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Construction Environmental Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
29 November 2021

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Glossary and Abbreviations

Abbreviation	Detail
CCFFMP	Construction Flora and Fauna Management Plan
CEMP	Construction Environmental Management Plan
CSWMP	Construction Soil and Water Management Plan
DOI	Department of Industry
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
DPIE - EES	Department of Planning, Industry and Environment – Environment, Energy and Science
EIS	An Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
POEO Act	*Protection of the Environment Operations Act 1997*
SRD SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD	State Significant Development
TRIPS	Tuross River Intake Pump Station
WQO	NSW Water Quality Objectives
WTP	Water treatment plant

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1 Introduction

1.1 Approved project

The Eurobodalla Southern Water Supply Storage (the Project) was granted Development Consent from the Department of Planning, Industry and Environment (DPIE) on 17 October 2019. The Development Consent is provided in **Appendix A**.

The Project consists of an off-stream water storage facility and associated ancillary facilities. Water would be extracted from the Tuross River, using a new river intake pump station, and transferred to the storage via the Storage Inlet Pipeline. As necessary, the storage volume would be supplemented by water extracted from an existing borefield adjacent the storage.

Water would be extracted from the Tuross River at volumes in accordance with the *Water Sharing Plan for the Tuross River Unregulated and Alluvial Water Sources 2016* (Tuross River WSP). The Tuross River WSP defines the total daily extraction limit (TDEL) of water from the Tuross River. The Tuross River WSP also provide limits for the maximum volume of water that can be extracted from the Tuross River under specific flow conditions.

Extracted water stored in the facility would be used to supplement the existing Eurobodalla Shire Council water supply network during periods of drought. The water storage facility would also supplement peak summer demand by providing a secure yield, while complying with the requirements of the Tuross River WSP.

Key features of the Project include:

- a 3,000 megalitre storage capacity
- a 370 metre long embankment, 39 metres in height and a crest width of 20 metres located on an unnamed tributary of the Tuross River
- a spillway
- permanent erosion control structures located downstream of the spillway
- inlet works to convey and dissipate raw water transferred from the river intake pump station through a pipeline constructed along the left abutment to the proposed water storage facility
- outlet works to allow transfer of water from the storage to the existing southern water treatment plant (WTP)
- instrumentation to monitor seepage, reservoir levels and water quality
- a consequence category of “High C” for both flood and sunny day scenarios in accordance with the Australian National Committee on Large Dams (ANCOLD) Guidelines on the consequence categories of dams (2012)
- a thermal stratification control system
- a boat ramp at the storage for maintenance and water quality monitoring
- safety and perimeter fencing at the storage.

Key features of the ancillary facilities include:

- new river intake pump station with a total river extraction capacity made up of a combination of flows from the river intake (up to 26 megalitres) and the borefield (up to six megalitres)
- installation of the following new pipelines including:
  - a pipeline with a capacity of 26 megalitres per day to transfer raw water from the new river intake pump station to the storage inlet chute
  - a cross connection to the proposed water storage inlet pipeline with a capacity of six megalitres per day providing connection to supply water from the storage to the balance tank at the existing WTP
  - a pipeline connection from the existing borefield pipeline to the river intake pump station.
- a new storage access road that is about one kilometre in length and extends from Eurobodalla Road opposite the existing WTP to the embankment crest
- basic right-turn and basic left-turn treatment at the intersection of the new storage access road and Eurobodalla Road would be provided
- a new access road that would provide a route for vehicles to access the new river intake pump station
- power supply including the construction of new sub-stations located near the storage and the river intake pump station.

1.2 Construction activities covered under this CEMP

This Construction Environmental Management Plan (CEMP) relates only to the early works construction activities for the Project specified below. Separate CEMPs and associated management sub-plans would be prepared and submitted for approval for subsequent construction stages of the Project.

The early works construction activities covered by this CEMP are shown in Figure 1-1 and include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

1.2.1 General description of early works construction activities covered under this CEMP

1.2.1.1 Storage Access Road

This CEMP covers only the construction of the Storage Access Road to the forestry property boundary. This will allow the initial section of the Storage Access Road to be constructed, prior to the storage site clearing activities as the latter are bound by timing conditions specified in the Environmental Impact Statement (EIS) and Development Consent. The extent of the Storage Access Road construction covered by this CEMP is shown in Figure 1-2.

The Storage Access Road is required to provide vehicular access to Storage Site. The design of the Storage Access Road and intersection with Eurobodalla Rd has been developed based on the requirements of the following design standards (in order of precedence):

- Eurobodalla Shire Council Infrastructure Design Standard
- RMS Supplement to Austroads
- Austroads Design Guidelines.

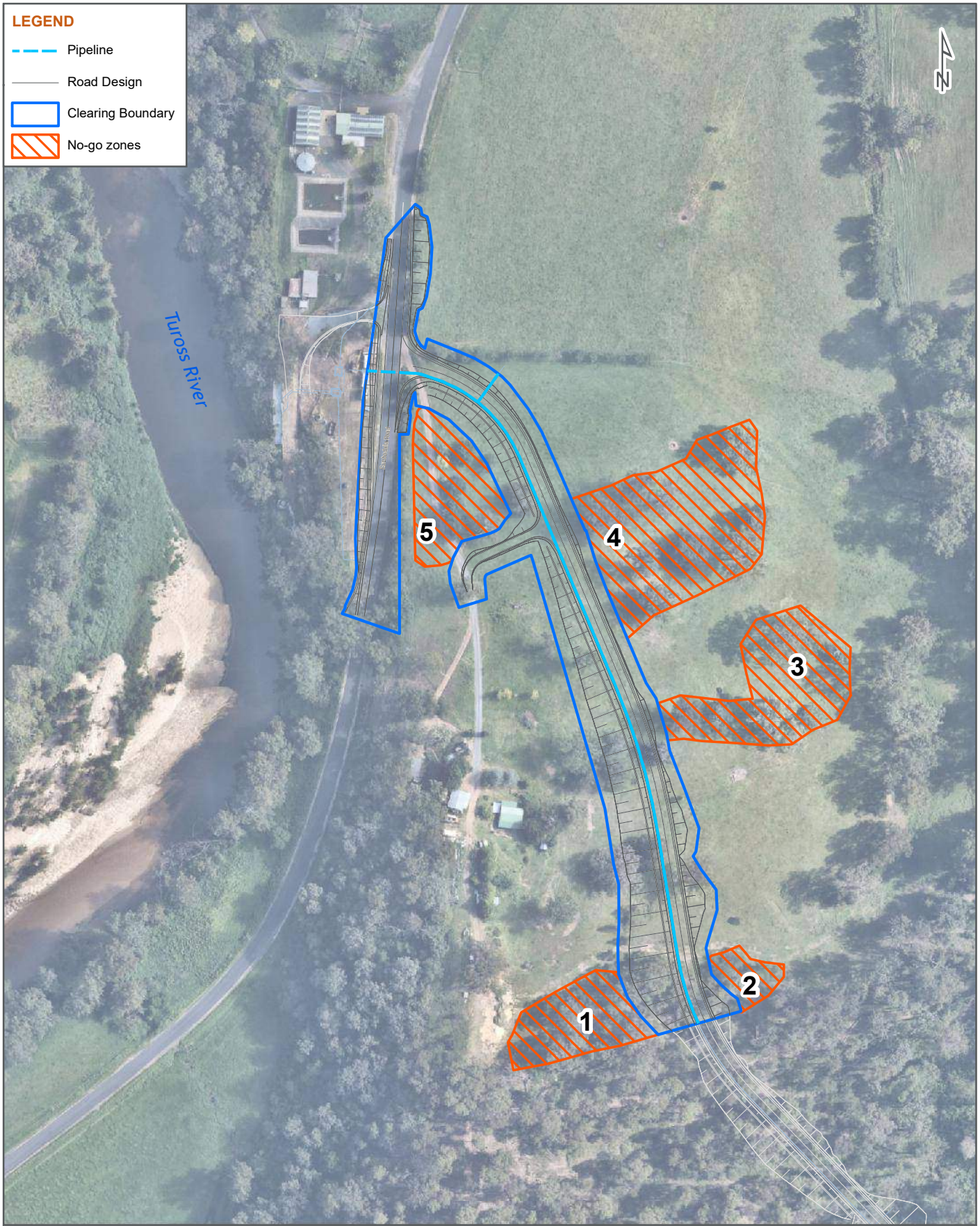
The Storage Access Road would have a design and posted speed of 40 km/h. Its maximum longitudinal grade would be 12.5%, with a maximum 3% crossfall. The width of the Storage Access Road would be 6.5 meters sealed, comprising two, 3.25 metre sealed lanes, plus a 0.75 metre unsealed shoulder. The pavement treatment proposed for the Storage Access Road and shoulder widenings consists of a thin wearing course over a granular base. A temporary pavement would be provided during construction to suit construction vehicle loading.

The construction works for the Storage Access Road have an impact on existing surface stormwater flow along the side of the existing, steep embankment. To alleviate this, new stormwater drainage infrastructure is to be installed under the Storage Access Road to follow the existing valleys along the embankment. Swales along the high side of the Storage Access Road would capture stormwater from the upper catchments created by the new works. The swales are typically trapezoidal, 0.6 metres deep and 4.2 metres wide with a base width of 0.5 metres. The drainage pipes under the Storage Access Road are typically 450 millimetre diameter Reinforced Concrete Pipe (RCP) with headwall outlets and either headwall or grated pit inlets.

1.2.1.2 Intersections upgrades

This CEMP covers the upgrades required for the Eurobodalla Road and Storage Access Road / TRIPS site intersection. This intersection upgrade is required to facilitate safe access and egress to both the TRIPS and Storage sites. The extents of these intersection upgrades are shown in Figure 1-3.

As per the recommendations of the Stony Creek 2 Off Stream Facility Transport Report (Masson Willson Twiney, 2007), a BAL/BAR intersection treatment would be provided at the intersection of the Storage Access Road/ TRIPS site with Eurobodalla Road and would be designed per the geometry requirements of Austroads Guide to Road Design Part 4 and 4A.



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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Overview of Early Works Stage covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2020, Nearmap Imagery

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 1-2

FIGURE TITLE Extent of Storage Access Road covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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COORDINATE SYSTEM
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FIG NO. 1-3

FIGURE TITLE Eurobodalla Road Intersection Upgrades

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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Last updated by: FA13847 on 30/10/2020 at 13:30

1.2.1.3 Storage inlet pipeline

This CEMP covers only the construction of the Storage Inlet Pipeline from the limits of the TRIPS construction contract, which is on the Tuross River side of Eurobodalla Road, to the forestry property boundary. This will allow the initial section of the Storage Inlet Pipeline to be constructed, prior clearing of the storage site as the latter is bound by specific timing conditions specified in the EIS and Development Consent. The extent of Storage Inlet Pipeline construction covered by this CEMP is shown in Figure 1-4.

The Storage Inlet Pipeline will transfer water from the TRIPS to the inlet chute for the storage. The design flow for the pipeline is 0.3 cubic metres per second (26 ML/d), which is the capacity of the TRIPS when all three pumps are in operation. The Storage Inlet Pipeline is proposed to be a two-way pipeline and is therefore designed to deliver flows from the storage outlet chamber to the existing water treatment plant balance tank, via the Storage Inlet Flow Meter Pit on the western verge of Eurobodalla Road. The Storage Inlet Pipeline is designed as an OD710 PE PN16 pipeline with an internal diameter of approximately 577.6 millimetres. The design velocity during maximum flow (0.3 cubic metres per second) is approximately 1.14 metres per second.

Where the Storage Inlet Pipeline crosses Eurobodalla Road, the pipeline would be constructed using trenchless construction techniques. Due to the proximity of services on the western verge of Eurobodalla Road, micro-tunnelling is proposed and as such the pipe diameter reduces to OD630 PE PN16 (ID512.6 millimetres) and will be constructed within a DN825 RC Class 4 enveloper pipe. Alternative trenchless methodologies (e.g., Horizontal Directional Drilling) would also be feasible in this location, depending on the Contractor's preference. The depth to the invert of the pipeline at the road crossing is approximately 2.8 metres to allow for the potential future lowering of Eurobodalla Road.

The alignment of the pipeline between Eurobodalla Road and the Storage Inlet Chute, is generally within the road shoulder of the Storage Access Road. The pipeline will typically be in cut with the exception of where the road alignment crosses natural gullies. At these locations, the pipeline alignment has been designed to provide adequate side support to the pipeline.

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-4

FIGURE TITLE Extent of Pipeline Construction covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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1.2.2 Construction program

Subject to approval of this CEMP, it is expected that the early works construction activities covered under this CEMP would commence in late 2021/early 2022 and would take approximately three months to complete.

Unless approval has been obtained from the Secretary, construction activities on site can only be undertaken between the following hours:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturdays
- at no time on Sundays and NSW public holidays.

1.2.3 Applicant

Eurobodalla Shire Council is the applicant for the Project.

1.3 Purpose

This CEMP covers the construction of initial sections of the Storage Access Road and Storage Inlet Pipeline for the Project as discussed in Section 1.2.1. This CEMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the early works construction activities outlined in Section 1.2.1, as part of the Project, and would comply with State Significant Development (SSD) 7089 Development Consent, the EIS, Addendum Submissions Report and any associated licences, permits and approvals required for the Project.

The CEMP specifically outlines how Eurobodalla Shire Council is to minimise environmental risks and achieve environmental outcomes for the Project by providing a structured approach to ensure appropriate mitigation measures and controls are implemented.

The CEMP has been prepared in accordance with the *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004) and:

- describes the early works construction activities to be undertaken and their timing
- identifies the planning approval requirements, legal obligations, permits, licences, standards and guidelines that construction works are to adhere to
- provides specific mitigation measures and controls to be implemented on-site to avoid or minimise adverse environmental impacts
- describes the environmental management related roles and responsibilities including competence, training and awareness, effective communication and consultation processes
- outlines a monitoring, auditing and reporting regime to ensure compliance with the requirements including incident investigation and action response.

The requirements of Development Consent SSD-7089, including agency consultation, their relevance and where they are covered in this CEMP are provided in Section 2.

This CEMP is applicable to all staff and sub-contractors associated with the early works construction activities covered under this CEMP.

1.4 CEMP Function

This CEMP has been prepared to satisfy conditions of Development Consent SSD 7089, specifically the Conditions outlined in Table 1-1.

Table 1-1 Development Conditions relevant to the CEMP

Condition	Requirements
C1	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include: (a) details of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions) (ii) any relevant limits or performance measures and criteria

Condition	Requirements
	(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures (b) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria (c) a program to monitor and report on the: (i) impacts and environmental performance of the development (ii) effectiveness of the management measures set out pursuant to paragraph (b) above (d) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible (e) a program to investigate and implement ways to improve the environmental performance of the development over time (f) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria) (ii) complaint (iii) failure to comply with statutory requirements, and (g) a protocol for periodic review of the plan.
C2	The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of Condition C1.
C3	As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following: • Construction Flora and Fauna Management Plan (Appendix B) • Construction Soil and Water Management Plan (Appendix C) • Emergency Response Procedures in the event of flooding and bushfire (Appendix D) • Construction Traffic Management Plan (Appendix E) • Construction Noise and Vibration Management Plan (Appendix F).
Appendix 2, item 1.2	[As required relevant to the scope of construction works], the CEMP would include [additional] sub plans identified in the EIS safeguards and management measures and include: • Construction Air Quality Management Plan (Appendix G) • Construction Erosion and Sediment Control Plan (Appendix C) • Bushfire Management Plan (Appendix D).

1.5 Structure and CEMP revision

Table 1-2 outlines the structure and scope of this CEMP, highlighting how it been prepared to be consistent with the conditions of Development Consent SSD 7089.

Table 1-2 Structure of the CEMP

Section	Content
2	Strategic framework – provides an overview of the legislation relevant to environmental compliance of the Project
3	Implementation – How the Principal will implement their environmental management and compliance obligations

Section	Content
4	Accountability, competence and communications – who is accountable for implementing the CEMP and sub-plans, what competence those implementing the CEMP and sub-plans are required to have, and what the lines of communications are
5	Complaints, incidents and emergencies – procedures for recording and responding to complaints, incidents and emergencies
6	Non-compliance – what constitutes non-compliance, how to respond to non-compliance, corrective actions and notifications
7	Auditing and reporting – outline of the compliance auditing and reporting requirements

Eurobodalla Shire Council would review and, as required, update this CEMP and associated plans within one month of:

- an incident being reporting to DPIE (refer to Section 9 below)
- any modification to the existing Development Consent.

Any changes to the management plans must be approved by the Secretary, and in consultation with relevant agencies, before being implemented.

2 Strategic framework

2.1 Environmental strategy

Eurobodalla Shire Council's aim is to design, construct, operate, upgrade and decommission the Project in full compliance with Development Consent SSD 7089. Condition A.2 of the Development Consent states:

The Applicant must carry out the development:

(a) in compliance with the conditions of this consent
(b) in accordance with all written directions of the Planning Secretary
(c) in accordance with the EIS and response to submissions
(d) in accordance with the Development Layout shown in the Development Consent, Appendix A
(e) in accordance with the revised management and mitigation measures in Appendix 2 of the Development Consent, Appendix A.

2.2 Legislative requirements

Table 2-1 sets out the environment and planning law requirements for the Project.

Table 2-1 Register of legal requirements

Legislation	Requirement	Authority
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The Eurobodalla Southern Water Supply Storage Project was not considered to be a controlled activity under the EPBC Act	Department of Agriculture, Water and the Environment
Environmental Planning and Assessment Act 1979	Changes to the approved scope of SSD-7089 would require modification to the project approval under the *Environmental Planning and Assessment Act 1979* (EP&A Act).	DPIE
Protection of the Environment Operations Act 1997	Any unauthorised pollution of waters is considered an offence under section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act). Section 148 of the POEO Act requires that the Environment Protection Authority (EPA), the Minister of Health, SafeWork NSW, Fire and Rescue NSW and Eurobodalla Shire Council be notified immediately if a pollution incident occurs that may cause or threaten material harm to the environment (being environmental harm that is not trivial or would cost more than $10,000 to rectify). Note that the EPA is required to be notified verbally, immediately in these circumstances, prior to written notification being provided to DPIE (as per Condition C9 of Development Consent SSD-7089). Sections 139 and 140 of the POEO Act set out offences relating to noise pollution.	EPA
Biodiversity Conservation Act 2016	Part 1, Divisions 1 and 2 set out requirements with respect to threatened flora and fauna species and communities within NSW, as well as protected species more generally (i.e., any native flora or fauna species regardless of its threatened status). The EIS included a Biodiversity Assessment Report, and a Biodiversity Offset Strategy has been developed and approved by DPIE.	Biodiversity Conservation Division, DPIE

Legislation	Requirement	Authority
National Parks and Wildlife Act 1974	Protection of Aboriginal Objects and Places. Duty to notify Heritage NSW in the event that an Aboriginal object is uncovered during the works.	Heritage NSW
Biosecurity Act 2015	Priority weeds are regulated under the *Biosecurity Act 2015* with a general biosecurity duty to prevent, eliminate or minimize any biosecurity risk they may pose. Some priority weeds have additional management obligations which may apply generally, or under specific circumstances. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised as far as is reasonably practicable.	Department of Primary Industries (DPI)
Rural Fires Act 1997	Sections 63(1) and 63(2) of the *Rural Fires Act 1997* require public authorities and owners/occupiers of land to take all practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of bushfires on or from, that land.	Rural Fire Service
Contaminated Land Management Act 2017	As per Section 6 of the *Contaminated Land Management Act 2017*, ensure only EPA-approved VENM and ENM are brought to site, keep records of the same and provide copies to DPIE if requested.	EPA
Fisheries Management Act 1994	Section 37 of the *Fisheries Management Act 1994* requires a permit be obtained from DPI – Fisheries where fish are to be relocated during in-stream works. The EIS and Statement of Commitments for SSD-7089 also refer to the need to obtain a Section 219 permit for blocking fish passage during construction works where fish passage would become blocked. However, Section 4.41 of the EP&A Act provides a blanket exemption for all SSD projects to obtain such a permit under Section 219 of the *Fisheries Management Act 1994*. This matter is to be resolved with DPI – Fisheries in the event that fish passage is to be blocked.	DPI - Fisheries
Water Sharing Plan for the Tuross River Unregulated and Alluvial Water Sources 2016.	Water extracted from the Tuross River for use as construction process water during the Access road and pipeline construction is to be in accordance with Water Access Licences held by Eurobodalla Shire Council under the Water Sharing Plan for the Tuross River Unregulated and Alluvial Water Sources 2016.	DPIE - Water

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the framework for environmental planning and assessment in NSW. Part 4 of the EP&A Act provides for development that requires consent under an Environmental Planning Instrument. Division 4.7 (previously Part 4, Division 4.1) of Part 4 deals with SSD which due to the size, economic value or potential impacts of the development, is deemed to have State significance. Section 4.36 provides for certain types of development or development on specified land to be declared SSD by means of a State Environmental Planning Policy or by a Ministerial Order. The full list of SSD development types and identified sites is provided in Schedules 1 and 2 of *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP).

Section 4.38 of the EP&A Act provides for the Minister for Planning to be the consent authority for SSD. However, Section 2.4 provides for the Minister to delegate the consent authority function to the Planning Assessment Commission, the Secretary of DPIE or to any other public authority.

An EIS was prepared on behalf of the Applicant, Eurobodalla Shire Council, under Part 4, Division 4.7 of the EP&A Act as SSD-7089. The EIS went on public exhibition in September 2018 and a Submissions Report was subsequently prepared

to outline the responses to submissions received. The Project was approved by DPIE as the determining authority, on 17 October 2019, and Development Consent SSD-7089 issued.

All personnel associated with construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline for the Project as discussed in Section 1.2.1, must comply with all environmental requirements for the Project, including Development Consent SSD-7089, legal and statutory requirements, permits, licences, standards and guidelines. The conditions of Development Consent SSD-7089 relating to the Project and their applicability to the Storage Access Road and Storage Inlet Pipeline construction are outlined in Table 2 2.

As the Project was determined to be SSD, it must also comply with the relevant guidelines for SSD under the EP&A Act. Section 4.41 of the EP&A Act specifies the approvals, permits, licences that do not apply to an approved SSD project, and those that must be applied consistently along with Development Consent SSD-7089.

Table 2-2 Conditions of Development Consent SSD-7089

Condition reference	Condition Requirement	Condition Delivery
B2	No more than 54.61 ha of native vegetation is to be cleared	The construction of the Storage Access Road and Storage Inlet Pipeline requires 0.12 ha of native vegetation to be cleared. This area is considered within the approved clearing limit of 54.61 ha of native vegetation.
B3	Prior to clearing of native vegetation, the Applicant must prepare a Construction Flora and Fauna Management Plan (CFFMP) in consultation with DPIE Fisheries and to the satisfaction of the Planning Secretary.	CFFMP included as Appendix B. Details and evidence of consultation with DPIE Fisheries is included as part of the CFFMP. Note that the only area to be cleared for works covered by this CEMP is that under the Storage Access Road and Storage Inlet Pipeline footprint, which is a maximum area of 0.12 ha of native vegetation.
B4	The CFFMP must form part of the CEMP required by Condition C2 and, in addition to the general management plan requirements listed in Condition C1, the CFFMP must include the following: (a) measures to ensure biodiversity values not intended to be impacted are delineated by mapping of 'no-go areas' and the installation of on-site measures such as temporary exclusion fencing prior to clearing; (b) measures to minimise the risk of introducing weed species via construction vehicles, plant and equipment and control of pest and weed species existing at the site; (c) method of vegetation removal and measures to minimise impacts outside the water storage facility construction boundary and within the perimeter road construction boundary as a result of the equipment used for clearing and general access for heavy vehicles and construction plant and equipment; (d) options to reuse cleared vegetation, in preference to burning, such as relocation of hollow logs for habitat and mulch for use in areas to be revegetated within the site and use elsewhere within the local area; (e) measures to minimise the impacts on fauna within the site including the installation of nest boxes prior to clearing, relocation of fauna to adjacent habitat (including any fish during dewatering of the cofferdam), staged clearing and timing of clearing outside breeding seasons; and	CFFMP included as Appendix B. The requirement for new storage access road batters is not relevant to this stage of works. A cofferdam is not required as part of the works covered under this CEMP. No river bed exposure would occur during the works covered by this CEMP. 'No-go zones' are indicated in Figure 1-1.

Condition reference	Condition Requirement	Condition Delivery
	(f) details on rehabilitation and revegetation including: (i) use of locally indigenous plant species including collection of seed prior to clearing for this purpose; (ii) for construction areas outside the full supply level including the construction compounds, on-site quarry areas and the new storage access road batters; (iii) for the construction area at the existing water treatment plant (WTP) including for the bed and banks of the Tuross River affected by the temporary cofferdam.	
B5	Prior to removing/clearing any vegetation or any demolition, pre-clearing surveys and inspections for threatened species must be undertaken. The surveys and inspections, and any subsequent relocation of species and associated management measures, must be undertaken under the guidance of a suitably qualified and experienced ecologist.	CFFMP included as Appendix B. The clearing required for the initial sections of the Storage Access Road and Storage Inlet Pipeline is through a previously (historical) cleared rural lot. No habitat trees or potential habitat for threatened species was identified on this site during surveys which were undertaken following the bushfires of 2019/2020.
B6	Applicant must: (a) not commence any clearing work until the CFFMP is approved by the Planning Secretary; and (b) implement the most recent version of the CFFMP approved by the Planning Secretary for the duration of works.	CFFMP included as Appendix B.
B13	Prior to commencement of any surface disturbance the Applicant must prepare a Construction Soil and Water Management Plan (CSWMP) as part of the CEMP required by Condition C2. The CSWMP must be prepared by a suitable qualified person(s) in consultation with the EPA and include: (a) guidelines and procedures to reuse dirty water collected in sediment basins with reuse prioritised over discharge to receiving waters; (b) an assessment of cumulative risks associated with sediment pond settling agents; (c) discharge criteria based on an assessment of potential impacts against the NSW Water Quality Objectives (WQO) for receiving waters;	CSWMP included as Appendix C. Details and evidence of consultation with the National Resources Access Regulator (NRAR, former DPIE Water), DPI Fisheries and NSW EPA are included as part of the CSWMP.

Condition reference	Condition Requirement	Condition Delivery
	(d) identification and implementation of mitigation measures to avoid pollution including, but not limited to, dosing procedures, discharge procedures, direct ecotoxicology testing; (e) a detailed Erosion and Sediment Control Plan prepared in consultation with DPIE Fisheries and Water (in addition to the EPA); and (f) evidence of consultation with the EPA and DPIE Fisheries and Water.	
B14	Erosion and sediment control measures must: (a) be in accordance with the relevant requirements of Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and mitigation measures outlined in the Policy and Guidelines for Fish Habitat Conservation and Management (DPI 2013); and (b) have sediment basins sized to a 90th or 95th percentile 5-day rainfall depth or as otherwise agreed with the EPA during the preparation of the Erosion and Sediment Control Plan referred to in Condition B13(e).	CSWMP included as Appendix C. Erosion and Sediment Control Plan (ESCP) included as Appendix A of the CSWMP.
B15	The development must comply with section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an Environmental Protection Licence (EPL).	Construction activities governed by this CEMP would comply with s.120 of the POEO Act. Construction activities governed by this CEMP do not require an EPL. The CSWMP includes an ESCP which would be implemented to avoid pollution of waters.
B16	The Applicant must store all chemicals, fuels and oils used on-site in accordance with: (a) the requirements of all relevant Australian Standards; and (b) the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual' if the chemicals are liquids.	Refer to Section 3.6.
B17	In the event of an inconsistency between the requirements Conditions B16(a) and B16(b), the most stringent requirement must prevail to the extent of the inconsistency.	Refer to Section 3.6.
B20	The CEMP required by Condition C2 and OEMP required by Condition C5 must include emergency response procedures in the event of flooding or bushfire.	Fire and Emergency Response Plan included as Appendix F.

Condition reference	Condition Requirement	Condition Delivery
B25	The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent	Section 3.5 of the CSWMP includes provisions to manage dust. Air Quality Management provided in Appendix E includes dust management procedure.
B26	During construction, the Applicant must ensure that: (a) unsealed roads used for truck access and exposed surfaces and stockpiles within the construction area are regularly watered to suppress dust; (b) all trucks entering or leaving the site with loads have their loads covered; (c) trucks associated with the development do not track dirt onto the public road network; (d) public roads used by these trucks are kept clean; and (e) measures are implemented to minimise dust from exposed surfaces following vegetation clearing and until transfer of storage water to the WTP.	Section 3.5 of the CSWMP includes provisions to manage dust. Air Quality Management provided in Appendix E includes dust management procedure.

2.2.2 Protection of the Environment Operations Act 1997

The POEO Act regulates certain activities related to air, water and noise pollution, and waste. Schedule 1 of the POEO Act identifies activities and thresholds related to activity types and volume(s) of emissions that require an EPL to be issued by the EPA. Water storages and related infrastructure are not included in Schedule 1.

The activities to be carried out for the Storage Access Road and Storage Inlet Pipeline construction do not meet the criteria specified in Schedule 1 of the POEO Act. Therefore, an EPL is not required to be issued by the EPA.

The POEO Act also identifies a number of pollution offences, including offences relating to:

- the wilful or negligent disposal of waste in a manner that harms or is likely to harm the environment
- the wilful or negligent causing of a substance to leak, spill or otherwise escape (whether or not from a container) in a manner that harms or is likely to harm the environment
- the wilful or negligent causing of any controlled substance to be emitted into the atmosphere in contravention of the regulations under the *Ozone Protection Act 1989* and in a manner that harms or is likely to harm the environment
- water pollution
- air pollution
- noise pollution
- land pollution and waste.

Part 5.7 of the POEO Act specifies a general duty to notify the relevant authority (defined in Subsection 148(8)) of a pollution incident where there is actual or potential material harm to the environment. The activities associated with the Storage Access Road and Storage Inlet Pipeline construction are to be managed to ensure pollution risks are minimised. Measures were included in the EIS to ensure risks to soils, waterways and air quality are avoided or minimised. The EPA is to be notified if a 'pollution incident' occurs that causes or threatens 'material harm' to the environment, along with Minister of Health, SafeWork NSW, Fire and Rescue NSW and Eurobodalla Shire Council.

Legal requirements for the management of waste are also established under the POEO Act and the *Protection of the Environment Operations (Waste) Regulation 2005*. Unlawful transportation and deposition of waste is an offence under Section 143 of the POEO Act.

Schedule of 8 of the *Protection of the Environment Operations (Clean Air) Regulation 2010,* identifies Eurobodalla Local Government Area as an area in which all burning (including vegetation and domestic waste) is prohibited except with approval.

2.2.3 Permits and licensing requirements

Environmental objectives and targets have been developed to evaluate environmental performance during the early works construction activities and guide the implementation of the development of any management measures required. These are outlined in Table 2-3.

Table 2-3 Project environmental objectives

Objective	Target	Measurement/Tool
Compliance with the Conditions of Development Consent SSD-7089	All relevant Conditions of Development Consent SSD-7089 implemented throughout the construction of Access road and pipeline in accordance with requirements and within designated time frames. No non-conformances identified during self-regulation through monitoring and auditing.	Site inspections Auditing Review
Compliance with all legal requirements	No breaches or environmental infringement notices.	Site inspections Auditing Review

3 Implementation

3.1 Construction Environmental Management Plan

The CEMP is the primary environmental management document governing environmental performance during the early works construction activities detailed in Section 1.2.1. The CEMP is supported by several aspect-specific sub management plans which provide additional environmental management requirements. The sub plans prepared as part of the CEMP include:

- CSWMP and ESCP, Appendix B
- CFFMP, Appendix C
- Construction Traffic Management Plan, Appendix D
- Construction Noise Management Plan, Appendix E
- Construction Air Quality Management Plan, Appendix F
- Fire and Emergency Response Plan, Appendix G.

In addition to the sub-plans, an Unexpected Finds Procedure is provided (Appendix G). This procedure must be complied with during the early works construction activities detailed in Section 1.2.1.

3.2 Waste management

A Waste Management Register will be maintained until the completion of the works and will include:

- the classification according to the EPA's Waste Classification Guidelines Part 1: Classifying Waste (EPA, 2014)
- volume of waste
- evidence of disposal to a facility that may lawfully accept the waste or reuse location.

3.3 Heritage

If any item or object of Aboriginal cultural heritage significance is identified on site during the Storage Access Road and Storage Inlet Pipeline construction works detailed in Section 1.2.1, the following must occur:

- all work within a 10 metre area surrounding the suspected Aboriginal item or object is to cease immediately
- a 10 metre buffer area around the suspected item or object is to be cordoned off and Heritage NSW is to be notified immediately
- work within a 10 metre area surrounding the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the *National Parks and Wildlife Act 1974*.

If any unexpected archaeological relics are uncovered during the Storage Access Road and Storage Inlet Pipeline construction works detailed in Section 1.2.1:

- all work within a 10 metre area surrounding the find is to cease immediately
- Heritage NSW is to be notified
- a suitably qualified and experienced archaeologist is to be engaged to record and assess the significance of the find and the results are to be reported to the Secretary of DPIE and the Heritage Division DPC
- where required by Heritage NSW, a Management Strategy is to be developed and implemented in consultation with the Heritage NSW
- work within a 10 metre area surrounding the find may only recommence on the advice of the archaeologist.

Potential archaeological deposits were identified on the Storage Site during surveys undertaken to inform the EIS. The Storage Access Road and Storage Inlet Pipeline alignment was selected to avoid these deposits.

3.4 Site management

General site management procedures to be implemented during the Storage Access Road and Storage Inlet Pipeline construction works detailed in Section 1.2.1 include:

- the work site is to be maintained in an orderly manner to reduce the potential visual impact

- any damage to local roads that occurs due to the construction activities outlined in Section 1.2.1 of this CEMP is to be repaired by the party responsible for the damage as soon as practical
- mud tracking off the site and onto the local roads is to be monitored, and local roads are to be cleared of mud should this occur
- all plant and equipment are to be maintained to minimise the risk of pollution to the environment.

3.5 Contamination, spill prevention and response

The following controls must be implemented to minimise the risk of site contamination during the Storage Access Road and Storage Inlet Pipeline construction works detailed in Section 1.2.1:

- vehicles and machinery are to be maintained to minimise the risk of fuel/oil leaks. Routine inspections for evidence of fuel/oil leaks are to be carried out on all vehicles and machinery
- all fuels, chemicals and hazardous liquids are to be stored within an impervious bunded area in accordance with Australian standards and the EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual
- refuelling would only occur in an appropriately contained area
- a spill kit is to be located at the site compound. If a spill occurs, it is to be managed according to the following:
  - check for any hazards to the responder or other personnel
  - control the source of the spill, following the Safety Data Sheet instructions for Personal Protective Equipment and handling
  - contain the spread of the spill, if safe to do so
  - clean up the spill
  - document the spill in the Incident Management Procedure
  - some spills may require external reporting (refer to Section 6).

4 Accountability, competence and communications

4.1 Responsibilities and accountabilities

Table 4-1 below outlines the roles and responsibilities of personnel responsible for carrying out the requirements outlined in this CEMP.

Table 4-1 Storage Access Road and Storage Inlet Pipeline construction roles and responsibilities

Role	Responsibility
Project Manager	• include environment considerations in all aspects of project planning • allocate project resources to handle environmental issues • ensure suppliers and contractors comply with environmental requirements • investigate and ensure that environmental incidents are reported and recorded • review the performance of environmental management • ensure environmental inspections are conducted.
Project Engineer	• assist and guide the respective workers to meet their environmental responsibilities • check the implementation of the environmental requirements as per this CEMP • report to the Project Manager on environmental issues • monitor the rectification of incidents • provide technical advice to personnel and management in the review of environmental management method • carry out environmental inductions, environmental toolbox talks and discuss environmental matters during the daily pre-start meetings where required • implement appropriate action to address any environmental incidents • development, implementation, monitoring and updating of the CEMP and sub-plans • ensure environmental risks of the Project are identified and appropriate mitigation measures implemented • manage environmental document control, reporting, inductions and training • oversee site monitoring, inspections and audits • manage all subcontractors and consultants with regards to environmental matters, including assessing their environmental capabilities and overseeing the submission of their environmental documents • respond to stakeholder enquires/complaints within required timeframes • ensure suppliers and contractors comply with environmental requirements.
Site supervisor	• communicating with all personnel and sub-contractors regarding compliance with the CEMP and site specific environmental issues • notification of environmental incidents • coordinating the implementation of the CEMP • undertaking site inspections • co-ordinating the implementation and maintenance of pollution control measures • identifying resources required for implementation of the CEMP • coordinating action in emergency situations and allocating required resources in accordance with the Incident Response Plan • notify the Project Manager of any environmental harm or potential environmental harm, or if authorised by the Project Manager notify the Client • ensuring that instructions are issued, and adequate information is provided to site resources which relate to environmental risks on site.
Contractors	• contribute to effective environmental management at the site for the life of the project, by implementing this CEMP within their area of responsibility

Role	Responsibility
	• comply with the relevant Act(s), Regulations, Specifications and Standards • promptly report to management any environmental non-conformances, incidents and/or breaches • participate in environmental awareness training as directed.

4.2 Competence, training and awareness

Onsite environment training would be coordinated and recorded by the Project Engineer/ Site Supervisor. Records must include details of topics discussed, attendees, and duration of discussion. These will be stored in the training register, along with a signed attendance sheet.

4.2.1 Environmental induction and awareness

All contractors involved in the construction activities governed by this CEMP are required to attend a health, safety, quality and environment induction prior to commencing work. The induction is to cover core issues including (but not limited to):

- purpose and objectives of the CEMP
- requirements of due diligence and duty of care
- conditions of environmental permits and approvals
- potential environmental emergencies and emergency response procedures
- reporting and notification requirements for pollution and other environmental incidents
- high-risk activities and associated environmental safeguards, e.g., working near waterways
- working in or near environmentally sensitive areas
- traffic management, including clear instructions to all contractors with regards to speed limits, approved access tracks, approved working hours and delivery times
- unexpected finds procedure (Appendix D)
- all relevant noise and vibration management measures including:
  - avoiding use of radio during work outside normal hours
  - avoiding shouting and slamming doors
  - operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods, where practical
  - Minimising reversing
  - Avoid metal to metal contact.

4.2.2 Toolbox talks, training and awareness

Daily pre-start toolbox meetings are to be undertaken by the Project Engineer/Site Supervisor or delegate. All contractors for the early works governed by this CEMP that undertake work at site are required to attend. Toolbox meetings are to include provision of information about health and safety, environmental aspects, impacts and risks relevant to the proposed work activities and location. Attendance, meeting content and issues raised are to be recorded.

Specific environmental toolbox meetings may be developed and implemented as required at the discretion of the Project Engineer/Site Supervisor. Relevant environmental issues for discussion may include (but are not limited to):

- waste management
- erosion and sediment control
- noise and vibration control
- environmental monitoring
- emergency response procedures
- environmental reporting
- traffic and transport
- flora and fauna management

- relevant licences and approval conditions
- permissible hours of work
- location of nearest sensitive receivers
- construction employee parking areas
- designated loading/unloading areas and procedures
- site opening/closing times.

A register of lesson learnt is to be maintained by the Project Engineer/Site Supervisor for the construction works governed by this CEMP. These are to be included in inductions and daily pre-start meetings as necessary and appropriate.

4.3 Emergency contacts, general communications and consultation

4.3.1 Emergency contacts

Emergency contact details relevant to the Storage Access Road and Storage Inlet Pipeline construction works detailed in Section 1.2.1 are provided in Table 4-2.

Table 4-2 Emergency contact details relevant to the Access road and pipeline construction works

Organisation / Project Position	Responsible representative	Contact details
EPA pollution hotline	-	131 555
DPI - Fisheries	Carla Ganassin	Carla.ganassin@dpi.nsw.gov.au
Fire and Rescue NSW	-	000 (for incidents that present an immediate threat to human health or property) or 1300 729 579 (for incidents that do not present an immediate threat to human health or property)
Southern NSW Local Health District	-	1300 066 055
SafeWork NSW	-	131 050
Eurobodalla Shire Council	Harvey Lane - Engineer	harvey.lane@esc.nsw.gov.au 02 4474 1342
Public Works Representative	Ross Bailey Public Works Advisory	02 4474 7556 0412 320 064

4.3.2 Internal communications

Regular internal communications are to be carried out between the project team, including sub-contractors. Internal lines of communication are to include:

- meetings
- phone calls
- written correspondence, including:
  - management reports
  - site inspection reports
  - audit reports

  - incident reports
- employee induction, toolbox talks, daily pre-start meetings
- notice boards, alerts and notifications.

4.3.3 External communications

Eurobodalla Shire Council will be responsible for consultation with government authorities (as required), key stakeholders and the community. Government agencies, including the NSW EPA, Department of Industry (DoI) - Water, DoI – Fisheries and DPIE have been consulted during preparation of the EIS and this CEMP and sub plans.

At the commencement of construction activities as outlined in this CEMP, until the completion of all works, the following information and documents would be made publicly available:

- SSD 7089 conditions of Development consent
- Eurobodalla Southern Water Supply Storage Project EIS
- Eurobodalla Southern Water Supply Storage Project EIS response to submissions
- site construction layout
- management and mitigation measures
- all statutory approvals relevant to the construction works detailed in Section 1.2.1
- all strategies, plans and programs required under the conditions of the Development Consent
- reporting on environmental performance in accordance with the reporting requirements in any plans or programs approved under the conditions of the Development Consent
- compliance report.

4.3.4 Community and stakeholder communication

Community and stakeholder engagement for Storage Access Road and Storage Inlet Pipeline works would include:

- notice to local residents of proposed construction activities provided at least 5 days prior to commencement of activities
- as required, local residents are to be informed of any changes construction activities that may impact upon them
- in the event that works may produce noise at levels that may impact sensitive receivers, the affected receivers would be consulted regarding proposed noise mitigation measures
- where dust and air quality complaints are received, the cause would be identified, and appropriate measures implemented as soon as possible to reduce emissions. Details of the complaint and rectification actions would be recorded.

There were no businesses identified in proximity to the early works outlined in Section 1.2.1. As such, there is not expected to be impact to local business. Due to the limited anticipated impact of the activities covered by this CEMP as detailed in Section 1.2.1, a project hotline would not be established.

5 Complaints, incidents and emergencies

A Fire and Emergency Response Plan is provided in Appendix G.

5.1 Incident notification and reporting

Eurobodalla Shire Council is the person undertaking the activity, and the occupier of the premises and is therefore responsible for incident notification. Eurobodalla Shire Council would therefore be required to immediately notify the EPA in the event of a 'material harm' Incident occurring.

Under section 147 of the POEO Act, a 'material harm' incident is defined as:

1. for the purposes of this Part—
   (a) harm to the environment is material if
      (i) it involves actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial, or
      (ii) it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000 (or such other amount as is prescribed by the regulations), and
   (b) loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment.
2. for the purposes of this Part, it does not matter that harm to the environment is caused only in the premises where the pollution incident occurs.

Where a potential material harm incident occurs, the EPA should be notified immediately by calling 131 555. Following notification to the EPA, Eurobodalla Shire Council should immediately notify the Minister of Health, SafeWork NSW and Fire and Rescue NSW. Once these verbal notifications occur, DPIE should be provided with written notification (via email to: compliance@planning.nsw.gov.au). The latter requirement to undertake incident reporting and notification to DPIE complies with Condition C9 Development Consent SSD-7089 and is the responsibility of Eurobodalla Shire Council. This written notification is required to be emailed to DPIE immediately (but following the above verbal notifications) in the event of a potential material harm incident occurring.

Eurobodalla Shire Council should clarify who is responsible for providing these notifications, and what steps should be taken where a material harm incident occurs out of hours.

5.2 Complaints management

5.2.1 Means of making a complaint

Prior to the commencement of the construction activities outlined in Section 1.2.1, Eurobodalla Shire Council would ensure that the following contact details are available for the community to make a complaint:

- a phone number available to call 24 hours a day
- a postal address to which written complaints may be sent
- an email address to which electronic complaints may be transmitted.

These details should be provided on the on the project website. They are also specified in Table 4-2.

5.2.2 How any complaint will be handled

Any complaint received will be immediately logged by the Project Manager or delegate in a Complaints Register. As soon as is practicable Eurobodalla Shire Council will investigate the cause of the complaint and identify any actions required to avoid a recurrence. Regardless of the circumstance, an initial response to the complaint would be completed with 24 hours of its receipt.

If requested when the complaint is received, Eurobodalla Shire Council will also contact the complainant to discuss the issue, the cause and advise them of the actions taken to avoid a recurrence.

The complaint investigation and complainant contact would be documented using a Complaint Record maintained by Eurobodalla Shire Council and the Complaints Register would be updated.

5.2.3 Recording complaints

Every complaint would be recorded in a Complaints Register (cross referenced against an individual Complaint Record). The requirements of the Complaints Register and Complaints Record are discussed below.

5.2.3.1 Complaints Register

The Complaints Register will record:

- a complaint reference number
- the date and time the complaint was received
- whether the complainant wanted to be contacted
- nature of the complaint.

The Complaints Register would be a publicly available document, therefore details of the complainant would not be included in the Complaints Register.

5.2.3.2 Complaint record

Every complaint received would be recorded using a Complaint Record that details:

- the date and time of the complaint
- the means by which the complaint was made (e.g., telephone, mail or email)
- any personal details of the complainant that were provided, or if no details were provided a note to that affect
- the nature of the complaint
- any actions taken in relation to the complaint, including timeframes for implementing the action
- if no action is undertaken in relation to the complaint, the reasons why no action was taken
- if the complainant wanted to be contacted, whether the action taken was considered acceptable to the complainant.

A copy of every Complaints Record would be held on-site and, on request, be provided to:

- the DPIE
- the Environment Protection Authority (EPA)
- the complainant.

Each Complaint Record would contain personal information of the complainant; therefore the Complaint Record would not be made publicly available on the project website.

5.3 Emergency response and management

In addition to the requirements specified in the Fire and Emergency Response Plan (Appendix G), the DPIE must be notified in writing to compliance@planning.nsw.gov.au immediately after an incident occurs. The notification will include the following information:

- development application number SSD7089
- name of the development – Eurobodalla Southern Water Supply Storage Project
- details of the incident including date, time, location, a brief description of what occurred and why it is classified as an incident
- how the incident was detected
- when the incident became known
- identify any actual or potential non-compliance with conditions of consent
- describe what immediate steps were taken in relation to the incident
- identify further action(s) that would be taken in relation to the incident
- identify a project contact for further communication regarding the incident.

6 Non-compliance

6.1 Commitment

Eurobodalla Shire Council agree that a failure to comply with any relevant condition of Development Consent (SSD 7089), conditions within the EIS or statutory approval would constitute a non-compliance.

6.2 Response

In the event of a non-compliance, Eurobodalla Shire Council would undertake the steps outlined in Table 6-1, consistent with the guidance advice for ISO 14001 –Environmental management systems.

Table 6-1 Non-compliance response

Step	Action
React	React to the non-compliance and, as applicable: 1. act to control and correct the non-compliance 2. deal with the consequences, including mitigating adverse environmental impacts associated with the non-compliance.
Evaluate	Evaluate the need for action to eliminate the cause of the non-compliance in order that it does not reoccur or occur elsewhere by: 1. reviewing the non-compliances 2. determining the cause of the non-compliances 3. determining if similar non-compliances exist or could potentially occur.
Act	Implement any action required to rectify the non-compliance.
Review	Review the effectiveness of any corrective action taken.
Change	Make changes to the environmental management plans, if necessary

6.3 Corrective action

Any non-compliance would trigger a Corrective Action appropriate to the significance of the effect of the non-compliance. Eurobodalla Shire Council would retain documented information as evidence of the nature of the non-compliance and any subsequent actions taken, and the results of the Corrective Action.

6.4 Notification

Following a non-conformance incident, the DPIE must be notified in writing to compliance@planning.nsw.gov.au within seven days of the non-compliance becoming known.

In reporting the non-compliance, the notification must identify the following:

- development application number SSD7089
- name of the development – Eurobodalla Southern Water Supply Storage Project
- the condition of consent that has been breached
- outline how the condition has not been met and the reasons for the non-compliance (if known)
- what actions have been, or will be, undertaken to address the non-compliance

A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

7 Auditing and reporting

7.1 Environmental monitoring and reporting

Any required aspect specific environmental monitoring will be detailed within the relevant sub-plans.

7.2 Management reviews

The Applicant, Eurobodalla Shire Council is responsible for all relevant reporting requirements specified in Development Consent SSD-7089.

Reviews of the CEMP and associated environmental management sub-plans are to be undertaken by Eurobodalla Shire Council, where required, as part of a continual improvement process. As the program of construction works covered by this CEMP, as detailed in Section 1.2.1, is only three months. Reviews are unlikely to be necessary. Should a review be necessary, the review is to consider:

- additional processes or management that would improve the environmental performance of the Access road and pipeline activities
- compliance with a direction, strategy, plans and/or program required under the Conditions of Development Consent SSD-7089, to the satisfaction of DPIE.

Where revisions are required, the revised document must be submitted to the Secretary of DPIE for approval within six weeks of the review.

Revised strategies, plans and programs required as a part of the conditions of approval for SSD-7089, must also be submitted to the Secretary of DPIE within three months of:

- there is an environmental incident with circumstances that have caused or threatened to cause material harm to the environment, and an incident report was been prepared
- in the event that the procedure for investigating and responding to a complaint, including the implementation of measures for avoiding a recurrence, cannot be resolved to the satisfaction of a third party, and a dispute has arisen
- the approval of any modification to Development Consent SSD-7089
- the issue of a direction of the Secretary of DPIE which outlines the requirement for a review.

The continuous improvement process is to be designed to:

- identify areas of opportunity for improvement of environmental management and performance
- determine the cause or causes of non-conformances and deficiencies
- develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- verify the effectiveness of the corrective and preventative actions
- document any changes in procedures resulting from process improvement
- make comparisons with objectives and targets.

Appendix A Development Consent

Development Consent

Section 4.38 of the Environmental Planning and Assessment Act 1979

As delegate of the Minister for Planning under delegation executed on 11 October 2017, I approve the Development Application referred to in Schedule 1, subject to the conditions specified in Schedule 2.

These conditions are required to:

- prevent, minimise, or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the development

Erica van den Honert
Acting Executive Director
Infrastructure

Sydney 17 October 2019

SCHEDULE 1

Application Number:	SSD 7089
Applicant:	Eurobodalla Shire Council
Consent Authority:	Minister for Planning
Site:	Parts of Lot 3 DP 438839 and Lot 2 DP 1168581 and an unnamed lot bounded by Bullockys Hut Road and Big Rock Road, Bodalla
Development:	Construction and operation of an off-stream water storage facility of approximately 3000 ML capacity and associated infrastructure including: - Tuross River raw water intake and pumping station - pipelines including connection to existing Tuross River borefield and Southern Water Treatment Plant - substations, access road and fencing Construction activities including: - clearing approximately 55 ha of native vegetation - extraction and processing of approximately 487,000 m^3 of material within the storage inundation area for use on-site, primarily for storage embankment construction - importation of approximately 163,000 m^3 of rock, gravel, sand and clay for construction works - concrete batching - temporary coffer dam on the Tuross River for river intake construction

TABLE OF CONTENTS

DEFINITIONS

AHD	Australian Height Datum
Applicant	Eurobodalla Shire Council, or any person carrying out any development to which this consent applies
BCA	Building Code of Australia
BC Act	*Biodiversity Conservation Act 2016*
CEMP	Construction Environmental Management Plan
Conditions of this consent	Conditions contained in Schedule 2 of this document
Construction	The demolition and removal of buildings or works, the carrying out of works for the purpose of the development, including bulk earthworks, and erection of buildings and other infrastructure permitted by this consent.
Construction Boundary	The boundaries shown in Figure 1 of **Appendix 1** which comprise a water storage facility construction boundary and perimeter road construction boundary
Council	Eurobodalla Shire Council
Demolition	The deconstruction and removal of buildings, sheds and other structures on the site
Department	NSW Department of Planning, Industry and Environment (DPIE)
Development	The development described in the EIS and response to submissions (Submissions Report and Addendum Submissions Report)
Development layout	The plans at **Appendix 1** of this consent
DPC	Department of Premier and Cabinet
Earthworks	Bulk earthworks, site levelling, import and compaction of fill material, excavation for installation of drainage and services, to prepare the site for construction
EIS	The Environmental Impact Statement titled *Eurobodalla Southern Water Supply Storage Environmental Impact Statement*, prepared by SMEC dated 27/8/2018, submitted with the application for consent for the development, including any additional information provided by the Applicant in support of the application.
EESG	DPIE Environment, Energy and Science Group
ENM	Excavated Natural Material
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in their social groupings
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence under the POEO Act
FSL	Full Supply Level of the water storage
Heritage	Encompasses both Aboriginal and historic heritage including sites that predate European settlement, and a shared history since European settlement.
Heritage item	An item as defined under the *Heritage Act 1977*, and assessed as being of local, State and/or National heritage significance, and/or an Aboriginal Object or Aboriginal Place as defined under the *National Parks and Wildlife Act 1974*, the World Heritage List, or the National Heritage List or Commonwealth Heritage List under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), or anything identified as a heritage item under the conditions of this consent.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance Note: "material harm" is defined in this consent
Land	Has the same meaning as the definition of the term in section 1.4 of the EP&A Act

Material harm	Is harm that: a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial or b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)
MOL	Minimum Operating Level
Minister	NSW Minister for Planning and Public Spaces (or delegate)
Mitigation	Activities associated with reducing the impacts of the development prior to or during those impacts occurring
Monitoring	Any monitoring required under this consent must be undertaken in accordance with section 9.40 of the EP&A Act
NRAR	NSW Natural Resources Access Regulator
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
Non-compliance	An occurrence, set of circumstances or development that is a breach of this consent
OEH	former NSW Office of Environment and Heritage (now DPIE EESG)
OEMP	Operational Environmental Management Plan
Operation	The operation of the water storage and associated infrastructure upon completion of construction excluding pre-commissioning activities
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
POEO Act	*Protection of the Environment Operations Act 1997*
Reasonable	Means applying judgement in arriving at a decision, taking into account: mitigation benefits, costs of mitigation versus benefits provided, community views, and the nature and extent of potential improvements.
Registered Aboriginal Parties	Means the Aboriginal persons identified in accordance with the document entitled "*Aboriginal cultural heritage consultation requirements for proponents 2010*" (DECCW).
Rehabilitation	The restoration of land disturbed by the development to a good condition, to ensure it is safe, stable and non-polluting
Response to submissions	The Applicant's response to issues raised in submissions received in relation to the application for consent for the development under the EP&A Act: *Eurobodalla Southern Storage Submissions Report*, prepared by SMEC dated 1/04/2019 and Eurobodalla Southern Storage Addendum Submissions Report, prepared by SMEC dated 24/05/2019.
RMS	NSW Roads and Maritime Services
Sensitive receivers	A location where people are likely to work, occupy or reside, including a dwelling, school, hospital, office or public recreational area
Site	The land defined in the EIS and Response to Submissions
TfNSW	Transport for New South Wales
VENM	Virgin Excavated Natural Material
Waste	Has the same meaning as the definition of the term in the Dictionary to the POEO Act
WTP	Water Treatment Plant

SCHEDULE 2

PART A ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

A1. In addition to meeting the specific performance measures and criteria in this consent, all reasonable and feasible measures must be implemented to prevent, and if prevention is not reasonable and feasible, minimise, any material harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.

TERMS OF CONSENT

A2. The development may only be carried out:

(a) in compliance with the conditions of this consent;

(b) in accordance with all written directions of the Planning Secretary;

(c) in accordance with the EIS and response to submissions;

(d) in accordance with the Development Layout in **Appendix 1**; and

(e) in accordance with the revised management and mitigation measures in **Appendix 2.**

A3. Consistent with the requirements in this consent, the Planning Secretary may make written directions to the Applicant in relation to:

(a) the content of any strategy, study, system, plan, program, review, audit, notification, report or correspondence submitted under or otherwise made in relation to this consent, including those that are required to be, and have been, approved by the Planning Secretary; and

(b) the implementation of any actions or measures contained in any such document referred to in **Condition A3(a)**.

A4. The conditions of this consent and directions of the Planning Secretary prevail to the extent of any inconsistency, ambiguity or conflict between them and a document listed in **Condition A2(c)** and the revised management and mitigation measures in **Appendix 2**. In the event of an inconsistency, ambiguity or conflict between any of the documents listed in **Condition A2(c)** and the revised management and mitigation measures, the most recent document prevails to the extent of the inconsistency, ambiguity or conflict.

Note: For the purposes of this condition, there will be an inconsistency between documents if it is not possible to comply with both documents, or in the case of a condition of consent or direction of the Planning Secretary, and a document, if it is not possible to comply with both the condition or direction, and the document.

LIMITS OF CONSENT

A5. This consent lapses five years after the date from which it operates, unless the development has physically commenced on the land to which the consent applies before that date.

A6. Clearing of vegetation is not permitted outside the construction boundaries shown in **Appendix 1.**

A7. The volume of water extracted from the Tuross River and Tuross River borefield must be in accordance with surface and groundwater access licences.

A8. Water extraction from the Tuross River intake must only occur at flow levels specified in the water access licence or when river flows are at or above 20ML/day at the reference point, whichever is highest.

A9. The full supply water level must not exceed 47.7m AHD.

NOTIFICATION OF COMMENCEMENT

A10. The date of commencement of each of the following phases of the development must be notified to the Department in writing, at least one month before that date:

(a) construction;

(b) operation; and

(c) cessation of operations.

A11. If the construction or operation of the development is to be staged, the Department must be notified in writing at least one month before the commencement of each stage, of the date of commencement and the development to be carried out in that stage.

EVIDENCE OF CONSULTATION

A12. Where conditions of this consent require consultation with an identified party, the Applicant must:

(a) consult with the relevant party prior to submitting the subject document to the Planning Secretary for approval; and

(b) provide details of the consultation undertaken including:

(i) the outcome of that consultation, matters resolved and unresolved; and

(ii) details of any disagreement remaining between the party consulted and the Applicant and how the Applicant has addressed the matters not resolved.

STAGING, COMBINING AND UPDATING STRATEGIES, PLANS OR PROGRAMS

A13. With the approval of the Planning Secretary, the Applicant may:

(a) prepare and submit any strategy, plan or program required by this consent on a staged basis (if a clear description is provided as to the specific stage and scope of the development to which the strategy, plan or program applies, the relationship of the stage to any future stages and the trigger for updating the strategy, plan or program);

(b) combine any strategy, plan or program required by this consent (if a clear relationship is demonstrated between the strategies, plans or programs that are proposed to be combined); and

(c) update any strategy, plan or program required by this consent (to ensure the strategies, plans and programs required under this consent are updated on a regular basis and incorporate additional measures or amendments to improve the environmental performance of the development).

A14. If the Planning Secretary agrees, a strategy, plan or program may be staged or updated without consultation being undertaken with all parties required to be consulted in the relevant condition in this consent.

A15. If approved by the Planning Secretary, updated strategies, plans or programs supersede the previous versions of them and must be implemented in accordance with the condition that requires the strategy, plan or program.

PROTECTION OF PUBLIC INFRASTRUCTURE

A16. Before the commencement of construction, the Applicant must consult with the relevant owner and provider of services that are likely to be affected by the development to make suitable arrangements for access to, diversion, protection and support of the affected infrastructure;

A17. Unless the Applicant and the applicable authority agree otherwise, the Applicant must:

(a) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by carrying out the development; and

(b) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

DEMOLITION

A18. All demolition must be carried out in accordance with *Australian Standard AS 2601-2001 The Demolition of Structures* (Standards Australia, 2001).

STRUCTURAL ADEQUACY

A19. All new buildings and structures, and any alterations or additions to existing buildings and structures, that are part of the development, must be constructed in accordance with the relevant requirements of the BCA.

A20. The development must comply with Dam Safety Committee guidance.

COMPLIANCE

A21. The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.

OPERATION OF PLANT AND EQUIPMENT

A22. All plant and equipment used on site, or to monitor the performance of the development must be:

(a) maintained in a proper and efficient condition; and

(b) operated in a proper and efficient manner.

APPLICABILITY OF GUIDELINES

A23. References in the conditions of this consent to any guideline, protocol, Australian Standard or policy are to such guidelines, protocols, Standards or policies in the form they are in as at the date of this consent.

A24. However, consistent with the conditions of this consent and without altering any limits or criteria in this consent, the Planning Secretary may, when issuing directions under this consent in respect of ongoing monitoring and management obligations, require compliance with an updated or revised version of such a guideline, protocol, Standard or policy, or a replacement of them.

ADVISORY NOTES

AN1. All licences, permits, approvals and consents as required by law must be obtained and maintained as required for the development. No condition of this consent removes any obligation to obtain, renew or comply with such licences, permits, approvals and consents.

PART B SPECIFIC ENVIRONMENTAL CONDITIONS

BIODIVERSITY

Water Intake

B1. The water intake must be designed to reduce the potential uptake of fish by ensuring the flow velocity 8 cm from the intake screen is no greater than 0.1 m/sec, using intake screens with apertures no larger than 3 mm and/or other measures as agreed in consultation with DPIE Fisheries.

Construction Flora and Fauna Management

B2. No more than 54.61 ha of native vegetation is to be cleared.

B3. Prior to clearing of native vegetation, the Applicant must prepare a **Construction Flora and Fauna Management Plan** (CFFMP) in consultation with DPIE Fisheries and to the satisfaction of the Planning Secretary.

B4. The CFFMP must form part of the CEMP required by **Condition C2** and, in addition to the general management plan requirements listed in **Condition C1**, the CFFMP must include the following:

(a) measures to ensure biodiversity values not intended to be impacted are delineated by mapping of 'no-go areas' and the installation of on-site measures such as temporary exclusion fencing prior to clearing;

(b) measures to minimise the risk of introducing weed species via construction vehicles, plant and equipment and control of pest and weed species existing at the site;

(c) method of vegetation removal and measures to minimise impacts outside the water storage facility construction boundary and within the perimeter road construction boundary as a result of the equipment used for clearing and general access for heavy vehicles and construction plant and equipment;

(d) options to reuse cleared vegetation, in preference to burning, such as relocation of hollow logs for habitat and mulch for use in areas to be revegetated within the site and use elsewhere within the local area;

(e) measures to minimise the impacts on fauna within the site including the installation of nest boxes prior to clearing, relocation of fauna to adjacent habitat (including any fish during dewatering of the cofferdam), staged clearing and timing of clearing outside breeding seasons; and

(f) details on rehabilitation and revegetation including:

(i) use of locally indigenous plant species including collection of seed prior to clearing for this purpose;

(ii) for construction areas outside the full supply level including the construction compounds, on-site quarry areas and the new storage access road batters;

(iii) for the construction area at the existing water treatment plant (WTP) including for the bed and banks of the Tuross River affected by the temporary cofferdam.

B5. Prior to removing/clearing any vegetation or any demolition, pre-clearing surveys and inspections for threatened species must be undertaken. The surveys and inspections, and any subsequent relocation of species and associated management measures, must be undertaken under the guidance of a suitably qualified and experienced ecologist.

B6. The Applicant must:

(a) not commence any clearing work until the CFFMP is approved by the Planning Secretary; and

(b) implement the most recent version of the CFFMP approved by the Planning Secretary for the duration of works.

Biodiversity Offsets

B7. Before any clearing or construction works, the Applicant must submit a **Biodiversity Offset Strategy** to the Planning Secretary for approval.

B8. Within 24 months of approval of the Biodiversity Offset Strategy, or another timeframe agreed to by the Planning Secretary, the Applicant must prepare and implement a **Biodiversity Offset Package** which outlines how the retirement of credits will be achieved in accordance with the NSW Biodiversity Offsets Policy for Major Projects, i.e. by:

(a) acquiring or retiring credits under the BioBanking scheme established under the-then *Threatened Species Conservation Act 1995*;

(b) making payments into an offset fund that has been established by the NSW Government; or

(c) providing suitable supplementary measures.

B9. Before commencement of operation of the water storage, the Applicant must retire the biodiversity credits of a number and class specified in **Tables 1 and 2**.

B10. The retirement of credits must be determined in accordance with the OEH's *Framework for Biodiversity Assessment* (FBA) and the *BioBanking Assessment Methodology 2014* (BBAM).

Note: *If the Applicant seeks a variation to the offset rules, the Applicant must demonstrate that reasonable steps have been taken to find like-for-like offsets in accordance with Section 10.5.4.2 of the FBA and Appendix A of the OEH's NSW Biodiversity Offsets Policy for Major Projects 2014*

Table 1 *Ecosystem credit requirements*

Plant community type	Area to be impacted ha	Credits required
Spotted Gum - White Stringybark - Burrawang shrubby open forest on hinterland foothills, northern South East Corner Bioregion (SR643)	37.56	1,967
Grey Myrtle - Lilly Pilly dry rainforest in dry gullies of the Sydney Basin Bioregion and South East Corner Bioregion (SR551)	9.57	571
River Peppermint - Rough-barked Apple - River Oak herb/grass forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion (SR608)	0.22	14
Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner (SR533)	0.07	4
River Peppermint - Rough-barked Apple moist open forest on sheltered sites, southern South East Corner Bioregion (SR609)	7.19	383

Table 2 *Species credit requirements*

Species	Area to be impacted ha	Credits required
Correa baeuerlenii	0.07	16
Genoplesium vernale	37.56	2,926
Persicaria elatior	0.07	13
Galium australe	0.22	15
Myotis macropus	0.22	5
Heleioporus australiacus	54.39	707
Cercartetus nanus	54.39	1,088
Phascolarctos cinereus	0.22	6
Isoodon obesulus obsesulus	0.07	2

Operational Flora and Fauna Management

B11. The OEMP required under **Condition C5**, must include details on:

(a) management and maintenance of revegetated areas until vegetation is established;

(b) fauna habitat maintenance and nestbox maintenance and monitoring; and

(c) control of pest and weed species.

SOILS, WATER QUALITY AND HYDROLOGY

Imported Soil

B12. The Applicant must:

(a) ensure that only VENM, ENM, or other material approved in writing by EPA is brought onto the site;

(b) keep accurate records of the volume and type of fill to be used; and

(c) make these records available to the Department upon request.

Construction Soil and Water Management Plan

B13. Prior to commencement of any surface disturbance the Applicant must prepare a Construction Soil and Water Management Plan as part of the CEMP required by **Condition C2**. The Construction Soil and Water Management Plan must be prepared by a suitable qualified person(s) in consultation with the EPA and include:

(a) guidelines and procedures to reuse dirty water collected in sediment basins with reuse prioritised over discharge to receiving waters;

(b) an assessment of cumulative risks associated with sediment pond settling agents;

(c) discharge criteria based on an assessment of potential impacts against the NSW Water Quality Objectives (WQO) for receiving waters;

(d) identification and implementation of mitigation measures to avoid pollution including, but not limited to, dosing procedures, discharge procedures, direct ecotoxicology testing;

(e) a detailed **Erosion and Sediment Control Plan** prepared in consultation with DPIE Fisheries and Water (in addition to the EPA); and

(f) evidence of consultation with the EPA and DPIE Fisheries and Water.

B14. Erosion and sediment control measures must:

(a) be in accordance with the relevant requirements of *Managing Urban Stormwater: Soils and Construction* Volume 1 (Landcom, 2004) and mitigation measures outlined in the *Policy and guidelines for fish habitat conservation and management* (DPI 2013); and

(b) have sediment basins sized to a 90th or 95th percentile 5-day rainfall depth or as otherwise agreed with the EPA during the preparation of the Erosion and Sediment Control Plan referred to in **Condition B13(e)**.

Pollution

B15. The development must comply with section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an EPL.

B16. The Applicant must store all chemicals, fuels and oils used on-site in accordance with:

(a) the requirements of all relevant Australian Standards; and

(b) the NSW EPA's *Storing and Handling of Liquids: Environmental Protection – Participants Manual'* if the chemicals are liquids.

B17. In the event of an inconsistency between the requirements **Conditions B16(a)** and **B16(b)**, the most stringent requirement must prevail to the extent of the inconsistency.

Stormwater Management

B18. The Applicant must:

(a) design and manage stormwater runoff from access roads so that it does not result in erosion and pollution of receiving waters;

(b) maintain erosion control measures downstream of the spillway, storage outlet works and at the river intake; and

(c) use natural materials, such as rock rip rap, for erosion and river bank protection.

B19. Stormwater design must be in accordance with *Australian Rainfall and Runoff* (Engineers Australia, 2016) and *Managing Urban Stormwater: Council Handbook* (EPA, 1997).

Flooding and Bushfire

B20. The CEMP required by **Condition C2** and OEMP required by **Condition C5** must include emergency response procedures in the event of flooding or bushfire.

Water Storage Emergency

B21. Prior to the commencement of operation, the Applicant must prepare a **Water Storage Emergency Plan** complying with the *State Emergency and Rescue Management Act 1989*.

Water Management

B22. Prior to the commencement of operation, the Applicant must prepare a **Water Management Plan** for the Planning Secretary's approval. The Water Management Plan must form part of the OEMP required by **Condition C4**. The Water Management Plan must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) be prepared in consultation with DPIE Water and Fisheries;

(c) detail the water access licence requirements for the development;

(d) include details of existing baseline river water quality and groundwater quality and levels;

(e) set out water and groundwater quality and river flow objectives;

(f) detail criteria and triggers for:

(i) transfer of water from the river intake to the water storage;

(ii) transfer of groundwater from the borefield to the water storage;

(iii) transfer of groundwater from the borefield directly to the WTP;

(iv) transfer of water from the storage to the WTP including draw-off level;

(v) discharge of water from the storage outlet works to the unnamed stream;

(vi) operation of the water storage thermal mixing system;

(vii) operation of the water storage spillway;

(g) contain a program (including sampling locations, parameters, frequency and duration) to monitor:

(i) changes to channel morphology in the vicinity of the river raw water intake;

(ii) water quality and river flows at the raw water intake;

(iii) water storage surface levels;

(iv) water quality within the storage water column;

(v) the effectiveness of the thermal mixing system;

(vi) water quality of storage water transferred to the WTP;

(vii) seepage through the water storage embankment;

(viii) groundwater levels at the borefield near the WTP;

(ix) groundwater levels and groundwater quality along the unnamed stream channel downstream of water storage embankment, including baseline monitoring;

(h) identify mitigation and management measures to address impacts such as:

(i) exceedance of water quality criteria; and

(ii) drawdown at existing bores.

B23. The Applicant must:

(a) not commence operation until the Water Management Plan required by **Condition B22** is approved by the Planning Secretary; and

(b) implement the most recent version of the Water Management Plan approved by the Planning Secretary for the duration of the development.

B24. Within one month after the water storage has been operational for 12 months and annually thereafter during operation, or another time period as agreed by the Planning Secretary, the applicant must submit a **Site Water Balance Report** to the Planning Secretary and NRAR. The Site Water Balance Report must identify all water sources entering and leaving the water storage where practical and as agreed with NRAR.

AIR QUALITY

Dust Minimisation

B25. The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent.

B26. During construction, the Applicant must ensure that:

(a) unsealed roads used for truck access and exposed surfaces and stockpiles within the construction area are regularly watered to suppress dust;

(b) all trucks entering or leaving the site with loads have their loads covered;

(c) trucks associated with the development do not track dirt onto the public road network;

(d) public roads used by these trucks are kept clean; and

(e) measures are implemented to minimise dust from exposed surfaces following vegetation clearing and until transfer of storage water to the WTP.

Air Quality Discharges

B27. The Applicant must install and operate equipment in line with best practice to ensure that the development complies with all load limits, air quality criteria/air emission limits and air quality monitoring requirements as specified in the EPL applicable to the site.

TRAFFIC AND ACCESS

Construction Traffic Management Plan

B28. Prior to the commencement of construction, the Applicant must prepare a Construction Traffic Management Plan for the development. The plan must form part of the CEMP required by **Condition C2** and must:

(a) be prepared by a suitably qualified and experienced person(s);

(b) include a Road Safety Audit for the Eurobodalla Road/Nerrigundah Mountain Road intersection in accordance with the relevant Austroads guidelines;

(c) detail the measures that are to be implemented to ensure road safety during construction;

(d) detail heavy vehicle routes, access and parking arrangements; and

(e) include procedures for notifying residents of the duration and times when heavy vehicles are accessing the site via particular routes and in particular Waincourt Road.

B29. The Applicant must:

(a) not commence construction until the Construction Traffic Management Plan is prepared in accordance with **Condition B28**; and

(b) implement the most recent version of the Construction Traffic Management Plan for the duration of construction.

Public Access

B30. The Applicant must ensure that public access is managed to prevent erosion or damage to native vegetation by restricting access through site fencing to pedestrians.

NOISE

Hours of Work

B31. The Applicant must comply with the hours detailed in **Table 3**, unless otherwise agreed in writing by the Planning Secretary.

Table 3 *Hours of Work*

Activity	Day	Time
Earthworks and construction (other than blasting)	Monday – Friday Saturday not permitted on public holidays	7 am to 6 pm 8 am to 1 pm
Blasting	Monday – Friday not permitted on public holidays	9 am to 3 pm
Operation	Monday – Sunday	24 hours

B32. Works outside of the hours identified in **Condition B31** may be undertaken in the following circumstances:

(a) works that are inaudible at the nearest sensitive receivers; or

(b) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or

(c) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or

(d) where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works.

Construction Noise Limits

B33. The development must be constructed to achieve the construction noise management levels detailed in *the Interim Construction Noise Guideline* (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in **Appendix 2**.

Construction Noise and Vibration

B34. The Applicant must prepare a **Construction Noise and Vibration Management Plan** for the development. The Plan must form part of a CEMP in accordance with **Condition C2** and must:

(a) be prepared by a suitably qualified and experienced noise expert;

(b) describe procedures for achieving the noise management levels in EPA's *Interim Construction Noise Guideline* (DECC, 2009) (as may be updated or replaced from time to time);

(c) describe the measures to be implemented to manage high noise generating works such as blasting, in close proximity to sensitive receivers; and

(d) include strategies that have been developed with the affected sensitive receivers for managing high noise generating works.

B35. The Applicant must:

(a) not commence construction of any relevant stage until the Construction Noise and Vibration Management Plan is prepared in accordance with **Condition B34**; and

(b) implement the most recent version of the Construction Noise and Vibration Management Plan for the duration of construction.

Blasting Limits

B36. The overpressure level from blasting operations must not:

(a) exceed 115dB (Lin Peak) for more than 5% of the total number of blasts over a period of 12 months; and

(b) exceed 120dB (Lin Peak) at any time.

B37. The airblast overpressure values stated above apply when the measurements are performed with equipment having a lower cut-off frequency of 2Hz or less. If the instrumentation has a higher cut-off frequency then a correction of 5dB should be added to the measured value. Equipment with a lower cut-off frequency exceeding 10Hz should not be used for the purpose of measuring airblast overpressure.

B38. Ground vibration peak particle velocity from the blasting operations at the premises must not:

(a) exceed 5 mm/s for more than 5% of the total number of blasts over a period of 12 months; and

(b) exceed 10 mm/s at any time

when measured at any point within one metre of any affected residential boundary or other noise sensitive location.

B39. The hours for blasting operations specified in **Condition B31** may be varied if the EPA, having regard to the effect that the proposed variation would have on the amenity of the residents in the locality, gives written consent to the variation.

HERITAGE

Unexpected Finds

B40. If any item or object of Aboriginal heritage significance is identified on site:

(a) all work in the immediate vicinity of the suspected Aboriginal item or object must cease immediately;

(b) a 10 m wide buffer area around the suspected item or object must be cordoned off; and

(c) the EESG must be contacted immediately.

B41. Work in the immediate vicinity of the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the *National Parks and Wildlife Act 1974*.

B42. If any unexpected archaeological relics are uncovered:

(a) all work in the immediate vicinity of the find must cease immediately;

(b) the Heritage Division DPC must be notified;

(c) a suitably qualified and experienced archaeologist must record and assess the significance of the find with the results reported to the Planning Secretary and the Heritage Division DPC; and

(d) where required by Heritage Division DPC, a Management Strategy is to be developed and implemented in consultation with the Heritage Division DPC.

B43. Work in the immediate vicinity of the find may only recommence on the advice of the archaeologist.

WASTE MANAGEMENT

B44. The CEMP required under **Condition C2** must detail the quantities of each waste type generated during construction and the proposed reuse, recycling and disposal locations.

STATUTORY REQUIREMENTS

B45. The Applicant must assess and classify all liquid and non-liquid wastes to be taken off site in accordance with the latest version of EPA's *Waste Classification Guidelines Part 1: Classifying Waste* (EPA, 2014) and dispose of all wastes to a facility that may lawfully accept the waste.

B46. The Applicant must retain all sampling and waste classification data for the life of the development in accordance with the requirements of the EPA.

PART C ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Management Plan Requirements

C1. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

(a) details of:

(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);

(ii) any relevant limits or performance measures and criteria; and

(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;

(b) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;

(c) a program to monitor and report on the:

(i) impacts and environmental performance of the development;

(ii) effectiveness of the management measures set out pursuant to **paragraph (b)** above;

(d) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;

(e) a program to investigate and implement ways to improve the environmental performance of the development over time;

(f) a protocol for managing and reporting any:

(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);

(ii) complaint;

(iii) failure to comply with statutory requirements; and

(g) a protocol for periodic review of the plan.

Note: *the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans*

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

C2. The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of **Condition C1**.

C3. As part of the CEMP required under **Condition C2** of this consent, the Applicant must include the following:

(a) Construction Flora and Fauna Management Plan (see **Condition B3**)

(b) Construction Soil and Water Management Plan (see **Condition B13**);

(c) emergency response procedures in the event of flooding or bushfire (as required under **Condition B20**);

(d) Construction Traffic Management Plan (see **Condition B28**); and

(e) Construction Noise and Vibration Management Plan (see **Condition B34**).

OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

C4. The Applicant must prepare an Operational Environmental Management Plan (OEMP) in accordance with the requirements of **Condition C1**.

C5. As part of the OEMP required under **Condition C4** of this consent, the Applicant must include the following:

(a) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the development;

(b) describe the procedures that would be implemented to:

(i) keep the local community and relevant agencies informed about the operation and environmental performance of the development;

(ii) receive, handle, respond to, and record complaints;

(iii) resolve any disputes that may arise;

(iv) respond to any non-compliance;

(v) respond to emergencies; and

(c) include the following environmental management plans:

(i) flora and fauna management (as required under **Condition B11**)

(ii) emergency response procedures in the event of flooding or bushfire (as required under **Condition B20**);

(iii) Water Management Plan (see **Condition B22**).

C6. The Applicant must:

(a) not commence operation until the OEMP is prepared; and

(b) operate the development in accordance with the OEMP (as revised from time to time).

REVISION OF STRATEGIES, PLANS AND PROGRAMS

C7. Within three months of:

(a) the submission of an incident report under **Condition C9**;

(b) the approval of any modification of the conditions of this Consent; or

(c) the issue of a direction of the Planning Secretary under **Condition A2(b)** which requires a review,

the strategies, plans and programs required under this consent must be reviewed and submitted to the Planning Secretary.

C8. If necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review.

Note: *This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.*

REPORTING AND AUDITING

Incident Notification, Reporting and Response

C9. The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one), and set out the location and nature of the incident. Subsequent notification requirements must be given and reports submitted in accordance with the requirements set out in **Appendix 3**.

Non-Compliance Notification

C10. The Department must be notified in writing to compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of any non-compliance.

C11. A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

C12. A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.

Compliance Reporting

C13. Construction Compliance Reports and a Pre-Operational Compliance Report of the project must be carried out in accordance with the Compliance Reporting Post Approval Requirements (Department 2018) or any revision as in force from time to time.

C14. The Applicant must make each Compliance Report publicly available no later than 60 days after submitting it to the Department and notify the Department in writing at least 7 days before this is done.

ACCESS TO INFORMATION

C15. At least 48 hours before the commencement of construction until the completion of all works under this consent, including rehabilitation, the Applicant must:

(a) make the following information and documents (as they are obtained or approved) publicly available on its website:

(i) the documents referred to in **Condition A2** of this consent and the final layout plans for the development;

(ii) all current statutory approvals for the development;

(iii) all strategies, plans and programs required under the conditions of this consent;

(iv) regular reporting on the environmental performance of the development in accordance with the reporting requirements in any plans or programs approved under the conditions of this consent;

(v) a comprehensive summary of the monitoring results of the development, reported in accordance with the specifications in any conditions of this consent, or any approved plans and programs;

(vi) contact details to enquire about the development or to make a complaint;

(vii) the Compliance Reporting of the development;

(viii) any other matter required by the Planning Secretary; and

(b) keep such information up to date, to the satisfaction of the Planning Secretary.

APPENDIX 1 DEVELOPMENT LAYOUT PLANS

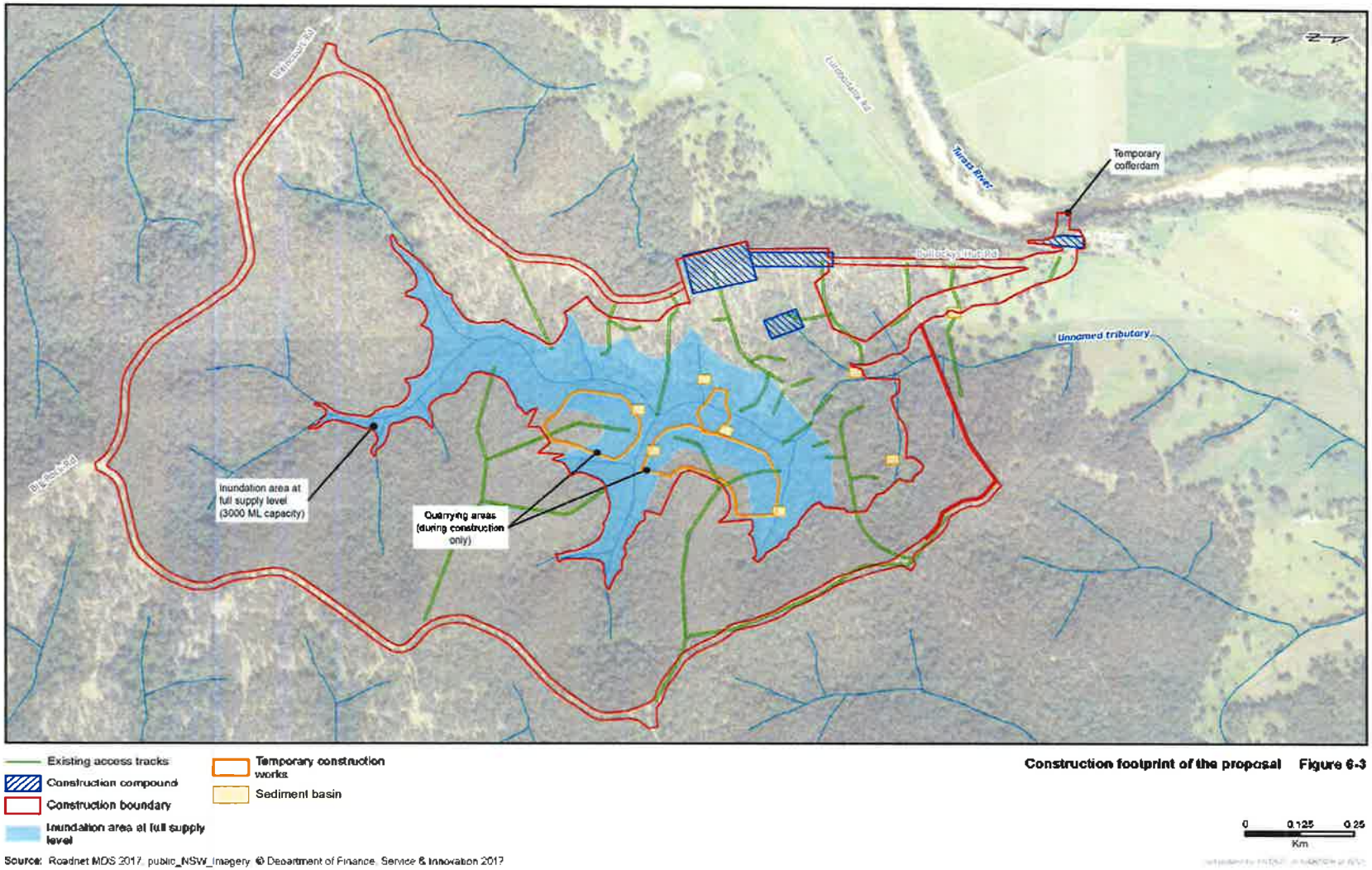

Figure 1: Water Storage Facility and Perimeter Road Construction Boundaries

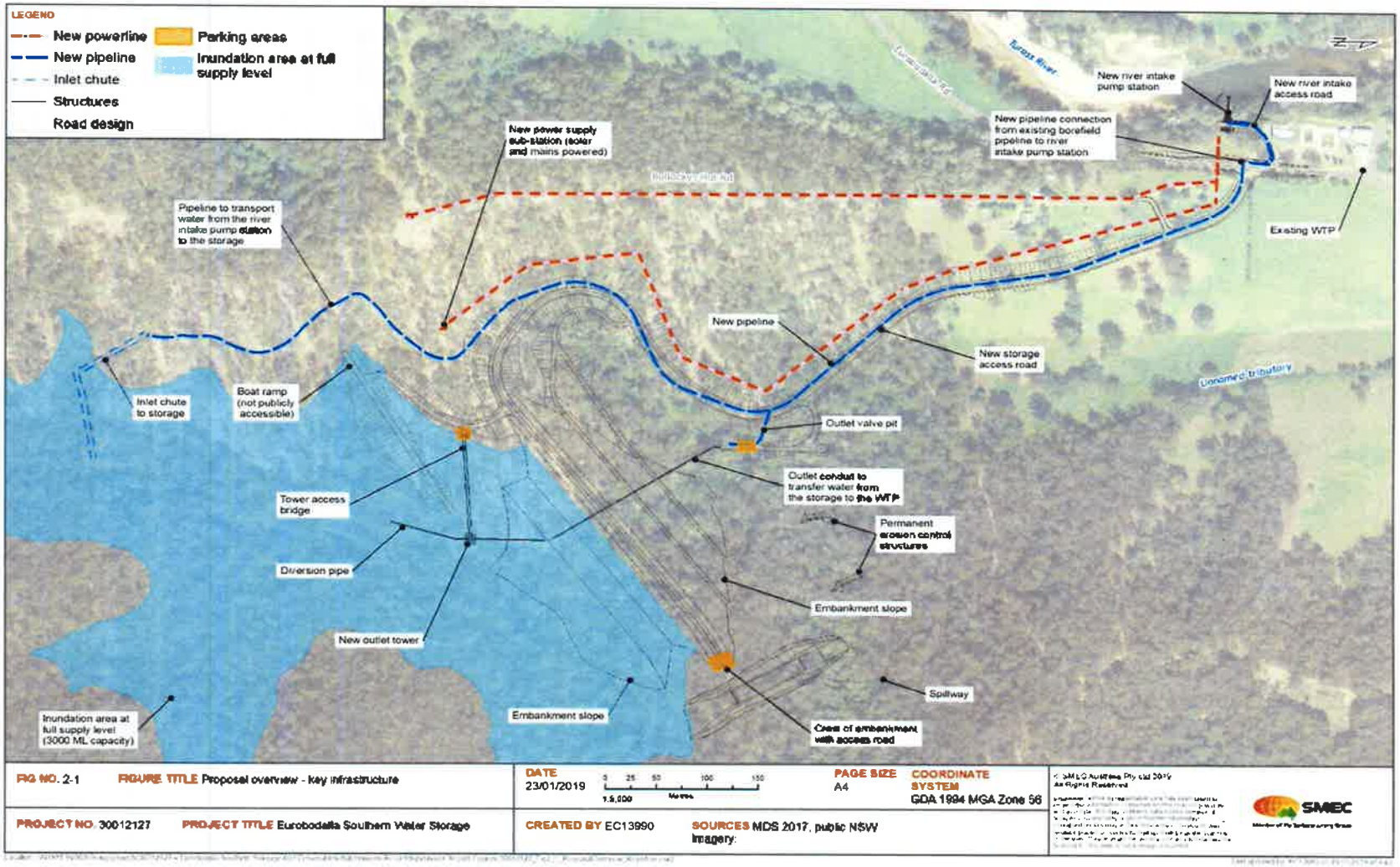

Figure 2: Proposal Overview

APPENDIX 2 APPLICANT'S REVISED MANAGEMENT AND MITIGATION MEASURES

No.	Issue	Environmental safeguards
1. Environmental management		
1.1	CEMP	A CEMP would be prepared to detail the approach to environmental management during construction, as described in Section 20.1.1 and in accordance with the conditions of approval.
1.2	CEMP	The CEMP would include a number of sub plans identified in the safeguards and management measures and include: • Traffic management plan • Flora and fauna management plan • Aboriginal heritage management plan • Noise and vibration management sub plan • Construction erosion and sediment control plan • Air quality management plan • Bush fire management plan • Landscape management plan.
1.3	CEMP Review	DPI Fisheries requests the opportunity to review and provide comment on the: Construction Environmental Management Plan; Erosion and Sediment Control Plan; and Flora and Fauna Management Plan. DPI Fisheries to be provided with advance notice of the submission of the CEMP for review, as a one week turnaround is required for the Principal Contractor to meet the delivery timeframe.
1.4	OEMP	An OEMP would be prepared to describe operational safeguards and management measures identified. The plan would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation. The plan would be prepared prior to operation and must be reviewed and certified by Council prior to the commencement of any operational work. The OEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The OEMP would include: • a description of activities to be undertaken during operation • an environmental risk analysis to identify the key environmental performance issues associated with the operation phase • statutory and other obligations that the proponent is required to fulfil during operation, including approvals, consultations and agreements required from authorities and other stakeholders under key legislation and policies • overall environmental policies, guidelines and principles to be applied to operation • roles and responsibilities for relevant employees involved in operation, including relevant environmental training and induction requirements incident and contingency management procedures • details of how environmental performance would be managed and monitored to meet acceptable outcomes, including what actions would be taken to address identified potential adverse environmental impacts.
2. Water resources and geomorphology		
2.1	Flooding	A Hydrology and Consequence Assessment would be carried out to inform the detailed design. Consideration of mitigation measures would be carried out in consultation with the relevant local authorities (e.g. NSW State Emergency Service) to ensure that flood related outcomes are consistent with floodplain risk management. This would be detailed in the Dam Safety Emergency Plan.

No.	Issue	Environmental safeguards
2.2	Flooding	Construction planning would consider flood risk for all compounds and work sites. The site layout and staging of construction activities would avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required.
2.3	Hydrology	Measures to further avoid and minimise the construction footprint will be investigated during detailed design and implemented where practicable and feasible.
2.4	Hydrology	Additional assessment of scour potential would be undertaken as necessary during the detailed design. This would include the development of appropriate mitigation measures.
2.5	Hydrology	Works within or near watercourses would be undertaken with consideration given to the DPI Water's guidelines for controlled activities.
2.6	Water quality	Water quality control systems would be incorporated into the detailed design to ensure that relevant WQOs can be met during water discharge.
2.7	Water quality	The current WQMSP will be revised (as necessary) and implemented during construction and operation of the proposal. The plan will specify: • sampling locations relevant to assessing potential impacts and / or the effectiveness of control measures • the frequency of monitoring and sampling and the triggers for event-based monitoring / sampling • the monitoring and sampling methodology in accordance with relevant guidelines, and the parameters to be monitored and sampled • general and reactive management and mitigation processes • procedures addressing relevant matters specified in relevant legislation and guidelines.
2.8	Water quality	Erosion and sediment mitigation measures would be installed and maintained for the duration of the construction period.
2.9	Water quality	Discharges would be monitored to ensure compliance with WQOs and discharge criteria in the environment protection licence.
2.10	Water quality	During construction a coffer dam will be in place to cater for medium level events and a sediment and erosion control plan in place to minimise risks of sediment-laden water escaping from the site.
2.11	Water quality	Several temporary sediment basins (suited to Type D dispersive soils) are proposed to be located in the main storage construction footprint. The location of the basins is down-gradient of ground disturbance areas. These would be operated as 'wet basins' which are designed to retain sediment laden water for extended periods allowing adequate time for the gravitational settlement of fine sediment particles. These basins would rely on chemical dosing to assist flocculation; the basins would not be drained until suitable water quality is obtained. Discharge from the sediment basins to the environment would only occur during: • Uncontrolled discharges following significant wet weather events leading to basin overflow via spillway (incidental frequency) • Controlled discharges following treatment of sediment basin water (periodic frequency).
2.12	Water quality	The coffer dam would be constructed early in the program, upslope of the main embankment and is designed to capture and divert stormwater runoff (up to approximately 32 megalitre capacity, suited for flood capacity design criteria of 1 in 10 Annual Exceedance Probability) for the duration of construction. The

No.	Issue	Environmental safeguards
		coffer dam is designed to facilitate up-gradient 'clean water' diversion through the site.
2.13	Water quality	Discharge of water temporarily stored in sediment basins and/or the coffer dam to the Tuross River would, where practicable, be avoided or minimised through practical reuse such as for on-site dust suppression, irrigation, or discharged to vegetated swales, which would act as a natural filter.
2.14	Water quality	Sediment basins would discharge soon after rainfall events, avoiding discharges during periods of low flows. Treatment of sediment basins would commence soon after rainfall events using chemical dosing (coagulants and/or flocculants) using either an automatic or manual chemical dosing system. Prior to treatment, jar testing would be used to determine the chemical dosing requirements of the sediment basins.
2.15	Water quality	The water quality of 'clean water' would be maintained through implementation of appropriate erosion and sediment controls and staged vegetation clearing in upslope areas. The coffer dam outlet will connect to the diversion pipe constructed through the base of the embankment, diverting 'clean' flow through the site to the outlet works.
2.16	Water quality	Discharges would not occur during the construction of in-stream features within the Tuross River (i.e. intake pump structures). Temporary in stream structures (i.e. temporary coffer dam) would be constructed in accordance with the NSW DPI policy and guidelines and dewatering activities designed to avoid re-enter the waterway.
2.17	Water quality	Water quality impacts from uncontrolled discharges (i.e. significant wet weather) would be reduced by ensuring adequate size, location and operation & maintenance requirements of the temporary sediment basins. This includes: • Sizing of the basins would account for a minimum of 5-day rainfall depth, 80th percentile rain events in accordance with published guidelines for extended construction period (> 6 months) • A series of Progressive Erosion and Sediment Control Plans (PESCP) would be prepared which detail construction sediment basin location and sizing with respect to each individual construction stage • Nomination of an environmental representative on site to complete audits and monitor PESCPs. Independent audits would be carried out by a soil conservationist or accredited erosion and sediment control professional • Operation and maintenance of sediment basins would refer to available guidance within the industry practice (e.g. Blue Book, 2004 and IECA, 2018).
2.18	Water quality	The storage would have continuous de-stratification equipment in place to ensure that water is consistently mixed to avoid issues of de-oxygenated water.
2.19	Water quality	Discharge by either the spillway or outlet works (if it occurs) would have erosion protection (i.e. stabilised outlets consisting of rock rip rap) to reduce water velocities and minimise the risk of additional erosion downstream of the storage.
2.20	Water quality monitoring	Water quality impacts from controlled discharges would also be reduced by adequate selection, dosing and management of chemical coagulants and flocculants. This includes: • Consideration would be given to the selection of suitable chemical coagulants and/or flocculants by the contractor's environmental representative. Reference would be made to Safety Data Sheets for

No.	Issue	Environmental safeguards
		chemical specific ecotoxicity information. The use of biodegradable products and/or non-hazardous would be considered first preference. • Chemical dosing and operation of discharges from sediment basins would be managed by suitably qualified and experienced persons. A detailed plan for management, storage and use of chemical coagulants and/or flocculants would be prepared as part of PESCPs. • Operation and maintenance of sediment basins would refer to available guidance within the industry practice (e.g. Blue Book, 2004 and IECA, 2018).
2.21	Sand slug Tuross River	Council will review the need for mitigation works and management of the channel, in particular the movement of the sand slug, to ensure it does not encroach on and impact the pumping infrastructure based on previous experience associated with the operation of original intake pump station that had been in operation since the 1950's.
2.22	Inlet Screen	DPI recommends that self-cleaning meshed screens are installed around the inlet structure to mitigate the uptake of fish and minimise the uptake of larvae and eggs.
2.23	Water flows	Water extraction will be in accordance with the Tuross River WSP
2.24	Temporary structures	Temporary in stream structures will be constructed in accordance with the NSW DPI policy guideline and will: • avoid spanning the full width of the waterway channel • be inserted during low-flow periods with management plans being submitted to NSW DPI detailing how high flow events will be managed. Dewatering of temporary in-stream structure should follow the following guidelines: • NSW DPI is to be notified 7 days prior to any dewatering activities to organise potential fish rescue activities. A separate s.37 permit may be required from NSW DPI to relocate fish. • water is to be pumped a minimum of 30 m away from the waterway and should preferentially not re-enter the waterway. If water is to re-enter the waterway, ANZECC water quality guidelines need to be adhered to with the proponent being required to submit a detailed water quality monitoring program.
3. Biodiversity		
3.1	Biodiversity - construction	A Flora and Fauna Management Plan will be prepared and implemented as part of the CEMP. It will include, but not be limited to: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • pre-clearing survey requirements • procedures for unexpected threatened species finds and fauna handling • procedures addressing relevant matters specified in the *Policy and guidelines for fish habitat conservation and management* (DPI Fisheries, 2013).
3.2	Biodiversity - construction	Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal will be investigated during detailed design and implemented where practicable and feasible.
3.3	Biodiversity - construction	Biodiversity offset requirements would be finalised during detailed design based on the revised construction footprint. A Biodiversity Offset Strategy would be developed during detailed design to address the obligations identified in the EIS.

No.	Issue	Environmental safeguards
3.4	Threatened flora/ EEC management	As part of the Flora and Fauna Management Plan, a management sub-plan will be produced to establish pre-construction and construction mitigation measures to minimise the impacts on River plains EEC.
3.5	Threatened flora/ EEC management	Monitoring water quality during construction will be evaluated for potential impacts to on threatened species and EEC, and corrective measures applied in consultation with Council.
3.6	Impacts on retained native vegetation adjoining the construction footprint	Pre-clearing surveys are to ensure exclusion zones (at the construction footprint boundary) are established prior to vegetation clearing.
3.7	Establishment and spread of invasive species and pathogens	The Flora and Fauna Management Plan will include a Weed and Pathogens Management Sub-plan which will include, but not be limited to: • weed management controls for construction and post-construction (if required) • protocols to prevent introduction or spread of *Phytophthora cinnamomi* • protocol to manage vehicle cleaning in accordance to reduce the potential for spread of noxious weeds, plant pathogens or animal diseases into retained forested habitats.
3.8	Impact on native fauna and their habitat	The Flora and Fauna Management Plan is to describe a process for: • pre-clearing surveys • supervision of vegetation clearing by a suitably qualified fauna ecologist/spotter • fauna handling including the capture of any injured fauna or fauna that does not naturally relocate, and identifying suitable services for the treatment of injured fauna, for example a local vet or local wildlife carer • identifying opportunities for further minimisation of native vegetation removal when developing construction methodologies, in order to retain the maximum amount of habitat for native fauna possible.
3.9	Impact on native fauna and their habitat	The Flora and Fauna Management Plan will: • identify hollow-bearing trees for retention and establish exclusion zones which will be mapped and clearly marked out on site prior to construction commencing • outline a staged approach to habitat removal of hollow-bearing trees and other established/ prominent trees that cannot be retained • include a nest box strategy would be implemented prior to vegetation removal.
3.10	Impact on fish passage	Ensure that fish passage is not blocked during construction. If blockage cannot be avoided, gain a permit from Fisheries prior to undertaking any activities that will cause blockage.
3.11	Aquatic biodiversity	Monitoring protocols, if required, will be approved by NSW DPI and must rigorous experimental designs to allow for thorough statistical analysis, including adequate numbers of control sites, replication and consideration of temporal changes where relevant.
3.12	Temporary structures	Temporary in stream structures will be constructed in accordance with the NSW DPI policy guideline and will: • avoid spanning the full width of the waterway channel

No.	Issue	Environmental safeguards
		• be inserted during low-flow periods with management plans being submitted to NSW DPI detailing how high flow events will be managed Dewatering of temporary in-stream structures should follow the following guidelines: • NSW DPI is to be notified seven days prior to any dewatering activities in order to organise potential fish rescue activities. A separate s.37 permit may be required from NSW DPI to relocate fish • water is to be pumped a minimum of 30 m away from the waterway and should preferentially not re-enter the waterway. If water is to re-enter the waterway, ANZECC water quality guidelines need to be adhered to with the proponent being required to submit a detailed water quality monitoring program.
3.13	Removal of large woody debris	Should any large woody debris be required to be removed the following management guidelines would be followed in accordance with the removal of large woody debris from NSW rivers and streams Prime Fact 11 (DPI 2005b): • lopping (trimming) should be considered as a first option; • instream realignment should be considered as the next option; • if realignment is unfeasible, relocation within the river channel is preferable to removal; • removal should be considered as a last resort; and • removal/relocation of snags would be undertaken so as to cause the least disturbance to the bed or nearby sensitive aquatic habitat. An aquatic ecologist shall be present on site when working with snags that require lopping, realignment, relocation and/or removal.
4. Socio-economic		
4.1	Anxiety and uncertainty over property impacts and changes	A Community and Stakeholder Engagement (CSE) Plan will be prepared for the proposal and be inclusive of: • a Construction Communications Plan, identifying when communication would occur, to whom, the method of communication and timing. • outlining the dedicated service and scope of assistance to be provided to landowners, residents and businesses with the effects of property acquisition and the relocation process. This would be prepared with reference to the NSW Government Land Acquisition Reform 2016.
4.2	Proposal communications	The Construction Communications Plan will be prepared and will include (as a minimum): • mechanisms to provide details and timing of proposed activities to affected residents, businesses and community facilities, including, but not limited to, changed traffic and access conditions, vegetation clearing • contact name and number for complaints • a complaints-handling procedure and register.
4.3	Property acquisition and relocation issues	Council would: • identify and categorise affected landowners, residents and businesses and the nature of assistance that may be required • establish communication protocols, including an acquisition hotline, requirements for English as a second language assistance with negotiations and communications.
4.4	Business and industry impacts	On-going communication and consultation will occur with local business owners located close to construction works about the timing, duration and likely impact of construction activities and to identify appropriate measures to manage potential impacts. A project hotline will be established as a direct contact for businesses to consult with.

No.	Issue	Environmental safeguards
4.5	Community values and amenity	Local residents would be notified at least five days prior to works commencing and would be kept regularly informed of construction activities during the construction process.
4.6	Impact of noise on local amenity	The affected community will be consulted regarding the proposed noise mitigation measures for construction.
4.7	Visual impacts - operation	Further opportunities to increase landscaping opportunities to minimise the visual impact of the proposal would be explored during detailed design.
5. Aboriginal heritage		
5.1	General Aboriginal impacts	A construction Aboriginal heritage management plan will be prepared for the project. The plan would provide details of management measures and procedures to be carried out during construction to minimise and manage impacts on Aboriginal heritage, and includes an unexpected finds procedure.
5.2	Awareness of Aboriginal heritage and legislative obligations	Aboriginal cultural awareness training for all relevant staff and contractors would be carried out prior to commencing work onsite. All relevant staff, contractors and subcontractors will be made aware of their statutory obligations for heritage under the *National Parks and Wildlife Act 1974*.
6. Historic heritage		
6.1	General historic heritage impact	While impacts to historic heritage items are considered unlikely, the following protocol for unexpected finds would be undertaken in accordance with the requirements of the NSW Heritage Manual (OEH, 1996): • should an item of historic heritage be identified, works in the vicinity of the find would cease. The Heritage Division (NSW Office of Environment and Heritage) would be contacted prior to further work being carried out in the vicinity of the find.
7. Traffic and transport		
7.1	Construction traffic impacts	A Construction Traffic Management Plan (TMP) would be prepared prior to construction and would be included in the CEMP. The TMP would: • identify the traffic management requirements during construction • describe the general approach and procedures to be adopted when producing specific traffic control plan • identify designated parking areas for construction workforce. • determine temporary speed restrictions to ensure safe driving environment around work zones, including on unsealed roads, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road) • identify any high-risk periods (such as during school bus operations), and whether delivery to site, and material haulage can be undertaken outside of these hours • identify opportunities to stagger heavy vehicle arrivals to site (e.g. use of minimum headways between arriving haul trucks), to avoid the potential for heavy vehicle convoys arriving on site • identify and provide temporary works, such as for site access, turn-around bays, parking areas for heavy vehicle dwelling, and minor site distance clearing around local road intersection sites (e.g. at the access points to the construction site) • provide temporary warning and advisory signposting, such as during periods of material haulage, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road), where there will be increased traffic activity

No.	Issue	Environmental safeguards
		• where practical, program deliveries of construction plant and materials (such as over-mass and over-dimension vehicles) outside peak traffic periods • identify steps to minimise construction traffic, such as car-pooling by construction staff to site • regularly review and modify the TMP (such as at changes of construction stages), to ensure the TMP remains valid and appropriate • document communication protocols amongst heavy vehicle operators, such as when approaching higher risk areas. This could be through the establishment of a call point system, whereby call point signage is erected on the approach to higher risk areas, such as the intersection of Nerrigundah Mountain Road and Eurobodalla Road, or the single lane Tuross River (Tyrone) bridge, and access points to the construction site • maintain access to private properties (and liaise with property owners), particularly that off Bullockys Hut Road, which may be used as a site access • identify a contact person (and phone number) for liaison and complaints, by project stakeholders and the community. Consultation with various stakeholders will also be undertaken in the development and periodic review of the Construction TMP, including: • ensuring all relevant requirements from emergency service providers are included, including from NSW Rural Fire Service, NSW Ambulance Service and NSW Police • consultation with the respective road authorities including Roads and Maritime Services and Eurobodalla Shire Council • consultation with other relevant parties including school bus operators • periodic notification of construction activities and changes in traffic control arrangements would be publicly notified, including through local newspapers, community noticeboards, and through a letter box drop off for residents in proximity to the construction site as appropriate. Detailed traffic control plans would be developed for each construction phase. These would include: • provision for emergency services passage through construction zones. • Only accredited traffic controllers would be permitted to prepare and implement traffic control plans.
7.2	Impacts to local roads during construction	Council will undertake a photographic inspection of local roads, and undertake a pre-dilapidation survey of local road pavements before construction commences, in order to document the state and condition of local roads. Periodic surveys will be undertaken during construction activities to identify any road damage, with road damage to local roads being repaired by Council as soon as practical. The construction contractor will also monitor the incidence of mud tracking off the construction site and onto local roads, and will sweep or clean local roads to minimise mud tracking. The contractor will preferably install controls to minimise the incidence of mud-tracking in the first instance, such as by use of grids at site access points. Construction personnel will also be encouraged to report road hazards and road damage
7.3	Impacts to local roads during operation	Council will develop a traffic plan to show the new storage access road for maintenance purposes which will be provided to the rural fire service.
8. Noise and vibration		

No.	Issue	Environmental safeguards
8.1	Construction noise and vibration	A Construction Noise and Vibration Management Plan (NVMP) will be prepared and implemented as part of the CEMP. The NVMP will generally follow the approach in ICNG (DECC, 2009a) and will consider the following as a minimum: • identify nearby residences and other sensitive land uses • develop noise management levels consistent with the ICNG • assess the potential impact from the proposed construction methods • where management levels are exceeded examine feasible and reasonable noise mitigation and develop associated noise monitoring program • develop reactive and proactive strategies for dealing with any noise complaints • identify a site contact person to follow up complaints.
8.2	Construction hours	• where feasible and reasonable, works would be undertaken within ICNG recommended working hours • where works are required to be undertaken outside of recommended working hours, an Out of Hours procedure as described in the NVMP must be followed and all appropriate approvals would be obtained prior to works, and all affected receivers would be notified of the works • noisy activities that cannot be undertaken during standard construction hours would be scheduled as early as possible during the evening and/or night-time periods • any out of hours works would comply with the Roads and Maritime Construction Noise Guidelines.
8.3	Construction noise and vibration	All relevant noise and vibration management measures would be incorporated into site inductions for all employees, contractors and sub-contractors. The environmental component may be covered in toolboxes and should include: • relevant licences and approval conditions • permissible hours of work • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times.
8.4	Construction noise and vibration	The environmental induction program would include specific noise and vibration issues awareness training including, but not limited to, the following: • avoiding use of radios during work outside normal hours • avoiding shouting and slamming doors • where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods • minimising reversing • avoiding dropping materials from height and avoiding metal to metal contact.
8.5	Construction noise and vibration	All plant and equipment is to be maintained to ensure optimum running conditions, with periodic monitoring.
8.6	Construction noise and vibration	Consider construction compound layout so that primary noise sources are at a maximum distance from sensitive receivers (primarily residential receivers), with solid structures (sheds and containers) placed between sensitive receivers and noise sources (and as close to the noise sources as is practical).
8.7	Construction noise and vibration	• locate compressors, generators, pumps and any other fixed plant as far from residences as possible and behind site structures. • alternatives to reversing alarms would be considered for site compound equipment subject to OHS compliance requirements and risk assessments.

No.	Issue	Environmental safeguards
		• avoid and limit the use of engine compression brakes at night and in residential areas • delivery times would be scheduled, where feasible, to the recommended construction hours to minimise noise impacts from heavy vehicle movements.
8.8	Construction noise and vibration	• use quieter and less noise/vibration emitting construction methods, where feasible and reasonable • plant and equipment would be selected to ensure only necessary size and power plant and equipment are used • plant used intermittently would be throttled down or shut off when not in use • simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be limited/avoided where possible • the offset distance between noisy plant and adjacent sensitive receivers is to be maximised where practicable. • noise-emitting plant to be directed away from sensitive receivers where possible. • stage work to limit high noise impacts to sensitive receivers.
8.9	Construction noise and vibration	The following approach would be adopted with regard to noise monitoring procedures during the construction works: • where potential noise impacts are predicted to be 20 to 30 dB(A) above the RBL, the potential construction noise nuisance is considered to be moderate. Noise monitoring would be carried out to confirm predicted noise impacts within two weeks of commencement of construction. Feasible and reasonable noise reduction measures would be investigated, where necessary. • where potential noise impacts are predicted to be more than 30 dB(A) above the RBL, the potential construction noise nuisance is considered to be high. All feasible and reasonable noise control measures would be implemented prior to the commencement of the noisy activity.
8.10	Blasting noise	A blast management plan will be developed prior to construction. The blast management plan will include: • limiting criteria • identified blast sensitive receivers • performance indicators • monitoring protocols • roles and responsibilities • blasting controls • protocols for community consultation, incidents and complaints • contingency protocols • reporting requirements.
8.11	Blasting vibration	The blast management plan will consider the following with regard to overpressure and ground vibration: • restriction of blasting to between the hours of 9.00am to 5.00pm Monday to Fridays, except Public Holidays • blast monitoring and inspection including: – blast monitoring at key sensitive sites – trial blasts to assist in the development of "site laws" based on monitoring data.
9. Soils, contamination and spoil management		

No.	Issue	Environmental safeguards
9.1	Erosion and sedimentation	A construction erosion and sediment control plan (ESCP) will be prepared for the proposal in accordance with the principles and practices detailed in *Managing Urban Stormwater: Soils and Construction* (the Bluebook) (Landcom, 2004), Volume 2D: Main Road construction (DECC 2008). The ESCP would form part of the CEMP and would be supported by a qualified and experienced soil conservationist.
9.2	Erosion and sedimentation	The ESCP will contain as a minimum the following elements: • site specific ESCMP, including detailed consideration of staging and management at ancillary sites, in accordance with the Blue Book • identification of site conditions or construction activities that could potentially result in erosion and associated sediment runoff • methods to minimise potential adverse impacts of construction activities on the water quality within surrounding waterways • details of measures to minimise any adverse impacts of sedimentation on the surrounding environment • details of measures to minimise soil erosion caused by all construction works including clearing, grubbing and earthworks • details of measures to make site personnel aware of the requirements of the SWMP by providing information within induction, toolbox and training sessions • details of the roles and responsibilities of personnel responsible for implementing the SWMP • details of measures for the inspection and maintenance of construction phase water treatment devices and structures • details of water quality monitoring.
9.3	Waterway crossings	• watercourse crossings, including temporary work platforms, waterway crossings and/or coffer dams, shall be designed and constructed in consultation with the Department of Primary Industries (DPI) (Fisheries) and the NSW Office of Water.
9.4	Management of contaminated waste	• additional assessment will be undertaken for soils requiring off-site disposal to ensure the correct waste classification is determined. Excavated material that is not suitable for on-site reuse or recycling, such as contaminated material should be transported to a site legally able to accept that material. • a classification system will be used to control the excavation, stockpiling and disposal of all potentially contaminated materials. Soils should be classified (where possible) in-situ prior to excavation or when stockpiled during excavation, depending on available time and room for stockpile areas. Any unexpected finds should follow the same procedures. • if groundwater is encountered during construction, it will be managed and disposed of in accordance with legislation.
9.5	Risk of spills and leaks	• vehicles and machinery will be properly maintained to minimise the risk of fuel/oil leaks. Routine inspections of all construction vehicles and equipment should be undertaken for evidence of fuel/oil leaks • all fuels, chemicals and hazardous liquids will be stored within an impervious bunded area in accordance with Australian standards and EPA guidelines • any on-site refuelling will occur in a designated area with impervious surfaces.
9.6	Construction dewatering	Any dewatering activities will be undertaken in accordance with the *Technical Guideline: Environmental management of construction site dewatering* (RTA, 2011b) in a manner that prevents pollution of waters.

No.	Issue	Environmental safeguards
9.7	Waste management	A waste management plan would be developed as part of the CEMP and will take into account the waste hierarchy.
9.8	Waste management	Waste management will be incorporated into the operational management plan.
10. Bushfire planning and management		
10.1	Bushfire	A Hazard and Risk Management Plan (HRMP) will be prepared and implemented as part of the CEMP. The Rural Fire Service will be consulted to determine the appropriate level of management measures and the catchment perimeter roads for construction and operation will be accessible for the Rural Fire Service. The HRMP will include, but not be limited to: • details of hazards and risks associated with the activity including bushfire management • measures to be implemented during construction and operation of the storage facility to minimise these risks • record keeping arrangements, including information on the materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials • a monitoring program to assess performance in managing the identified risks • contingency measures to be implemented in the event of unexpected hazards or risks arising, including emergency situations. The HRMP will be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA, Rural Fire Service or Office of Environment and Heritage publications.
11. Greenhouse gas and climate change		
11.1	Greenhouse gas emissions	Equipment will be properly maintained to ensure it is operating efficiently.
11.2	Impacts to the proposal as a result of climate change	Opportunities to increase the resilience of the water storage facility to the impacts of climate change would be investigated during detailed design where possible, as new information about the impact of climate change on performance of materials (and drainage structures becomes available. The review would aim to identify materials that are less susceptible to degradation impacts of climate change.
11.3	Impacts of the proposal on climate change	The construction contractor is to include consideration of the following as a minimum to minimise the potential for GHG emissions: • preferential use of local materials (where feasible and practicable) to reduce quantities of fuel consumption associated with material transportation • delivery of materials with full loads where feasible • ensure that all plant and vehicles are maintained regularly to maintain fuel efficiency • seek opportunities to reduce the quantity of construction materials used through innovative design and construction methodologies • where reasonable and feasible, procure recycled content road construction and maintenance materials such as recycled aggregates in road pavement and surfacing (including crushed concrete, granulated blast furnace slag, glass, slate waste and fly ash). This measure forms part of RMS' implementation of the NSW Government's 'Waste Reduction and Purchasing Policy' (WRAPP).

No.	Issue	Environmental safeguards
12. Air quality		
12.1	Air quality	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
12.2	Air quality	A Dust Management Plan will be prepared and implemented as part of the CEMP. The DMP will include, but not be limited to: • potential sources of air pollution and dust • air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces.
13.3	Air quality	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
13. Landscape character and visual impact		
13.1	Landscape character and visual impact	A Landscape Management Plan (LMP) will be prepared during the detailed design phase of the project and implemented as part of the CEMP. The LMP will present an integrated landscape and urban design for the project, providing practical detail on the application of design principles and objectives identified in the environmental assessment. The Plan will include design treatments for: • location and identification of existing vegetation and proposed landscaped areas, including species to be used, density and size • hydromulch seed mix designs and locations • built elements including any retaining walls and bridge walls • fixtures such as lighting, fencing and signs • details of the staging of landscape works taking account of related environmental controls such as erosion and sedimentation controls and drainage • procedures for monitoring and maintaining landscaped or rehabilitated areas.
13.2	Visual impacts of construction activities	To reduce the potential visual impact of construction activities: • work sites will be left tidy at the end of each work day • where appropriate, fencing with material attached (e.g. shade cloth) will be provided around the construction compound to screen views from adjoining properties • lighting for night-time work will comply with relevant Australian Standards, including *AS4282-1997 (Control of the obtrusive effects of outdoor lighting).*
13.3	Operational	Vegetation will be maintained to reduce visual impacts from the road
13.4	Potential cumulative construction traffic impacts	The Construction TMP for the proposal will be prepared with consideration for other nearby road upgrade project traffic management plans if still being implemented. A coordinated approach to traffic management between the nearby projects will be adopted to minimise travel time and congestion impacts on road users.

APPENDIX 3 INCIDENT NOTIFICATION AND REPORTING REQUIREMENTS

WRITTEN INCIDENT NOTIFICATION REQUIREMENTS

1. A written incident notification addressing the requirements set out below must be emailed to the Department at the following address: compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of an incident. Notification is required to be given under this condition even if the Applicant fails to give the notification required under **Condition C9** or, having given such notification, subsequently forms the view that an incident has not occurred.
2. Written notification of an incident must:
   a. identify the development and application number;
   b. provide details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);
   c. identify how the incident was detected;
   d. identify when the Applicant became aware of the incident;
   e. identify any actual or potential non-compliance with conditions of consent;
   f. describe what immediate steps were taken in relation to the incident;
   g. identify further action(s) that will be taken in relation to the incident; and
   h. identify a project contact for further communication regarding the incident.

INCIDENT REPORT REQUIREMENTS

3. Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, the Applicant must provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below, and such further reports as may be requested.
4. The Incident Report must include:
   a. a summary of the incident;
   b. outcomes of an incident investigation, including identification of the cause of the incident;
   c. details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and
   d. details of any communication with other stakeholders regarding the incident.

Appendix B Construction Soil and Water Management Plan

SMEC

Member of the Surbana Jurong Group

local people
global experience

Soil and Water Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
12 October 2021

Document Control

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This document must be read as a whole. The CEMP and any subsequent document must be read in conjunction with this report.

The document supersedes all previous draft or interim documents, whether written or presented orally, before the date of this document. This document has not and will not be updated for events or transactions occurring after the date of the document or any other matters which might have a material effect on its contents, or which come to light after the date of the document. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the document for anything that occurs, or of which SMEC becomes aware, after the date of this document.

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1 Introduction

1.1 Context

This Construction Soil and Water Management Sub Plan (CSWMP) forms part of the Construction Environmental Management Plan (CEMP) for initial sections of the Storage Access Road and Storage Inlet Pipeline for the Eurobodalla Southern Water Supply Storage Project (the Project).

The early works construction activities covered by this CSWMP include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

This CSWMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the early works construction activities outlined above, as part of the Project, and would comply with State Significant Development (SSD) 7089 Development Consent, the Environmental Impact Statement (EIS), Addendum Submissions Report and any associated licences, permits and approvals required for the Project.

The CSWMP specifically outlines how Eurobodalla Shire Council is to avoid or minimise risks to soil and water and achieve environmental outcomes for the Project by providing a structured approach to ensure appropriate mitigation measures and controls are implemented.

1.2 Background and project description

The EIS assessed the impacts of construction and operation of the Project regarding soil and water within Chapter 7 (Water resources and geomorphology) and Chapter 14 (Soils etc.). A Response to Submissions was subsequently prepared, which included additional information and safeguards pertaining to water quality within the Water Quality Addendum Assessment.

As part of the EIS development, a Conceptual Erosion and Sediment Control Plan (Ref: 30012127_R10) was developed for the Project, informing the EIS and Submissions Report. This plan provided concept level recommendations on erosion and sediment control measures and other considerations for the Project. This included, but was not limited to, the requirement for Progressive (or detailed) Erosion and Sediment Control Plans prepared by Eurobodalla Shire Council.

The Project is located approximately 30 kilometres south of Moruya, within the Eurobodalla Local Government Area (LGA). While the Storage Site is within the Bodalla State Forest, the construction works covered by this CSWMP are not. The construction works covered by this CSWMP cease at the boundary of the Bodalla State Forest.

The Storage Site is north-facing, bound by Bullockys Hut Road to the west, Eurobodalla Road to the north and Big Rock Road to the south-east. The Storage Site is comprised of at least 20 un-named creeks and waterways that come together to flow into a section of the Tuross River approximately 8.5 kilometres south-west of the town of Bodalla.

The works covered by this CFFMP comprise:

- construction of the Storage Access Road from Eurobodalla Road to the boundary of the Bodalla State Forest
- construction of the Storage Inlet Pipeline from the limit of the TRIPS contract works (on the Tuross River side of Eurobodalla Road) to the boundary of the Bodalla State Forest
- upgrades to the intersection of Eurobodalla Road and the Storage Access Road to facilitate safe access and egress to the Storage Site and TRIPS site.

2 Purpose and Objectives

2.1 Purpose

The purpose of this CSWMP is to describe how Eurobodalla Shire Council is required to manage and protect water quality during the construction of the Storage Access Road and Storage Inlet Pipeline for the Project.

The conditions of the Development Consent for the Project state that the proponent or Eurobodalla Shire Council are required to:

- prevent, minimise, or offset adverse environmental impacts
- set standards and performance measures for acceptable environmental performance
- require regular monitoring and reporting
- provide for the ongoing environmental management of the development.

Conditions of consent specific to this CSWMP are described in Table 2-1.

2.2 Objectives

The objective of this CSWMP is to ensure all mitigation measures and licence/permit requirements relevant to soil and water management are described, scheduled and assigned responsibility with reference to commitments outlined in:

- the EIS for the Project
- Addendum Submissions Report for the Project
- Development Consent SSD-7089 for the Project

2.3 Targets

The following targets have been established for the management of soil and water impacts during the Storage Access Road and Storage Inlet Pipeline construction works:

- ensure full compliance with the relevant legislative requirements, EIS, and conditions of the Development Consent
- manage downstream water quality impacts attributable to the project (i.e., maintain water waterway health by avoiding the introduction of nutrients, sediment and chemicals outside of that permitted by the environmental protection licence and/or ANZECC guidelines)
- ensure training on best practice soil and water management is provided to all construction personnel through site inductions.

Table 2-1 Soil and Water Management Conditions of Consent

Condition reference	Condition	Where addressed in CSWMP
B13	Prior to commencement of any surface disturbance the Applicant must prepare a Construction Soil and Water Management Plan to the satisfaction of the Planning Secretary as part of the CEMP required by Condition C2. The Construction Soil and Water Management Plan must be prepared by a suitable qualified person(s) in consultation with the EPA and include:	This document
	(a) guidelines and procedures to reuse dirty water collected in sediment basins with reuse prioritised over discharge to receiving waters;	Section 4-3 Section 6.3.2
	(b) an assessment of cumulative risks associated with sediment pond settling agents;	Section 4-3 Section 6.3.2
	(c) discharge criteria based on an assessment of potential impacts against the NSW Water Quality Objectives (WQO) for receiving waters;	Section 6.3.2 Section 7.3.3
	(d) identification and implementation of mitigation measures to avoid pollution including, but not limited to, dosing procedures, discharge procedures, direct ecotoxicology testing; and	Section 6.3
	(e) a detailed Erosion and Sediment Control Plan prepared in consultation DPI Fisheries and DPIE Water in addition to the EPA.	Section 6.3.1 Appendix A
B14	Erosion and sediment control measures must:	
	(a) be in accordance with the relevant requirements of Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and mitigation measures outlined in the Policy and guidelines for fish habitat conservation and management (DPI 2013); and	Section 3.3 Section 6.1
	(b) have sediment basins sized to a 90th or 95th percentile 5-day rainfall depth where possible.	Section 4.3 Section 6.3.2
B15	Compliance with section 120 of the POEO Act, which prohibits the pollution of waters, except as expressly provided for in an EPL	Section 7.3.3
B16	The Applicant must store all chemicals, fuels and oils used on-site in accordance with:	
	(a) the requirements of all relevant Australian Standards; and	Section 6.4.3

Condition reference	Condition	Where addressed in CSWMP
	(b) the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual if the chemicals are liquids.	
B18	The Applicant must	
	(a) design and manage stormwater runoff from access roads so that it does not result in erosion and pollution of receiving waters;	Section 6.3.5
	(b) maintain erosion control measures downstream of the spillway, storage outlet works and at the river intake; and	Section 6.3
	(c) use natural materials, such as rock rip rap, for erosion and river bank protection	Section 6.3
B30	The Applicant must ensure that public access is managed to prevent erosion or damage to native vegetation by restricting access through site fencing to pedestrians	Section 6.3

3 Environmental requirements

3.1 Legislation

All legislation relevant to the Storage Access Road and Storage Inlet Pipeline is included in Section 2 of the CEMP, including the following relevant to this SWMP:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Fisheries Management Act 1994* (FM Act)
- *Contaminated Land Management Act 2017* (CLM Act).

3.2 Additional approvals, licences, permits and requirements

Eurobodalla Shire Council, in undertaking the construction activities covered under this CSWMP must comply with the relevant conditions of Development Consent SSD-7089. These conditions are stated in Section 2.1. The Project has been determined to be SSD, and as such must comply with the relevant guidelines for SSD under the EP&A Act.

An Environment Protection Licence (EPL) does not apply to the Storage Access Road and Storage Inlet Pipeline construction activities.

3.3 Guidelines

The main guidelines, specifications and policy documents relevant to this CSWMP include:

- Managing urban stormwater: soils and construction Volume 1, Landcom, 2004 (referred to herein as the 'Blue Book')
- Managing urban stormwater: soils and construction Volume 2D, Main road construction, Department of Environment and Climate Change, NSW, 2008
- NSW Office of Environment and Heritage (NSW OEH, 2012), Erosion and Sediment Control on Unsealed Roads, Sydney
- *Policy and guidelines for fish habitat conservation and management* (DPI, 2013)
- *Storing and Handling of Liquids: Environmental Protection - Participants Manual* (EPA, 2007).

4 Existing environment

4.1 Regional topography and drainage

The Project area includes moderate to steep gradients within valley slopes where terrain remains densely forested, undulating foothills and flats, and riverbanks along the Tuross River. The upper and mid valley areas remain densely forested with minimal clearing for fire trails only. The lower foothills and flats comprise cleared and vacant pastures. Drainage from the Project area is expected to follow existing ephemeral streams through valley areas and discharge to low lying areas within pasturelands.

Figure 4-1 is taken from the Conceptual Erosion Sediment Control Plan (CESCP) (SMEC, 2018c) outlines the location and expected surface flow behaviours of the Storage Access Road and Storage Inlet Pipeline construction area and broader Storage Site. The Storage Access Road and Storage Inlet Pipeline construction site is located in the lower foothills and flats, comprising of mostly cleared and vacant pastures further from the Forestry boundary. The site is in the northern most area of the Project, intersecting with Eurobodalla Road near the Tuross River.

The site largely follows elevation contours, achieving elevations between 20 metres and 30 metres AHD. Surface flow is expected to discharge longitudinally along the site footprint. Surface flows between the mid-point of site towards the Forestry Boundary are expected to flow towards the forestry boundary, and upon reaching the boundary, flow eastward downslope.

Surface flows closer from the mid-point of the site towards the intersection at Eurobodalla Road are expected to flow north towards Eurobodalla Road. Flows are expected to continue south along the south directing slope of Eurobodalla Road. An existing swale exists on the eastern side of Eurobodalla Road.

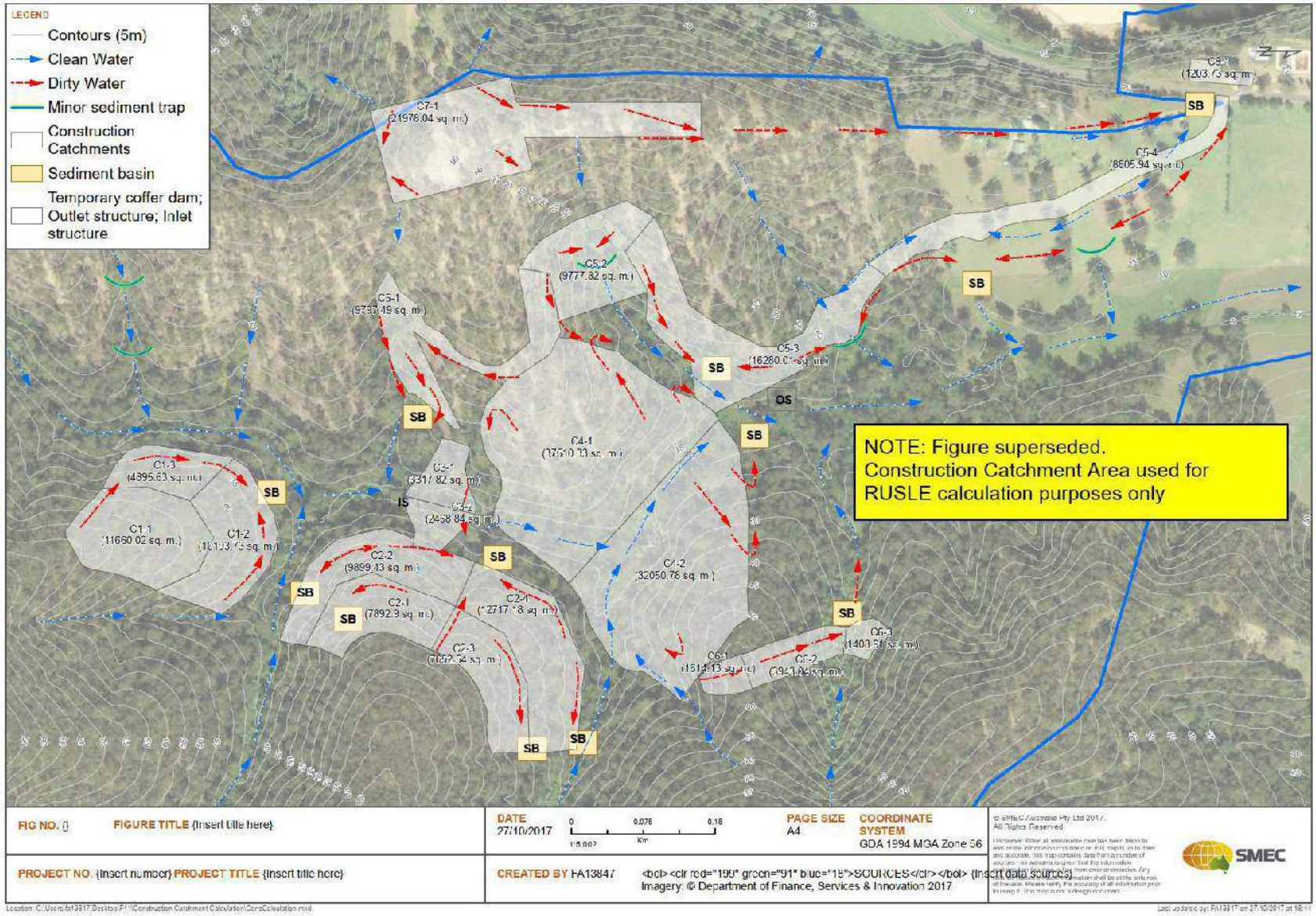

Figure 4-1 Construction Catchments used for RUSLE calculations (SMEC, 2018c)

4.2 Soil landscape and geology

Soil landscapes have been identified from the Soil Landscapes of the Narooma 1:100 000 Sheet (Talau, 2002) within the study area. A summary of relevant soil landscapes within the study area is as follows:

- Murrah (mu) – This soil landscape occurs on rolling low hills to hills on Ordovician sediments and metasediments, siltstones, greywackes, shales and fine sandstone and is mostly used for dairy cattle grazing on improved pasture. Soils in this landscape have a very high erosion hazard and have commonly abundant surface gravels to cobbles. At the site of the proposal, this soil landscape occurs within the mid and upper valley slopes and currently comprises native forest vegetation. The current land use is designated for production forestry activities. Majority of the Storage Access Road and Storage Inlet Pipeline are located within this landscape.
- Tanja (tj)– This soil landscape occurs on low hills on Ordovician sediments and metasediments, siltstones, greywackes, shales and fine sandstone and is mostly used for dairy cattle grazing on improved pasture. Severe sheet and rill erosion have occurred where soils have been disturbed by road construction. Parts of the Storage Access Road and Storage Inlet Pipeline are located within this landscape.

The Project area has not been identified in the Eurobodalla Local Environmental Plan (2012) or coastal Acid Sulfate Soils Risk Mapping (NSW OEH, as viewed on eSpade website) as having the potential for Acid Sulfate Soils to be present.

Geotechnical investigations have been recently carried out within the Project area to inform detailed design phase of works, the details of which are presented within the Geotechnical Investigations Factual Report (SMEC, 2018a) and Geotechnical Investigations Interpretive Report (SMEC, 2018b). The investigations were required to gain a better understanding of the subsurface geology to inform the detailed design of the storage embankment and related ancillary structures.

The geology encountered during the geotechnical investigations was found to be consistent with the published geology of the Early to Middle Ordovician age rocks from the undifferentiated Adaminaby Group. In general, a thin cover of topsoil and slopewash colluvium is found overlying residual soils developed on rocks from the undifferentiated Adaminaby Group. Sequences of Quaternary alluvial sediments in excess of 5m depth ranging from gravelly clay/silt through to imbricated clast supported cobble deposits were encountered in the creek bed.

Geotechnical conditions for the Storage Access Road and Storage Inlet Pipeline areas were investigated specifically using test pit excavations and laboratory testing on select samples. In general, these investigation results indicate:

- topsoil ranging in thickness between 0.2 metres to 0.4 metres.
- residual soil and extremely weathered material to depths of between 0.5 metres to 1.9 meters in test pits along the main Storage Access Road and Storage Inlet Pipeline alignment. Residual soil and extremely weathered materials was encountered in a test pit to a depth of 3.8 metres; however, this test pit was located further down the valley below the proposed access road alignment.
- residual soil and extremely weathered material was overlying highly weathered siltstone with refusal of the excavator at depths of between 1.0 metres to 2.3 metres in test pits along the main Storage Access Road and Storage Inlet Pipeline alignment.
- no groundwater was encountered within the test pits.

For the majority of the Storage Access Road and Storage Inlet Pipeline alignment, the Storage Access Road is likely to be readily excavated and/or ripped through extremely weather to highly weathered rock. However, where excavations are required at up to 7 metres depth (at the road centreline) moderately weather or less weathered, higher strength rock may be encountered with associated increased excavation difficulty. Excavation to these levels is expected to be achieved with the use of a dozer and/or an excavator with rock breaking attachment. Further details are presented within the Geotechnical Investigations Factual Report (SMEC, 2018a) and Geotechnical Investigations Interpretive Report (SMEC, 2018b).

4.3 Erosion hazard

As part of the Conceptual Erosion and Sediment Control Plan (Ref: 30012127_R10) an erosion hazard assessment was carried out using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE formula is as follows:

A = R x K x LS x P x C

Where,

A = computed soil loss (tonnes/ha/yr)

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length/gradient factor

P = erosion control practice factor

C = ground cover and management factor.

As detailed in Section 6.3.2 (d) of the Blue Book 'the building of a sediment retention basin can be considered unnecessary' if the computed soil loss from a catchment is less than 150 cubic metres per year. For all catchments which exceed this requirement, a sediment basin is required. Table 4-1 summarises the RUSLE assessment finding for the Storage Access Road and Storage Inlet Pipeline, which are located within catchment 5, sub-catchment C5-4 (Figure 4-1). The RUSLE calculation sheets are available in Appendix D.

Soil loss for the construction activities associated with the Storage Access Road and Storage Inlet Pipeline is calculated as 62 tonnes/ha/year, corresponding to a low erosion hazard. The Soil Loss Class is a measure of erosion hazard that underpins the erosion control aspects of these guidelines.

Table 4-1 Construction catchments and RUSLE calculations

Catchment ID	Sub-catchment ID	Catchment size (ha)	Soil loss (tonnes/hectare/year)	Soil loss (m3 / y)	Sediment basin required? (N/Y)	Soil loss class	Erosion Hazard
Catchment 5	C5-4	0.86	62	41	N	1	Very Low
Soil loss classes and erosion hazard: Extremely high (7), Very high (6), High (5), Moderate (4), Low-moderate (3), Low (2), Very low (1)							

4.4 Receiving water quality

Maintaining the surface water quality in the Tuross River has been identified as being a primary water quality objective for the Project. Existing water quality conditions, and potential risks to water quality posed by the proposal are discussed in the Addendum Submissions Report.

Water Quality Objectives (WQO) for this section of the Tuross River relate to the protection of:

- aquatic ecosystems
- visual amenity
- primary contact recreation
- secondary contact recreation
- livestock water supply
- irrigation water supply
- homestead water supply
- drinking water at point of supply (disinfection only, clarification and disinfection, groundwater)
- aquatic foods (cooked).

A Water Quality Monitoring and Sampling Plan (WQMSP) was developed and has been implemented for the Project. Baseline water quality monitoring included scheduled (monthly) and event based (e.g., immediately after rainfall) sampling carried out within several locations along this section of the Tuross River for various water quality parameters including total dissolved solids (TDS), total suspended solids (TSS), turbidity, pH, nutrients, heavy metals, various organic pollutants and microbial parameters. Baseline water quality data indicated that the Tuross River is characterised by:

- elevated turbidity, nutrients and chlorophyll and selected heavy metals (aluminium and zinc), following wet weather events
- other pollutants such as heavy metals (excluding aluminium and zinc), petroleum hydrocarbons, pesticides and other contaminants were below adopted assessment criteria.

Construction water quality monitoring will be carried out throughout the construction of the Project. This will enable a comparison of water quality during Storage Access Road and Storage Inlet Pipeline construction to the pre-construction baseline water quality. The baseline monitoring program methodology and findings are provided in Appendix C. Appendix C also include site specific trigger values for comparison during construction water quality monitoring, in accordance with *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG 2018).

4.5 Climate and river flows

Climate and river monitoring data for the proposal were sourced from the two nearby available weather and river monitoring stations:

1. Daily river flows and rainfall monitoring data at 'Tuross River @ Eurobodalla (Station ID 218008)', located immediately adjacent to the proposal within the existing southern water treatment plant sourced from the Department of Primary Industries, Office of Water website (DPI, 2017).
2. Rainfall monitoring data only at 'Bodalla Post Office (Station ID 069036)' located approximately six kilometres north-east of the proposal sourced from the Bureau of Meteorology website (BOM, 2017).
3. Source 3: Weather including temperature and wind data at 'Narooma (Marine Rescue) (Station ID 069022)' located approximately 15 kilometres south-east of the proposal sourced from the Bureau of Meteorology website (BOM, 2017).

Temperatures are typically mild to warm (ranging between 6.7 degrees Celsius in June and 16.8 degrees Celsius in February).

Prevailing summer winds are typically from the south, south-west and west (reaching 16.1 kilometres per hour recorded at 3 pm in the month November). Prevailing winter winds are typically from the east in the mornings, with varied wind direction in the afternoon (west, south west, north and south) (reaching 13.1 kilometres per hour in the month of August). It is noted that weather statistics from Source 3 may overestimate wind speed and direction at the proposal site which is located approximately 10 kilometres inland from the coast.

Cumulative annual rainfall appears a relatively stable trend over the past 40 years. Moderate to high rainfall occurs throughout the year (871 millimetres annually), with a slight summer dominance (118 millimetres in February). The lowest rainfall occurs in spring (41 millimetres in September). SMEC consider that rainfall data at Source 1 is typically less than Source 2 and may provide a better estimate of actual rainfall expected at the site.

Similarly, mean monthly flow within the Tuross River was 23309 Megalitres (all months), with highest flows observed in March (42007 Megalitres) or June (44433 Megalitres) and the lowest flow in September (9721 Megalitres). Seasonal monthly runoff figures show the Tuross River experiences its highest flows in autumn, possibly resulting from dominant summer rainfall.

Historically, water levels within the Tuross River ranged between -1 metre AHD (dry) and 13 metres AHD (highest recorded flow). Within 2016, at least two events were recorded where river flows exceeded 10 metres AHD.

5 Potential environmental impacts

5.1 Construction Activities

The Storage Access Road and Storage Inlet Pipeline are outlined in this section. More generally, construction activities will typically include:

- site establishment activities typically including:
  - establishment of a temporary construction site compounds and lay down areas in a fenced-off area within the Storage Access Road and Storage Inlet Pipeline footprint
  - construction of access tracks and installation of boundary fencing
  - temporary and permanent erosion control structures including construction basins and catch drains
  - site survey to confirm infrastructure positioning and placement
- clearing of road alignment, access tracks and haul routes
- excavation and trenching
- transport and stockpiling of excavated material
- import of construction materials.

5.1.1 Storage Access Road

The Storage Access Road would have a design and posted speed of 40 km/h. Its maximum longitudinal grade is 12.5%, with a maximum 3% crossfall. The Storage Access Road width would be 6.5 metre sealed, consisting of two, 3.25 metre sealed lanes, with a 0.75 metre unsealed shoulder. The pavement treatment proposed for the Storage Access Road and shoulder widenings consists of a thin wearing course over a granular base. A temporary pavement would be provided during construction to suit construction vehicle loading.

The construction works for the Storage Access Road have an impact on the existing surface stormwater flow along the side of the existing, steep embankment. To alleviate this, new stormwater drainage infrastructure is to be installed under the Storage Access Road to follow the existing valleys along the embankment. Swales along the high side of the Storage Access Road would capture stormwater from the upper catchments created by the new works. The swales are typically trapezoidal, 0.6 metres deep and 4.2 metres wide with a base width of 0.5 metres. The drainage pipes under the Storage Access Road are typically 450 millimetre diameter Reinforced Concrete Pipe (RCP) with headwall outlets and either headwall or grated pit inlets.

Storage Access Road construction activities will include:

- temporary and/or permanent culverts (for clean water diversion)
- excavation of road alignment
- construction of drainage infrastructure (including temporary and/or permanent culverts for clean water diversion).

5.1.2 Intersection Upgrades

At the intersection of the new Storage Access Road and Eurobodalla Road, basic right-turn and basic left-turn treatment would be provided Road and would be designed per the geometry requirements of Austroads Guide to Road Design Part 4 and 4A. The basic left-turn treatment would include localised widening of Eurobodalla Road.

Intersection Upgrade construction activities will include:

- excavation and surface preparation for localised widening of Eurobodalla Road
- road surfacing and pavement.

5.1.3 Storage Inlet Pipeline

The alignment of the pipeline between Eurobodalla Road and the Storage Inlet Chute, is generally within the road shoulder of the Storage Access Road. The pipeline will typically be in cut with the exception of where the road alignment crosses natural gullies. At these locations, the pipeline alignment has been designed to provide adequate side support to the pipeline.

Storage Inlet Pipeline construction activities include:

- excavation and trenching along Storage Inlet Pipeline alignment

- trenchless methodologies (e.g. Horizontal Directional Drilling) for installation underneath Eurobodalla Road.

5.2 Impacts

The potential impacts on soil and water resources will depend on several factors. Primarily impacts will be dependent on the nature, extent and magnitude of Storage Access Road and Storage Inlet Pipeline and their interaction with the natural environment. If inadequately managed, Storage Access Road and Storage Inlet Pipeline can impact water quality if they disturb soils or watercourses or result in uncontrolled discharges of contaminating or polluting substances to watercourses.

Potential sources of water quality impacts include:

- increased sediment loads due to:
  - erosion, spills or dust generation during excavations
  - exposed or stockpiled soil transported during rain events discharging to the Tuross River
- increased concentrations of nutrients, metals, and other pollutants, transported via sediment-laden (i.e., dirty water) discharge to Tuross River.
- chemicals, oils, grease and petroleum hydrocarbon spills or leaks from storage containers or directly from construction machinery entering and polluting Tuross River.
- gross pollutants (e.g., litter) from construction activities entering and polluting Tuross River.
- stockpiles of cleared vegetation (including mulch) could leach or be washed directly in the Tuross River.

Impacts to water quality that may result from these activities include:

- smothering of aquatic life and/or inhibiting critical processes (e.g., photosynthesis) of aquatic and riparian flora
- reduction of fish passage area from instream activities and erosion and sediment controls
- impacts to breeding and spawning conditions of aquatic fauna
- changes to water temperature due to reduced light penetration, or from discharge of water that is not at ambient temperature
- impacts to downstream ecosystems such as wetlands, floodplains and coastal estuaries
- increased turbidity and nutrient concentrations leading to a proliferation of nuisance aquatic flora
- pollutant runoff in surface water from herbicide application
- runoff high in tannins can increase the biological oxygen demand (BOD) of the receiving environment, which in turn would decrease the availability of dissolved oxygen. Tannins may also reduce light penetration and alter the pH of receiving waters. These impacts may affect aquatic ecosystems in receiving environments.

Some impacts on soil and water attributable to the Project are anticipated. Section 6 provides mitigation measures that will be implemented to avoid or minimise those impacts.

6 Mitigation and management measures

6.1 Key management strategies

Key management strategies which underpin this CSWMP have been developed from the Blue Book principles and include:

- staged clearing of existing vegetation within construction and inundation footprint to prevent soil destabilisation
- minimising extent and duration of disturbance
- early clean water diversions around the site (i.e., minimising run-on)
- control stormwater flows onto, through and from the site
- use erosion control measures to prevent onsite damage
- use sediment control measures to prevent off site damage
- stabilise disturbed areas quickly and progressively throughout construction stage
- regular inspection and maintaining controls measures
- scheduling construction activities outside of inclement heavy rainfall periods or high river flows.
- works carried out Environmental Work Method Statements (EWMS) prepared by the Eurobodalla Shire Council, including effective consultation and implemented by construction personnel.

6.2 Environmental Work Method Statements (EWMS)

Eurobodalla Shire Council would prepare a detailed Environmental Work Method Statement (EWMS) for clearing activities to comply with the requirements of this CSWMP. The EWMS should detail the:

- proposed activities to be undertaken
- identify environmental hazards and assess initial risk ranking
- nominated proposed control measures with reference to this CSWMP
- assess residual risk ranking and responsible personnel to implement controls.

Prior to works, the EWMS will require review and approval by the Project Manager and consultation / induction with all construction personnel involved in the activity. External input or review may be carried out by a soil conservation consultant or accredited erosion and sediment control professional.

6.3 Erosion and sediment control plan

Appendix A includes the Erosion and Sediment Control Plan for the works. The plans include the minimum requirements to be progressively installed by Eurobodalla Shire Council during the works. Standard controls are identified where relevant to the Storage Access Road and Storage Inlet Pipeline construction activities in the following sections. In summary, these include:

- up-gradient clean water diversions to be installed around the site
- install silt fencing along perimeter to prevent clean water run-on and divert dirty water flows away from site
- site-won mulch proposed to be used in windrows to control/treat dirty water runoff
- vegetation clearing to leave tree stumps and roots in place, and maintain existing grass covered areas, low-lying shrubs and undergrowth to minimise soil destabilisation (where practical).

6.3.1 Consultation with agencies

SMEC undertook consultation with the Natural Resources Access Regulator (NRAR, former DPIE Water), DPI Fisheries and the NSW EPA as required under Condition B13 and B13(e) of the Conditions of Consent. A summary of agency consultation and responses to feedback from agency consultation is provided below in Table 6-1. Evidence of consultation with agencies is provided in Appendix B.

Table 6-1 Summary of agency consultation as required under Condition B13 and B13 (e) of the Conditions of Consent

Agency	Dates of consultation	Agency consultation feedback	Response
NSW EPA	• SMEC request for consultation sent via letter on 9 September 2021 • NSW EPA response received via letter on 23 September 2021	As the receiving environment for the project is the Tuross River which flows into the high conservation value Batemans Bay Marine Park, the EPA considers that a high standard of sediment and erosion controls be implemented top protect the NSW Water Quality Objectives of Tuross River and Tuross Lake during construction. The EPA have no further recommendations on the controls and procedures outlined in the management plans provided. The EPA notes the management plans incorporate the advice the EPA has given during other stages of the project, in particular the development of pre-rainfall checks and procedures.	Noted.
		The EPA reminds Eurobodalla Shire Council of the strict liability provisions of the Protection of the Environment Operations Act 1997 (POEO Act), particularly section 120 of the Act which prohibits the pollution of water. As such, any person who pollutes waters or causes waters to become polluted, including placing matters in a position where it can be washed or fall into waters, is guilty of an offence under section 120 of the POEO Act.	Noted. This CSWMP specifically outlines how Eurobodalla Shire Council is to avoid or minimise risks to soil and water and achieve environmental outcomes for the Project by providing a structured approach to ensure appropriate mitigation measures and controls are implemented. Construction and vegetation clearing activities as part of the Project will not involve any major earthworks adjacent to or direct interaction with the Tuross River (refer to Section 7.3.3).
DPI Fisheries	• SMEC request for consultation sent via letter on 16 September 2021 • DPI Fisheries response received via email on 21 September 2021	No changes to recommend.	Noted.
NRAR	• SMEC request for consultation sent via letter on 10 September 2021 • NRAR response received on 5 October 2021	No comment.	Noted.

6.3.2 Standard controls

The following standard erosion and sediment controls are indicative of controls that may be used to manage soil and water impacts during construction. Table 6-2 details the relevant section from the following guidelines where the drawings (or requirements) are detailed. Controls should be implemented where appropriate and maintained to ensure proper function:

- Volume 1 Soils and Construction – Managing Urban Stormwater (Landcom, 2004) ('the Blue Book')
- Volume 2D Soils and Construction – Main Road Construction (DECC, 2008); and
- Erosion and sediment control on unsealed roads (NSW OEH, 2012).

Where the drawings are detailed, controls should be implemented where appropriate and maintained to ensure proper function. Selection of control measures requires the following:

- identifying the problem – erosion or sedimentation to be managed
- where the problem is erosion, identifying whether it is caused by raindrop impact or concentrated flow
- where the problem is sedimentation, identifying if sediment is conveyed by sheet or concentrated flow
- selecting the appropriate techniques depending on the identified specific nature of the problem.

Table 6-2 Standard erosion and sediment controls, Storage Access Road and Storage Inlet Pipeline only

Control	Drawing Reference	Source Page Reference	Recommended standard erosion and sediment controls: Y (yes recommended) NR (not recommended) TBA (to be assessed by Eurobodalla Shire Council)
Stockpiles	SD 4-1	4-5 Blue Book	Y
Replacing topsoil	SD4-2	4-6 Blue Book	Y
Temporary waterway crossing	SD5-1	5-14 Blue Book	NR
Rock check dams	SD 5-4	5-22 Blue Book	NR
Earth Bank (low flow)	SD 5-5	5-25, Blue Book	Y – Clean water diversions
Earth Bank (high flow)	SD 5-6	5-26 Blue Book	NR
Concentrated Flow (Batter Chute)	SD 5-7	5-28 Blue Book	NR
Energy dissipater	SD 5-8	5-34 Blue Book	Y
Sediment Fence	SD 6-8	6-36 Blue Book	Y
Rock sediment basin	SD 6-1	6-16 Blue Book	NR
Gabion sediment basin	SD 6-1	6-17 Blue Book	NR
Earth basin - wet	SD6-4	6-19 Blue Book	NR
Turbidity barrier	SD6-10	6-39 Blue Book	NR
Mesh and Gravel Inlet Filter	SD 6-11	6-40 Blue Book	Y
Geotextile Inlet Filter	SD 6-12	6-41 Blue Book	NR

Control	Drawing Reference	Source Page Reference	Recommended standard erosion and sediment controls: Y (yes recommended) NR (not recommended) TBA (to be assessed by Eurobodalla Shire Council)
Stabilised Site Access	SD 6-14	6-48 Blue Book	NR
Control of wind erosion	SD6-15	6-49 Blue Book	NR
Temporary batter drains – typical arrangement	C2	Vol 2D Appendix C, p57	NR
Check dams in drains and gullies	C3 Figure 32	Vol 2D Appendix C, p58 NSW OEH (2012), p41	NR
Sediment Traps at drop inlets	C5	Vol 2D Appendix C, p60	NR
Sediment fence – typical arrangement	C6	Vol 2D Appendix C, p61	NR
Crowning and in fall drainage	Figure 5 & 7 (example photo)	NSW OEH (2012)	NR
Typical road drainage features (incl. Catch drain, table drain, mitre drain)	Figure 8	NSW OEH (2012)	NR
Rollovers	Figure 13 (example photo)	NSW OEH (2012)	NR
Catch drains	Figure 16	NSW OEH (2012)	NR
Temporary cross drain	Figure 14	NSW OEH (2012)	NR
Temporary crossing (Culvert)	Figure 27	NSW OEH (2012)	NR
Batter slope stabilisation (various)	Table D1 Group 1	Vol 2D Appendix C, p61	Y – (if required)
Erosion control blankets	Section 6.1.3, Figure 30 and Figure 31	NSW OEH, p38-40	Y – (if required)

Control	Drawing Reference	Source Page Reference	Recommended standard erosion and sediment controls: Y (yes recommended) NR (not recommended) TBA (to be assessed by Eurobodalla Shire Council)
Spoon drains on batters	Figures 40 and 41	NSW OEH (2012), p54	NR
Soil surface Mulching	Section 6.1.2 and 7.1.3	NSW OEH (2012), p38	TBA

6.3.3 Stockpile Management

Standard controls for stockpiles will be implemented as outlined in SD 4-1 of the Blue Book (Landcom, 2004) and would include the following measures:

- stockpiles to be treated with dust suppression, soil binder or equivalent. Where practical and safe to do so, stockpiles are to be covered.
- stockpiles to be placed away from concentrated water flow and clean water diversions
- stabilised Bunding/silt traps/hay bales to be established around stockpile area boundary
- surface water flows are diverted away from stockpiles
- stockpiles are to be kept to manageable sizes.

6.3.4 Weed control and management

Weed control will be carried out prior to vegetation clearing for construction works. Specific weed control measures are contained within the Construction Flora and Fauna Management Plan. Mitigation measures will be employed to prevent soil land water impacts include:

- herbicide application (if required):
  - the handling and use of herbicides on the site will be in accordance with labelling instructions and Safety Data Sheets and comply with the NSW Pesticides Act 1999. Herbicides should generally be applied when wind speeds are generally low.
  - herbicide application will take place after two consecutive days with no rain and prior to at least five consecutive days with no predicted rain. Herbicide application should be delayed if rain is forecasted.
- vehicle washdown (if required):
  - vehicle washdown to occur within designated hygiene control points established at site access points for any vehicle, machinery or personnel entering site.
  - minimisation of water volume will be achieved through high pressure
  - runoff from vehicle washdown will be contained within suitable earth bunded areas and standard controls used to prevent runoff entering site drains and pits.

6.3.5 Clean water diversions

Eurobodalla Shire Council will install upgradient clean water diversions around the site (i.e., minimising run-on) including:

- silt fencing will be installed along existing fence line to the north of the Storage Access Road and Storage Inlet Pipeline site to separate clean and dirty water flows
- installing a mesh and gravel filter inlet (or equivalent geotextile filter) will be placed over the existing stormwater pit downslope of the Southern Water Treatment Plant
- installing perimeter silt fencing and mulch bunds at the crest of the steep embankment to divert dirty water and prevent from entering the Tuross River.

Appendix A shows clean water diversions.

6.3.6 Maintaining vegetation

Vegetation clearing, including tree felling and slashing within the clearance boundary is required to be carried out during the Storage Access Road and Storage Inlet Pipeline construction works. In addition to requirements specified elsewhere in the CEMP and sub-plans, Eurobodalla Shire Council will adopt the following control measures when undertaking vegetation clearing activities to prevent topsoil destabilisation, along steep embankment slopes.

- grubbing and soil disturbance should be avoided. Retained roots can assist in soil stabilisation and some regrowth and coppicing can assist in the rehabilitation stage post construction
- slashed native vegetation, unless there is a specific need to remove, should be left in place
- larger trees within 10 metres of the clearing boundary are to be cut down with a chainsaw, not pushed over. Trees are to be felled into the clearing boundary to minimise damage to retained vegetation. Trunks and roots are to be left in situ to minimise soil erosion
- trees could be chipped, and the mulch used in windrows to control potential run off if appropriate and/or spread over disturbed earth to avoid soil erosion

6.3.7 Tannin management

The RMS Environment Direction Management of Tannins from Vegetation Mulch (RMS, 2012) states that 'Tannins are naturally occurring plant compounds. Tannin generation from vegetation mulch is likely to be highest from low-lying coastal floodplain areas. The species of vegetation (e.g., Melaleuca) will have a major impact on the likelihood of tannin generation.'

Eurobodalla Shire Council would assess and employ tannin management control measures wherever organic mulch us used or stockpiled onsite (mulch windrows, stockpiles and mulch cover areas,). Reference would be made to suitable control measures within the RMS Environmental Direction (RMS, 2012) including but not limited to:

- placement of silt fence on downslope side of mulch to prevent leaching of tannins
- visual monitoring during wet weather events for evidence of tannins
- mulch windrows to be limited in height (i.e., avoid excessive height above 1m) and placed along the contours to reduce concentrated flows.
- mulch stockpile areas (if required) should be established no less than 50 m from the Tuross River. Upgradient water should be diverted around stockpiles to prevent it entering the stockpile
- mulch cover should not be spread mulch in thicker than 100 millimetre layers.
- do not use mulch for surface cover on steep embankment slopes
- visual inspection of organic mulch vegetation areas within 24 hours following rainfall event greater than 10 millimetres to ensure tannin impacted water does not leach.

6.4 Contingency measures

6.4.1 Wet weather (heavy rainfall)

The following contingency measures are to be implemented to mitigate risks associated with inclement wet weather (heavy rainfall) during the works:

- weather and flood monitoring will be carried out daily as outlined in Section 7.3.2.
- works will be scheduled to not occur prior to or during heavy rainfall. Works will be postponed until after predicted heavy rain events
- progressive erosion and sediment controls would be installed, and maintenance inspections/repairs undertaken prior to weekends or periods of predicted heavy rainfall
- additional visual monitoring inspections to be undertaken during wet weather (heavy rainfall) as outlined in Section 7.3.1.

6.4.2 River flood potential

The following additional contingency measures will be carried out to mitigate risks of river flood potential:

- weather and flood monitoring will be carried out daily as outlined in Section 5.3.2
- works will be scheduled to not occur prior to or during heavy rainfall. Works will be postponed until after predicted heavy rain events
- erosion and sediment controls will be progressively installed during works installed and inspected prior to weekends and predicted heavy rainfall events.

6.4.3 Environmental spills

The following contingency measures apply for environmental spills:

- all liquid chemical handling/storage, refuelling and vehicle washdown activities will be located at a designated bunded area near the driveway entrance, away from stormwater drains and at least 50 metres away from the Tuross River
- a sediment sump located at the hydraulic low point at the site will be used a contingency pollution sump to capture and treat contaminated runoff
- an environmental spill kit will be readily available
- no refuelling activities will occur on the steep embankment slopes. All powered plant will be inspected and checked prior to use.

7 Compliance management

7.1 Roles and responsibilities

The roles and responsibilities of all project staff of relevance to the CSWMP are listed in the CEMP. Specific roles and responsibilities for this CSWMP are outlined within Table 7-1. Eurobodalla Shire Council will be primarily responsible for the implementation of the CSWMP and may engage a qualified consultant with experience in erosion and sediment control for monitoring and auditing.

Table 7-1 Project staff roles and responsibilities – specific to SWMP

Role	Responsibility
Project manager	• Develop/review Environmental Work Method Statements for compliance with this CSWMP • Review and update of Progressive Erosion and Sediment Control Plans • Monitoring and inspections within this CSWMP • Complete self-audits and monitor compliance with this CSWMP

7.2 Training

Training of all contractors and management staff will be conducted prior to construction works. Training will be conducted through a series of inductions, toolbox talks, daily pre-start meetings and the formulation of a lessons learnt register. A detailed description of the training methodology is outlined in Section 5.2 of the CEMP.

7.3 Monitoring and inspection

A program of monitoring and inspection will be carried out by the Project Manager / Project Engineer / Site Engineer. Monitoring of the erosion and sediment management controls is required to ensure the measures outlined in this CSWMP are implemented. The monitoring program will commence at the establishment of construction works.

The monitoring program will involve:

- assessment of erosion and sediment control measures
- compiling evidence of erosion and sedimentation and the correct function of erosion control devices
- forming recommendations for corrective measures and/or additional management measures
- all maintenance must be recorded to ensure compliance with the specification.

The monitoring program timings will be comprised of:

- informal daily inspection
- site environmental inspections, documented in a format that enables capture of all information such as environmental status, action and close out
- inspections carried out after heavy rainfall to ensure environmental controls are effective (Section 7.3.2)
- inspections of plant and equipment maintenance records to ensure all plant and equipment is being maintained to ensure optimum running conditions.

7.3.1 Visual monitoring

Regular visual monitoring is to commence following site mobilisation for the Storage Access Road and Storage Inlet Pipeline construction works for any potential or observable impacts to the Tuross River during construction activities. Visual monitoring is to be carried out at least daily (or more frequently if required) by the Environmental Representative during construction activities, and during and after wet weather (heavy rain) events. Visual monitoring is to include:

- making observations and photographic evidence for signs of:
  - damaged or ineffective erosion and sediment control measures
  - dirty water runoff from construction site directed towards Tuross river
  - tannin impacted runoff from use of mulch windrows or stockpiles
  - evidence of turbid plumes forming within the river
- employing appropriate corrective measures will be taken as required including:

  - temporarily stopping works (where appropriate)
  - review and amendment to Environmental Work Method Statements
  - inspecting and maintaining erosion and sediment control measures
  - incident investigations and reporting of notifiable incidents (where appropriate)
- documentation of visual monitoring and corrective actions undertaken during the construction period will be recorded.

7.3.2 Weather and flood monitoring

Weather and flood monitoring are to be carried out by the Environmental Representative during the construction activities to ensure that scheduled works do not occur during or shortly after heavy rainfall periods (including subsequent high river flows).

- daily monitoring data is to be obtained from the following online data sources:
  - daily river flows and rainfall monitoring data at 'Tuross River @ Eurobodalla (Station ID 218008)', located immediately adjacent to the proposal within the existing southern water treatment plant sourced from the Department of Primary Industries, Office of Water website (DPI, 2017).
  - rainfall monitoring data only at 'Bodalla Post Office (Station ID 069036)' located approximately six kilometres north-east of the proposal sourced from the Bureau of Meteorology website (BOM, 2017).
- predicted rainfall forecasts for 24-48 hours (or 72 hours prior to weekends) are to be notified to construction personnel during Daily Pre-start/toolbox discussions prior to undertaking works. Works will be stopped and rescheduled to avoid predicted heavy rainfall and high river flows.
- documentation of actual daily rainfall and river flows during construction will be recorded.

7.3.3 Water quality monitoring

No additional water quality monitoring is required during Storage Access Road and Storage Inlet Pipeline construction works, noting that construction and vegetation clearing activities will not involve any major earthworks adjacent to or direct interaction with the Tuross River.

As discussed in Section 4.4, Eurobodalla Shire Council will be undertaking construction water quality monitoring during the construction of the Eurobodalla Southern Water Supply Storage Project.

8 Safeguards and management measures

8.1.1 EIS compliance

Table 8-1outlines the EIS safeguards and mitigation measures that will be adopted to address potential impacts on hydrology and water quality.

Table 8-1 Safeguards and management measures - EIS (those not relevant to the early works construction activities are highlighted)

Impact	Environmental safeguards	Responsibility	Timing
Flooding	A Hydrology and Consequence Assessment would be carried out to inform the detailed design. Consideration of mitigation measures would be carried out in consultation with the relevant local authorities (e.g. NSW State Emergency Service) to ensure that flood related outcomes are consistent with floodplain risk management. This would be detailed in the Dam Safety Emergency Plan.	Council	Detailed design
Flooding	Construction planning would consider flood risk for all compounds and work sites. The site layout and staging of construction activities would avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required.	Construction contractor	Pre-construction Construction
Hydrology	Measures to further avoid and minimise the construction footprint will be investigated during detailed design and implemented where practicable and feasible. *Note that the design has been revised since the EIS was submitted to further avoid and minimise environmental impacts.*	Council	Detailed design
Hydrology	Additional assessment of scour potential would be undertaken as necessary during the detailed design. This would include the development of appropriate mitigation measures. *Note that the design has been revised since the EIS was submitted. The current design would prevent scour.*	Council	Detailed design
Hydrology	Works within or near watercourses would be undertaken with consideration given to the DPI Water's guidelines for controlled activities.	Construction contractor	Pre-construction Construction
Water quality	Water quality control systems would be incorporated into the detailed design to ensure that relevant WQOs can be met during water discharge.	Council	Detailed design

Impact	Environmental safeguards	Responsibility	Timing
	This does not relate to the Storage Access Road and Storage Inlet Pipeline construction activities as no discharges are proposed.		
Water quality	The current WQMSP will be revised (as necessary) and implemented during construction and operation of the proposal. The plan will specify: • Sampling locations relevant to assessing potential impacts and / or the effectiveness of control measures • The frequency of monitoring and sampling and the triggers for event-based monitoring / sampling • The monitoring and sampling methodology in accordance with relevant guidelines, and the parameters to be monitored and sampled • General and reactive management and mitigation processes • Procedures addressing relevant matters specified in relevant legislation and guidelines. *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction works as no discharges are proposed.*	Construction Contractor Council	Pre-construction Construction Operation
Water quality	Erosion and sediment mitigation measures would be installed and maintained for the duration of the construction period.	Construction contractor	Pre-construction Construction
Water quality	Discharges would be monitored to ensure compliance with WQOs and discharge criteria in the Environment Protection Licence. *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction activities as no discharges are proposed.*	Construction Contractor Council	Pre-construction Construction Operation
Water flows	Water extraction will be in accordance with the Tuross River WSP *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction works as no discharges are proposed.*	Council	Operation
Temporary structures	Temporary in stream structures will be constructed in accordance with the NSW DPI policy guideline and will: • Avoid spanning the full width of the waterway channel	Construction contractor	Pre-construction of storage site and in-stream works for TRIPS site. Construction

Impact	Environmental safeguards	Responsibility	Timing
	• Be inserted during low-flow periods with management plans being submitted to NSW DPI detailing how high flow events will be managed. • If require, dewatering of temporary in-stream structure should follow the following guidelines: – NSW DPI is to be notified 7 days prior to any dewatering activities to organise potential fish rescue activities. A separate s.37 permit may be required from NSW DPI to relocate fish – water is to be pumped a minimum of 30 m away from the waterway and should preferentially not re-enter the waterway. If water is to re-enter the waterway, ANZECC water quality guidelines need to be adhered to with the proponent being required to submit a detailed water quality monitoring program. *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction activities as no discharges are proposed.*		

8.1.2 Submissions Report compliance

Table 8-2 outlines the additional safeguards and mitigation measures that have been proposed to address potential impacts on hydrology and water quality.

Table 8-2 Additional water quality safeguards - Submissions report

Impact	Environmental safeguards	Responsibility	Timing
Water quality	The water quality of 'clean water' would be maintained through implementation of appropriate erosion and sediment controls and staged vegetation clearing in upslope areas. The coffer dam outlet will connect to the diversion pipe constructed through the base of the embankment, diverting 'clean' flow through the site to the outlet works. *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction works as no discharges are proposed.*	Construction Contractor	Construction
Water quality	Discharges would not occur during the construction of in-stream features within the Tuross River (i.e., intake pump structures). Temporary in stream structures (i.e. silt boom) would be constructed in accordance with the NSW DPI Policy and Guidelines (see requirements in Appendix D) and dewatering activities designed to avoid re-enter the waterway. *This does not relate to the Storage Access Road and Storage Inlet Pipeline construction works.*	Construction Contractor	Construction
Water quality monitoring	A revised Water Quality Monitoring and Sampling Plan (WQMSP) would be prepared during pre-construction and implemented during construction and operation of the proposal. This would outline the ongoing additional water quality monitoring to assess and demonstrate compliance with NSW WQOs during construction phase of the project. *Note that a baseline water quality assessment has been undertaken by Council, and site-specific trigger values have been developed (see Appendix C). Council will undertake monitoring as per the requirements of the baseline water quality assessment.*	Construction Contractor Council	Pre-construction Construction Operation

9 References

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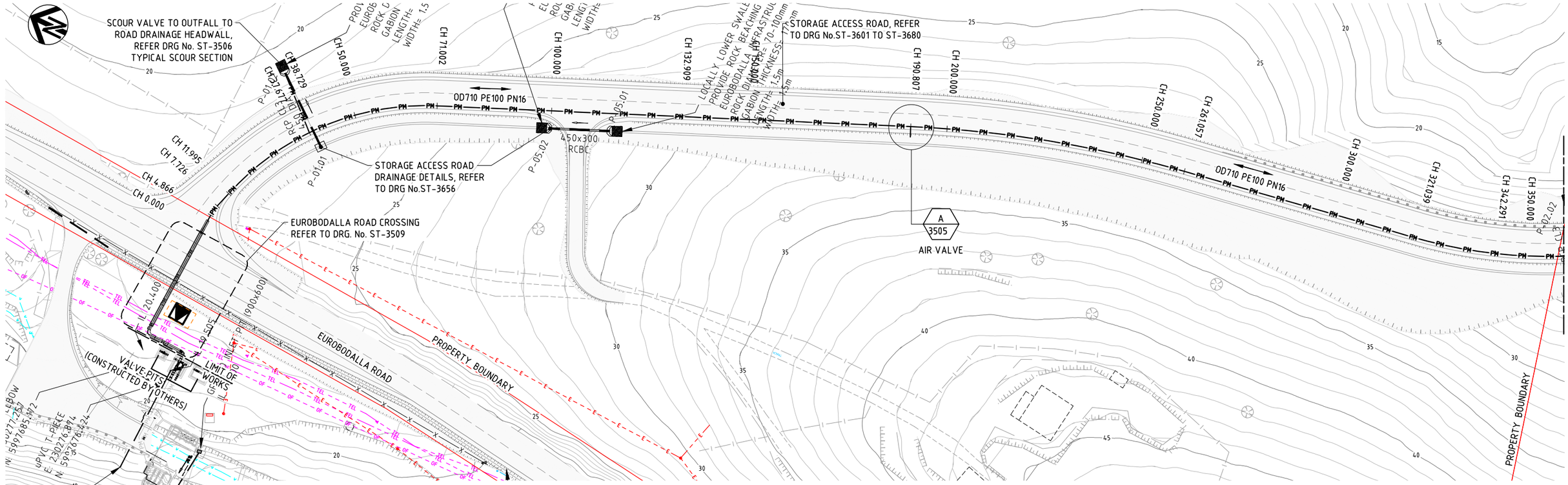
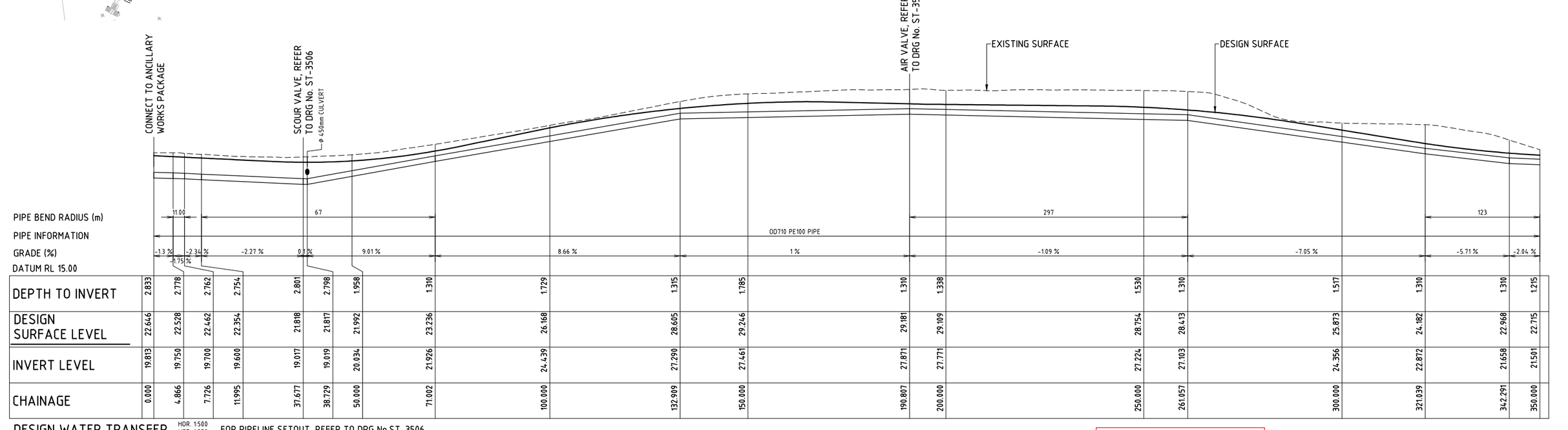
Appendix A Erosion and sediment control plan



LAYOUT PLAN
SCALE 1:500



DEPTH TO INVERT	2.833	2.778	2.762	2.754	2.801	2.798	1.958	1.310	1.729	1.315	1.785	1.310	1.338	1.530	1.310	1.517	1.310	1.310	1.215						
DESIGN SURFACE LEVEL	22.646	22.528	22.462	22.354	21.818	21.817	21.992	23.236	26.168	28.605	29.246	29.181	29.109	28.754	28.413	25.873	24.182	22.968	22.715						
INVERT LEVEL	19.813	19.750	19.700	19.600	19.017	19.019	20.034	21.926	24.439	27.290	27.461	27.871	27.771	27.224	27.103	24.356	22.872	21.658	21.501						
CHAINAGE	0.000	4.866	7.726	11.995	37.677	38.729	50.000	71.002	100.000	132.909	150.000	190.807	200.000	250.000	261.057	300.000	321.039	342.291	350.000						

PIPE BEND RADIUS (m): 11.00, 67, 297, 123

GRADE (%): -1.3 %, -2.34 %, -1.75 %, -2.27 %, 0.1 %, 9.01 %, 8.66 %, 1 %, -1.09 %, -7.05 %, -5.71 %, -2.04 %

DESIGN WATER TRANSFER HOR. 1:500 VER. 1:250 FOR PIPELINE SETOUT, REFER TO DRG No.ST-3506

DRAFT ISSUED FOR TENDER
NOT FOR CONSTRUCTION

NOTE:
1. REFER TO DRG. No. ST-3003 AND ST-3004 FOR GENERAL NOTES .

150 mm ON ORIGINAL

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ISSUE	DATE	AMENDMENT / ISSUE DESCRIPTION	APPROVAL
A	12/07/2018	ISSUED FOR 60% DETAILED DESIGN	CP
B	07/11/2018	ISSUED FOR 95% DETAIL DESIGN	CP
C	14/06/2019	DRAFT ISSUE FOR TENDER	CP
D	18/02/2020	ISSUED FOR TENDER	JR

TITLE	NAME
DRAFTSMAN	B. CORNELIUS
DRAFTING CHECK	C.PURSS
DESIGNER	B. CORNELIUS
DESIGN CHECK	B. MODINI
PROJECT MANAGER	D.EVANS
PROJECT DIRECTOR	B.TILBURY

SCALES AT A1 SIZE DRAWING
SCALE 1:250 2.5 0 5 10
SCALE 1:500 5 0 10 20

DESIGNER: SMEC Member of the Surbana Jurong Group

CLIENT: eurobodalla shire council

APPROVED | DATE

PROJECT TITLE
EUROBODALLA SHIRE COUNCIL
EUROBODALLA SOUTHERN STORAGE
STORAGE INLET/OUTLET PIPELINE
PLAN AND LONGITUDINAL SECTION
SHEET 1 OF 4

SCALE	DRAWING STATUS	PROJECT / DRAWING No.	ISSUE
AS NOTED	TENDER	30012127-ST-3500	D

Appendix B Agency Consultation Correspondence

Correspondence from consultation to be appended in this section

Reference: DOC21/795288-1
Date: 23 September 2021

SMEC
PO Box 1052
North Sydney NSW 2059

Attention: Anthony Moll – Environmental Scientist

Dear Anthony,

Eurobodalla Southern Water Supply Storage – SSD-7089 – Access Road and Pipeline to Property Boundary

I refer to the documentation provided to the NSW Environment Protection Authority (EPA) on 9 September 2021, regarding the Storage Access Road and Inlet Pipeline works associated with the Eurobodalla Southern Water Storage System.

Thank you for providing the EPA with the opportunity to review the Construction Environment Management Plan and Construction Soil and Water Management Plan associated with this project. The EPA understands that as per the condition of Development Consent SSD-7089 the EPA is required to be consulted regarding the proposed sediment and erosion controls for the construction of these works; however, the EPA does not approve or endorse management plans. The EPA has reviewed the documents and provides the following comments.

As the receiving environment for the project is the Tuross River which flows into the high conservation value Batemans Bay Marine Park, the EPA considers that a high standard of sediment and erosion controls be implemented top protect the NSW Water Quality Objectives of Tuross River and Tuross Lake during construction.

The EPA have no further recommendations on the controls and procedures outlined in the management plans provided. The EPA notes the management plans incorporate the advice the EPA has given during other stages of the project, in particular the development of pre-rainfall checks and procedures.

The EPA reminds Eurobodalla Shire Council of the strict liability provisions of the *Protection of the Environment Operations Act 1997* (POEO Act), particularly section 120 of the Act which prohibits the pollution of water. As such, any person who pollutes waters or causes waters to become polluted,

Phone 131 555
Phone +61 2 6229 7002
Fax +61 2 6229 7001
TTY 133 677
ABN 43 692 285 758
PO Box 622
Queanbeyan NSW
2620 Australia
Level 3
11 Farrer Place
Queanbeyan NSW
2620 Australia
queanbeyan@epa.nsw.gov.au
www.epa.nsw.gov.au

including placing matters in a position where it can be washed or fall into waters, is guilty of an offence under section 120 of the POEO Act.

Thank you for discussing the matter with the EPA. If you have any questions or wish to discuss the matter further, please contact Claudine Jeffery or myself on (02) 6229 7002 or at EPA.southopsregional@epa.nsw.gov.au.

Yours sincerely

MATTHEW RIZZUTO
Unit Head – Regional South
Regulatory Operations

Anthony MOLL

From: Timothy Baker <tim.baker@nrar.nsw.gov.au>
Sent: Tuesday, 5 October 2021 8:16 AM
To: Anthony MOLL
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation trk:00430000332

Hi Anthony,

I can confirm the CEMP and CSWMP have been reviewed for the access road and pipeline to property boundary as part of the Eurobodalla southern storage works. It is understood this consultation was required by Condition B13 of the project approval for SSD-7089. NRAR has no comment on these plans.

Regards
Tim

Tim Baker | Senior Water Regulation Officer
Natural Resources Access Regulator
Department of Planning, Industry & Environment
M: 0428 162 097 | E: Tim.Baker@dpie.nsw.gov.au
www.industry.nsw.gov.au

From: Anthony MOLL <Anthony.Moll@smec.com>
Sent: Friday, 1 October 2021 11:47 PM
To: Timothy Baker <tim.baker@nrar.nsw.gov.au>
Cc: Rachel Daly <rachel.daly@nrar.nsw.gov.au>
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation trk:00430000332

Thank you Tim, much appreciated.

Kind regards

Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia

From: Timothy Baker <tim.baker@nrar.nsw.gov.au>
Sent: Friday, 1 October 2021 10:08 AM
To: Anthony MOLL <Anthony.Moll@smec.com>
Cc: Rachel Daly <rachel.daly@nrar.nsw.gov.au>
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation trk:00430000332

This Message Is From an External Sender

This message came from outside your organization.

Hi Anthony,

I can confirm I have received your email. I will aim to update you at the start of next week.

Regards
Tim

From: Anthony MOLL <Anthony.Moll@smec.com>
Sent: Friday, 1 October 2021 9:59 AM
To: Timothy Baker <tim.baker@nrar.nsw.gov.au>
Cc: NRAR Service Desk Mailbox <nrar.servicedesk@dpie.nsw.gov.au>
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation trk:00430000332

Good morning Tim,

I hope this email finds you well. By way of introduction, my name is Anthony and I am coordinating the agency consultation for the CEMP for this project on behalf of Eurobodalla Shire Council. I was hoping for an update if you and your team has had an opportunity to review the CEMP and CSWMP we had sent through, and if you knew what kind of time frame you were working with for their review? I understand that you are quite busy.

Please reach out should you require any more information.

Kind regards,

Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia

From: NRAR Coordination Mailbox <coordination@nrar.nsw.gov.au>
Sent: Monday, 27 September 2021 6:24 PM
To: Anthony MOLL <Anthony.Moll@smec.com>
Cc: Timothy Baker <tim.baker@nrar.nsw.gov.au>
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation trk:00430000332

This Message Is From an External Sender

This message came from outside your organization.

Dear Anthony,

Thank you for your enquiry about the progress of your enquiry: Reference number V15/3875-5#9.

We apologise for the delay in providing our response to your enquiry, and any inconvenience this delay has caused.

We are currently experiencing a high number of Enquiries which is affecting our response times.

We are endeavouring to address all enquiries as soon as possible, in the order in which we have received the enquiries.

An NRAR officer Timothy Baker) has been assigned to your enquiry and we will update you as soon as possible regarding its progress.

If you have any further questions or should require further assistance, please do not hesitate to contact our team at nrar.servicedesk@dpie.nsw.gov.au.

Kind regards

Ilse

Reg Coord - Service Support Team
Natural Resources Access Regulator | Lands & Water Division | Department of Planning, Industry & Environment
Locked Bag 5022, Parramatta NSW 2124
T: 1800 633 362
E: nrar.servicedesk@dpie.nsw.gov.au
W: www.industry.nsw.gov.au/nrar

To contact the NRAR Hotline and make a suspicious activity report call: 1800 633 362

Read the NRAR Progress Report 2019-20

The Department of Planning, Industry and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

---------- Original Message ----------
From: Anthony MOLL <anthony.moll@smec.com>;
Received: Wed Sep 15 2021 15:54:19 GMT+1000 (Australian Eastern Standard Time)
To: David Zerafa <david.zerafa@nrar.nsw.gov.au>; David Zerafa <david.zerafa@nrar.nsw.gov.au>; David Zerafa <david.zerafa@nrar.nsw.gov.au>; NRAR Industry mailbox <nrar.servicedesk@industry.nsw.gov.au>; water.enquiries@dpie.nsw.gov.au;
Cc: Bob.Tilbury@smec.com; harvey.lane@esc.nsw.gov.au; Jessica.Miller@smec.com;
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation
Good afternoon David,

Wanted to follow up to confirm from my previous email, the status of our submission for agency consultation on a Construction Environmental Management Plan for the Eurobodalla southern storage works?
Tried to give you a call this afternoon and left a voice message. Happy to discuss, my contact details are below.

Kind regards,
Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia

From: Anthony MOLL
Sent: Friday, 10 September 2021 2:01 PM

To: Nrar.servicedesk@industry.nsw.gov.au; Water.enquiries@dpie.nsw.gov.au; David.zerafa@dpi.nsw.gov.au
Cc: Jessica MILLER <Jessica.Miller@smec.com>; 'Harvey Lane' <Harvey.Lane@esc.nsw.gov.au>
Subject: SSD-7089 - Request for CEMP and CSWMP Consultation

Good afternoon David,

I write on behalf of SMEC's client, Eurobodalla Shire Council, regarding the upcoming scope of works to construct the Access Road and Pipeline to property boundary (early works construction activities) for the Eurobodalla Southern Storage Project (the Project). The Eurobodalla Southern Water Supply Storage was granted Development Consent from the Department of Planning, Industry and Environment (DPIE) on 17 October 2019 (Significant State Development SSD-7089).

We are required by the Conditions of Development Consent SSD-7089 to consult with the Natural Resources Access Regulator (former DPIE – Water) regarding proposed erosion and sediment controls and vegetation clearing for the construction of this scope of works. The further details of this matter are spelled out in the letter which is attached to this email.

I have also attached a copy of our proposed Construction Environmental Management Plan and Construction Soil and Water Management Plan (ESCP appended) and Construction Flora and Fauna Management Plan.

We look forward to hearing back from you regarding this project.

Best regards,
Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia
SMEC Australia We're redefining exceptional

From: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Sent: Tuesday, 21 September 2021 2:38 PM
To: Anthony MOLL
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation - Eurobodalla Southern Storage Access Road and Pipeline

HI Anthony,

Thank you for this notification.

DPI Fisheries has reviewed the Construction Environmental Management Plan, Soil and Water Management Plan, and Construction Flora and Fauna Management Plan for the Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary that were attached to your email below.

DPI Fisheries supports these plans and has no changes to recommend to these documents.

Regards,
Carla Ganassin | Senior Fisheries Manager - South | Coastal Systems
NSW Department of Primary Industries | Fisheries
Block E, Level 3, 84 Crown Street, Wollongong NSW 2500
SEND MAIL TO: PO Box 97, Huskisson NSW 2540
T: (02) 4222 8342 | M: 0447 644 357 | E: carla.ganassin@dpi.nsw.gov.au

---

From: Anthony MOLL <Anthony.Moll@smec.com>
Sent: Thursday, 16 September 2021 11:06 AM
To: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>; Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Cc: Jessica MILLER <Jessica.Miller@smec.com>; Harvey Lane <harvey.lane@esc.nsw.gov.au>; Bob TILBURY <Bob.Tilbury@smec.com>
Subject: SSD-7089 - Request for CEMP and CSWMP Consultation - Eurobodalla Southern Storage Access Road and Pipeline

Good morning Carla,

I hope this email finds you well. I write on behalf of SMEC's client, Eurobodalla Shire Council, regarding the upcoming scope of works to construct the Access Road and Pipeline to property boundary (early works construction activities) for the Eurobodalla Southern Storage Project (the Project). The Eurobodalla Southern Water Supply Storage was granted Development Consent from the Department of Planning, Industry and Environment (DPIE) on 17 October 2019 (Significant State Development SSD-7089). I note that you were the contact for the associated Eurobodalla Southern Storage - Tuross River Intake Pipeline works (TRIPS), undertaken by Quay

Civil last November 2020 (under the same SSD Consent SSD-7089).

We are required by the Conditions of Development Consent SSD-7089 to consult with DPI Fisheries regarding proposed erosion and sediment controls and vegetation clearing for the construction of this scope of works. The further details of this matter are spelled out in the letter which is attached to this email.

I have also attached a copy of our proposed Construction Environmental Management Plan and Construction Soil and Water Management Plan (ESCP appended) and Construction Flora and Fauna Management Plan.

We look forward to hearing back from you regarding this project.

Best regards,

Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia
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Appendix C Baseline Water Quality Monitoring Report

SMEC

Member of the Surbana Jurong Group

local people
global experience

DRAFT Baseline Water Quality Monitoring Report

Eurobodalla Southern Storage

Reference No. 30012127-R20
Prepared for NSW Public Works
25 May 2020

SMEC INTERNAL REF. 30012127

Document Control

Document:	DRAFT Baseline Water Quality Monitoring Report
File Location:	\\AUMBFPV002\projects\Projects\30012127 - Eurobodalla Storage\06 Deliverables\01 Reports and Tech Notes\R20 Baseline Water Quality Monitoring Report
Project Name:	Eurobodalla Southern Storage
Project Number:	30012127
Revision Number:	DRAFT

Revision History

Revision No.	Date	Prepared by	Reviewed by	Approved for Issue by
DRAFT	25 May 2020	Leura Kowald Cara Jacques	Alex Williams	Greg Tallentire

Issue Register

Distribution List	Date Issued	Number of Copies
NSW Public Works	25 May 2020	1 electronic PDF and Word
Cameron Purss (SMEC)	25 May 2020	1 electronic PDF and Word
SMEC Library	25 May 2020	1 electronic PDF and Word

SMEC Company Details

Approved by:	Cameron Purss		
Address:	[Insert office address of approving manager]		
Signature:			
Tel:	+61 3 9869 0954]		
Email:	Cameron.purss@smec.com	Website:	www.smec.com

Important Notice

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This report must be read as a whole. The executive summary is not a substitute for this. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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Appendices

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Abbreviations and Acronyms

Abbreviation / Term	Parameter / Description
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
COC	Contaminant of Concern
CRMRM	Cumulative Residual Monthly Rainfall Mass
DO	Dissolved Oxygen
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
LOR	Limit of Reporting
LGA	Local Government Area
LLD	Lower Limit of Detection
m	meters
mAHD	Meters Australian Height Datum
mBGL	Meters Below Ground Level
RL	Relative Level in mAHD
MGA 94	Map Grid of Australia Projection 1994
mg/L	Milligrams per litre
ppm	Parts per million
NTU	Nephelometric Turbidity Unit
RL	Relative Level; generally referenced to mAHD
RPD	Relative Percent Difference
SEAR	Secretary's Environmental Assessment Requirements
SWL	Standing Water Level
SWTP	Southern Water Treatment Plant
TKN	Total Kjeldahl Nitrogen
WQM	Water Quality Meter (field portable)
µS/cm	Micro siemens per centimetre - units of measurement for electrical conductivity

1 Introduction

1.1 Project Overview

Eurobodalla Shire Council (Council) are planning the construction of a new 3000ML off-stream water supply storage and associated infrastructure (the Project). The Project will enable raw water to be extracted from the Tuross River from a new river intake pump station and the existing borefield for transfer to the new water supply storage. The Project Site is located within Tuross River and Bodalla State Forest in the Eurobodalla Shire LGA as shown in Figure 1.1.

Major components of the works include an embankment, spillway, inlet and outlet works, a transfer system, pipelines and road upgrade. Tuross River intake and pumping station (TRIPS) will be constructed adjacent to the Tuross River for extraction of raw water during Project operation. The scale of Project construction activities are expected to include:

- Clearing around 55 hectares of native vegetation
- Extraction and processing of around 487,000 m^3 of material within the storage inundation area for use onsite
- Importation of around 163,000 m^3 of material for construction
- Concrete batching
- Temporary coffer dam on the Tuross River for intake construction.

1.2 Background

SMEC Australia Pty Ltd (SMEC) prepared an Environmental Impact Statement (EIS) followed by a Submissions Report in which several environmental management and mitigation measures were adopted for the Project. The Project was approved in 2019 subject to the conditions of the Development Consent under Section 4.38 of the Environmental Planning and Assessment Act 1979.

Prior to surface disturbances, the Development Consent included a requirement to prepare of a Construction Soil and Water Management Plan as part of the Construction Environmental Management Plan (CEMP) (refer to Condition B13). Several management and mitigation measures applicable to water quality during construction were also noted as a result of the EIS and Submission Report.

As part of the EIS, Council previously carried out 12 months of baseline water quality monitoring between October 2017 and September 2018 in accordance with the Water Quality Monitoring Sampling Plan prepared by SMEC (Ref 30012127-R01, dated 17 August 2017). Following submission of the EIS, SMEC advised Council to undertake a further review of the water monitoring data to inform construction water quality monitoring and management measures. Council requested SMEC to prepare this Baseline Water Quality Monitoring Report (this report) and revision to the Water Quality Monitoring Sampling Plan for the construction phase of the project.

1.3 Purpose and scope

The purpose of this Baseline Water Quality Monitoring Report (the Report) was to review the 12 months of baseline water quality monitoring data and provide an assessment of the baseline water quality, covering physical and chemical parameters (excluding microbiological parameters). This included development of preliminary 'site-specific' assessment criteria (i.e. trigger values) used to compare future water quality results prior to, during and after construction identify potential issues with water quality and trigger the relevant management / mitigation responses.

The scope of this Report includes:

- Overview of monitoring methodology
- Collation of existing surface and groundwater monitoring data
- Presentation of results for key parameters
- Interpretation of results and recommendations
- Outline of the proposed second year of baseline monitoring program
- Development of investigation levels
- Response and mitigation measures.

It was beyond the scope of this assessment to review microbiological parameters for construction purposes, noting these are applicable to operational assessment the raw water quality suitability for drinking water supply purposes.

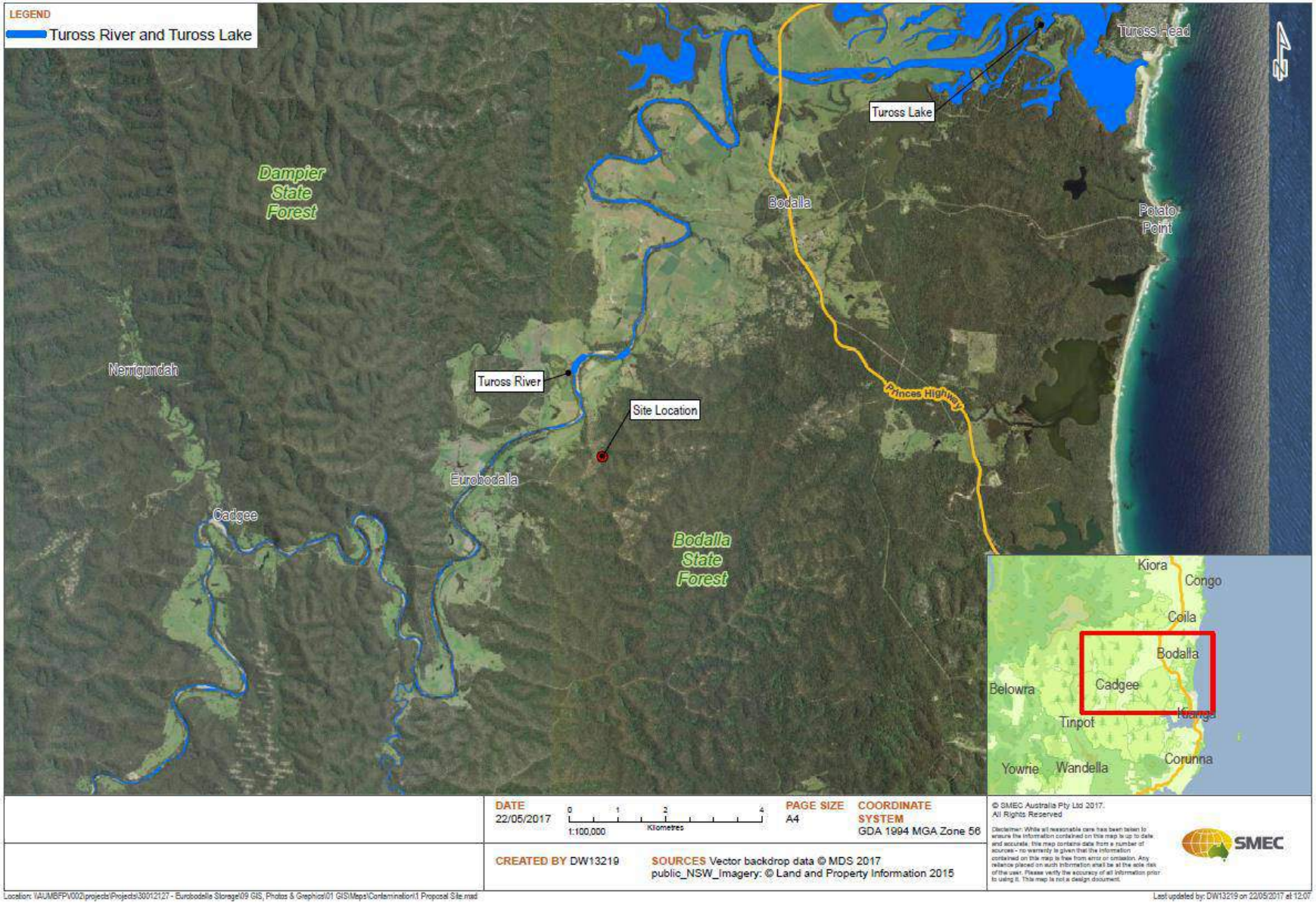


Figure 1.1: Site location and regional context

2 Site environmental setting

2.1 Site Description

The Site is located in the Eurobodalla Shire Council region on the New South Wales south coast around about 30 kilometres to the south of Moruya, 14km North-West from Narooma and around 7km south-west from Bodalla. The Storage site is located, on a third order ephemeral stream, approximately 950 metres east of the Tuross River, within the Tuross River catchment. Figure 2.1 shows the Site location, monitoring points and existing and proposed infrastructure. There are six surface water quality monitoring locations and one groundwater quality monitoring location.

The Site's surface water monitoring covers an approximate 4km section of the Tuross river, starting upstream of the construction just below the bridge which crosses the river at Nerrigundah Mountain Road. The construction area covers approximately 55 hectares and is bounded by the roads on the hills surround the Site; Bullocky's Hutt Road on the western and southern and Big Rock Road on the eastern side, which act as surface water catchment divides. An ephemeral creek connects the small catchment area to the Tuross River.

2.2 Climate and Meteorology

The Site is located within an area classified as temperate under the BOM Koppen Class, characterised by warm summer and cold winter with seasonal rainfall predominantly uniform to wet summer and low winter rainfall. The regional climate is strongly influenced by the Tasman Sea and the proximity of the coast to the Great Dividing Range. The closest weather station recording rainfall, weather and climate is Narooma (Marine Rescue) (Station Number 069022), approximately 16.4km south-east of the Site.

The nearest BOM station for evaporation data is Moruya Airport (Station number 069148) which is located approximately 29km north-east of the Site on a coastal aspect. The nearest rainfall station is located at Bodalla Post Office (Station Number 069036). The weather and climate data is summarised in Error! Reference source not found. and Table 2-1: Rainfall Data BOM Station 069036 for all years 1900 to February 2020

Statistic	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean rainfall (mm)	96.3	105.3	109.7	80.8	75.6	85.0	53.5	54.1	60.2	77.5	79.3	85.9	963.2
Median rainfall (mm)	74.5	62.5	70.4	45.8	46.0	45.2	28.0	23.9	44.4	51.7	65.0	67.4	624.8
Highest Daily (mm), month and year of highest on record	228.8, 29th 1999	337.3, 6th 1971	179.6, 21st 1914	293.4, 8th 1945	272.8, 28th 1900	162.6, 5th 1899	160.0, 11th 1957	132. 12th 1929	143.5, 28th 1970	187.6, 14th 1976	141.0, 5th 1973	159.0, 9th 1992	

Table 2-2 using Narooma and Bodalla and Figure 2.2 presents a summary of the monthly rainfall for 2019 compared to the mean and median. Evaporation is not considered as Moruya Airport is too far from the Site to be representative.

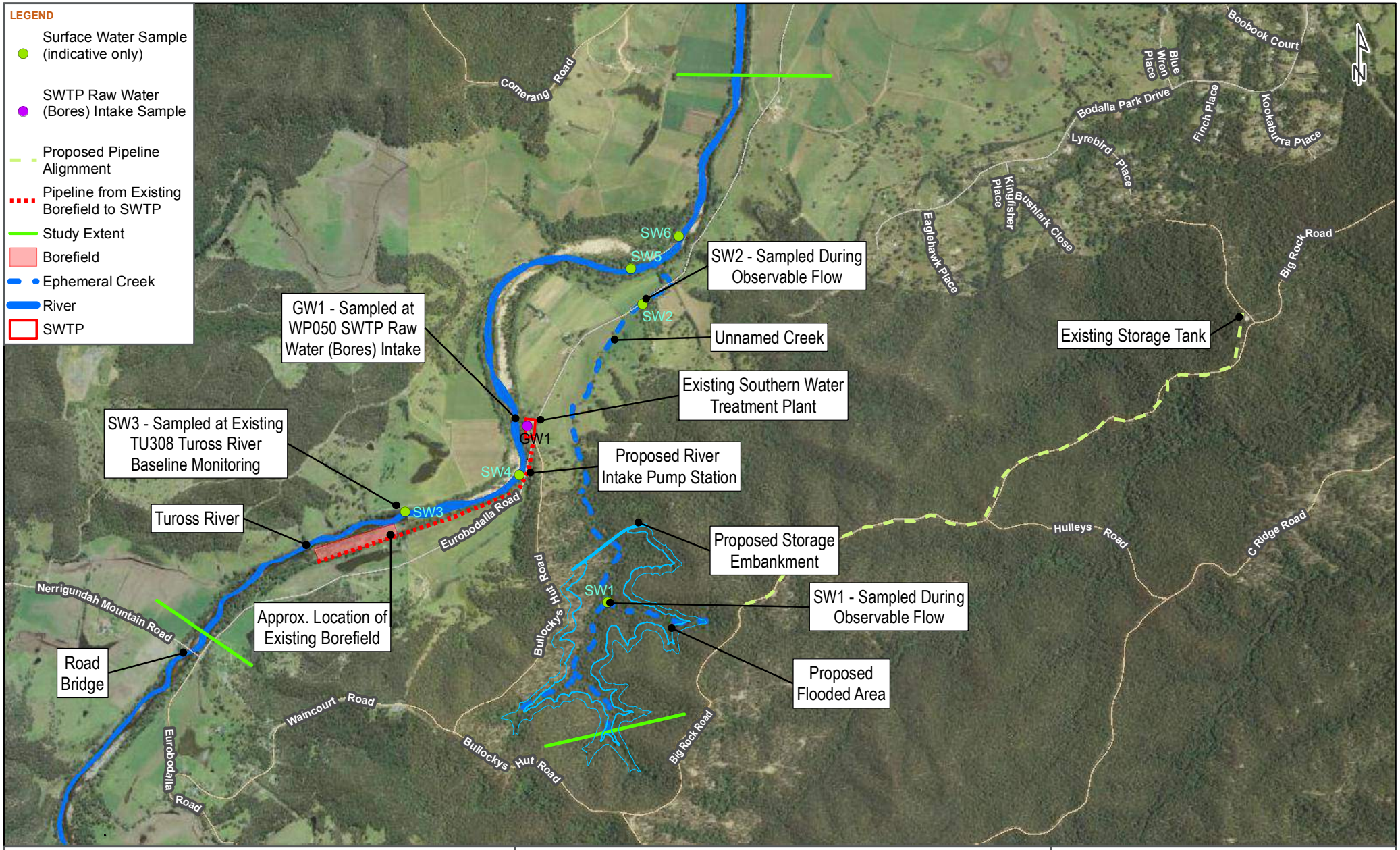


FIG NO. 2	**FIGURE TITLE** Proposal Site Features and Water Quality Monitoring Locations	**DATE** 04/08/2017	0 0.5 1 Kilometres 1:30,000	**PAGE SIZE** A4	**COORDINATE SYSTEM** GDA 1994 MGA Zone 56
PROJECT NO. 30012127	**PROJECT TITLE** Eurobodalla Southern Storage	**CREATED BY** FN12672	**SOURCES** Vector backdrop data © MDS 2017 public_NSW_Imagery: © Land and Property Information 2015		

SMEC

Location: \\AUMBFPV002\projects\Projects\30012127 - Eurobodalla Storage\09 GIS, Photos & Graphics\01 GIS\Maps\Contamination\2 Proposed Water Quality Monitoring Locations.mxd

Last updated by: FN12672 on 4/08/2017 at 11:50

Table 2-1: Rainfall Data BOM Station 069036 for all years 1900 to February 2020

Statistic	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Mean rainfall (mm)	96.3	105.3	109.7	80.8	75.6	85.0	53.5	54.1	60.2	77.5	79.3	85.9	963.2
Median rainfall (mm)	74.5	62.5	70.4	45.8	46.0	45.2	28.0	23.9	44.4	51.7	65.0	67.4	624.8
Highest Daily (mm), month and year of highest on record	228.8, 29th 1999	337.3, 6th 1971	179.6, 21st 1914	293.4, 8th 1945	272.8, 28th 1900	162.6, 5th 1899	160.0, 11th 1957	132. 12th 1929	143.5, 28th 1970	187.6, 14th 1976	141.0, 5th 1973	159.0, 9th 1992	

Table 2-2: Climate Data for BOM Station 069022 Narooma for 1965 to 2019

Statistic	January	February	March	April	May	June	July	August	September	October	November	December
Mean minimum temperature (°C)	23.8	23.7	22.9	21.2	19.0	16.8	16.3	16.9	18.4	19.6	20.8	22.1
Mean maximum temperature (°C)	16.7	16.8	15.5	13.1	10.2	8.0	6.7	7.4	9.1	11.3	13.3	15.2
Mean Rainfall (mm) (1910 to Feb 2020)	90.8	90.7	104.9	80.7	75.4	89.6	48.1	50.3	58.1	72.7	73.8	73.5
Mean 9am relative humidity % (1972 to 2010)	79	81	79	75	75	74	73	69	69	71	75	75
Mean 9am wind speed km/hr (1972 to 2010)	9.3	8.6	7.7	7.3	7.3	8.6	8.2	8.0	9.1	10.0	10.6	10.4
Mean 3pm relative humidity % (1972 to 2010)	74	74	71	68	65	62	60	58	63	70	72	73
Mean 3pm wind speed km/hr (1972 to 2010)	15.1	14.5	14.4	12.5	11.5	11.7	11.9	13.1	15.3	15.6	16.1	15.5

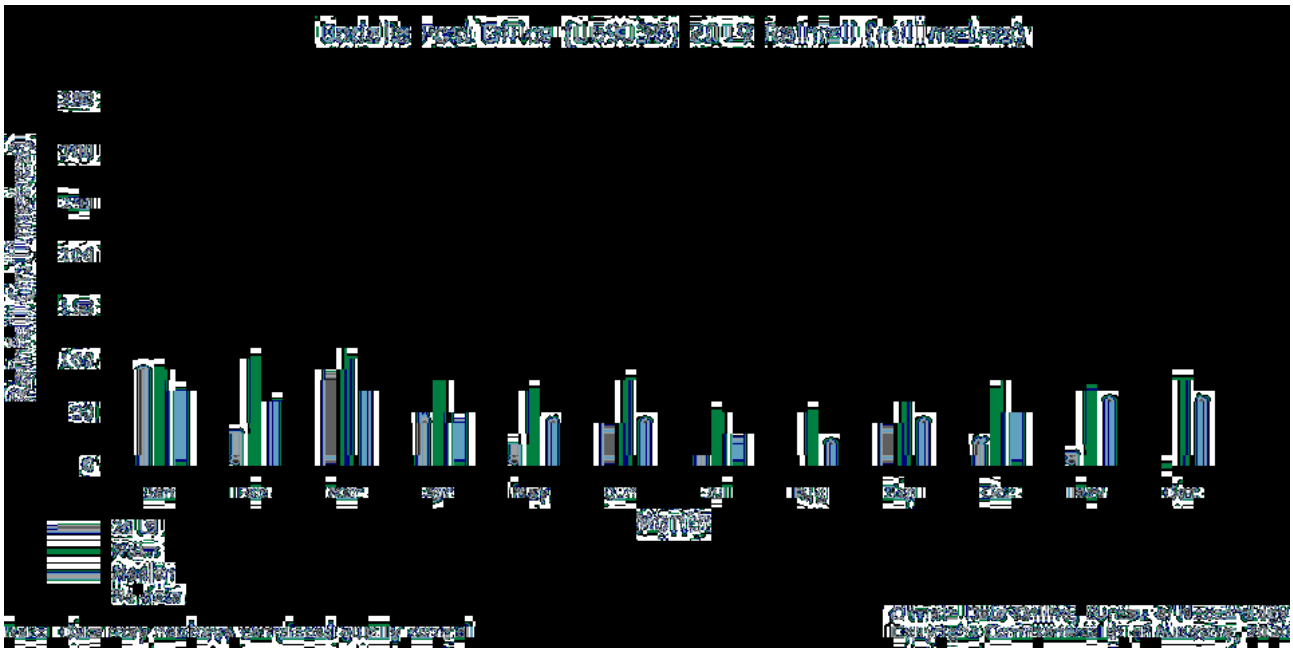


Figure 2.2: Monthly rainfall summary for 2019 comparing the mean and median results

2.2.1 Cumulative Residual Monthly Rainfall Mass

The cumulative residual monthly rainfall mass (CRMRM) trend compares the actual cumulative monthly rainfall with the long-term monthly average to establish a trend in terms of periods of above or below average rainfall. It is a useful tool for assessing drivers for water level changes in hydrographs and aids in the identification of impacts caused by factors other than climate. Where a water table aquifer is responding to climatic variations the hydrograph plot will tend to mirror the CRMRM.

Figure 2.3 presents a plot of monthly total rainfall and CRMRM between 1900 and June 2019 and Error! Reference source not found. presents the CRMRM between 1990 and 2019. The CRMRM was calculated using monthly total rainfall data from BOM station 90147 from 1899 to 2019. Where records did not exist, data has been taken from the following locations to infill the monthly totals:

- from the now closed Bodalla State Forest Station (No. 69007), which is approximately 6.9km away from the Site was used to infill monthly totals between July 1949 and January 1955;
- for February to September 1982 no nearby stations had data and the mean rainfall from Table 3.2 is used
- the mean monthly rainfall from Table 3.2 is used:
  - for July 1999;
  - November 2000;
  - May, September, November and December 2001;
  - December 2002;
  - May 2003;
  - September 2004;
  - January, June, July and August 2006;
  - November 2007;
  - December 2010; and
  - June 2016.

Figure 2.3 shows from 1900 to 1944 a persistent general trend of below average rainfall conditions followed by a strong change to above average rainfall conditions to around 1978. From 1978 to 1988 there is short period of below average rainfall followed by generally average to slightly above average rainfall to around 2002. From 2003 to 2013 generally average rainfall conditions are observed and from 2013 to 2019 the trend is for generally below average rainfall

conditions. Figure 2.4 presents the monthly rainfall totals from 2016 to 2019 with the CRMRM trend line. There is a short period of generally average rainfall conditions between February 2017 and November 2018.

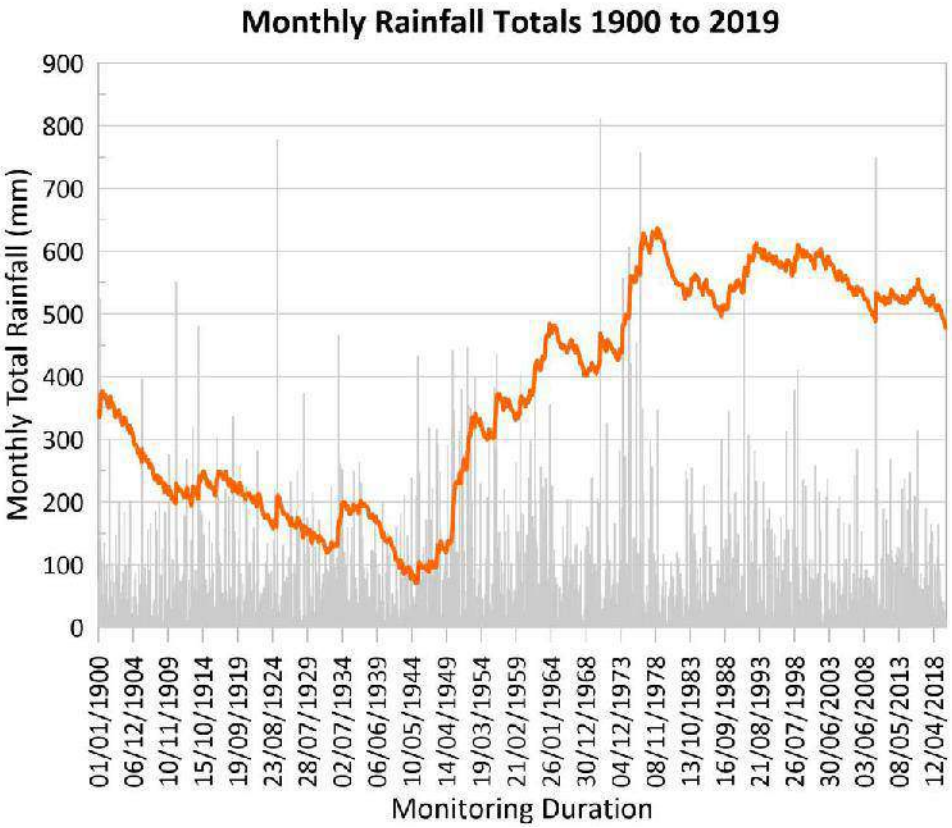


Figure 2.3: Monthly total rainfall from 1900 to 2019 with cumulative residual monthly rainfall mass (orange line)

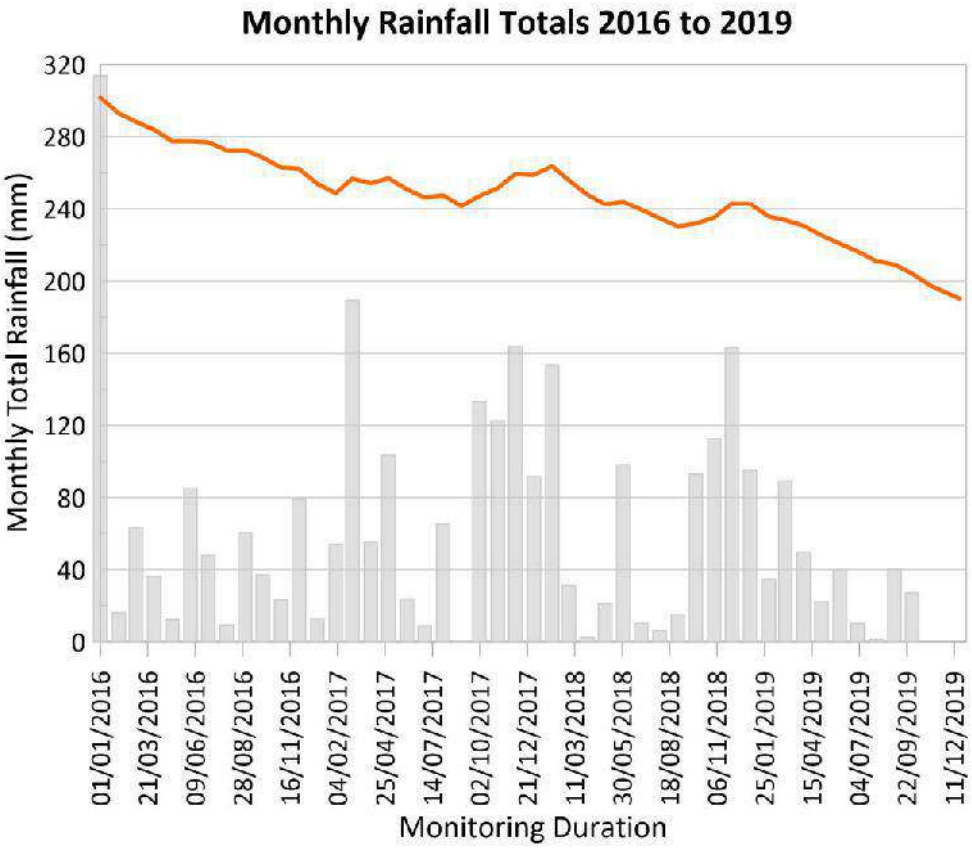


Figure 2.4: Monthly total rainfall from 2016 to 2019 with cumulative residual monthly rainfall mass (orange line)

2.3 Catchment and Geology

2.3.1 Tuross River Catchment

The Tuross River catchment covers an area of around 1814 km^2 and consists of mainly steep heavily forested land and low-land alluvial floodplains. The river rises on the western edge of the Wadbilliga National Park and flows in general north, east and north-east direction descending 1170 meters in elevation over 147 km and discharging into Tuross Lake and the South Pacific Ocean. The narrow river floodplain broadens from around 2.5m south-west of Bodalla. There 14 major tributaries, including Back River and Wadbilliga River that feed the Tuross River. The EIS outlines the river conditions index (RCI) as 'very good' for the Tuross River.

Current land use in the area is dominated by protected areas and privately-owned forest. Livestock grazing and irrigation for dairy farming with minor urban development make up around 10% of the catchment. These activities occur both up-gradient and downgradient of the Site. Tuross River and catchment is part of the Tuross River Water Sharing Plan for unregulated and alluvial water sources under the Water Act 2000 regulatory framework.

Within the low-land alluvial floodplain of the Site, the Tuross River and tributaries are subject to periodic erosion and sediment deposition. Large amounts of mobile sand are held within the lowland reaches of the Tuross River and tributary streams. The alluvial aquifer sediments of the Tuross river are comprised of eroded highlands of the Lachlan Fold Belt during the formation of the river system.

2.3.2 Geology

The bedrock of the Tuross River Catchment lies with the structural complex of the Lachlan Fold Belt and comprises metamorphosed Ordovician sandstone and Silurian ages and Devonian metasediments and granite intrusions. Ordovician sediments of the Adaminaby Group underlay the Site, comprising a turbiditic sequence of sandstone mudstone, shale carbonaceous shale, greywacke, chert, quartz arenite phyllite and slate. They are folded and generally steeply dipping.

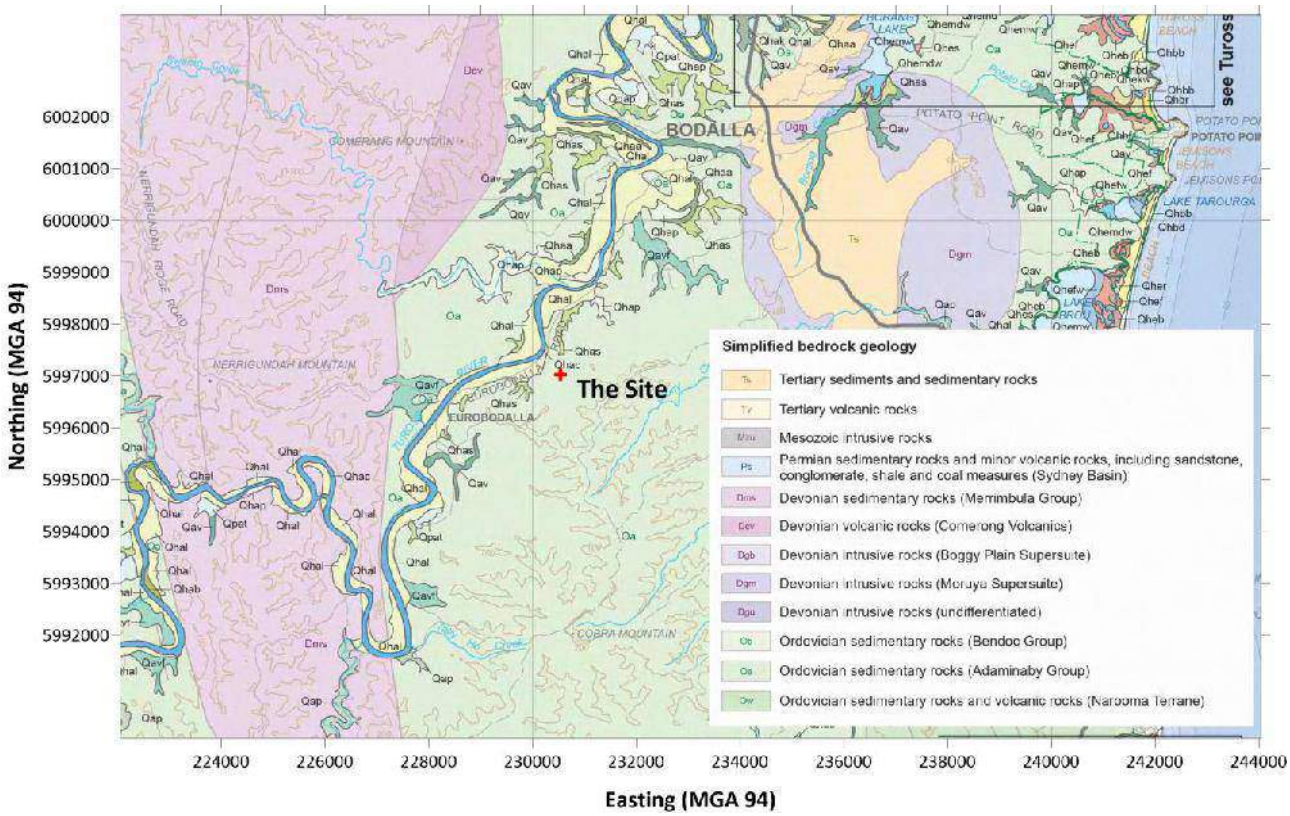


Figure 2.5: 1:100,000 coast quaternary geology map for Eurobodalla (modified from Troedson and Hashimoto 2013)

2.4 River data

The Tuross River has real-time continous water level and discharge monitoring at Station Number 218008, which can be accessed through the BOM Water Online portal and Water NSW online portal, details of which are shown on Figure 2.7. The guaging station is located just upstream the Southern Water Treatment Plant. The water level at the gauge ranges from just below 0 m to just over 12 m and is shown with river discharge on Figure 2.7.

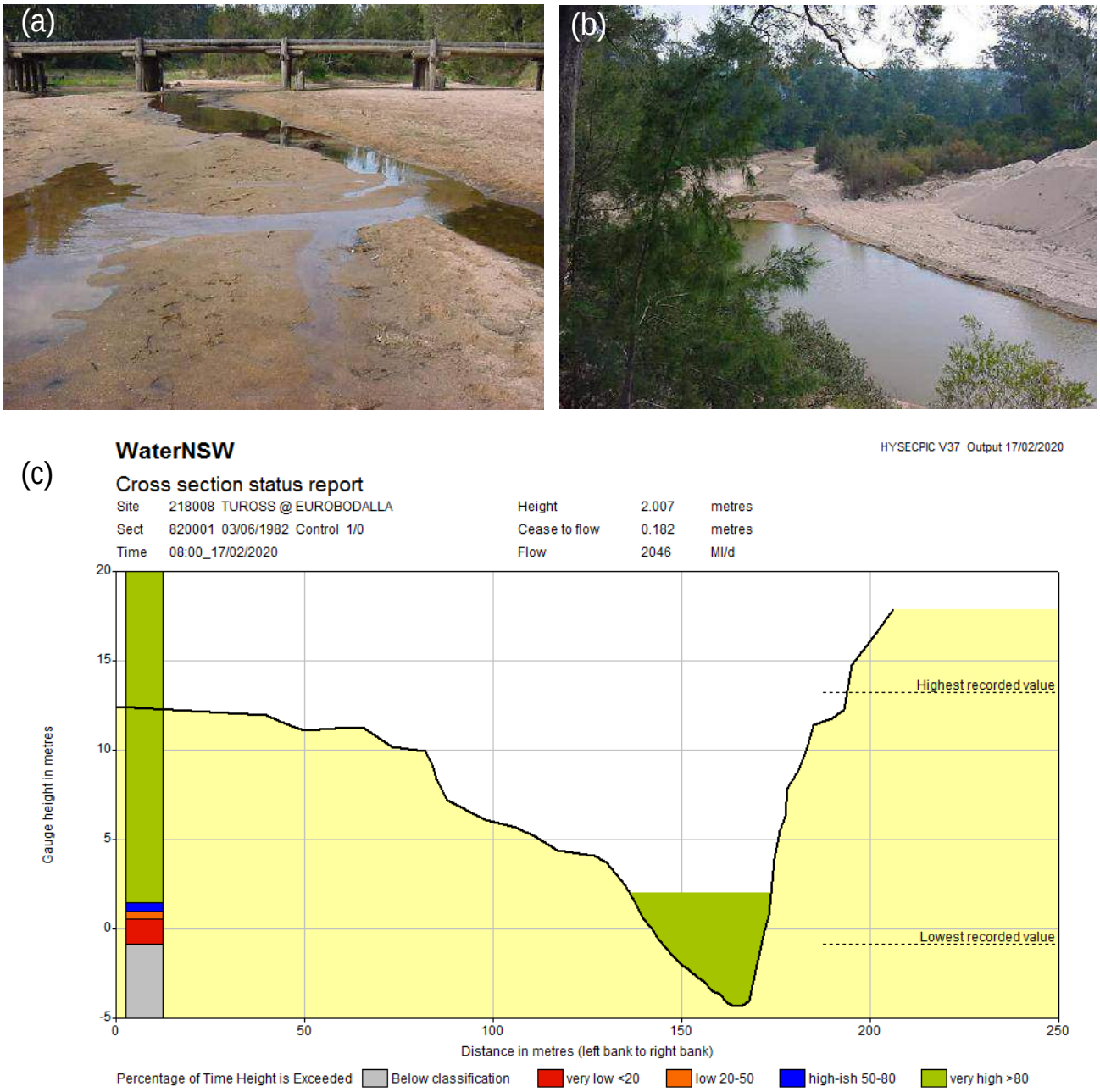


Figure 2.6: Tuross River gauge location view upstream (a), downstream (b) and cross section details (c) (WaterNSW, 2020)

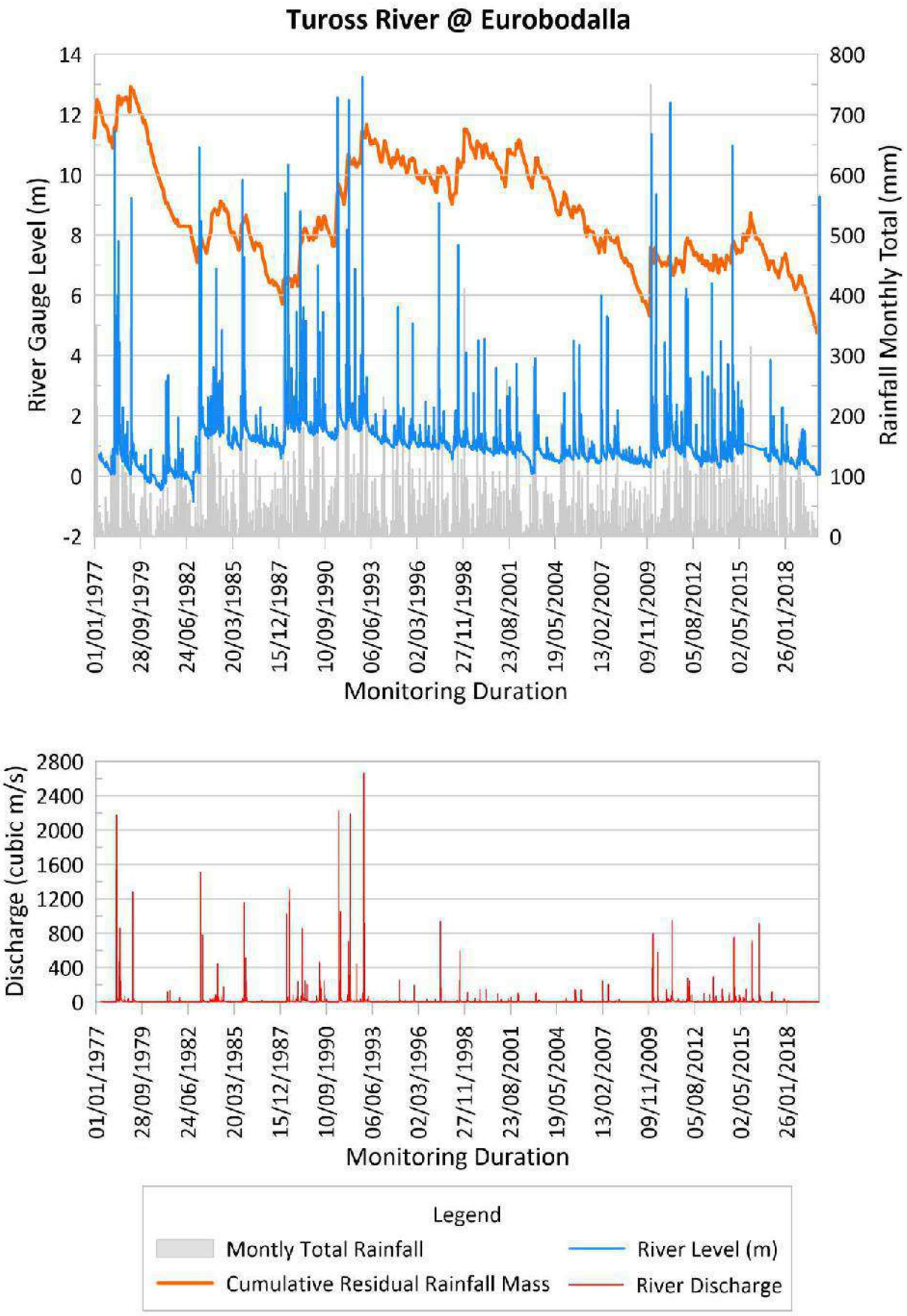


Figure 2.7: Tuross River discharge from 1977 to February 2020 (WaterNSW, 2020)

2.5 Groundwater bores

A review of WaterNSW online portal for registered groundwater bores shows several private bores near the site comprise a mix of alluvial and fractured rock. The Project groundwater monitoring standpipes installed by SMEC in 2017 at the Site and nearby registered private bores.

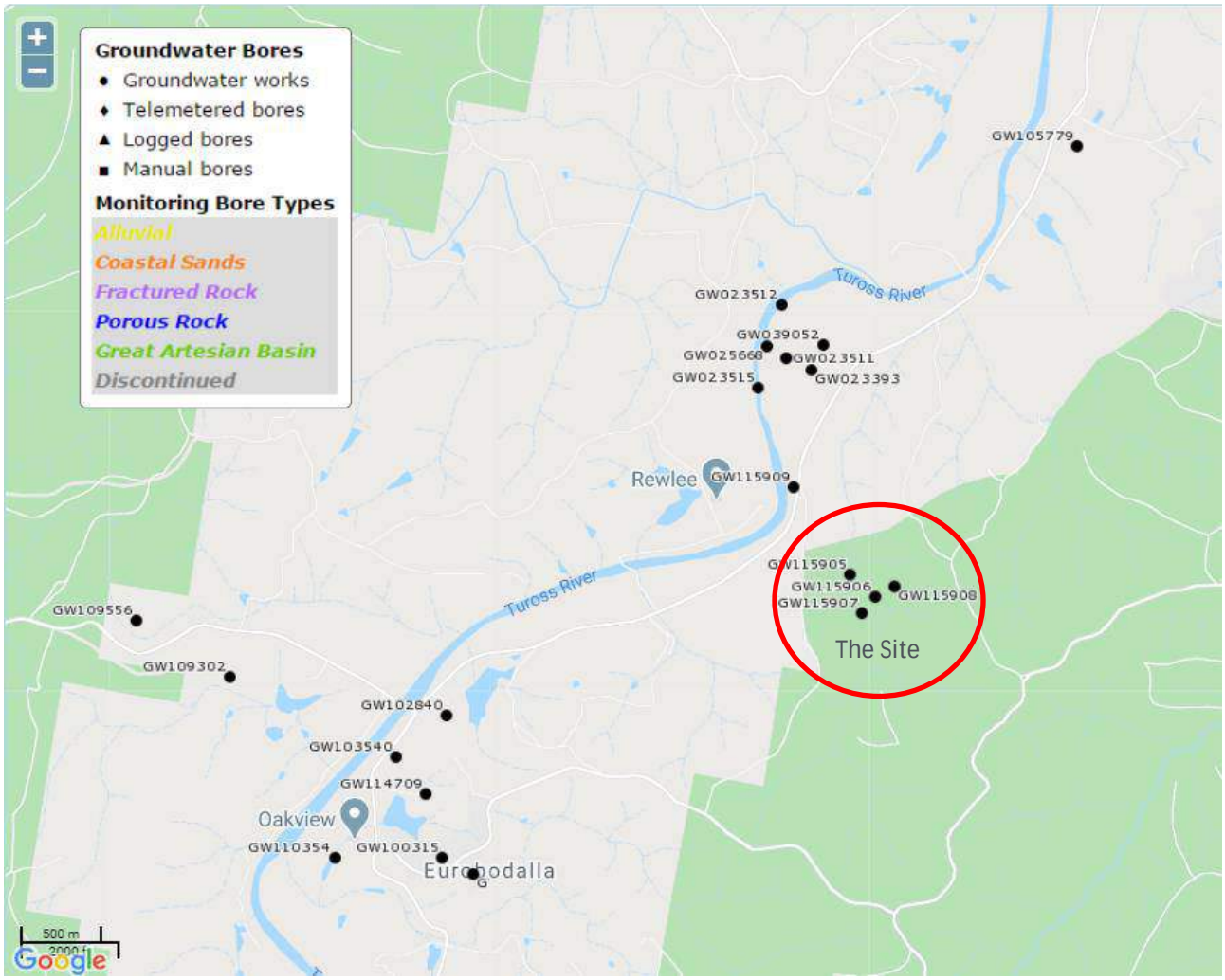


Figure 2.8: Groundwater Bores in the Tuross River Basin (WaterNSW Online) and standpipes installed by SMEC in 2017 (red circle)

3 Monitoring Network Details

3.1 General

To inform the Project EIS, Council carried out 12 months of baseline water quality monitoring between October 2017 and September 2018 in general accordance with the Water Quality Monitoring Sampling Plan (Ref 30012127-R01, dated 17 August 2017). Results of monitoring were presented to Council via the following factual summary letters:

- Eurobodalla Southern Storage – Water quality monitoring results - October 2017 (ref: 30012127-L01)
- Eurobodalla Southern Storage – Water quality monitoring results – November and December 2017 (ref: 30012127-L02)
- Eurobodalla Southern Storage – Water quality monitoring results – January to March 2018 (ref: 30012127-L03)
- Eurobodalla Southern Storage – Water quality monitoring results – April to June 2018 (ref: 30012127-L05)
- Eurobodalla Southern Storage – Water quality monitoring results – July to September 2018 (ref: 30012127-L07)

The follow sections outline the adopted methodology including where applicable any deviation from the WQMSP.

3.2 Monitoring locations

The Project monitoring network consisted of six surface water sample locations (designated SW1 to SW6) and one ground water sample (designated GW1) location which were established along the Tuross River and the Ephemeral creek drainage line. Monitoring locations are also shown on Figure 2.1.

Table 4.1 presents a summary of the monitoring locations and rationale.

In addition, Council undertake ongoing monthly raw water quality monitoring for assessing suitability for drinking water supply purposes as part of routine operation of the Southern Water Treatment Plant. These include the following monitoring locations:

- Council location ID WP050 (corresponding to GW1) - Represents groundwater quality raw water intake of the existing borefield which supplies the SWTP. Limited details are available on the borefield which is understood to be located on the southern banks of Tuross River approximately 1,000m upstream of the SWTP.
- Council location ID TU308 (corresponding to SW3) - Representing upstream surface water quality adjacent to the existing borefield upstream Tuross River upstream of the SWTP

Flowrate data is ongoing monitored by WaterNSW via the existing river gauging station data (Station ID 218008).

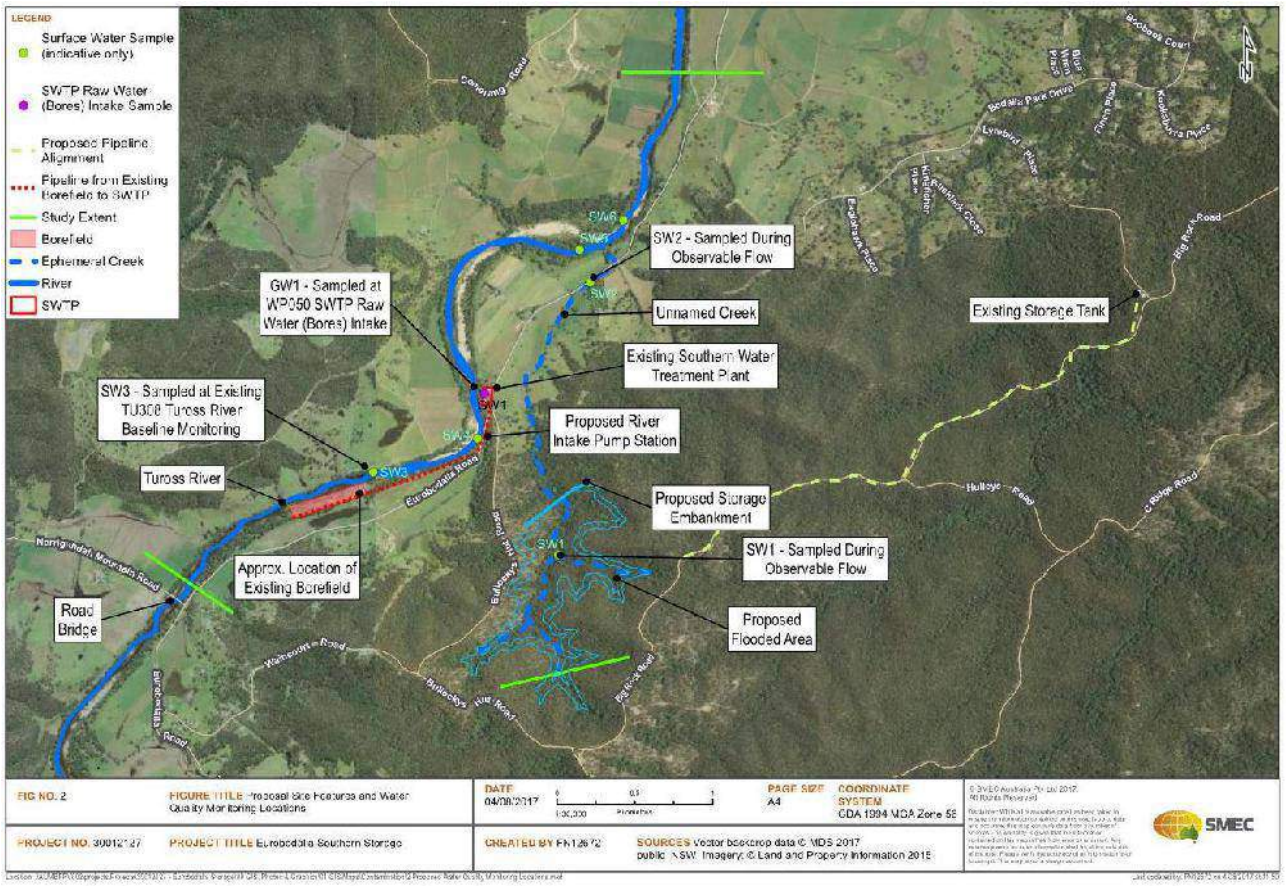


Table 3-1: Monitoring network location summary

Location ID	Easting (MGA 94)	Northing (MGA 94)	Type (Catchment)	Location description and rationale	Control or impact
SW1	230740	5996736	Surface Water (Unnamed Creek)	Upstream creek of proposed storage dam embankment.	Considered to represent 'control' sample location, upstream of impacts from construction of storage embankment.
SW2	230943	5998488	Surface Water (Unnamed Creek)	Downstream creek of proposed storage dam embankment. Upstream of the confluence with Tuross River.	Considered to represent 'impact' sample location.
SW3	769421	5997229	Surface Water (Tuross River)	Upstream on the Tuross River, at the existing monitoring point identified as 'TU308 - Tuross River Baseline Monitoring Data' (approximately 1000m upstream of the existing SWTP).	Considered to represent 'control' sample location, outside of the influence of Proposal features.
SW4	230025	5997369	Surface Water (Tuross River)	Upstream on the Tuross River, at the location of the proposed river intake pump station	Considered to represent 'impact' sample location and will input to pump design parameters.

Location ID	Easting (MGA 94)	Northing (MGA 94)	Type (Catchment)	Location description and rationale	Control or impact
				(approx. 500m upstream of the existing SWTP).	
SW5	230086	5998136	Surface Water (Tuross River)	Downstream along the Tuross River, downstream of the proposed river intake pump station, approx. 100m upstream of the confluence with the unnamed creek.	Considered to represent 'control' relative to confluence with unnamed creek and 'impact' relative to construction of river intake pump station.
SW6	231446	5998780	Surface Water (Tuross River)	Downstream along the Tuross River, approx. 100m downstream of the confluence with the unnamed creek (corresponding to existing bridge)	Considered to represent 'impact' relative to confluence with unnamed creek.
GW1*	230231	5997874	Groundwater (Tuross Alluvial Aquifer)	Sample location is same monitoring point identified as 'WP050 - SWTP Raw Water (bores) intake'.	Considered to represent 'control' sample location relative to groundwater quality.

Note: MGA 94 coordinates are in Zone 56H except for SW3 which is Zone 55H

3.3 Monitoring frequency

Monthly monitoring for baseline data collection over a 12-month period between October 2017 and September 2018. In accordance with the WQMSP, additional event-based monitoring was carried out within 48-78 hrs triggered by the following event within the 12-month monitoring period:

- Trigger 1: 30mm or greater of rainfall in a 24hr period - Weather station data was observed from the nearest weather station at Bodalla Post Office (Station ID 69036), or alternatively, the Tuross Head (Station 069067) to trigger the need for wet weather monitoring event (i.e. > 30mm rain in a 24-hour period). Additional wet weather monitoring was carried out by the following rainfall events above trigger 1:
  - 119mm of rainfall 27 October 2017 @ Tuross Head Weather station 069067
  - 55mm of rainfall 6th November 2017 @ Bodalla Post Office
  - 54mm of rainfall 4th December 2017 @ Bodalla Post Office
  - 63mm of rainfall 16th December 2017 @ Bodalla Post Office
  - 31mm of rainfall 2nd January 2018 @ Bodalla Post Office
  - 88mm of rainfall 19th February 2018 @ Bodalla Post Office
  - 48mm of rainfall 24th February 2018 @ Bodalla Post Office
  - 53mm of rainfall 5th June 2018 @ Bodalla Post Office
- Trigger 2: Peak river flow conditions 38,650 ML per day or greater in a 24hr period - Real-time monitoring data published by NSW Department of Primary Industries (DPI) Office of Water was reviewed at the Tuross River at Eurobodalla gauging station (ID 218008). Peak river flow conditions were not recorded above the trigger 2 for additional monitoring rounds for 12-month monitoring period.

A summary of monitoring rounds is included in Error! Reference source not found. below:

Table 3-2 Summary of monitoring rounds – physical and chemical parameters

Dates	Round type	Monitoring locations
23/10/17	Quarterly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)
30/10/17	Wet Weather Event (Quarterly Analysis)	SW1, SW3, SW4, SW5, SW6 and GW1 (SW2 dry)
8/11/2017	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
13/11/2017	Monthly monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
6/12/2017	Wet Weather Event (Quarterly analysis)	SW1, SW2, SW3, SW4, SW5, SW6, GW1
11/12/2017	Monthly monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
18/12/2017	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
4/01/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
15/01/2018	Quarterly monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
21/02/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
27/02/2018	Wet Weather Event (Quarterly analysis)	SW2*, SW3*, SW4, SW5, SW6*, GW1*
19/03/2018	Monthly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)
30/04/2018	Quarterly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)
14/05/2018	Monthly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)
7/06/2018	Wet weather (quarterly) monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
18/06/2018	Monthly monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
16/07/2018	Quarterly monitoring	SW2, SW3, SW4, SW5, SW6, GW1 (SW1 dry)
13/08/2018	Monthly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)
10/09/2018	Monthly monitoring	SW3, SW4, SW5, SW6 and GW1 (SW1 and SW2 dry)

Table 3-3 Summary of monitoring rounds – microbial parameters

Dates	Round type	Monitoring locations
09/10/17	Weekly monitoring	SW3
17/10/17	Weekly monitoring	SW3
23/10/17	Quarterly monitoring	SW3, SW6 and GW1 (SW2 dry)
30/10/17	Wet Weather Event (Quarterly analysis)	SW3, SW6 and GW1 (SW2 dry)
8/11/2017	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
13/11/2017	Monthly	SW3 and GW1
20/11/2017	Weekly monitoring	SW3
28/11/2017	Weekly monitoring	SW3 and GW1 (additional to requirements)
6/12/2017	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
11/12/2017	Monthly	SW3 and GW1
18/12/2017	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
4/01/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
8/01/2018	Weekly monitoring	SW3
22/01/2018	Weekly monitoring	SW3
29/01/2018	Weekly monitoring	SW3
5/02/2018	Weekly monitoring	SW3
12/02/2018	Weekly monitoring	SW3

21/02/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
27/02/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
05/03/2018	Weekly monitoring	SW3
12/03/2018	Weekly monitoring	SW3
19/03/2018	Monthly	SW3 and GW1
26/03/2018	Weekly monitoring	SW3
4/04/2018	Weekly monitoring	SW3
10/04/2018	Weekly monitoring	SW3
18/04/2018	Weekly monitoring	SW3
23/04/2018	Weekly monitoring	SW3
30/04/2018	Quarterly monitoring	SW3, SW6 and GW1 (SW2 dry)
7/05/2018	Weekly monitoring	SW3
14/05/2018	Monthly monitoring	SW3 and GW1
21/05/2018	Weekly monitoring	SW3
28/05/2018	Weekly monitoring	SW3
4/06/2018	Weekly monitoring	SW3
7/06/2018	Wet Weather Event (Quarterly analysis)	SW2, SW3, SW6 and GW1
12/06/2018	Weekly monitoring	SW3
18/06/2018	Monthly monitoring	SW3 and GW1
25/06/2018	Weekly monitoring	SW3
4/07/2018	Weekly monitoring	SW3
9/07/2018	Weekly monitoring	SW3
16/07/2018	Quarterly monitoring	SW2, SW3, SW6 and GW1
24/07/2018	Weekly monitoring	SW3
30/07/2018	Weekly monitoring	SW3
6/08/2018	Weekly monitoring	SW3
13/08/2018	Monthly monitoring	SW3 and GW1
20/08/2018	Weekly monitoring	SW3
27/08/2018	Weekly monitoring	SW3
3/09/2018	Weekly monitoring	SW3*
10/09/2018	Monthly monitoring	SW1, SW2, SW3, SW4, SW5, SW6, GW1*
17/09/2018	Weekly monitoring	SW3*
24/09/2018	Weekly monitoring	SW3*

3.4 Monitoring parameters

The monitoring parameters and adopted testing frequency are summarised in Table 3-4 as follows:

Table 3-4: Monitoring network parameter testing frequency

Parameter	Testing Frequency / Locations (See notes)
Physical and chemical parameters - Field measurement	
pH	Monthly* - All
Electrical Conductivity	Monthly* - All
Turbidity	Monthly* - All
Dissolved oxygen	Monthly* - All
Temperature	Monthly* - All
Salinity	Monthly* - All
Physical and chemical parameters - Laboratory	
Biochemical oxygen demand (BOD)	Monthly* - All
Total organic carbon (TOC)	Monthly* - All
Dissolved organic carbon (DOC)	Monthly* - All
Nitrogen species (as N): Nitrate (NO_3), Nitrite (NO_2), Ammonia (NH_3), Total Kjeldahl Nitrogen and Total Nitrogen Ammonium ion (as NH_4^+)	Monthly* - All
Phosphorus nutrients: Total phosphorus (as P), and Filterable reactive phosphate (as PO_4)	Monthly* - All
Major anions: chloride, fluoride, sulphate (as SO_4), total alkalinity (as $CaCO_3$))	Monthly* - All
Major cations: calcium, potassium, sodium and hardness (as $CaCO_3$)	Monthly* - All
Chlorophyll	Monthly* - All
Total dissolved solids (TDS)	Monthly* - All
Total suspended solids (TSS)	Monthly* - All
True colour	Monthly* - All
Particle size distribution	Monthly* – SW4 only (see note 2)
Heavy Metals: aluminium, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, uranium, vanadium and zinc	Quarterly* – SW2, SW3, SW6 (total concentration in surface water) Quarterly* – GW1 (dissolved concentration in groundwater)
Total Recoverable Hydrocarbons (TRH)	Quarterly* – SW2, SW3, SW6, GW1
Benzene, toluene, ethylbenzene and xylenes (BTEX)	Quarterly* – SW2, SW3, SW6, GW1
Polycyclic aromatic hydrocarbons (PAHs)	Quarterly* – SW2, SW3, SW6, GW1

Parameter	Testing Frequency / Locations (See notes)
Organochlorine Pesticides (OCPs)	Quarterly* – SW2, SW3, SW6, GW1
Organophosphorus Pesticides (OPPs)	Quarterly* – SW2, SW3, SW6, GW1
Speciated Phenols	Quarterly* – SW2, SW3, SW6, GW1
Acid Herbicides	Quarterly* – SW2, SW3, SW6, GW1
Microbiological parameters - Laboratory	
E. coli (Escherichia Coli) Protozoa – Cryptosporidium, Giardia Bacteria – Campylobacter Viruses – Noroviruses (or other cultivable human enteric virus, such as adenoviruses)	Weekly – SW3 only (see note 3) Monthly – GW1 (see note 3) Quarterly* – SW2 and SW6 only
Note 1: The asterix (*) indicates that additional testing for these parameters was carried out on event based (i.e. wet weather) events.	
Note 2: Particle size distribution was only needed for inputs to design of the Tuross River Intake Pump Station. Therefore, this parameter was monitored at monitoring location SW4 only.	
Note 3: Microbial parameters were carried out at increased 'weekly' frequency of monitoring within locations where raw water is currently or proposed for extraction for drinking water purposes.	

3.5 Field Sampling Methodology

The Council has undertaken the field sampling program in general accordance with the Council's standard sampling procedures and following guidelines and standards:

- Australian Guidelines for Water Quality Monitoring and Reporting, Chapter 4 Field Sampling Program (ANZECC/ARMCANZ 2000);
- AZ/NZS 5667.1:1998 Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples. Standards Australia, Homebush NSW;
- AZ/NZS 5667.6:1998 Water quality – Sampling – Guidance on sampling of rivers and streams. Standards Australia, Homebush NSW; and
- AZ/NZS 5667.11:1998 Water quality – Sampling – Guidance on sampling of groundwater. Standards Australia, Homebush NSW.

3.5.1 Surface Water Sampling

The general methodology of sampling is understood to comprise:

- Record sample time on bottles and COC;
- Spray denatured ethanol around sample jug;
- Rinse sample jug out downstream from sample point;
- Place bottles into head of swing pole to collect samples below surface mid depth of the water;
- Collect samples in laboratory supplied bottles;
- Add HNO to C9 bottle;
- Attach sample jug and collect sample for field meter readings;
- Place bottles in esky with ice bricks;
- Complete field readings and field data sheet; and
- Spray sample bottle with ethanol and wipe with paper towel at completion of each site sampling.

3.5.2 Groundwater Sampling

The general methodology of sampling is understood to comprise:

- Spray denatured ethanol around sample tap and outlet;
- Start bore pump and flush for minimum 10 minutes, reduce flow on outlet;
- Spray denatures ethanol liberally around sample jug;
- Use disposable gloves to collect biological samples directly from tap without rinsing;
- Fill 10L drums for virus analysis directly from tap outlet;
- Collect all other samples in disposable bottles directly from tap outlet following a single rinse of all bottles;
- Rinse sample jug under tap outlet and fill for metals sampling;
- Filter sample into filtered metal bottle;
- Add HNO to both C9 bottles;
- Use sample jug to collect sample for field meter readings;
- Place sample bottles in esky cooled with ice bricks;
- Complete field readings and field sheet; and
- Spay sample bottle with ethanol and wipe with paper towel at completion of each site sampling.

3.6 Specific Correspondence

October 2017	Samples could not be collected from SW1 and/or SW2 due to no observable flows during these monitoring events.

3.7 Quality Assurance and Quality Control

Collected samples were analysed at the Sydney Water Monitoring Services laboratory at the request of Council. Samples were also analysed at Australia Laboratory Services (ALS). Analysis reports have been provided directly to Council and are not included within this report. Summaries have been included where necessary. The internal quality assurance procedures of the laboratory are considered acceptable by SMEC and no significant issues with the results (i.e. contamination or unreliable concentration) were noted.

3.7.1 Precision

One duplicate (or blind intra-lab replicate) sample was collected each monitoring round. The duplicate sample is submitted to the laboratory with the samples for the purpose of assessing consistency in field practices and laboratory analysis methods.

3.7.2 Accuracy

Laboratory prepared VOC (trip) spikes consisting of distilled, de-ionised water or sand spiked with known concentrations of BTEX are included in QA/QC programmes where TPH and BTEX concentrations are being measured. Laboratory prepared VOC spikes should be included at a rate of one per sample batch. These samples should be submitted for BTEX and TPH (C6-C10) analysis with results compared with the known additions. The purpose of these samples is to monitor VOC losses during transit. Rinsate blanks consist of pre-preserved bottles filled with laboratory prepared water that has been passed over decontaminated field equipment. The purpose of the rinsate blanks is to determine the effectiveness of decontamination procedures

The results of the duplicate sample are required to be within a relative percentage difference (RPD) of less than 30% to 50% depending on the parameter with the exception of:

- nitrate in February 2018;
- ammonia, ammonium and nitrate in April and May 2018;
- Chlorophyll a in July 2018; and
- nitrate in September 2018.

Water is a non-homogenous matrix and some natural variation is anticipated. SMEC considers the results acceptable and in compliance with SMEC Quality Assurance and Quality Control procedures.

Field measurements were undertaken using a calibrated water quality meter (Instrument ID: Horiba H1). Daily instrument calibration was conducted using one-point standard (Horiba Cal Solution) in general accordance with manufacturers requirements. Calibration records are included in Attachment B.

3.7.3 Representativeness

Weather station data was observed from alternative weather station at Tuross Head (Station ID 069067) to trigger the need for wet weather monitoring. Data was not available or updated less-frequently at nearest weather station at Bodalla Post Office (Station ID 69036). Alternate weather stations are considered acceptable to trigger a wet weather monitoring event (i.e. 30mm per day or greater).

4 Assessment Criteria

The baseline water quality data is assessed against the adopted assessment investigation level (IL) for developing an understanding of exceedances and where the development of site specific assessment criteria may be required. The adopted assessment criteria are presented in Table 4-1 and derived from:

- ANZG (2020) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments;
- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality for 95% species protection; and
- NHMRC (2011) Australian Drinking Water Guidelines.

Table 4-1: Parameter or analyte and adopted assessment investigation level

Analyte group	Analyte	Units	Value / Range	Reference
In-Situ	pH	pH units	6.5 to 8.0	ANZECC (2000)
	Electrical conductivity	µS/m	125 to 2200	ANZECC (2000)
	Turbidity	NTU	>5	Drinking Water Guidelines (Aesthetic)
			>50	ANZECC (2000)
	Dissolved Oxygen	% Sat	<80% Sat	ANZECC (2000)
			<85% Sat	Drinking Water Guidelines (Aesthetic)
	Temperature	°C	No Criteria	
	Salinity	%	No Criteria	
Microbial parameters	E. coli	no./100 mL	No Criteria	
	Thermotolerant coliforms	cfu/100mL	No Criteria	
	Protozoa – Cryptosporidium	no./L	No Criteria	
	Bacteria – Campylobacter	no./L	No Criteria	
	Viruses -– Norovirus or other cultivable human enteric virus, such as adenoviruses	no./L	No Criteria	
Nutrients	Ammonia (as NH_3-N)	µg/L	500	Drinking Water Guidelines (Aesthetic)
			900	ANZECC (2000)
	Ammonium (as NH4+)	µg/L	26	ANZECC (2000)
	Nitrate (as N)	µg/L	90	ANZG (2018)
	Nitrite (as N)	µg/L	9	ANZECC (2000)
	Nitrate / Nitrite (as N)	µg/L	40	ANZECC (2000)
	Total Kjeldahl Nitrogen	µg/L	No Criteria	
	Total Nitrogen	µg/L	350	ANZECC (2000)
	Total Phosphorus (as P)	µg/L	25	ANZECC (2000)
	Filterable reactive Phosphate (as PO4)	µg/L	26	ANZECC (2000)
	Chlorophyll a	µg/L	3	ANZECC (2000)
Inorganics, Anions and Cations	Chloride	mg/L	175	ANZECC (2000)
	Fluoride	mg/L	2	Drinking Water Guidelines (Health)
	Sulphate (as SO4)	mg/L	250	Drinking Water Guidelines (Aesthetic)
			1000	ANZECC (2000)
	Total alkalinity	mg/L	No Criteria	-
	Calcium	mg/L	1000	ANZECC (2000)

Analyte group	Analyte	Units	Value / Range	Reference
	Potassium	mg/L	No Criteria	-
	Magnesium	mg/L	No Criteria	-
	Sodium	mg/L	115	ANZECC (2000)
	Hardness (as $CaCO_3$)	mg/L	200	Drinking Water Guidelines (Aesthetic)
			350	ANZECC (2000)
Physical & chemical Properties	True colour	HU	15	Drinking Water Guidelines (Aesthetic)
	Particle Size Distribution		No Criteria	
	Total Dissolved Solids	mg/L	600	Drinking Water Guidelines (Aesthetic)
			2000	ANZECC (2000)
	Total Suspended Solids	mg/L	No Criteria	
	Total organic carbon	mg/L	No Criteria	
	Dissolved organic carbon	mg/L	No Criteria	
	Biochemical oxygen demand	mg/L	No Criteria	
Metals	Aluminium	µg/L	55	ANZECC (2000)
	Antimony	µg/L	3	Drinking Water Guidelines (Health)
			9	ANZG (2018)
	Arsenic	µg/L	10	Drinking Water Guidelines (Health)
			13	ANZECC (2000)
	Barium	µg/L	2000	Drinking Water Guidelines (Health)
	Beryllium	µg/L	60	Drinking Water Guidelines (Health)
	Boron	µg/L	370	ANZECC (2000)
	Cadmium	µg/L	0.2	ANZECC (2000)
	Chromium (Total)	µg/L	1.0	ANZECC (2000)
	Cobalt	µg/L	1.4	ANZG (2018)
	Copper	µg/L	1.4	ANZECC (2000)
	Iron	µg/L	200	ANZECC (2000)
	Lead	µg/L	3.4	ANZECC (2000)
	Manganese	µg/L	100	Drinking Water Guidelines (Aesthetic)
			200	ANZECC (2000)
	Mercury	µg/L	0.06	ANZECC (2000)
	Molybdenum	µg/L	34	ANZG (2018)
	Nickel	µg/L	11	ANZECC (2000)
	Selenium	µg/L	5	ANZECC (2000)
	Silver	µg/L	0.05	ANZG (2018)
	Uranium	µg/L	0.5	ANZG (2018)
	Vanadium	µg/L	6	ANZG (2018)
	Zinc	µg/L	3000	Drinking Water Guidelines (Aesthetic)
			8	ANZECC (2000)
Total Recoverable Hydrocarbons (TRH)	TPH C6 - C10 less BTEX (F1)	mg/L	20	Limit of Reporting
	TRH C6 - C10	mg/L	20	Limit of Reporting
	TRH >C10 - C16 less Naphthalene (F2)	mg/L	100	Limit of Reporting
	TRH >C10-C16	mg/L	100	Limit of Reporting
	TRH >C16-C34	mg/L	100	Limit of Reporting
	TRH >C34-C40	mg/L	100	Limit of Reporting
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	Benzene	µg/L	1	Drinking Water Guidelines (Health)
			950	ANZECC (2000)
	Ethylbenzene	µg/L	3	Drinking Water Guidelines (Aesthetic)
			80	ANZG (2018)
	Toluene	µg/L	25	Drinking Water Guidelines (Aesthetic)

Analyte group	Analyte	Units	Value / Range	Reference
			180	ANZG (2018)
	o-xylene	µg/L	350	ANZECC (2000)
	m and p-xylene	µg/L	75	ANZECC (2000)
	Xylene (Total)	µg/L	No Criteria	
Polycyclic Aromatic Hydrocarbons (PAHs)	Naphthalene	µg/L	16	ANZECC (2000)
	Anthracene	µg/L	0.4	ANZG (2018)
	Phenanthrene	µg/L	0.6	ANZG (2018)
	Fluoranthene	µg/L	1.0	ANZG (2018)
	Benzo(a)pyrene	µg/L	0.01	Drinking Water Guidelines (Health)
			0.1	ANZG (2018)
	Total PAHs	µg/L	No Criteria	
Organochlorine Pesticides (OCP)	Aldrin	µg/L	0.01	ANZG (2018)
	chlordane	µg/L	0.03	ANZECC (2000)
	DDE	µg/L	No Criteria	-
	DDT	µg/L	0.006	ANZECC (2000)
	Dieldrin	µg/L	0.01	ANZG (2018)
	Endosulfan	µg/L	0.03	ANZECC (2000)
	Endrin	µg/L	0.01	ANZECC (2000)
	Heptachlor	µg/L	0.01	ANZECC (2000)
	Hexachlorobenzene (HCB)	µg/L	No Criteria	
	Lindane	µg/L	0.2	ANZECC (2000)
	Methoxychlor	µg/L	0.01	ANZG (2018)
Organophosphorus Pesticides (OPP)	Atrazine	µg/L	13	ANZECC (2000)
	Azinphos methyl	µg/L	0.01	ANZECC (2000)
	Chlorpyrifos	µg/L	0.01	ANZECC (2000)
	Diazinon	µg/L	0.01	ANZECC (2000)
	Dimethoate	µg/L	0.15	ANZECC (2000)
	Fenitrothion	µg/L	0.2	ANZECC (2000)
	Malathion	µg/L	0.05	ANZECC (2000)
	Parathion	µg/L	0.004	ANZECC (2000)
Phenols	Phenol	µg/L	320	ANZECC (2000)
	2-chlorophenol	µg/L	340	ANZECC (2000)
	4-chlorophenol	µg/L	220	ANZECC (2000)
	2,4-dichlorphenol	µg/L	120	ANZECC (2000)
	2,4,6-trichlorophenol	µg/L	3	ANZECC (2000)
	2,3,4,6-tetrachlorophenol	µg/L	10	ANZECC (2000)
	Pentachlorophenol	µg/L	3.6	ANZECC (2000)
Herbicides	Diuron	µg/L	0.5	ANZECC (2000)
	2,4-D	µg/L	280	ANZECC (2000)
	2,4,5-T	µg/L	36	ANZECC (2000)
	MCPA	µg/L	1.4	ANZECC (2000)

5 Results

The water quality monitoring data for the period October 2017 to September 2018 is presented in Appendix A with exceedance of the ILs indicated with colour shading of the cells.

5.1 Field Parameter Results

The field parameter results show pH, electrical conductivity and turbidity have regular exceedance of the ILs. Figure 5.1 and Figure 5.2 present time series plots of field pH and EC results respectively. SW1 is regularly dry and limited results are available. Figure 5.1 shows exceedance of the low-level pH IL for all monitoring results at GW1 and some monitoring results at SW1 and SW2. For EC SW3, SW4, SW5 and SW6 are less than the low-level IL of 125 µS/cm occurs for most results and whilst exceedance of the ANZECC (2000) IL values these than 125 µS/cm are not considered to a risk and generally represent more pristine environments.

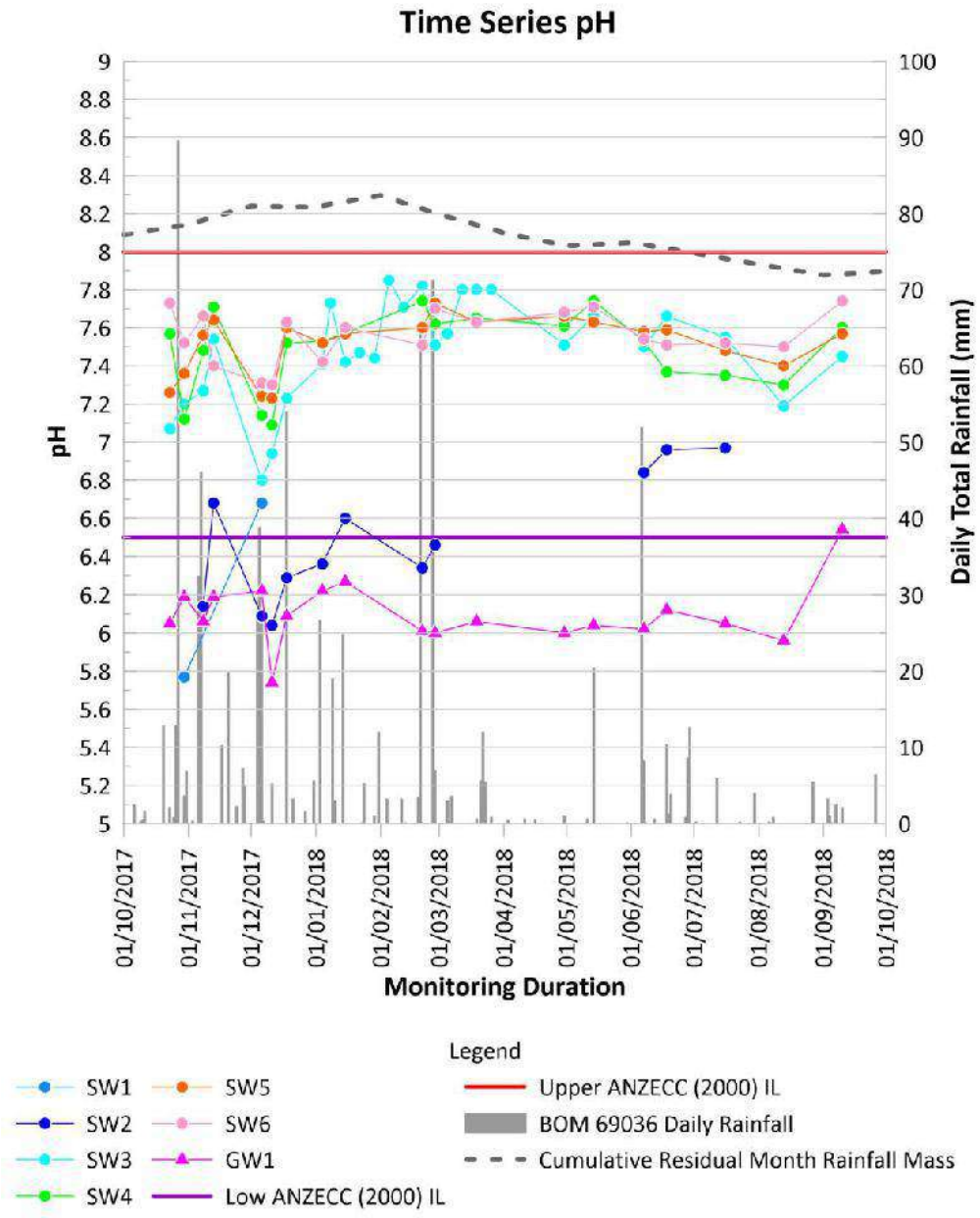


Figure 5.1: Time series plot of field pH with rainfall, CRMRM and ILs

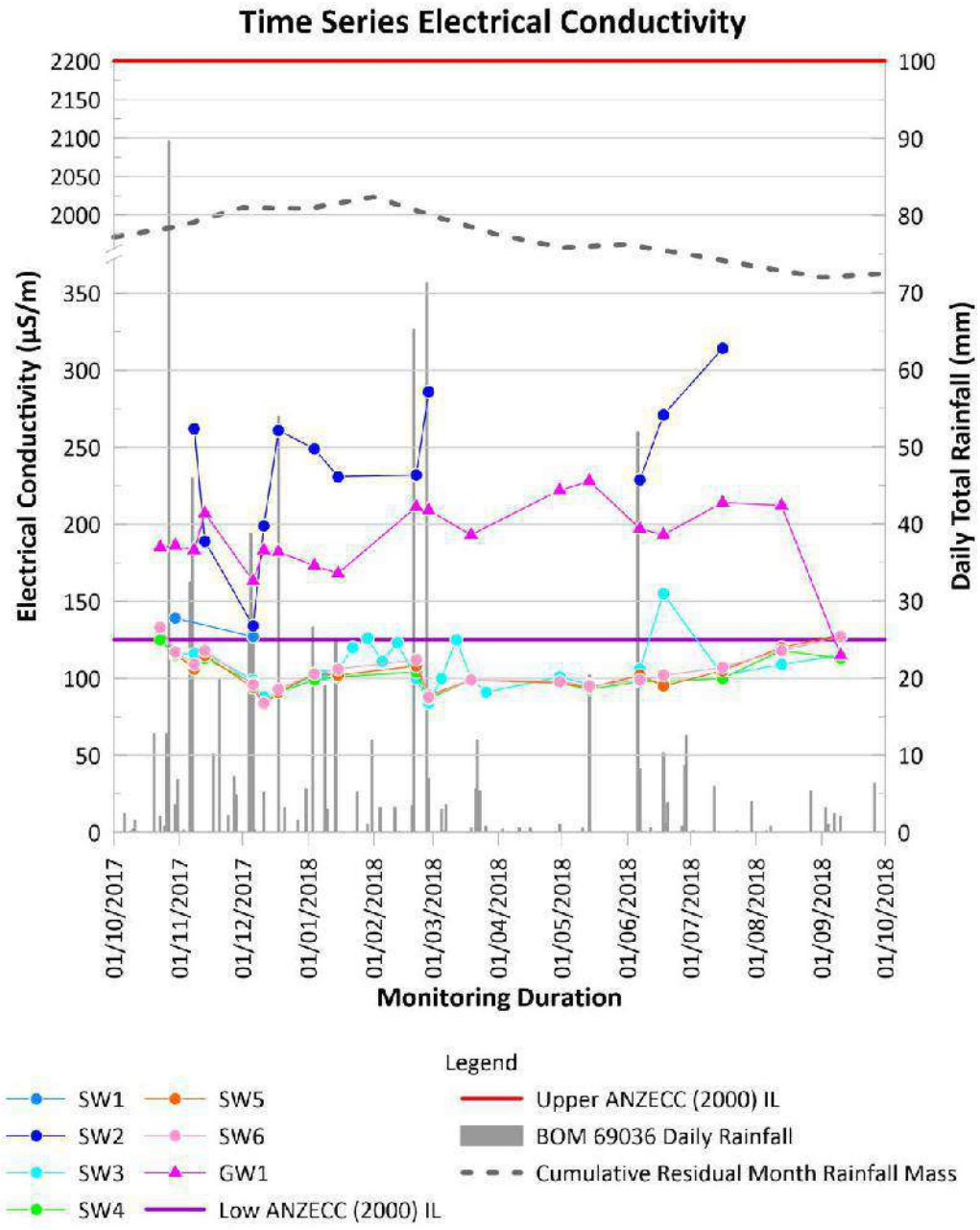


Figure 5.2: Time series plot of field electrical conductivity with rainfall, CRMRM and ILs

The results of turbidity show over the monitoring period most results were below the ANZECC (2000) IL and all results were below the Drinking Water Guidelines IL. Turbidity appears to increase following significant rainfall events in December 2017 at most monitoring locations except GW1 and in June 2018 at SW2 and GW1. SW2 the ephemeral creek shows a very high result in January 2018 which occurs without a significant rainfall event.

Dissolved oxygen results generally range from 80% to 120% saturation. The results are generally within the IL range except for all results SW1 and some results of SW2, SW3, SW4, SW5 and SW6 between October 2017 and May 2018. GW1 is generally below the ILs, ranging from 20% to 40% saturation. DO is generally lower in groundwater than surface water.

Surface water temperature shows seasonal variations and ranges from 9°C in winter months to around 24°C in the summer. Groundwater temperature also shows seasonal variability but with a less extreme range. The temperature varies from around 16°C to 21°C.

Salinity is recorded at generally 0.01 or less over the monitoring period.

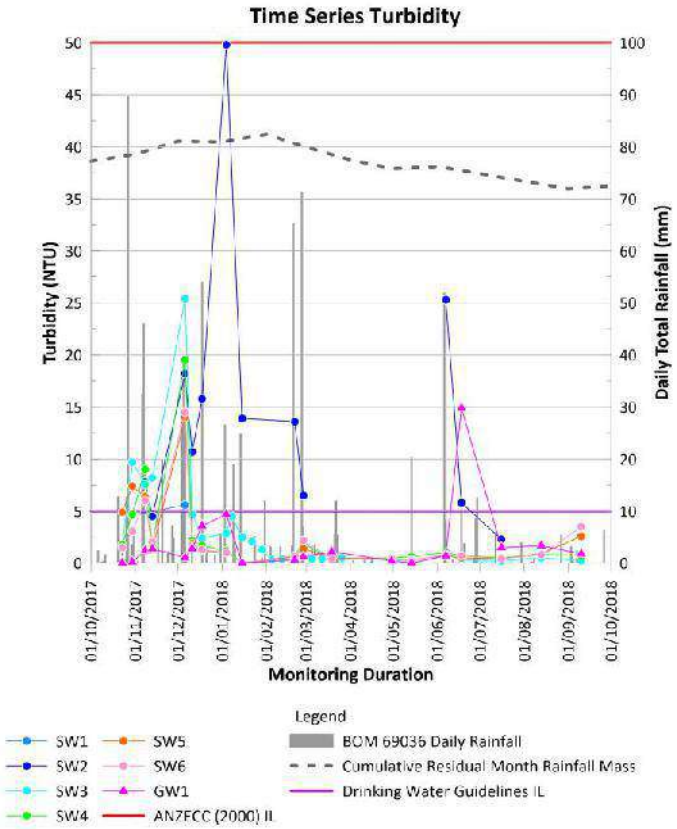


Figure 5.3: Time series plot of turbidity with rainfall, CRMRM and ILs

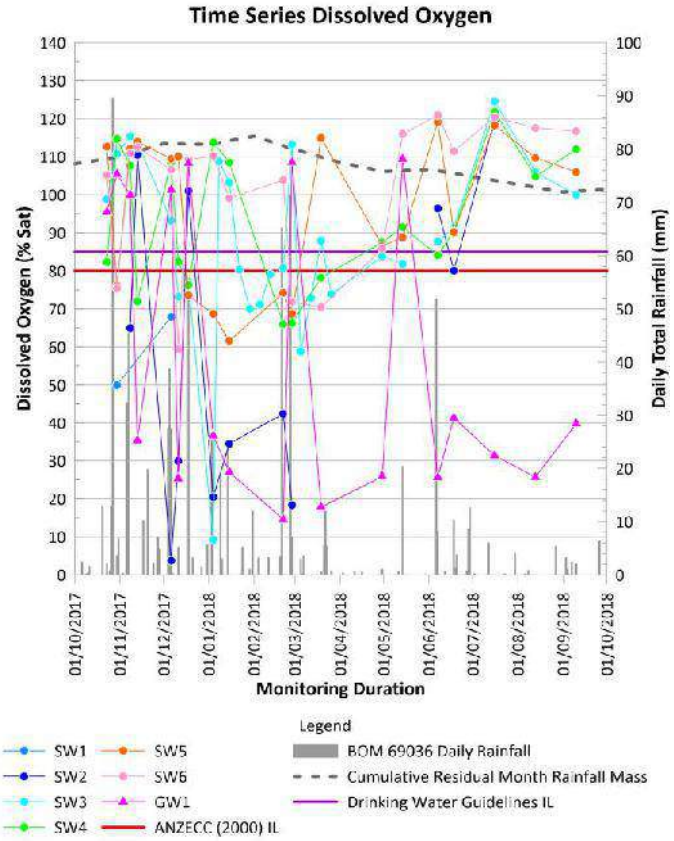


Figure 5.4: Time series plot of dissolved oxygen with rainfall, CRMRM and ILs

5.2 Microbial

The results of the microbial testing shows E.Coli was commonly observed at the surface water monitoring locations SW2, SW3 and occasionally SW6. The other locations were either not tested or not detected. Whilst there is no IL under the Drinking Water Guidelines any detection of E. Coli requires treatment. Results ranged from <1 to 3000 /100mL. Higher results appear to correlate with lower DO saturation of the surface water and increased turbidity. From July 2018 to September 2018 results were generally less than 100 / 100mL. An E. Coli result of 1/100mL in the groundwater occurred in December 2017 and January 2018.

Cryptosporidium was detected in the following samples:

- SW2 and SW3 – 21 February 2018;
- SW2 and SW3 27 February 2018;
- SW3 – 19 and 26 March 2018;
- SW3 – 18 April 2018;
- SW3 – 14 and 21 May 2018; and
- GW1 14 May 2018.

Giardia was detected in the following samples:

- SW3 – 9 and 30 October 2017;
- SW2, SW3, SW6 – 8 November 2017;
- SW3 – 13, 20, 28 November 2017;
- SW2 – 6 December 2017;
- SW3 – 11 December 2017; and
- SW2 – 4 January 2018.

Bacteria – Campylobacter was detected in the following samples as present:

- SW3 – 18 December 2017; and
- SW2 – 21 and 27 February 2018.

Viruses such as Norovirus or other cultivable human enteric virus was only present in SW3 in October 2017 and results in December 2017 for SW2 were inhibited.

5.3 Physio-Chemical Parameters

Total dissolved solids (TDS) and total suspended solids (TSS) are physio-chemical properties of water and are shown on Figure 5.5. The results show TDS is below both ILs with a range of around 50mg/L to 150 mg/L. SW2 shows the highest TDS for surface water with increases that appear to correlate to significant rainfall events. TSS in SW2 is also much higher than the other surface water locations with increases also appearing to correlate to significant rainfall events and likely increased river flow. The TDS in GW1 is relatively stable with a minor spike in December 2017 and a trend of decrease from July 2018. The other surface water sites show generally stable TDS which is less than 100mg/L.

The major ions include calcium, magnesium, potassium, sodium, sulphate, chloride and fluoride for which time series plots are presented in Appendix B along with a time series plot of hardness. The following observations are made regarding the results:

- Calcium – results are below the IL. Concentrations are highest in GW1 at around 10 mg/L and lowest in SW1 with SW2 showing the most variability. Increasing concentrations are seen between June 2018 and July 2018 at SW2 following a significant rainfall event
- Magnesium – results are generally for concentrations around 3 mg/L to 4 mg/L for SW1, SW3, SW4, SW5 and SW6. SW2 ranges from 4 mg/L to around 14 mg/L with increased concentration following significant rainfall events. GW1 shows generally higher concentrations than the surface water although is very similar to SW2;
- Potassium – results show slightly higher concentrations in GW1 compared to the surface water locations, excluding SW1 and SW2 which have the highest concentrations. SW2 shows variability in concentration with increases following periods of significant rainfall whist GW1 and SW3 to SW6 remain relatively stable;

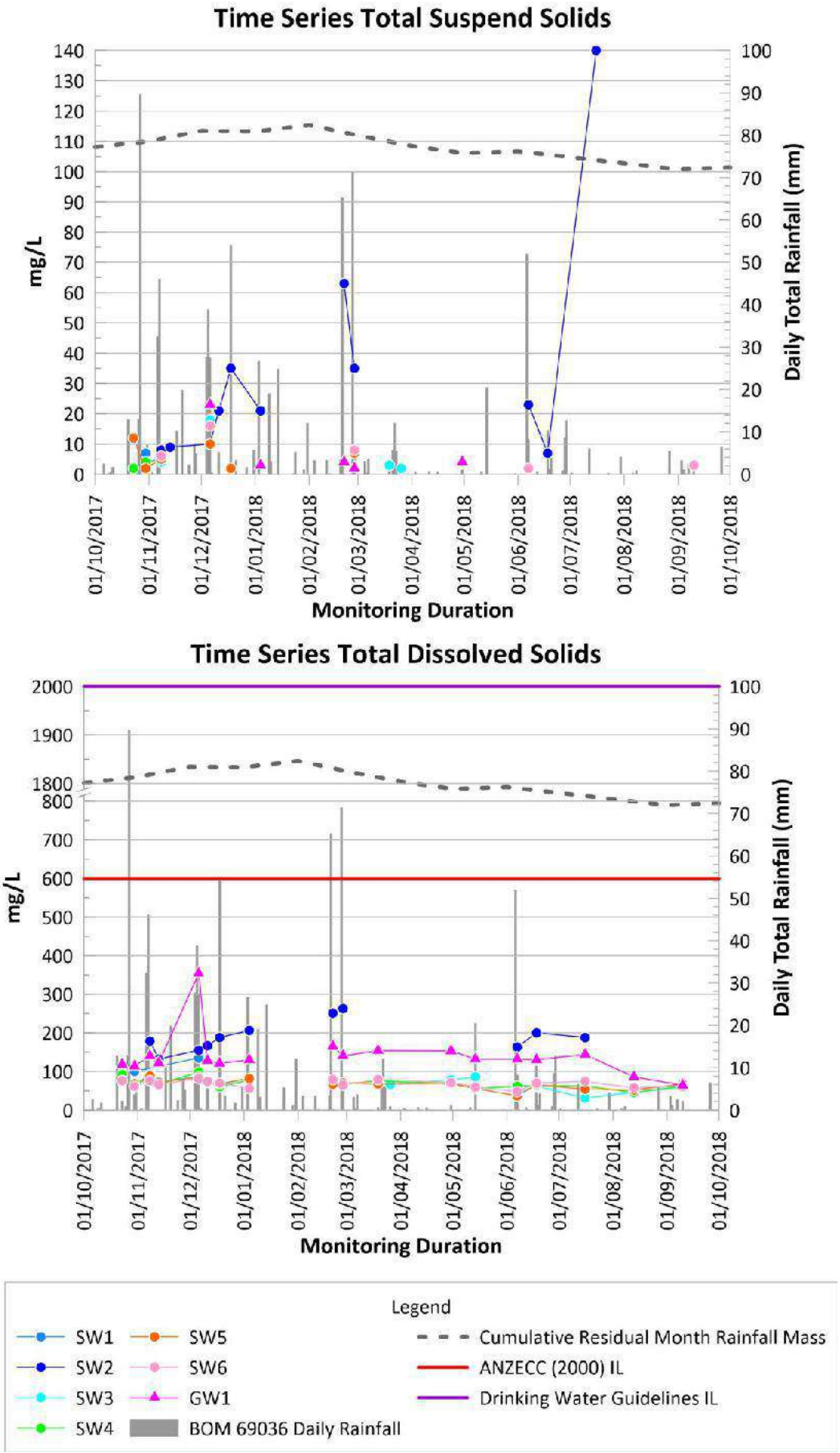


Figure 5.5: Time series plot of TDS and TSS with rainfall, CRMRM and ILs

- Sodium – all results are below the IL and generally range from 10 mg/L to 30 mg/L. SW2 has the highest concentration. The groundwater sample and other surface water samples are very similar and follow a similar trend of slight increases in concentration during periods of low rainfall or below average rainfall;
- Sulphate – results are below both ILs and sulphate concentrations are highest in GW1 followed by SW2. Results are generally around 25 mg/L for GW1, SW2 ranges from 2.5 mg/L to 20 mg/L and the other locations are generally less than 2.5 mg/L;
- Chloride – results range from 10 to 60 mg/L with all results below the IL. Chloride is highest in SW1 and SW2 and SW2 appears to increase after significant rainfall events. Increased concentrations in August and September 2018 may be in response to prolonged below average rainfall conditions;
- Fluoride – all results below the IL and generally less than 0.2 mg/L.; and
- The hardness of the water is below both ILs and for GW1 is generally around 60 mg/L. SW2 has a similar hardness to the groundwater and shows variability in response to rainfall events. SW 1 has the lowest hardness and SW3 to SW6 have results around 20 mg/L to 30 mg/L which are generally stable over the monitoring period. A slight increase from June 2018 to September 2018 is observed which appears to correlate to a period of low rainfall.

For True colour, which is what remains after the suspended particles are removed, exceedance of the IL occurred for the following results:

- SW1 – 30 October 2017 wet weather sample;
- SW2 – 8 November 2017 wet weather sample and 13 November 2017;
- SW1 to SW6 for 6 December 2017 wet weather samples;
- SW2 to SW6 – 11 December 2017 samples;
- SW2 to SW6 – 18 December 2017 wet weather samples;
- SW2 – 4 January 2018 wet weather sample;
- SW2 – 21 February 2018 wet weather sample;
- SW2 to SW6 – 27 February 2018 wet weather samples;
- SW2 – 7 June 2018 wet weather sample;
- SW2 – 18 June 2018 sample; and
- SW2 – 16 July 2018 sample.

A time series plot of Total and dissolved organic carbon is presented in Appendix B. The results show concentrations of total organic carbon is similar to the dissolved concentration with the dissolved concentration generally being slightly lower. SW1 and SW2 have the highest concentrations which appear to increase following significant rainfall events. A moderate increase is noted for SW3 to SW6 in December 2017 and a small increase in March 2018 in response to rainfall events. The concentrations in the groundwater remain relatively stable at less than 2.5 mg/L.

Biochemical oxygen demand is generally below the laboratory limit of detection except for the following results for SW2 wet weather samples:

- 18 December 2017;
- 4 January 2018;
- 21 February 2018;
- 28 February 2018 wet weather; and
- 7 June 2018.

The major ions are combined with alkalinity, TDS, pH and EC in the piper and durov diagrams presented in Figure 5.6 and Figure 5.7 for where a complete set of results was available. Appendix B presents piper plots for each individual location. The piper diagram plot shows SW1 and SW2 results for a distinctly different cluster to those of SW3, SW4, SW5 and SW6. SW2 shows a more distributed plot of data compared to the other surface water locations where the chemistry is relatively consistent. SW2 is characterised by increased chloride and decreased sulphate and calcium.

GW1 plots across the surface water results and in a small cluster characterised by increased calcium and magnesium. The variability has no linear trend of over time suggesting minor variations may be seasonal and influenced by river flow.

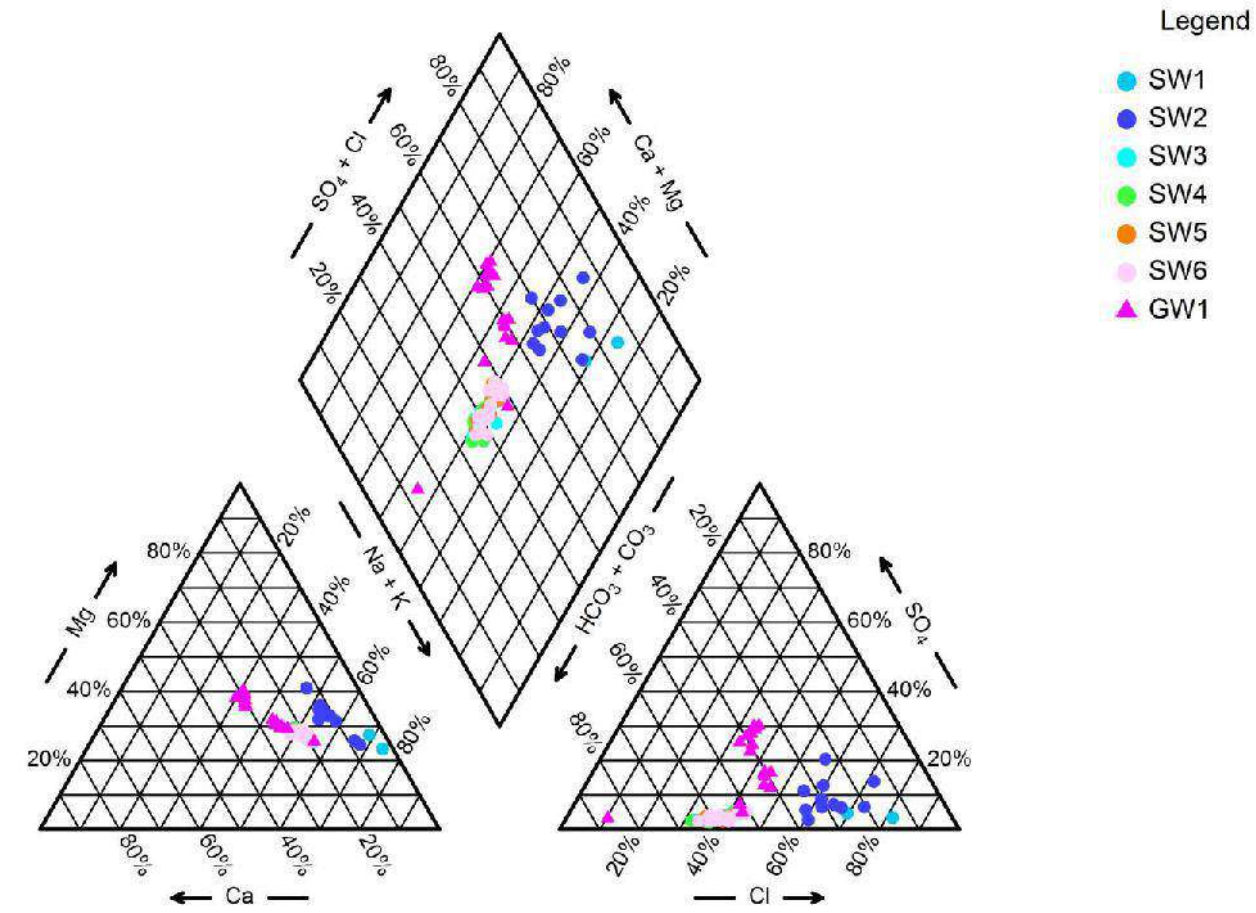


Figure 5.6: Piper diagram plot of water samples from 2017 to 2018

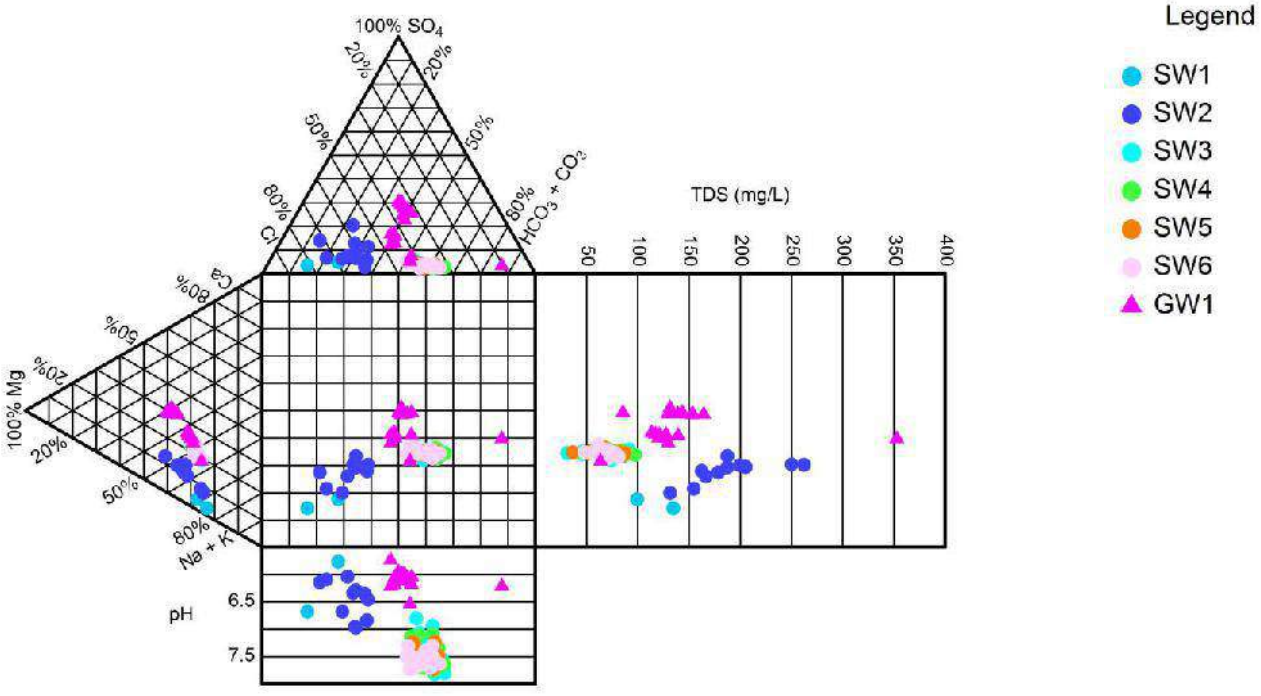


Figure 5.7: Durov diagram plot of water samples from 2017 to 2018

5.4 Nutrients

Time series plots of ammonia, ammonium, nitrate, nitrite, total nitrogen, TKN, total phosphorus and reactive phosphate are presented in Appendix B. The following observations are made on the results:

- Ammonia:
  - all results excluding are below both ILs;
  - increases in ammonia are see at SW2 following significant rainfall events;
  - concentrations in GW1 are relatively stable;
  - slight increase in concentrations in the Tuross River between SW3 the up-gradient and SW6 the down-gradient in December 2017 and May 2018;
- Ammonium:
  - SW2 shows increased ammonium following significant rainfall events and generally has results above the IL;
  - most results for GW1 are above the IL;
  - SW3, SW5 and SW6 have one or more results above the IL;
  - all results for SW4 are below the IL;
- Nitrate:
  - GW1 shows the most variability with increasing concentrations during periods of low rainfall.
  - Most results are above the IL however only result for SW1 is above the IL;
  - SW2 appears to have higher concentrations than SW3 to SW6, with concentrations increasing after significant rainfall events;
- Nitrite:
  - GW1 shows variability in concentration with increases following significant rainfall events;
  - SW2 shows the highest concentration with increases following significant rainfall events;
  - there appears to be a slight trend of increasing concentration from up-gradient to down-gradient surface water monitoring locations on the Tuross River
- TKN:
  - SW2 shows the highest concentration ranging from 700 µg/L to 2100 µg/L;
  - concentrations in SW1 are slightly higher than SW3 to SW6 and GW1;
  - concentrations appear to increase between SW3 and SW6 from up-gradient to down-gradient;
  - GW1 has a similar concentration to the Tuross River samples;
- Total Nitrogen:
  - SW1, SW2 and GW1, excluding two results, have all results are above the IL;
  - SW3 to SW6 results in December 2017 were above the IL and the increase is likely related to the significant rainfall event
  - GW1 appears to show increasing concentration during periods of below average rainfall with decreases in concentration following significant rainfall events. The result in September 2018 is much lower than other results and may be an outlier or represent a localised rainfall event;
- Total Phosphorus
  - most results are below the IL except for 4 results at GW1 and the December 2017 results at SW3 SW4 SW5 and SW6 and SW6 in November 2017;
  - apparent trend of decreasing concentration during below average rainfall conditions between March 2018 and August 2018;
  - for GW1 total phosphorus results appear the inverse of the total nitrogen results;
  - SW3 generally has lower concentrations than the down-gradient location SW6;
  - increases in concentration appear to follow significant rainfall events;
- Reactive Phosphate;
  - GW1 shows increasing concentration following the significant rainfall event in March 2018 and a period of low rainfall before declining; and
  - one result of SW2 and 3 results at GW1 exceed the IL;

- Chlorophyll:
  - SW2 has the highest results and exceeds the IL;
  - most results from October 2017 to December 2017 exceed the IL; and
  - shows a general trend of increase in response to rainfall events.

5.5 Heavy Metals

Time series plots of selected heavy metals are presented in Appendix B. For surface water samples total metals are presented, for the groundwater sample the results reflect the dissolved concentration. Metals were not tested at locations SW1, SW4 and SW5. The following heavy metals had either no results above the laboratory limit of detection (LLD) or only several results slightly above the LLD:

- Antimony – SW2 18 December 2017 wet weather, all results below ILs;
- Beryllium – no results above LLD;
- Cadmium – no results above LLD;
- Mercury – GW1 8 November 2017 wet weather (note the LLD for dissolved is different to total);
- Molybdenum – most results just above LLD but below IL;
- Selenium:
  - GW1 October and December 2017 and July 2018 wet weather
  - SW2 December 2017, January 2018, February 2018, June 2018, July 2018 wet weather.
  - All results below the IL;
- Silver – no results above LLD, IL is less than the LLD;
- Uranium:
  - GW1 30 October 2017 wet weather;
  - SW2, SW3, SW6 and GW1 6 December 2017 and 18 December 2017 wet weather samples;
  - SW2 4 January 2017 wet weather;
  - SW2 21 and 27 February 2018 wet weather samples;
  - SW2 7 June 2018 wet weather;
  - SW2 July 2018;
  - all results below the IL;
- Vanadium:
  - SW2 and SW6 8 November 2017 wet weather;
  - SW2, SW3 and SW6 6 December 2017 wet weather samples;
  - SW2, SW6 and GW1 18 December 2017 wet weather samples;
  - SW2 4 January 2018 wet weather;
  - SW2 21 February 2018 wet weather;
  - SW2 SW3 and SW6 27 February 2018 wet weather samples;
  - SW2 7 June 2018 and 16 July 2018 wet weather;
  - all results below the IL.

The following observations are made regarding the results of time series plots:

- Aluminium:
  - SW2 has the highest concentrations which appear to increase following rainfall events. All results are above the IL;
  - concentrations are generally higher at SW6 than SW3;
  - SW3 exceeds the IL for 3 results
  - SW6 exceeds the IL for4 results; and
  - GW1 has the lowest concentration and does not exceed the IL.
- Arsenic:
  - all results are below the ILs

  - SW2 has the highest concentrations;
  - SW3 is slightly lower in concentration that SW6 except in July 2018;
  - GW1 has similar concentrations to the surface water;
- Barium;
  - all results below the IL;
  - SW2 has highest concentrations;
  - SW6 slightly higher than SW3 except in March 2018;
  - GW1 has one result above the LLD;
- Boron:
  - all results below the IL
  - GW1 shows a spike in concentration in November 2017 following a rainfall event;
  - SW2 has higher concentrations than SW3 and SW
  - SW6 generally has higher concentrations than SW3;
- Chromium:
  - 5 results for SW2 are above the IL;
- Cobalt:
  - al results for SW2 are above the IL;
  - concentrations are higher in the groundwater than the surface water;
  - SW3 has lower concentrations than SW6;
- Copper:
  - SW2 shows most results exceed the IL
  - one result for GW1 and SW3 exceed in October 2017 and one result for SW6 in February 2018;
  - SW3 appears to have higher concentrations than SW6;
  - copper is not detected above LLD in SW6 from April 2018;
  - GW1 has similar concentration to the surface water;
- Iron:
  - all results above the IL;
  - SW2 has the highest concentration with results ranging from around 1900 µg/L to 16,000 µg/L;
  - SW6 shows higher concentrations than SW3
  - GW1 when detected above the LLD is slightly higher than the SW6 results
- Lead – all results are below the IL;
- Manganese:
  - one result for SW2 and SW6 exceeds the Drinking Water Guidelines IL but does not exceed the ANZECC (2000) IL;
  - SW6 has higher concentrations than SW3;
  - GW1 has higher concentrations than SW6
  - SW2 generally has the highest concentrations;
- Nickel – all results below the IL, SW2 has the highest concentrations;
- Zinc:
  - most results exceed ANZECC (2000) IL but no results exceed the Drinking Water Quality IL;
  - GW1 shows a trend of increase from May 2018 to August 2018 during a period of low rainfall; and
  - surface water concentrations are variable and appear to increase following significant rainfall events.

5.6 Hydrocarbons

The results show no detection above the LLD for:

- Total Recoverable Hydrocarbons (TRH);
- Benzene Toluene Ethylbenzene and Xylenes (BTEX); and

- poly aromatic hydrocarbons (PAH).

5.7 Pesticides

Pesticides both OPP and OCP had no detections above the LLD. Phenols and acid herbicides also had no results above the LLD. It is noted that some LLDs are higher than the adopted ILs.

6 Discussion and Recommendations

The results of the baseline water quality monitoring show some parameters exceed the adopted ILs with either an occasional result or most of the results. These are:

- In-Situ Measurements of:
  - pH
  - electrical resistivity
  - turbidity
  - dissolved oxygen saturation
- Nutrients
  - ammonium
  - nitrate
  - nitrite
  - total nitrogen
  - total phosphorus
  - Chlorophyll
- Physical Properties:
  - true colour
- Heavy Meals:
  - aluminium;
  - chromium (5 results);
  - cobalt (8 results);
  - copper (9 results);
  - iron;
  - manganese;
  - mercury (1 result); and
  - zinc.

6.1 In-Situ Measurements

Review of the in-situ measurements for pH shows the most common exceedance was the low-level value of 6.5 which occurred only at SW1, SW2 and GW1. All exceedances were within one pH unit of the IL. It results at GW1 continually were below 6.5 and relatively stable with minor variations. The groundwater has a naturally lower pH than the surface water. It is noted that the sample at GW1 is a composite sample from the borefield located near SW3. SW1 and SW2 which are along the ephemeral creek likely have lower pH results reflecting a greater contribution of groundwater discharge over surface water run-off.

Exceedance of the EC IL is most commonly the low-level value of 125 µS/cm with values less than this level at surface water samples from the Tuross River. The river is known to been in good health and EC values between 0 and 125 µS/cm are not considered to represent a negative impact rather they highlight the pristine nature of the environment. The EC in the groundwater is slightly higher than the surface water and SW2 shows higher values and variability.

Turbidity exceedance appears to correspond to significant rainfall events and river flows. In general, most groundwater and surface water results are below the 5 NTU value however a large portion of the baseline data was collected during a period of prolonged below average rainfall conditions. It is recommended the ILs for turbidity remain.

In field measurements of dissolved oxygen saturation provide a snapshot of conditions and do vary with time of day, exposure to sunlight and velocity of water movement. Groundwater generally has a lower concentration of dissolved oxygen than surface water. The extraction of groundwater, i.e. pumping, adds a small amount of oxygen to the water. The baseline monitoring results show exceedance of the ILs for GW1 for most monitoring results. SW1 and SW2 commonly exceed the ILs with very low saturation levels, likely due to being taken in an ephemeral creek. Adequate oxygen saturation in surface water is essential for good river health. Low oxygen conditions, which can result in lower

salinity, may be caused by algae growth from phosphorus or nitrogen. The monitoring results show some correlation with low oxygen and increased total nitrogen and phosphorus and Chlorophyll. Up-gradient of the site the application of fertilisers for cropping have the potential to impact on the water quality of the river.

6.2 Nutrients

Nitrogen compounds depend on the oxidation state of the waters. If the water is highly reducing then nitrogen will appear as ammonia (NH_3), where as in oxidising conditions it will appear as Nitrate (NO_3). Nitrite (NO_2) is an intermediate between ammonia and nitrate. Total Kjeldahl Nitrogen (TKN) is the sum of ammonia nitrogen plus organically bound nitrogen and does not include nitrate or nitrite.

The monitoring results show some correlation with low DO and increased ammonium, nitrate, total nitrogen and total phosphorus and reactive phosphate. These are indicative of activities, such as fertilising of crop areas and natural processes occurring in the catchment, upgradient of the Site and around the site. Figure 6.1 shows the Tuross River flow and level with the monitoring results for total nitrogen and total phosphorus. Nitrogen increases in the groundwater as the river flow and level decreases. Phosphorus in the surface water and groundwater appears to decrease as the river flow and level decreases. Periods of high river discharge / flow show increases in nitrogen and phosphorus in 2017. The Drinking Water Guidelines for nitrate and nitrite are 50000 µg/L and 3000 µg/L, significantly higher than the ANZECC (2000) criteria for the environment.

6.3 Physical Characteristics

The results for true colour and river flow and level are shown on Figure 6.2. Exceedance of the IL has occurred during tow high river flow periods in December 2017 and February 2018. The colour is likely due to the presence of dissolved organic matter which is observed to be elevated at these times. The Australian Drinking Water Guidelines state that a true colour range of 1 to 25 HU for filtered water supplies is typical in Australia. No change is recommended to the IL due to the limited number of exceedances in the baseline data.

6.4 Heavy Metals

In the surface water monitoring results concentrations of total heavy metal shows regular exceedance of the ILs for aluminium, iron, manganese and zinc and some exceedance of the ILs for chromium, cobalt and copper. These likely reflect the localised catchment geology and surface water and groundwater flow paths. Elevated levels of aluminium, iron, manganese and zinc are common with marine shales and sandstones which comprise the catchment bedrock. Within the river the alluvial material is comprised of weathered catchment host rock and water quality at GW1 reflects the combined borefield water source the residence time (e.g. how long in the formation), distance between location of recharge and point of sampling or discharge and the material through which it passes. Concentrations of heavy metals increases when the water is more turbid, such as during significant rainfall events which rapidly increase river flow, due to the suspended particle load.

Mercury and silver have LLDs which are greater than the ILs and whilst no results were detected above the LLD for silver one result was detected for mercury at the LLD. Analysis of ultra-trace levels is not considered to be required as for these two parameters the levels outlined in the Australian Drinking Water Guidelines should be adopted for protection of drinking water quality during construction.

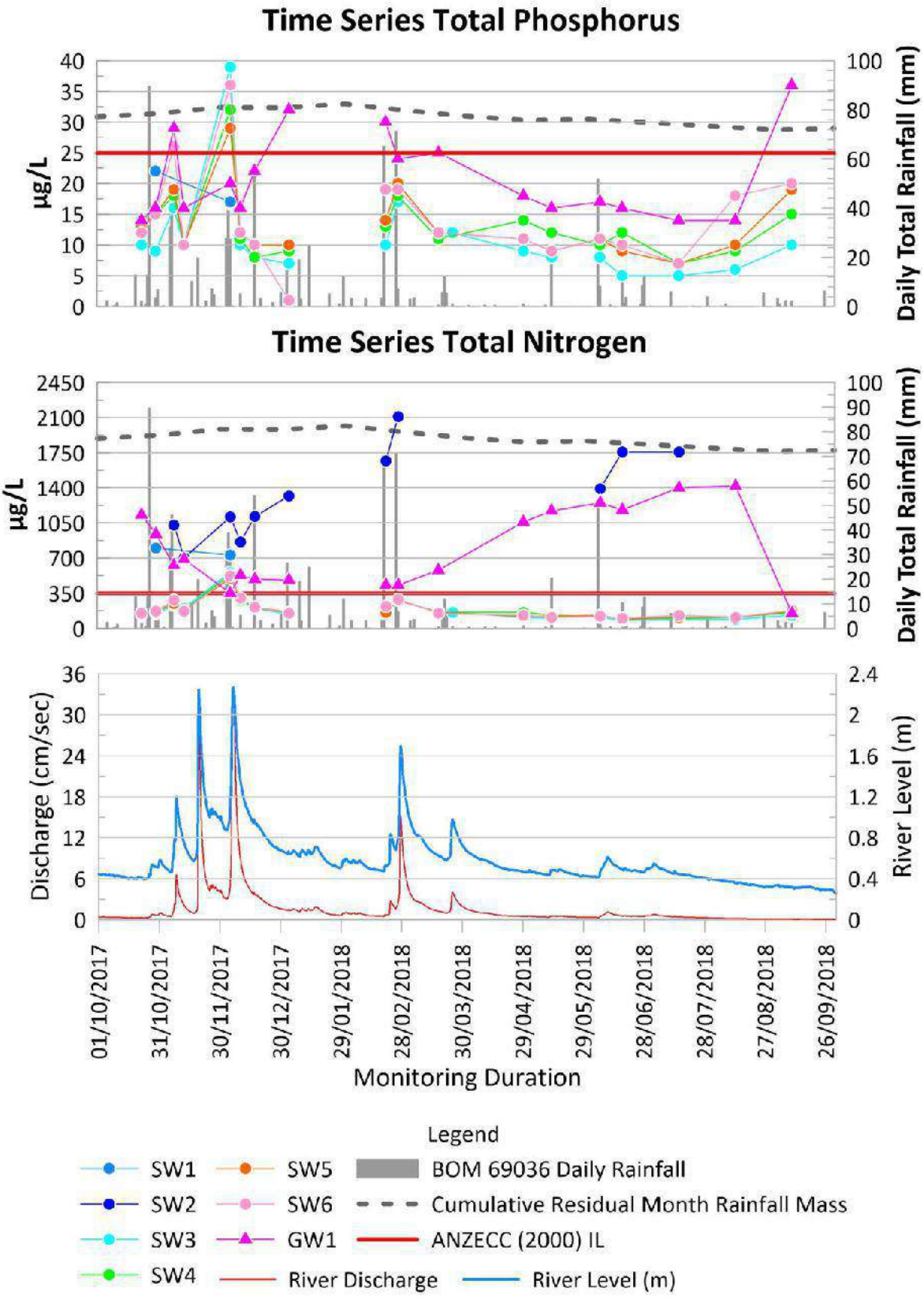


Figure 6.1: River discharge and level with Total Nitrogen and Total Phosphorus results from 2017 to 2018

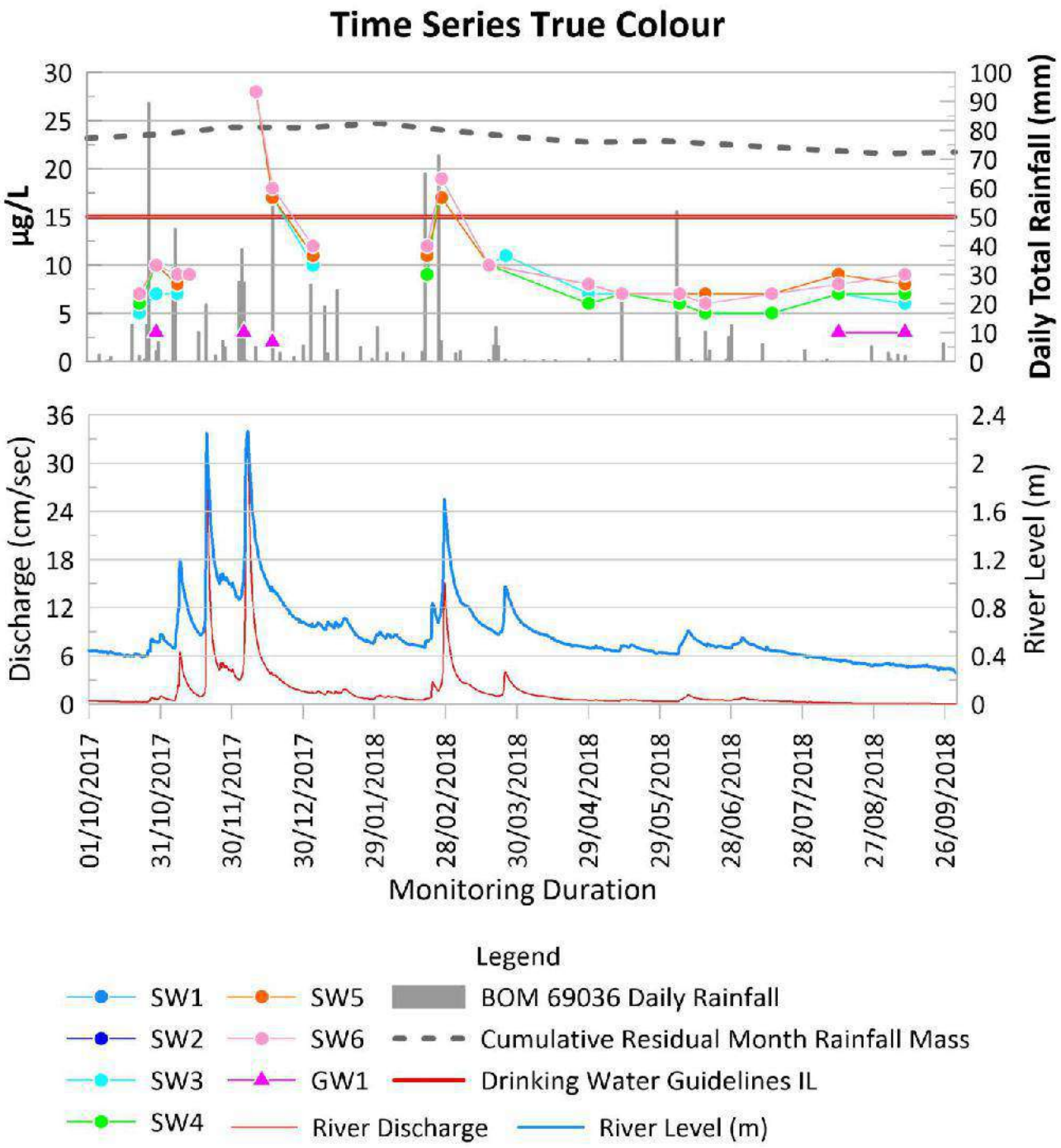


Figure 6.2: River discharge and level with true colour results from 2017 to 2018

6.5 Summary

The adopted ILs for the Site are used as a preliminary assessment of the baseline water quality results over the monitoring period. Exceedance of an IL may not indicate a risk / impact, rather a reflection of the existing natural conditions and variations. Up-gradient activities in the catchment will have an impact on down-gradient water quality. The baseline assessment shows some change between SW3 and SW6 in water quality that likely reflects the existing environment. During the construction phase monitoring SW3 provides an indication of any potential up-gradient contamination which is not attributable to the activities at the Site. GW1 represents a composite groundwater quality sample from the bores in the Councils borefield located near SW3. There are no construction details aviable for these bores. Review of registered private bores and test bores drilled by the Council would indicate approximated depths of 20m below ground surface with pump intakes at a similar depth.

Construction activities are likely to disturb the soil profile through stripping and exposure, alter the surface water catchment of the ephemeral creek due to de-vegetation and construction of the coffer dam and exposure of bedrock through the excavation of the dam foundations. These will likely cause temporary exceedances of ILs, localised to the ephemeral creek and groundwater system.

The main risks are likely to be sediment migration into the river from surface water run-off, mobilisation of metals and nutrients exposed in disturbed soil and rock, increased recharge to the groundwater system in excavated areas, increased run-off from de-vegetation and spills from onsite plant machinery. The WMP requires assessment criteria to trigger actions and responses for the protection of the Tuross River environment and the drinking water supply.

Where an activity is planned which will alter the environment it is important to assess the acceptable impacts and realistic monitoring and mitigation measures. The Tuross River is a reasonable healthy environment and through controls in the Site's Construction Environmental Management Plan (CEMP) impact to the groundwater and river should be minimal and short lived.

The borefiled has interconnectivity with the surface water and during pumping is in direct hydraulic connection with the river. Groundwater quality may be variable and at times results may be reflect the surface water samples, which is apparent with the September 2018 results. The groundwater aquifer is distinctly different to the surface water system. The cone of depression from pumping activities in the borefield will extend up-river and down river from the borefield the extent of which is not known and not part of this study. It does mean that groundwater migration

ANZECC (2000, Chapter 3 Section 3.1.4 and Chapter 7 Section 7.4.4.1) provides an avenue for the development of Site Specific assessment criteria using the baseline water quality data. The minimum data requirement for this is two years of continuous monthly data, which allows for seasonal variations to be captured. The baseline monitoring duration of this program has not covered 24 months. The monitoring data shows most exceedance of the ILs occurs at GW1, SW1 and SW2. The ephemeral creek is at time dry and an evaporative environment with potential groundwater discharge that is separate from the quality of the surface water samples in the Tuross River.

The focus of water quality monitoring should be on the quality of any surface water discharge from the construction site which may reach the river and or groundwater system (alluvial and bedrock). Parameters of regular monitoring should include:

- field pH, electrical conductivity;
- turbidity, total suspended solids, total dissolved solids;
- total and dissolved heavy metals (iron, aluminium, manganese, nickel, copper, lead and zinc);
- nutrients; and
- hydrocarbons and oil and grease.

Whilst the quality of the ephemeral creek is different to the River monitoring should assess for changes to the quality at GW1, SW4, SW5 and SW6 with a focus not just on exceedance of an IL but also trends of increase or decrease over time that may not reflect the observed baseline trends. ANZECC (2000), ANZG (2018) and the Australian Drinking Water Guidelines (2017) remain the most applicable ILs for the Tuross River. On the construction Site the CEMP is likely to use the Construction Blue Book for water quality. Use of water onsite and discharge from the site will need to meet these guidelines and it should be noted that some parameters limits are higher than the ANZECC (2000) ILs. Regular or continuous discharge to the river from the site may require an Environmental Protection Licence (EPL).

Assessment of future exceedances would consider if the exceedance is a result of a construction impact, natural climate variations or up-gradient catchment activities. Where a construction impact is noted assessment should consider if the impact is acceptable or un-acceptable. Given the construction activities are short lived the protection of the drinking

water source is most important. Acceptable impacts may be considered where exceedance of the ANZECC (2000) or ANZG (2018) IL has occurred but there is not an exceedance of the Drinking Water IL. Acceptable impacts may also be considered where the Drinking Water IL for aesthetic has been exceeded but not the IL for health. Where there is an impact to Drinking Water Quality it may be considered unacceptable if the Health ILs are exceeded or additional treatment is required to the drinking water source.

The monitoring results to date show there is exceedance of ILs under higher river flow conditions as well as during low river flow conditions. Additional baseline monitoring data prior to construction starting will provide the ability to design site specific investigation and trigger levels. Groundwater quality in the bedrock beneath the proposed construction site is not discussed in this report and may not be known. The alluvial groundwater aquifer at the Council borefield likely receives some volume of recharge from the bedrock aquifer.

6.6 Preliminary Investigation Levels

For the next year of baseline monitoring data the ILs are shown in Table 6-1 and have been revised, following the guidance of the method for developing site specific values and with consideration of acceptable and un-acceptable impacts. These ILs should be reviewed at the end of the next year of monitoring to ensure they are representative of the baseline data. Where only a few exceedances occurred for an analyte (i.e. in response to a high flow river event) the IL has not been adjusted. Reference is provided to the source of the IL value or its method of determination.

Table 6-1: Parameter or analyte and investigation level

Analyte group	Analyte	Units	Value / Range		Reference
In-Situ	pH Surface Water	pH units	<6.5		ANZECC (2000)
			>8.0		
	pH Groundwater	pH units	<6.0		Site Specific (20th Percentile)
			>8.0		ANZECC (2000)
	Electrical conductivity	µS/m	Level 1:	>300	Site Specific (1STV on the 95th percentile)
			Level 2:	>2200	ANZECC (2000)
	Turbidity	NTU	Level 1: >5		Drinking Water Guidelines (Aesthetic)
			Level 2: >50		ANZECC (2000)
	Dissolved Oxygen	% Sat	<80% Sat		ANZECC (2000)
	Temperature	°C	No Criteria		
	Salinity	%	No Criteria		
Microbial parameters	E. coli	no./100mL	No Criteria		
	Thermotolerant coliforms	cfu/100mL	No Criteria		
	Protozoa – Cryptosporidium	no./L	No Criteria		
	Bacteria – Campylobacter	no./L	No Criteria		
	Viruses –– Norovirus or other cultivable human enteric virus, such as adenoviruses	no./L	No Criteria		
Nutrients	Ammonia (as NH_3-N)	µg/L	Level 1:	500	Drinking Water Guidelines (Aesthetic)
			Level 2:	900	ANZECC (2000)
	Ammonium (as NH4+)	µg/L	220		Site Specific (95th Percentile)
	Nitrate (as N)	µg/L	Level 1:	90	ANZG (2018)
			Level 2:	50,000	Drinking Water Guidelines (Health)
	Nitrite (as N)	µg/L	Level 1:	9	ANZECC (2000)
			Level 2:	3,000	Drinking Water Guidelines (Health)
	Total Kjeldahl Nitrogen	µg/L	No Criteria		

Analyte group	Analyte	Units	Value / Range	Reference
	Total Nitrogen	µg/L	350	ANZECC (2000)
	Total Phosphorus (as P)	µg/L	25	ANZECC (2000)
	Filterable reactive Phosphate (as PO4)	µg/L	61	ANZECC (2000)
	Chlorophyll a	µg/L	3	ANZECC (2000)
Inorganics, Anions and Cations	Chloride	mg/L	175	ANZECC (2000)
	Fluoride	mg/L	1.5	Drinking Water Guidelines (Health)
	Sulphate (as S04)	mg/L	250	Drinking Water Guidelines (Aesthetic)
			1000	ANZECC (2000)
	Total alkalinity	mg/L	No Criteria	-
	Calcium	mg/L	1000	ANZECC (2000)
	Potassium	mg/L	No Criteria	-
	Magnesium	mg/L	No Criteria	-
	Sodium	mg/L	180	Drinking Water Guidelines (Aesthetic)
	Hardness (as $CaCO_3$)	mg/L	Level 1: 200	Drinking Water Guidelines (Aesthetic)
			Level 2: 350	ANZECC (2000)
Physical & chemical Properties	True colour	HU	Level 1: 15	Drinking Water Guidelines (Aesthetic)
			Level 2: 25	
	Particle Size Distribution		No Criteria	
	Total Dissolved Solids	mg/L	Level 1: 600 Level 2: 1,200	Drinking Water Guidelines (Aesthetic)
			Level 3: 2,000	ANZECC (2000)
	Total Suspended Solids	mg/L	No Criteria	
	Total organic carbon	mg/L	No Criteria	
	Dissolved organic carbon	mg/L	No Criteria	
	Biochemical oxygen demand	mg/L	No Criteria	
Metals	Aluminium	µg/L	Level 1: 55	ANZECC (2000)
			Level 2: 200	Drinking Water Guidelines (Health)
	Arsenic	µg/L	10	Drinking Water Guidelines (Health)
	Barium	µg/L	2000	Drinking Water Guidelines (Health)
	Boron	µg/L	Level 1: 370	ANZECC (2000)
			Level 2: 4,000	Drinking Water Guidelines (Health)
	Cadmium	µg/L	Level 1: 0.2	ANZECC (2000)
			Level 2: 2	Drinking Water Guidelines (Health)
	Chromium (Total)	µg/L	Level 1: 1.0	ANZECC (2000)
			Level 2: 50	Drinking Water Guidelines (Health)
	Cobalt	µg/L	1.4	ANZG (2018)
	Copper	µg/L	Level 1: 1.4	ANZECC (2000)
			Level 2: 1000	Drinking Water Guidelines (Aesthetic)
	Iron	µg/L	Level 1: 200	ANZECC (2000)
			Level 2: 300	Drinking Water Guidelines (Aesthetic)
	Lead	µg/L	Level 1: 3.4	ANZECC (2000)
			Level 2: 10	Drinking Water Guidelines (Aesthetic)
	Manganese	µg/L	Level 1: 100	Drinking Water Guidelines (Aesthetic)

Analyte group	Analyte	Units	Value / Range	Reference
			Level 2: 200	ANZECC (2000)
	Mercury	µg/L	1	Drinking Water Guidelines (Health)
	Molybdenum	µg/L	Level 1: 34	ANZG (2018)
			Level 2: 50	Drinking Water Guidelines (Health)
	Nickel	µg/L	Level1: 11	ANZECC (2000)
			Level2: 20	Drinking Water Guidelines (Health)
	Selenium	µg/L	Level 1: 5	ANZECC (2000)
			Level 2: 10	Drinking Water Guidelines (Health)
	Zinc	µg/L	Level 1: 8	ANZG (2018)
			Level 2: 3,000	Drinking Water Guidelines (Aesthetic)
Total Recoverable Hydrocarbons (TRH)	TPH C6 - C10 less BTEX (F1)	mg/L	20	Limit of Reporting
	TRH C6 - C10	mg/L	20	Limit of Reporting
	TRH >C10 - C16 less Naphthalene (F2)	mg/L	100	Limit of Reporting
	TRH >C10-C16	mg/L	100	Limit of Reporting
	TRH >C16-C34	mg/L	100	Limit of Reporting
	TRH >C34-C40	mg/L	100	Limit of Reporting
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	Benzene	µg/L	1	Drinking Water Guidelines (Health)
			950	ANZECC (2000)
	Ethylbenzene	µg/L	3	Drinking Water Guidelines (Aesthetic)
			80	ANZG (2018)
	Toluene	µg/L	800	Drinking Water Guidelines (Aesthetic)
			180	ANZG (2018)
	o-xylene	µg/L	350	ANZECC (2000)
	m and p-xylene	µg/L	75	ANZECC (2000)
	Xylene (Total)	µg/L	20	Drinking Water Guidelines (Aesthetic)
Polycyclic Aromatic Hydrocarbons (PAHs)	Naphthalene	µg/L	16	ANZECC (2000)
	Anthracene	µg/L	0.4	ANZG (2018)
	Phenanthrene	µg/L	0.6	ANZG (2018)
	Fluoranthene	µg/L	1.0	ANZG (2018)
	Benzo(a)pyrene	µg/L	0.01	Drinking Water Guidelines (Health)
			0.1	ANZG (2018)
	Total PAHs	µg/L	No Criteria	
Organochlorine Pesticides (OCP)	Aldrin	µg/L	0.01	ANZG (2018)
	chlordane	µg/L	0.03	ANZECC (2000)
	DDE	µg/L	No Criteria	-
	DDT	µg/L	0.006	ANZECC (2000)
	Dieldrin	µg/L	0.01	ANZG (2018)
	Endosulfan	µg/L	0.03	ANZECC (2000)
	Endrin	µg/L	0.01	ANZECC (2000)
	Heptachlor	µg/L	0.01	ANZECC (2000)
	Hexachlorobenzene (HCB)	µg/L	No Criteria	
	Lindane	µg/L	0.2	ANZECC (2000)
	Methoxychlor	µg/L	0.01	ANZG (2018)

Analyte group	Analyte	Units	Value / Range	Reference
Organophosphorus Pesticides (OPP)	Atrazine	µg/L	13	ANZECC (2000)
	Azinphos methyl	µg/L	0.01	ANZECC (2000)
	Chlorpyrifos	µg/L	0.01	ANZECC (2000)
	Diazinon	µg/L	0.01	ANZECC (2000)
	Dimethoate	µg/L	0.15	ANZECC (2000)
	Fenitrothion	µg/L	0.2	ANZECC (2000)
	Malathion	µg/L	0.05	ANZECC (2000)
	Parathion	µg/L	0.004	ANZECC (2000)
Phenols	Phenol	µg/L	320	ANZECC (2000)
	2-chlorophenol	µg/L	340	ANZECC (2000)
	4-chlorophenol	µg/L	220	ANZECC (2000)
	2,4-dichlorphenol	µg/L	120	ANZECC (2000)
	2,4,6-trichlorophenol	µg/L	3	ANZECC (2000)
	2,3,4,6-tetrachlorophenol	µg/L	10	ANZECC (2000)
	Pentachlorophenol	µg/L	3.6	ANZECC (2000)
Herbicides	Diuron	µg/L	0.5	ANZECC (2000)
	2,4-D	µg/L	280	ANZECC (2000)
	2,4,5-T	µg/L	36	ANZECC (2000)
	MCPA	µg/L	1.4	ANZECC (2000)

6.7 Water Monitoring Program Changes

For the next year of baseline monitoring the following changes are recommended:

- quarterly water quality monitoring of the parameters listed in Table 6-2;
- TRH, BTEX, PAH, OPP and OCP Phenols and Herbicides removed;
- particle size distribution is removed;
- microbial monitoring is removed;
- removal of antimony, beryllium, silver, uranium, vanadium from heavy metals sampling;
- dissolved metals added to SW3 and SW6
- one wet weather event per month; and
- one peak river flow event per month where river gauge level is greater than 2m.

When construction activities commence the water quality parameters and frequency may be adjusted. TRH, BTEX and PAH sampling with the addition of Oil and Grease for all monitoring locations is recommended during construction.

Table 6-2: Parameter or analyte monitoring frequency

Parameter	Field or laboratory method	Nominated Testing Frequency / Locations (See notes)	Locations
pH	Field measurement	Quarterly and Wet Weather / River Flow	All
Electrical Conductivity	Field measurement	Quarterly and Wet Weather / River Flow	All
Turbidity	Field measurement	Quarterly and Wet Weather / River Flow	All

Parameter	Field or laboratory method	Nominated Testing Frequency / Locations (See notes)	Locations
Dissolved oxygen	Field measurement	Quarterly and Wet Weather / River Flow	All
Temperature	Field measurement	Quarterly and Wet Weather / River Flow	All
Salinity	Field measurement	Quarterly and Wet Weather / River Flow	All
Biochemical oxygen demand	Laboratory	Quarterly and Wet Weather / River Flow	All
Nitrogen (as N) including Nitrate NO_3, Nitrite NO_2, Ammonia NH_3, Ammonium NH_4^+ Total Kjeldahl Nitrogen and Total Nitrogen.	Laboratory	Quarterly and Wet Weather / River Flow	All
Phosphorus (as P) including total phosphorus, and plant-available phosphate (PO_4)	Laboratory	Quarterly and Wet Weather / River Flow	All
Chlorophyll	Laboratory	Quarterly and Wet Weather / River Flow	All
Total dissolved solids (TDS)	Laboratory	Quarterly and Wet Weather / River Flow	All
Total suspended solids (TSS)	Laboratory	Quarterly and Wet Weather / River Flow	All
Major anions (Cl, Fl, SO_4, total alkalinity)	Laboratory	Quarterly and Wet Weather / River Flow	All
Major Cations (Ca, K, Mg, Na, Hardness)	Laboratory	Quarterly and Wet Weather / River Flow	All
True colour	Laboratory	Quarterly and Wet Weather / River Flow	All
Total organic carbon	Laboratory	Quarterly and Wet Weather / River Flow	All
Dissolved organic carbon	Laboratory	Quarterly and Wet Weather / River Flow	All
Total Metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, Zn)	Laboratory	Quarterly and Wet Weather / River Flow	All
Dissolved Metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, Zn)	Laboratory	Quarterly and Wet Weather / River Flow	GW1, SW3, SW6

6.8 Response and Mitigation Actions for Construction

During construction the water quality monitoring results should be reviewed against the ILs each time data is collected along with observations of the environment, noting river habitat or channel stability, vegetation type, algae blooms or plant growth and visible construction activities. When an IL is exceeded the first response protocol is to review the available information to assess if a construction impact is a likely source of the exceedance. If a construction impact is assessed as a likely source the second response protocol is to review the CEMP mitigation measures to establish if they are adequate and in place or require remediation works, such as a collapsed sediment control fence. Council may consider regular inspection of the construction site CEMP control measures as a means of mitigation of potential impacts.

Where impacts from construction are consistent, such as regular discharge of water from the site with a quality limit already higher than the ANZECC (2000) ILs mitigation measures should be applied at the point of mixing with the Tuross River including erosion and sediment controls.

6.9 Recommendations

The following recommendations are made for the second year of baseline monitoring:

- additional of a surface water monitoring point in the ephemeral creek down-gradient of SW1 near GW1; and
- monitoring of groundwater level and quality at the standpipes (installed by SMEC in 2017) in the construction site area.

SMEC also recommend consideration is given to adequate decommissioning of the groundwater standpipes located in the construction site footprint, prior to the start of construction. These standpipes may have been damaged by the recent bushfires and an assessment of their condition should be undertaken. Decommissioning in accordance with the Minimum Construction Requirements of Water Bores in Australia – Chapter 18 (3rd Ed, NUDLC, 2012) should be undertaken to avoid them becoming a conduit to the groundwater system if damaged or to be destroyed during construction.

7 References

Bureau of Meteorology (2017) Available at http://www.bom.gov.au/climate/data/index.shtml

BOM Australian Climate Maps

http://www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp?maptype=seasgrpb

Troedson A.L. & Hashimoto T.R. 2013. Eurobodalla 1:100 000 and 1:25 000, Coastal Quaternary Geology Map Series. Geological Survey of New South Wales, Maitland.

National Uniform Drillers Licencing Committee (2012) Minimum Construction Requirements for Water Bores in Australia, 3rd Edition

Appendix A Monitoring location photographs

Figure Error! No text of specified style in document..1: Location SW1 photograph taken 8 August 2018

Figure Error! No text of specified style in document..2: Location SW2 photograph taken 8 August 2018

Figure Error! No text of specified style in document..3: Location SW3 photograph taken 8 August 2018

Figure Error! No text of specified style in document..4: Location SW4 photograph taken 8 August 2018

Figure Error! No text of specified style in document..5: Location SW5 photograph taken 8 August 2018

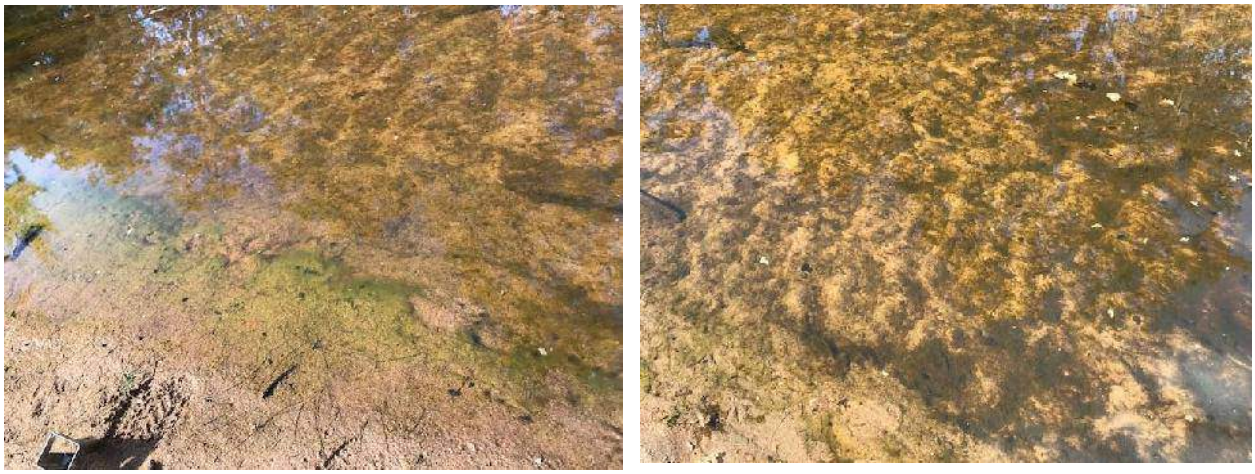
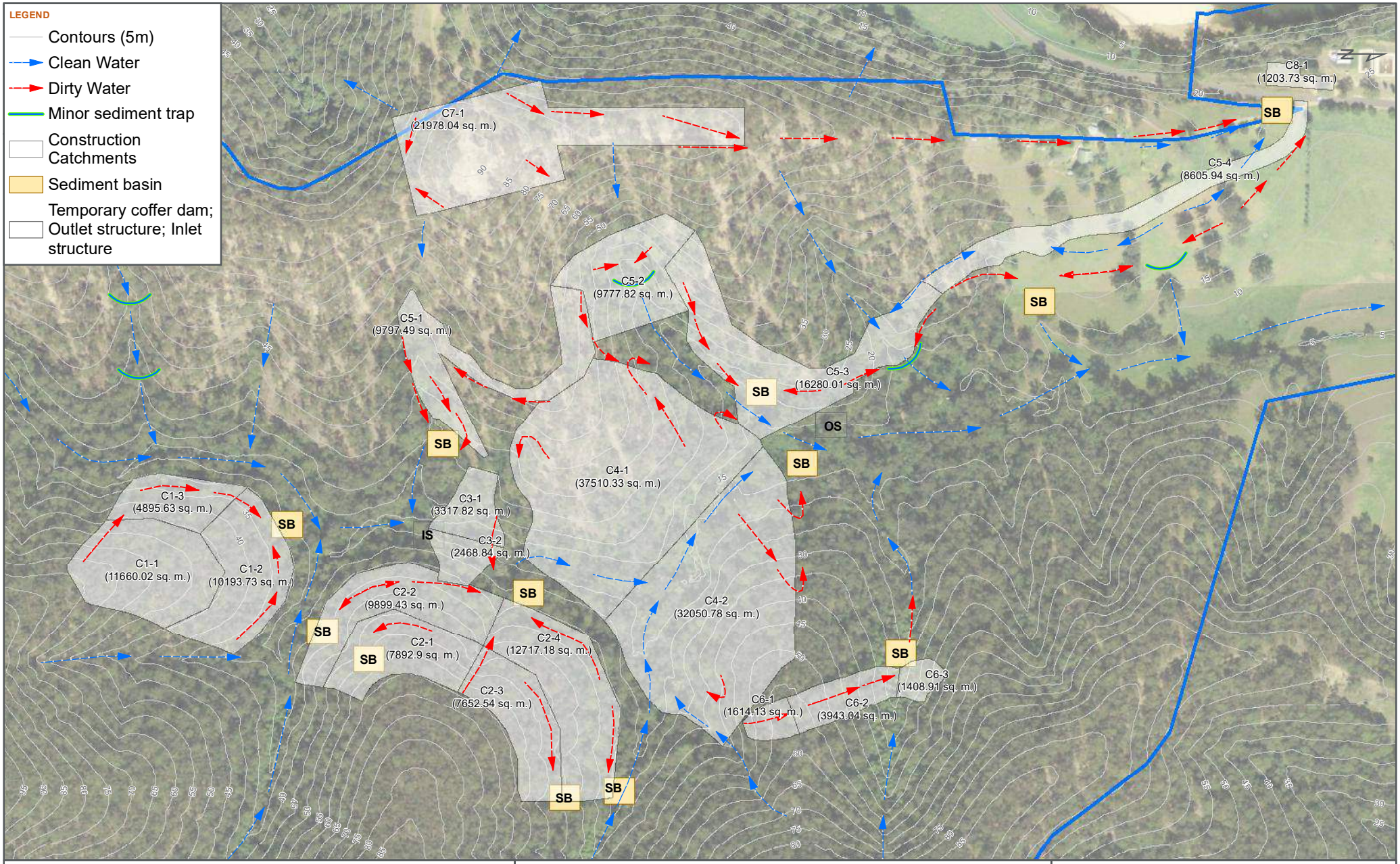


Figure Error! No text of specified style in document..6: Location SW6 photograph taken 8 August 2018

Appendix A – Monitoring locations photographs

Figure Error! No text of specified style in document..7: Location GW1 photograph



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COORDINATE SYSTEM GDA 1994 MGA Zone 56

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CREATED BY FA13847

<bol><clr red="199" green="91" blue="18">SOURCES</clr></bol> {Insert data sources}
Imagery: © Department of Finance, Services & Innovation 2017

SMEC

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Last updated by: FA13847 on 27/10/2017 at 18:44

Appendix D Construction RUSLE Calculations (SMEC, 2018c)

1. Erosion Hazard and Sediment Basins

Site Name: Eurobodalla Southern Storage

Site Location: Eurobodalla, NSW

Precinct/Stage: Stage 1

Other Details: Construction phase only - Quarry Areas 1 and 2

Site area	Sub-catchment or Name of Structure						Notes
	C1-1	C1-2	C1-3	C2-1	C2-2	C2-3	
Total catchment area (ha)	1.166	1.019	0.49	0.789	0.99	0.765	
Disturbed catchment area (ha)	1.166	1.019	0.49	0.789	0.99	0.765	

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D	D	D	From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)	42	42	42	42	42	42	Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)	16	16	16	16	16	16	
% clay (fraction finer than 0.002 mm)	14	14	14	14	14	14	
Dispersion percentage	54.0	54.0	54.0	54.0	54.0	54.0	E.g. enter 10 for dispersion of 10%
% of whole soil dispersible	11.88	11.88	11.88	11.88	11.88	11.88	See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D	D	D	Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	5	5	5	5	5	5	See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	80	80	80	80	80	80	
x-day, y-percentile rainfall event (mm)	35	35	35	35	35	35	
Rainfall R-factor (if known)	4500	4500	4500	4500	4500	4500	Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)							

RUSLE Factors

Rainfall erosivity (*R*-factor)	4500	4500	4500	4500	4500	4500	Auto-filled from above
Soil erodibility (*K*-factor)	0.042	0.042	0.042	0.042	0.042	0.042	
Slope length (m)	132.1	66.1	66.2	42.9	36.4	45.7	
Slope gradient (%)	15.14	15.1286	15.1057	34.965	41.2088	32.8228	RUSLE LS factor calculated for a high rill/interrill ratio.
Length/gradient (*LS*-factor)	7.40	4.45	4.45	8.20	8.30	8.13	
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	12	12	12	12	12	12	Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.35	0.35	0.35	0.35	0.35	0.35	See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	1819	1094	1093	2015	2039	1996	
Soil Loss Class	7	6	6	7	7	7	See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	1399	841	841	1550	1569	1536	Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	1632	858	412	1223	1553	1175	See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	143	125	60	97	121	94	See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	1775	983	472	1320	1674	1269	

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).

1. Erosion Hazard and Sediment Basins

Site Name: Eurobodalla Southern Storage

Site Location: Eurobodalla, NSW

Precinct/Stage: Stage 1

Other Details: Construction phase only - Coffer Dam and Storage Embankment

Site area	Sub-catchment or Name of Structure						Notes
	C3-1	C3-2	C4-1	C4-2		C2-4	
Total catchment area (ha)	0.332	0.247	3.751	3.205		1.272	
Disturbed catchment area (ha)	0.332	0.247	3.751	3.205		1.272	

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D		D	From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)	42	42	42	42		42	Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)	16	16	16	16		16	
% clay (fraction finer than 0.002 mm)	14	14	14	14		14	
Dispersion percentage	54.0	54.0	54.0	54.0		54.0	E.g. enter 10 for dispersion of 10%
% of whole soil dispersible	11.88	11.88	11.88	11.88		11.88	See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D		D	Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	5	5	5	5		5	See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	80	80	80	80		80	
x-day, y-percentile rainfall event (mm)	35	35	35	35		35	
Rainfall R-factor (if known)	4500	4500	4500	4500		4500	Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)							

RUSLE Factors

Rainfall erosivity (*R*-factor)	4500	4500	4500	4500		4500	Auto-filled from above
Soil erodibility (*K*-factor)	0.042	0.042	0.042	0.042		0.042	RUSLE LS factor calculated for a high rill/interrill ratio.
Slope length (m)	64	53.8	182.7	159.6		54.4	
Slope gradient (%)	15.625	27.881	19.1571	21.9298		27.6	
Length/gradient (*LS*-factor)	4.54	7.85	12.97	13.91		7.83	
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	12	12	12	12		12	Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.35	0.35	0.35	0.35		0.35	See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	1115	1928	3188	3418		1924	
Soil Loss Class	6	7	7	7		7	See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	857	1483	2452	2629		1480	Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	284	366	9198	8427		1883	See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	41	30	460	393		156	See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	325	396	9658	8820		2039	

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).

1. Erosion Hazard and Sediment Basins

Site Name: Eurobodalla Southern Storage

Site Location: Eurobodalla, NSW

Precinct/Stage: Stage 1

Other Details: Construction phase only - Storage access road

Site area	Sub-catchment or Name of Structure						Notes
	C5-1	C5-2	C5-3	C5-4			
Total catchment area (ha)	0.98	0.978	1.628	0.861			
Disturbed catchment area (ha)	0.98	0.978	1.628	0.861			

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D			From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)	42	42	42	42			Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)	16	16	16	16			
% clay (fraction finer than 0.002 mm)	14	14	14	14			
Dispersion percentage	54.0	54.0	54.0	54.0			E.g. enter 10 for dispersion of 10%
% of whole soil dispersible	11.88	11.88	11.88	11.88			See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D			Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	5	5	5	5			See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	80	80	80	80			
x-day, y-percentile rainfall event (mm)	35	35	35	35			
Rainfall R-factor (if known)	4500	4500	4500	4500			Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)							

RUSLE Factors

Rainfall erosivity (*R*-factor)	4500	4500	4500	4500			Auto-filled from above
Soil erodibility (*K*-factor)	0.042	0.042	0.042	0.029			
Slope length (m)	422.1	95.6	344	431			
Slope gradient (%)	4.73821	20.9205	8.72093	1.16009			RUSLE LS factor calculated for a high rill/interrill ratio.
Length/gradient (*LS*-factor)	2.84	8.86	5.96	0.36			
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	12	12	12	12			Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.35	0.35	0.35	0.35			See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	698	2177	1464	62			
Soil Loss Class	5	7	6	1			See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	537	1675	1126	47			Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	526	1637	1834	41			See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	120	120	199	105			See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	646	1757	2033	146			

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).

1. Erosion Hazard and Sediment Basins

Site Name: Eurobodalla Southern Storage

Site Location: Eurobodalla, NSW

Precinct/Stage: Stage 1

Other Details: Construction phase only - Spillway, compounds and river intake pump station

Site area	Sub-catchment or Name of Structure						Notes
	C6-1	C6-2	C6-3	C7-1	C8-1		
Total catchment area (ha)	0.161	0.394	0.141	2.198	0.12		
Disturbed catchment area (ha)	0.161	0.394	0.141	2.198	0.12		

Soil analysis (enter sediment type if known, or laboratory particle size data)

Sediment Type (C, F or D) if known:	D	D	D	D	D		From Appendix C (if known)
% sand (fraction 0.02 to 2.00 mm)	42	42	42	42	42		Enter the percentage of each soil fraction. E.g. enter 10 for 10%
% silt (fraction 0.002 to 0.02 mm)	16	16	16	16	16		
% clay (fraction finer than 0.002 mm)	14	14	14	14	14		
Dispersion percentage	54.0	54.0	54.0	54.0	54.0		E.g. enter 10 for dispersion of 10%
% of whole soil dispersible	11.88	11.88	11.88	11.88	11.88		See Section 6.3.3(e). Auto-calculated
Soil Texture Group	D	D	D	D	D		Automatic calculation from above

Rainfall data

Design rainfall depth (no of days)	5	5	5	5	5		See Section 6.3.4 and, particularly, Table 6.3 on pages 6-24 and 6-25.
Design rainfall depth (percentile)	80	80	80	80	80		
x-day, y-percentile rainfall event (mm)	35	35	35	35	35		
Rainfall R-factor (if known)	4500	4500	4500	4500	4500		Only need to enter one or the other here
IFD: 2-year, 6-hour storm (if known)							

RUSLE Factors

Rainfall erosivity (*R*-factor)	4500	4500	4500	4500	4500		Auto-filled from above
Soil erodibility (*K*-factor)	0.042	0.042	0.042	0.042	0.029		
Slope length (m)	48.5	107.1	49.1	272.3	31.4		
Slope gradient (%)	20.6186	28.0112	40.7332	7.34484	31.8471		RUSLE LS factor calculated for a high rill/interrill ratio.
Length/gradient (*LS*-factor)	5.18	13.57	10.48	4.06	5.85		
Erosion control practice (*P*-factor)	1.3	1.3	1.3	1.3	1.3	1.3	
Ground cover (*C*-factor)	1	1	1	1	1	1	

Sediment Basin Design Criteria (for Type D/F basins only. Leave blank for Type C basins)

Storage (soil) zone design (no of months)	12	12	12	12	12		Minimum is generally 2 months
Cv (Volumetric runoff coefficient)	0.35	0.35	0.35	0.35	0.35		See Table F2, page F-4 in Appendix F

Calculations and Type D/F Sediment Basin Volumes

Soil loss (t/ha/yr)	1274	3335	2576	997	992		
Soil Loss Class	6	7	7	6	6		See Table 4.2, page 4-13
Soil loss (m^3/ha/yr)	980	2566	1982	767	763		Conversion to cubic metres
Sediment basin storage (soil) volume (m^3)	158	1012	279	1686	92		See Sections 6.3.4(i) for calculations
Sediment basin settling (water) volume (m^3)	20	48	17	269	15		See Sections 6.3.4(i) for calculations
Sediment basin total volume (m^3)	178	1060	296	1955	107		

NB for sizing of Type C (coarse) sediment basins, see Worksheet 3 (if required).

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Appendix C Construction Flora and Fauna Management Plan

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Construction Flora and Fauna Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
2 December 2021

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1 Purpose and objectives

1.1 Purpose

This Construction Flora and Fauna Management Sub Plan (CFFMP) forms part of the Construction Environmental Management Plan (CEMP) for initial sections of the Storage Access Road and Storage Inlet Pipeline for the Eurobodalla Southern Water Supply Storage Project (the Project).

The early works construction activities covered by this CFFMP include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

This CFFMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the early works construction activities outlined above, as part of the Project, and would comply with State Significant Development (SSD) 7089 Development Consent, the EIS, Addendum Submissions Report and any associated licences, permits and approvals required for the Project.

The CFFMP specifically outlines how Eurobodalla Shire Council is to minimise biodiversity risks and achieve environmental outcomes for the Project by providing a structured approach to ensure appropriate mitigation measures and controls are implemented.

1.2 Objectives

The objectives of this CFFMP are to describe how clearing and construction impacts on flora and fauna will be minimised and managed during the early works construction for the Storage Access Road and Storage Inlet Pipeline. The conditions of the Development Consent (Specific Environmental Conditions – Biodiversity: B2 – B6) outline that the development of the project is required to:

- prevent, minimise, or offset adverse environmental impacts
- set standards and performance measures for acceptable environmental performance
- require regular monitoring and reporting
- provide for the ongoing environmental management of the development.

The specific flora and fauna management conditions are described in Table 1-1.

Table 1-1 Conditions of the Development Consent relevant to flora and fauna management

Condition reference	Condition	Where addressed in CFFMP
B2	No more than 54.61 ha of native vegetation is to be cleared.	Section 3 The construction of the Storage Access Road and Storage Inlet Pipeline requires 0.12 ha of native vegetation to be cleared. This area is considered within the approved clearing limit of 54.61 ha of native vegetation.
B3	Prior to clearing of native vegetation, the Applicant must prepare a Construction Flora and Fauna Management Plan (CFFMP) in consultation with DPIE Fisheries and to the satisfaction of the Planning Secretary.	This document. Consultation with DPIE Fisheries is detailed in Section 1.5. Evidence of consultation with DPIE Fisheries is included in Appendix C.
B4	The CFFMP must form part of the CEMP required by Condition C2 and, in addition to the general management plan requirements listed in Condition C1, the CFFMP must include the following:	
	(a) measures to ensure biodiversity values not intended to be impacted are delineated by mapping of 'no-go areas' and the installation of on-site measures such as temporary exclusion fencing prior to clearing;	Section 4.1 Section 4.2
	(b) measures to minimise the risk of introducing weed species via construction vehicles, plant and equipment and control of pest and weed species existing at the site;	Weed Management Plan, Appendix A
	(c) method of vegetation removal and measures to minimise impacts outside the access road and pipeline construction boundary and within the perimeter road construction boundary as a result of the equipment used for clearing and general access for heavy vehicles and construction plant and equipment;	Section 4
	(d) options to reuse cleared vegetation, in preference to burning, such as relocation of hollow logs for habitat and mulch for use in areas to be revegetated within the site and use elsewhere within the local area;`	Section 4
	(e) measures to minimise the impacts on fauna within the site including the installation of nest boxes prior to clearing, relocation of fauna to adjacent habitat, staged clearing and timing of clearing outside breeding seasons; and	Section 4

Condition reference	Condition	Where addressed in CFFMP
	(f) details on rehabilitation and revegetation including: (i) use of locally indigenous plant species including collection of seed prior to clearing for this purpose; (ii) for construction areas outside the full supply level including the construction compounds, on-site quarry areas and the new storage access road batters; (iii) for the construction area at the existing water treatment plant (WTP) including for the bed and banks of the Tuross River affected by the temporary cofferdam.	Section 5 Section 4.8 Not applicable
B5	Prior to removing/clearing any vegetation or any demolition, pre-clearing surveys and inspections for threatened species must be undertaken. The surveys and inspections, and any subsequent relocation of species and associated management measures, must be undertaken under the guidance of a suitably qualified and experienced ecologist.	Section 4.6 Section 4.8
B6	The Applicant must:	
	(a) not commence any clearing work until the CFFMP is approved by the Planning Secretary; and	This document
	(b) implement the most recent version of the CFFMP approved by the Planning Secretary for the duration of works.	This document

Appendix 2 of the Development Consent – *Applicant's revised management and mitigation measures*, outlines that a management sub-plan will be produced to establish pre-construction and construction mitigation measures to minimise the impacts to the endangered ecological community *River-Flat Eucalypt Forest on Coastal Floodplains* of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. ***No*** River Flat Eucalypt Forest will be cleared for the construction activities covered by this CFFMP.

1.3 Targets

The following targets have been established for the management of impacts to flora and fauna during the project:

- ensure full compliance with the relevant legislative requirements, the EIS, and conditions of the Development Consent
- no disturbance to flora and fauna outside the proposed construction footprint and associated access tracks and site compounds (Figure 2-1)
- no increase in distribution of weeds currently existing within the project areas
- no new weeds introduced to the project areas
- no transfer of plant diseases or pathogens to or from the project work areas
- all fauna species encountered during construction are handled humanely in accordance with industry standards
- no pollution or siltation of aquatic ecosystems, wetlands, endangered ecological communities or threatened species habitat
- minimise barriers to fauna movement.

1.4 Relevant guidelines

The guidelines, specifications and policy documents relevant to this CFFMP include:

- Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Botanic Gardens Trust 2008).
- New South Wales Weed Control Handbook (DPI 2018).
- Hygiene protocol for the control of disease in frogs (DECCW 2008).
- Australian Standard AS4373 Pruning of Amenity Trees (Standards Australia 2007).
- Australian Standard AS4970 Protection of Trees (Standards Australia 2009).
- NSW Biodiversity Offsets Policy for Major Projects (OEH 2014).

1.5 Consultation with DPIE Fisheries

SMEC undertook consultation with DPIE Fisheries via letter on 16 September 2021 regarding the CFFMP as per Condition B3 of the Conditions of Consent. DPIE provided a response via email on 21 September 2021. No changes were recommended to the CFFMP by DPIE Fisheries. Evidence of consultation with DPIE Fisheries is provided in Appendix C.

2 Existing environment

2.1 Location and surrounding environment

The Project is located approximately 30 kilometres south of Moruya, within the Eurobodalla Local Government Area (LGA). While the Storage Site is within the Bodalla State Forest, the construction works covered by this CFFMP are not. The construction works covered by this CFFMP cease at the boundary of the Bodalla State Forest.

The Storage Site is north-facing, bound by Bullockys Hut Road to the west, Eurobodalla Road to the north and Big Rock Road to the south-east. The Storage Site is comprised of at least 20 un-named creeks and waterways that come together to flow into a section of the Tuross River approximately 8.5 kilometres south-west of the town of Bodalla.

The works covered by this CFFMP are shown in Figure 2-1 and comprise:

- construction of the Storage Access Road from Eurobodalla Road to the boundary of the Bodalla State Forest
- construction of the Storage Inlet Pipeline from the limit of the TRIPS contract works (on the Tuross River side of Eurobodalla Road) to the boundary of the Bodalla State Forest
- upgrades to the intersection of Eurobodalla Road and the Storage Access Road to facilitate safe access and egress to the Storage Site and TRIPS site.

2.2 Existing vegetation

The Storage Access Road and Storage Inlet Pipeline construction boundary supports two vegetation types; wet sclerophyll forest and semi-cleared agricultural land (Figure 2-2). Wet sclerophyll forest covers 0.12 hectares of the area to be cleared, and is part of a patch occurring on the slopes between the valley floor and the ridgeline associated with Bullokys Hut Road (Figure 2-3). Commonly occurring canopy species include *Corymbia maculata* (Spotted Gum) and *Eucalyptus globoidea* (White Stringybark), with *E. longifolia* (Woollybutt), *E. agglomerata* (Blue-leaved Stringybark), *E. muelleriana* (Yellow Stringybark), *E. tricarpa* (Mugga Ironbark) and *E. pilularis* (Blackbutt) occurring less frequently. The area of wet sclerophyll forest to is dominated by juvenile tree regrowth, likely to be due to selective felling or regeneration of the paddock.

The 1.48 hectares of semi-cleared agricultural land supported a range of exotic species such as *Cenchrus clandestinus* (Kikuyu grass) and Cirsium vulgare (Thistle), and remnant canopy species such as *Casuarina cunninghamiana* (River Oak) and *Angophora floribunda* (Figure 2-4).

DATE 30/10/2020

0 10 20 40 60 80
Metres
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PAGE SIZE A4

COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 2-1

FIGURE TITLE Project design

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY JT14432

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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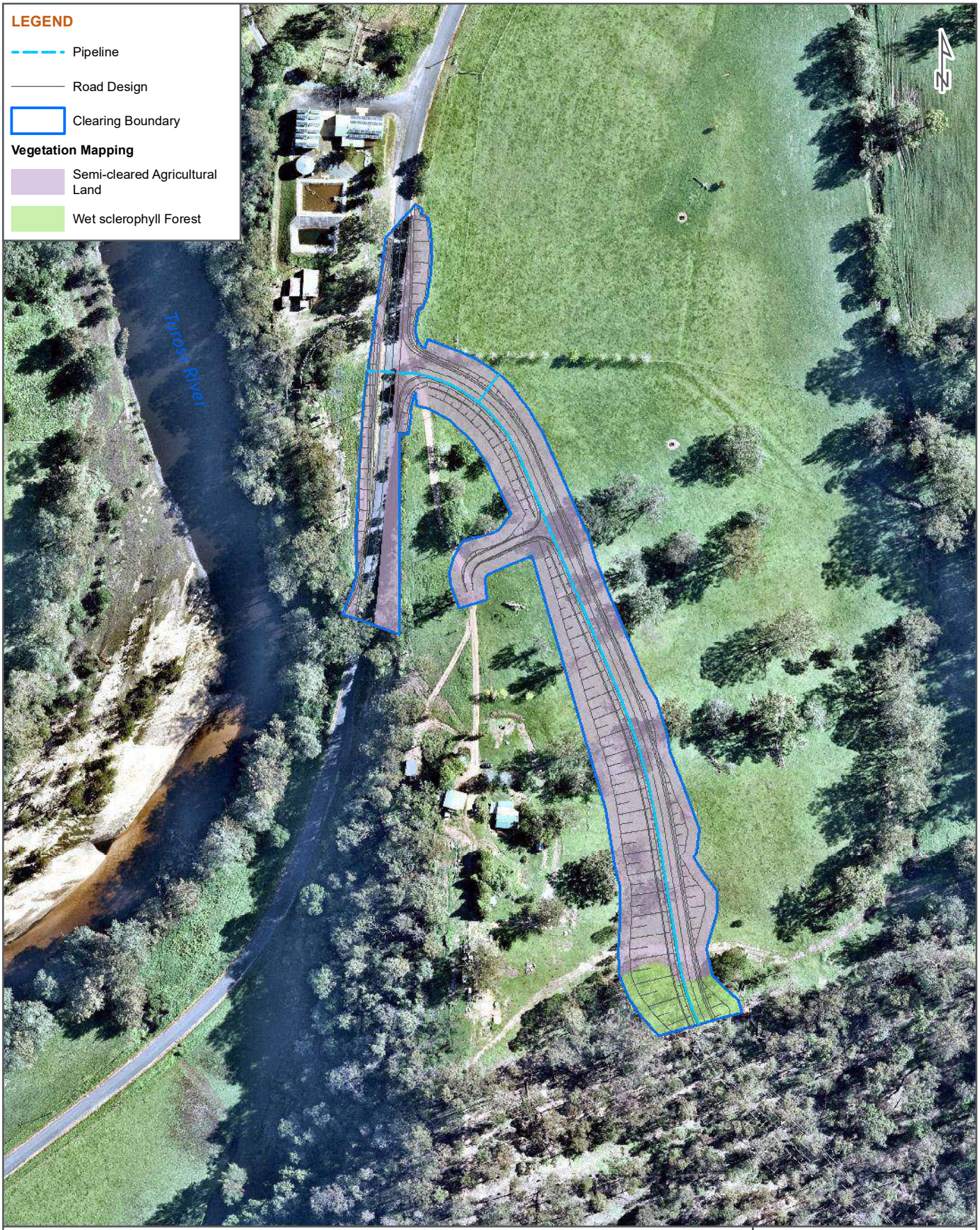

DATE 29/10/2020

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PAGE SIZE A4

COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 2-2

FIGURE TITLE Clearing Boundary and Vegetation Mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY JT14432

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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Location: \\AUSYFSV003\Group\projects\30012835 - Eurobodalla Southern Storage\160 GIS\Maps\Ecology\20201029\30012835_Fig2_ClearingBoundary_VegMapping_20201029.mxd

Last updated by: JT14432 on 29/10/2020 at 19:12

Figure 2-3 Wet sclerophyll forest in the pipeline and access road construction footprint viewed looking north.

Figure 2-4 Semi-cleared agricultural land. The semi-cleared agricultural land occurring within the pipeline construction footprint. The semi-cleared agricultural land supported an assemblage of locally native and non-native groundcover and shrub species along with a sparse assemblage of mature and juvenile locally native trees.

2.3 Threatened Ecological Communities

No threatened ecological communities have been mapped within the Storage Access Road and Storage Inlet Pipeline construction footprint.

2.4 Threatened flora

No threatened flora species were recorded in the Storage Access Road and Storage Inlet Pipeline construction footprint during the targeted surveys conducted for the EIS. No threatened flora species were incidentally recorded during the pre-fire and post-fire habitat assessment.

2.5 Fauna habitat

Five fauna habitat types were identified in the EIS. Four of these habitat types occur in the Storage Access Road and Storage Inlet Pipeline construction footprint and are described in Table 2-1. The post-fire assessment (SMEC, 2020) concluded that the extents of 'shrubby mid-story' and 'fallen tree trunks, woody debris and deep leaf litter' habitat types have been reduced.

Table 2-1 Fauna habitat within the Project Construction Footprint

Name	Habitat features
Remnant vegetation	Foraging, and sheltering for birds, reptiles, amphibians, arboreal and terrestrial mammals and bat species. Habitat is available for species with large home ranges because the site is part of a large remnant pacth, including, but not limited to *Dasyurus maculatus* (Spotted-tailed Quoll), *Tyto novaehollandiae* (Masked Owl), *Ninox strenua* (Powerful Owl) and *Ninox connivens* (Barking Owl).
Shrubby midstory	Limited foraging, nesting, roosting, and sheltering for small and medium sized birds; reptiles; arboreal and terrestrial mammals and arboreal frogs.
Fallen tree trunks, woody debris *and* deep leaf litter	Sheltering habitat for small terrestrial mammals, amphibians, and reptiles.
Access roads and pathways	Foraging habitat and flyways for microbats.

Consideration was given for the potential of the construction footprint to provide breeding habitat for the threatened fauna species known or assumed to be present on the site (see Section 2.6). Most of the species use hollow bearing trees as their primary breeding habitat. The vegetation to be cleared lacks hollow bearing trees and measures have been proposed for hollow bearing trees in close proximity to the construction footprint (refer Section 4). The small, forested area does not have the typical structure of its formation including lacking tall canopy trees, limited shrub layer and is subject to edge effected being on the boundary of cleared agriculture land. It is seen as unlikely that it supports breeding habitat for any of the threatened fauna species identified in Section 2.6.

2.6 Threatened fauna

Threatened fauna species identified during the EIS surveys and those which were predicted to occur using the Biobanking Calculator are listed in Table 2-2. Note that some of the recorded species were recorded in the broader development site and were not necessarily recorded in the Storage Access Road and Storage Inlet Pipeline construction footprint itself during the surveys carried out by SMEC in 2016-2017.

Table 2-2 Threatened species potentially occurring in the Project development area

Common name	Scientific name	BC Act	EPBC Act	Recorded
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	-
Gang-gang Cockatoo	*Callocephalon fimbriatum*	V	-	✓
Varied Sitella	*Daphoenositta chrysoptera*	V	-	✓
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	-
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V	-	-
Little Lorikeet	*Glossopsitta pusilla*	V	-	-
Little Eagle	*Hieraaetus morphnoides*	V	-	-
Square-tailed Kite	*Lophoictinia isura*	V	-	-
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V	-	✓
Southern Myotis	*Myotis macropus*	V	-	-
Turquoise Parrot	*Neophema pulchella*	V	-	-
Barking Owl	*Ninox connivens*	V	-	-
Powerful Owl	*Ninox strenua*	V	-	-
Scarlet Robin	*Petroica boodang*	V	-	-
Koala	*Phascolarctos cinereus*	V	V	-
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	✓
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	✓
Diamond Firetail	*Stagonopleura guttata*	V	-	-
Masked Owl	*Tyto novaehollandiae*	V	-	✓

It should be noted that the Koala and the Southern Myotis have been assumed to be present on the site in response to the DPIE EES comments on the BAR submitted with the EIS.

2.7 Aquatic fauna

No habitat for aquatic fauna occurs in the Storage Access Road and Storage Inlet Pipeline construction footprint. The Tuross River and an un-named creek occur downstream of the proposed works and may support such habitat. These waterways have been considered in sections 3 and 4.

2.8 Aquatic flora

No habitat for aquatic flora occurs in the Storage Access Road and Storage Inlet Pipeline construction footprint. The Tuross River and an un-named creek occur downstream of the proposed works and may support such habitat. These waterways have been considered in sections 3 and 4.

3 Potential environmental impacts

3.1 Vegetation clearing activities

The construction of the Storage Access Road and Storage Inlet Pipeline will involve the direct clearing of native vegetation. As stated within the Conditions of Consent, no more than 54.61 hectares of native vegetation can be cleared across the entire project. The construction activities required to build the Storage Access Road and Storage Inlet Pipeline will clear 0.12 hectares of native vegetation and 1.48 hectares of semi-cleared agricultural land (non-native vegetation) (Table 3-1).

Table 3-1 Required vegetation clearing

Vegetation community	TEC equivalency	Required clearing (hectares)
Wet sclerophyll forest	N/A	0.12
Semi-cleared agricultural land	N/A	1.48

3.2 Ecological impacts

Potential biodiversity impacts associated with project are discussed in EIS, BAR and Aquatic Ecology Report. Those that relate to the Storage Access Road and Storage Inlet Pipeline construction works are summarised in Table 3-2.

Table 3-2 Summary of potential impacts to terrestrial biodiversity

Potential Impact	Details	Extent/Scale
Loss and fragmentation of native vegetation	Clearing of wet sclerophyll forest	0.12 hectares of native vegetation will be cleared.
Loss of semi-cleared agricultural land	Clearing of semi-cleared agricultural land with remnant native vegetation.	1.48 hectares will be cleared.
Loss of threatened flora species and fragmentation of habitat	No threatened flora species were recorded.	No threatened flora species were recorded.
Loss of fauna habitat	The clearing of wet sclerophyll forest and semi-cleared agricultural land.	1.60 hectares of vegetation providing potential fauna habitat will be cleared.
Fauna habitat fragmentation	Vegetation clearing and the construction of the access road and pipeline will cause minor fragmentation of fauna habitat.	1.60 hectares of vegetation providing potential fauna habitat will be cleared.
Fauna mortality	May result from clearance works, earthworks or collisions with vehicles or machinery.	Most likely during clearance activities.
Impacts on fish passage	No important fish passage habitat is present within the development site.	None.
Edge effects and weed invasion	Vehicles, plant and people may transport weed propagules into the development site. New edges will be created as a result of the	Most likely during clearance activities.

Potential Impact	Details	Extent/Scale
	development creating the potential for edge effects.	
Pests and pathogens	Vehicles, plant and people may transport pathogens into the development site. Clearing of native vegetation and increased human activity increase the risk of pest animal species increasing.	May occur during construction and operational phases.
Alteration to air quality and noise environments	May impact upon the roosting, breeding and foraging activities of locally occurring fauna.	Temporary and localised scale of impacts during construction.

3.3 Tree Hollow Loss

No hollow-bearing trees and no large fallen logs were recorded within the Storage Access Road and Storage Inlet Pipeline construction footprint, after the 2019/2020 summer fire event (Figure 3-1). Five hollow bearing trees were recorded outside of the clearing boundary. Most are at least 50m from clearance works and will be protected by a buffer or retained vegetation. Hollow-bearing Tree 1 will need to be considered in the set up of No-go zone demarcation as it is close to the construction boundary and located in open paddock (refer Section 4.2 and Figure 3-1). All hollow-bearing trees were marked in the field to assist with re-identification. A description of each hollow-bearing tree has been provided in Table 3-3. No logs habitat was recorded with 20 metres of the clearing boundary.

Table 3-3 Tree hollows recorded within the Project construction footprint

	Tree height	Diameter at breast height	Hollow 1 size (centimetres)	Hollow 2 size (centimetres)	Hollow 3 size (centimetres)
Tree 1	12	80	20+	5-9	5-9
Tree 2	20	80	15-19		
Tree 3	20	85	20+	15-19	-
Tree 4	25	70	20+	-	-
Tree 5	25	80	10-14	10-14	-

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 3-1

FIGURE TITLE Fauna habitat

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY JT14432

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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4 Mitigation and management measures

Mitigation and management measures to avoid or minimise impacts to flora and fauna during the Storage Access Road and Storage Inlet Pipeline construction works include:

- hygiene control
- delineation of no-go zones
- weed control and management
- relocation of fallen logs and bushrock

4.1 Site set up

Hygiene control points are to be established at all site access points for any vehicle, machinery or personnel entering site. A mixture of bleach to water with a ratio of 1:1 should be used for all wash down procedures in in line with best practice methods of managing the spread of *Phytophthora cinnamomi* and Chytrid fungus. Hygiene management protocols are detailed in Appendix A.

4.2 Delineation of No-go zones

'No-go zones' are any areas outside the designated clearing boundary indicated in Figure 4-1. A physical clearing boundary is to be identified prior to any clearing works and 'No-go zones' marked with high-visibility bunting.

Hollow-bearing Tree 1 (Figure 3-1) must include demarcation of the tree's surrounding tree protection zone (TPZ). A TPZ is defined under Standards AS4970 as a radius from the centre point of the trunk that is 12 times the tree's Diameter at Breast Height (DBH), and incursions of more than 10% should be avoid unless a tree safety assessment can be conducted by a qualified arborist.

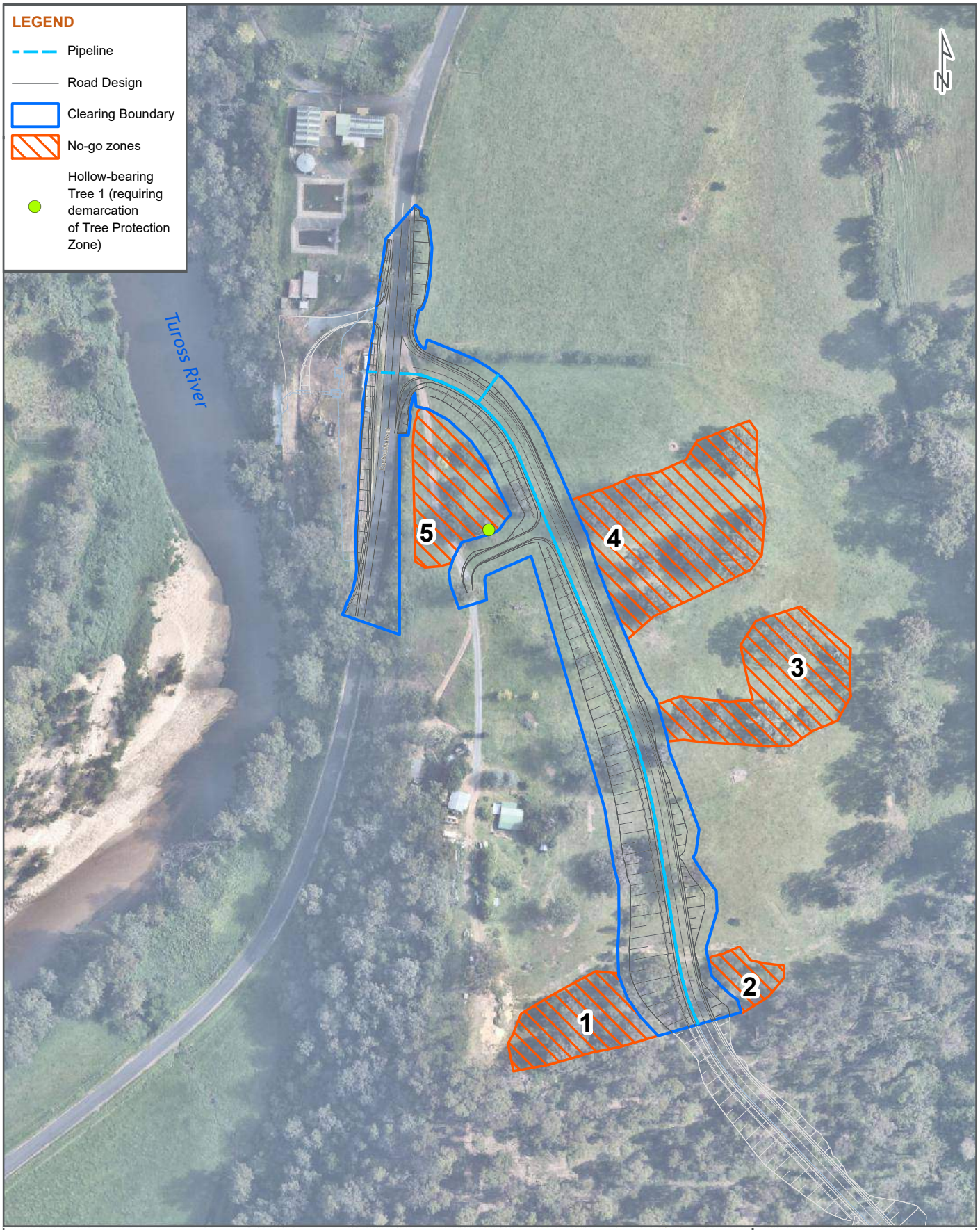
Trees for felling should be directed to fall within the clearance boundary where possible to minimise impacts on retained vegetation. It is recommended that shrubby vegetation is retained where possible (e.g., areas only cleared for temporary access) to assist in stabilizing the slope in the areas of wet sclerophyll forest. This may be done by slashing the vegetation to the ground, thereby retaining rootstock as soil stabilisation, and allowing vegetation to regenerate post-construction.

4.3 Weed control and management

Weed control is to be carried out prior to vegetation clearing. Specific weed control measures are outlined in Appendix A.

4.4 Relocation of fallen logs and bushrock

Prior to vegetation clearing, incidentally recorded fallen logs greater than 10 centimetres diameter and bushrock greater than approximately 20 centimetres by 20 centimetres in size are to be relocated to areas of retained vegetation within, or adjacent to, the project site. Should any fauna be found during the relocation process, fauna is to be relocated in accordance with the protocols detailed in Section 4.8.



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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 4-1

FIGURE TITLE No-go zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2020, Nearmap Imagery

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4.5 Erosion and sediment control

Specific erosion and sediment control measures are detailed within the SWMP. These are to be implemented prior to any vegetation clearing.

4.6 Pre-clearing surveys

Immediately prior to clearing of any vegetation, pre-clearing surveys and inspections for threatened and non-threatened fauna are to be conducted. The surveys and inspections, and any subsequent relocation of species and associated management measures, are to be undertaken under the guidance of a suitably qualified and experienced ecologist. Pre-clearance will also provide an opportunity to collect seeds of native species that may be ripe at the time of clearing. A suitably qualified and experienced ecologist may be stationed on site during all clearing works in the 0.12ha of the wet sclerophyll forest to attend to relocation of species and associated management measures, should the outcomes of the pre-clearing surveys deem it necessary.

4.7 Vegetation clearing

4.7.1 Timing of clearing

Clearing is planned to commence as soon as possible in December 2021 to January 2022. Relevant to the conditions of consent for the "timing of clearing outside breeding seasons", the clearing boundary is unlikely to support breeding habitat for threatened species. A minor risk is associated with noise near two hollow bearing trees with a close proximity the works area (hollow bearing Tree 1 & 2, refer Figure 3-1). The EIS recommends that clearing to minimise potential disturbance is from February to the second week of March base on all species likely across the broader project including the water storage site. The breeding periods for species likely in the access road and pipeline construction area are shown in Table 4-1. January to December is not a key time for most of these species. The hollow bearing tree closest to the construction boundary, hollow bearing Tree 1 (Figure 3-1) within the semi cleared agricultural area is unlikely to provide breeding habitat for Gang-gangs as the species favours old growth areas and the NSW threatened species database excludes paddock trees as important habitat. The next closest tree (hollow bearing Tree 2) retains an approximately 10m buffer from the clearing area and again the risk of disturbing a Gang-gang breeding event is considered low.

Table 4-1 Breeding periods listed in the EIS for likely threatened species in the project area.

Species	Breeding Period listed in the EIS.
Gang-gang *(Callocephalon fimbriatum)*	October to January
Varied Sitella *(Daphoenositta chrysoptera)*	June to April
Eastern Free-tailed Bat *(Mormopterus norfolkensis)*	Winter breeding, young in a crèche until autumn
Yellow-bellied Sheathtail-bat *(Saccolaimus flaviventris)*	Winter breeding, young at foot until autumn
Greater Broad-nose bat *(Scoteanax rueppellii)*	Winter breeding, young at crèche until autumn
Masked Owl *(Tyto novaehollandiae)*	Any time of year but generally winter

The use of this clearing window also serves as a mitigation process for the subsequent greater storage site clearing works, which will involve more substantial clearing activities and will have a short clearing window in February – March (as per the EIS recommendations). The access track will facilitate timely and efficient access to this area via the valley floor making it possible to meet the EIS objectives of completing the greater storage site clearing works in time with reduced impacts to biodiversity.

Furthermore, as shown in Figure 2-3, the construction footprint traverses a drainage gully which forms a significant drainage line. The construction of the access track ahead of clearing for the storage site will result in well designed and constructed drainage works in place rather than potentially relying on temporary tracks and mitigation measures at the time of the storage site clearing, which may otherwise increase the risk of compromising water quality objectives. As such, the proposed clearing window and mitigation measures proposed in this CFFMP will result in minor to negligible impacts to biodiversity and would facilitate greater positive environmental outcomes for the Project as a whole.

4.7.2 Clearing Methods

For removal of the understorey and non-hollow bearing trees, the following best-practice vegetation clearing methodology is to be applied:

- light vegetation (e.g., shrubs, herb, forbs and grasses) are to be cut down to ground level
- grubbing and soil disturbance should be avoided in areas where clearing is for temporary access. Retained roots can assist in soil stabilisation and some regrowth and coppicing can assist in the rehabilitation stage post-construction
- slashed native vegetation, unless there is a specific need to remove, should be left in place
- weed and exotic vegetation in seed should be removed and disposed of appropriately in order to prevent spread as required under the *Biosecurity Act 2015*. This would namely include *Rubus fruticosus* spp. agg. (Blackberry), *Cenchrus clandestinus* (Kikuyu Grass), *Solanum psuedocapsicum* (Jerusalem Cherry) and *Sida rhombifolia*
- trees are to be felled into the clearing boundary to minimise damage to retained vegetation. When possible, trunks and roots are to be left in situ to minimise soil erosion
- trees to be chipped, and the mulch used in windrows to control potential run off if appropriate and/or spread over disturbed earth to avoid soil erosion
- larger timber can be removed from site; however, where practicable some should be retained as fauna habitat. The ecologist present for habitat tree removal should be consulted during this process.
- should fauna be observed either during the felling process or during the inspection by an ecologist, the tree should be retained in place for 24 hours to allow fauna the opportunity to move on during the night.

4.8 Fauna management protocols

4.8.1 General protocols

Should fauna be observed on the project site during vegetation clearing activities, and there is a risk these activities may harm the animal or pose risk to site personnel, the following steps are to be taken.

- stop all work in the vicinity of the fauna and immediately notify the Environmental Representative
- if possible, allow fauna to leave the area without intervention
- if fauna cannot or will not leave the area without intervention, the fauna are to be removed by a suitably qualified ecologist, licensed fauna ecologist or wildlife carer with specific animal handling experience using the following methodology:
  - cover larger animals with a towel or blanket and place it in a cardboard box and/or canvas bag.
  - place smaller animals in a cotton bag, tied at the top.
  - keep the animal in a quiet, cool, ventilated and dark location away from noisy construction activities until it can be relocated.
  - frogs will be transported in moistened plastic bags (1 frog/bag) with a small amount of leaf litter. The translocation of frogs shall be in accordance with the Hygiene Protocol for the Control of Disease in Frogs.
  - if the animal cannot be handled (i.e., venomous reptiles):
    - Exclude all personnel from the vicinity with fencing and/or signage
    - Record the exact location of the animal/s and provide to the qualified ecologist or appropriate rescue agency (i.e., WIRES).

4.8.2 Injured fauna

Should fauna be injured as part of Storage Access Road and Storage Inlet Pipeline construction works, the follow steps are to be taken:

- call the appropriate rescue agency immediately and follow any advice provided by the agency.
- once the rescue agency arrives at the site, they are responsible for the animal. Any decisions regarding the care of the animal will be made by the rescue agency.
- in the event the rescue agency and/or local veterinary service cannot be contacted, the injured animal will be delivered to the relevant agency as soon as practicably possible.

The relevant fauna rescue services and local veterinary surgeries contact details are listed in Table 4-2.

Table 4-2 Fauna rescue services' contact details

Agency/Business	Contact Number
Qualified Ecologist	TBD
WIRES	1300 094 737
Vet 1 – Narooma Veterinary Hospital	(02) 4476 1125
Vet 2 – Moruya Veterinary Hospital	(02) 4474 2532

4.8.3 Relocation of fauna

Relocation of fauna adjacent to the Storage Access Road and Storage Inlet Pipeline construction footprint is to be carried out where possible by a qualified ecologist or wildlife rescuer and is to be recorded as part of the pre-clearance reporting obligations. If the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by the works and in accordance with the following procedures:

- site identified as suitable a release point by the qualified ecologist or wildlife rescuer
- release site is to contain similar habitat and occur as close to the original capture location as possible
- if the species is nocturnal, release is to be carried out at dusk
- release would generally not be carried out during periods of heavy rainfall.
- hollow-dependent species, particularly those with dependent young, shall be released into a temporary nest box.

Adjacent wet sclerophyll forest vegetation south of clearing site offers the best relocation site for most species, as shown as the 'No-go zones' in Figure 4-1. The area of wet sclerophyll maintains some connection with native vegetation and is in closest proximity to Bodalla State Forest.

4.8.4 Fauna handling information

It is important to consider the following when handling fauna:

- some animals require particular handling (e.g., venomous reptiles, raptors) and should only be handled by appropriately qualified personnel i.e., qualified ecologist or WIRES representative(s).
- if handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABL – a form of rabies).
- any frog handling will be carried out in accordance with the Hygiene Protocol for the Control of Disease in Frogs (DECC 2008). This protocol recommends onsite hygiene precautions be carried out to minimise the transfer of disease between and within wild frog populations. Measures recommended include:
  - thoroughly cleaning/disinfecting footwear and equipment when moving from one site to another.
  - where necessary in high risk areas, spraying/flushing vehicle tyres with a disinfecting solution.
  - cleaning/disinfecting hands between collecting samples/frogs (preference would be given to using bags, rather than bare hands to handle frogs). Limiting one frog or tadpole to a bag. Bags should not be reused.

4.9 Unexpected threatened species finds

If any threatened species are observed within the project site during the clearing activities, the following procedure is to be followed:

- immediately cease all work likely to affect the threatened species
- the qualified ecologist is to contact the relevant representatives from the Contractor and Eurobodalla Shire Council and inform of the situation
- the qualified ecologist shall then contact the following stakeholders to determine the appropriate corrective actions and additional safeguards to be carried out:
  - DPIE ESS (131 555).
  - others as instructed DPIE ESS
- the adequacy of existing safeguards will be reviewed in consultation with the above stakeholders
- the Project Engineer/Site Supervisor is to record the find using the Environmental Incident Reporting process. All relevant characteristics of the find should be recorded to the fullest extent practicable

- following consultation with all relevant stakeholders, the Environmental Representative shall implement any corrective actions and additional safeguards
- following confirmation by the Environmental Representative that all appropriate safeguards have been implemented, construction works shall recommence
- all relevant project documentation would be updated to display the new findings and subsequent management measures required. This would include such documents as the FFMP (and associated documents) and the CEMP.

5 Rehabilitation and re-vegetation

The rehabilitation and re-vegetation of works conducted as part of Storage Access Road and Storage Inlet Pipeline construction is to be conducted in concurrence with the rehabilitation and revegetation plan the main Storage Site. The goal of rehabilitation and re-vegetation is to manage vegetation through on-site weed and disease risk mitigation measures (see *Appendix A: Weeds and pathogens management subplan*), revegetation of temporary disturbance areas and maintaining and improving the condition of the vegetation retention areas. Seed collected on the site will be used to supplement the supply of local provenance planting stock.

Revegetation and regeneration

Areas cleared for construction works that will not support the access road or pipeline will be allowed to recover through re-colonisation by the surrounding native flora – known as re-colonisation areas (Figure 5-1). The re-colonisation areas are expected to be narrow and linear and adjacent to retained areas of native vegetation. The proximity of the re-colonisation areas to large stands of native vegetation (greater than one hectare) means that re-colonisation is a viable option and likely eliminates the need for re-planting works. Erosion is to be mitigated with standard erosion control measures and mulching with the weed-free chipped vegetation retained from the clearing activity site.

The condition of the re-colonisation areas will be monitored every six-months for 5 years. If re-colonisation is failing to occur, the requirement for native replanting works will be re-considered to include supplemental planting of locally acquire seed or seedlings. Weeds and invasive species will need to be managed as they will likely colonise the re-colonisation areas (see *Appendix A: Weeds and pathogens management subplan*). These weeds and invasive species will be managed by a bush regenerator contractor as required.

Retained vegetation

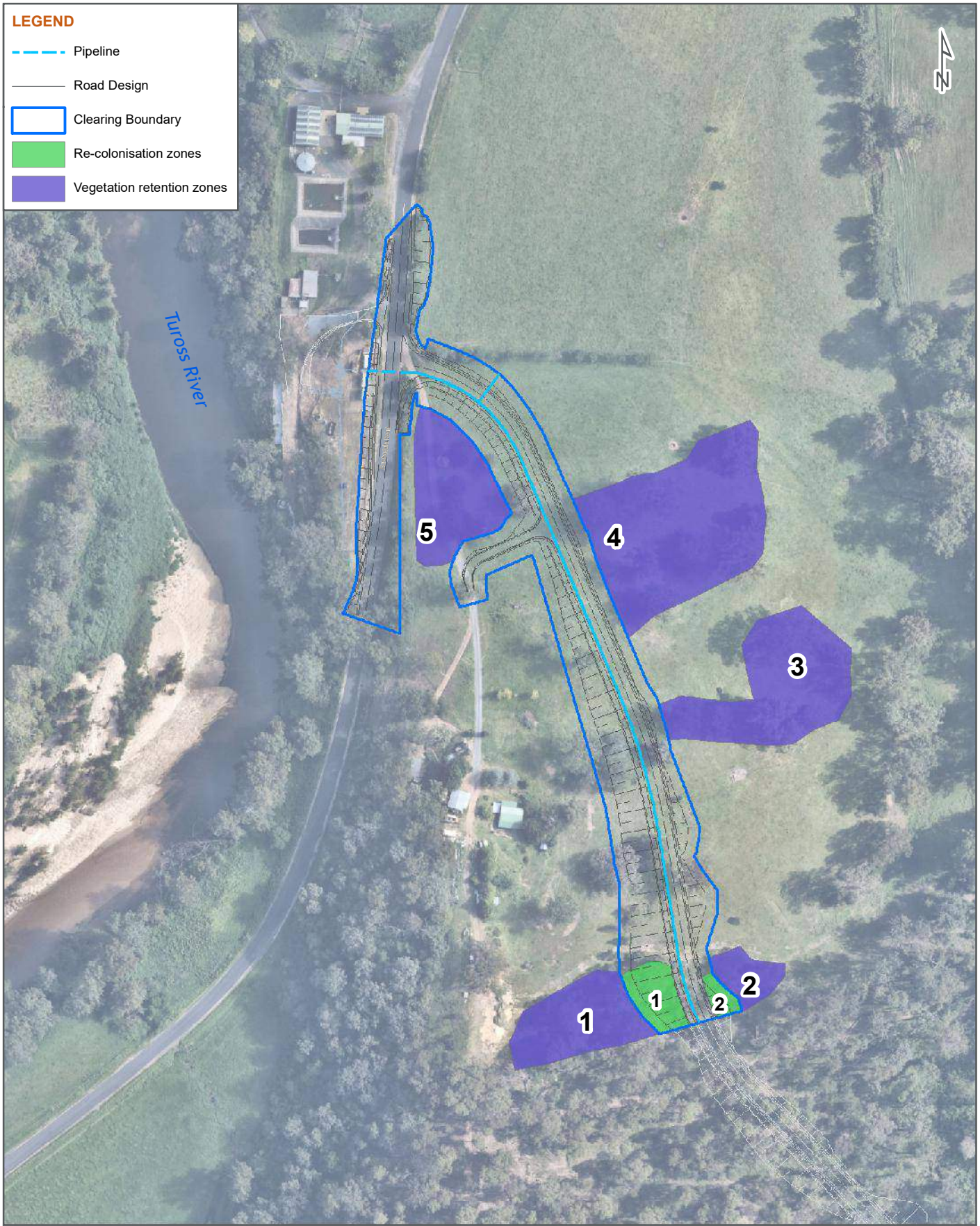
Vegetation retention zones have been delineated for the Storage Access Road and Storage Inlet Pipeline construction footprint (Figure 5-1). The vegetation zones correspond to the large stands of native vegetation that occur either side of the access road and pipeline. Two of the vegetation retention zones are contiguous with the native vegetation of Bodalla State Forest providing habitat connectivity to the biodiversity that may be impacted by the construction works. Two other vegetation zones occur in the semi-cleared agricultural land and are only partially connected to the native vegetation of Eurobodalla State Forest. The vegetation retention zones correspond to the no-go zones outlined in Section 4.2.

Vegetation management actions

The following table (Table 5-1) outlines the purpose and timing of relevant management actions applied to the two re-colonisation areas and two vegetation retention zones.

Table 5-1 Management actions and objectives for each re-colonisation and vegetation retention zone

Management zone	Management objective	Action	Timing
Recolonisation zone 1	Promote the re-colonisation of locally native flora species	Prohibit/control the occurrence of weeds and invasive flora species. This may include physical removal and/or the use of herbicide.	As construction commences
	Prevent the colonisation of weed and invasive flora species		
	Increase the resilience of the disturbed area	Monitor regrowth and conduct weed control as required	Ongoing monitoring every six months for five years
Recolonisation zone 2	Promote the re-colonisation of locally native flora species	Prohibit/control the occurrence of weeds and invasive flora species. This may include physical removal and/or the use of herbicide.	As construction commences
	Prevent the colonisation of weed and invasive flora species		
	Increase the resilience of the disturbed area	Monitor regrowth and conduct weed control as required	Ongoing monitoring every six months for five years
Vegetation retention zone 1	Minimise the spread of weeds and invasive flora species into veg-retention zones	Clearly delineate vegetation retention zones and mark them out with high-visibility tape/rope. Monitor the vegetation retention zones for signs of weed invasion. Treat weeds as required	As construction commences Ongoing monitoring every six months for five years
	Preserve the existing assemblage of native species and their condition		
	Prevent the introduction and spread of plant pathogens.	Clearly delineate vegetation retention zones and mark them out with high-visibility tape/rope.	As construction commences
Vegetation retention zone 2	Minimise the spread of weeds and invasive flora species into veg-retention zones	Clearly delineate vegetation retention zones and mark them out with high-visibility tape/rope. Monitor the vegetation retention zones for signs of weed invasion. Treat weeds as required	As construction commences Ongoing monitoring every six months for five years
	Preserve the existing assemblage of native species and their condition		
	Prevent the introduction and spread of plant pathogens.	Clearly delineate vegetation retention zones and mark them out with high-visibility tape/rope.	As construction commences



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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 5-1

FIGURE TITLE Re-colonisation zones and vegetation retention zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap Imagery

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Appendix A Weeds and pathogens management sub-plan

Hygiene measures and protocols

The following general weed management measures are to be adopted for the clearing works for the access road and pipeline:

- light vehicles and mobile plant should be brought to site in clean condition to prevent the introduction of new weeds or pathogens. Likewise, soil and plant material should be cleaned from vehicles before leaving the site in order to prevent the transport of weeds into areas outside the development site
- vehicle wash bays equipped with a high-pressure water cleaner and backpack or handheld sprayer containing disinfectant solution will be established at vehicle access points. Prior to entering site, the vehicle or plant (namely wheels, chassis, undercarriage) must be cleaned with the high-pressure water cleaner to remove loose soil and weed propagules. The vehicle must then be disinfected for pathogens using the disinfectant solution
- boot washdowns will be located adjacent to site offices and ancillaries and equipped with a tub filled with disinfectant solution and scrubbing brush. Prior to accessing the site, boots must be washed in the disinfectant solution with the scrubbing brush used to remove dirt and mud.

Most measures to prevent the colonisation of weeds in disturbed areas are to be addressed in the construction and rehabilitation stages, including follow up weed treatment and monitoring. No pre-clearance management of weeds is seen as necessary other than the appropriate disposal of any material removed.

Priority weed control

Weeds that are listed as 'priority weeds' for Eurobodalla LGA must be removed from the site or controlled depending on the category of weed and according to the provisions of the Biosecurity Act. Priority weed control is to be carried out across the entire site for the duration of the management works recommended in the FFMP. Works will be undertaken according to industry best practices.

Primary Weeding

Primary weeding is the first round of weeding activity and involves the removal of most of the weed biomass present (shown in Figure A-1). Primary weeding methods include:

- 'cut-and-paint', 'frill and fill', long stem scrape or target spraying of woody weeds (e.g., *Grevillea robusta*)
- hand-removal and spot spraying of smaller woody, vine and herbaceous weeds
- spot-spraying and hand-weeding of annuals (e.g., Blackberry, Fireweed and *Bidens pilosa*).

Primary weeding will occur prior to construction commencing.

Secondary weeds

Secondary weeding will occur approximately one to three months after the completion of primary weeding, depending on the amount of regrowth of herbaceous annuals (and other weeds that have an abundant seed source present in the soil). The site will be inspected at regular monthly intervals by a bush regeneration contractor and ecologist to determine the need and appropriate timing of secondary weeding. This will vary according to the timing of the primary weeding, insofar as regrowth will be stronger if primary weeding occurs during spring and summer, and slower during autumn and winter. The need for secondary weeding will also depend on climatic conditions in the intervening period (e.g., periods of sustained rainfall will promote germination of weed seeds and require secondary weeding to occur sooner than it would under dry conditions).

Secondary weeding will involve the targeted removal of priority weed regrowth and hand removal and spot spraying of exotic grasses, herbaceous weeds and seedlings of woody weeds.

Maintenance weeding

Maintenance weeding will occur after construction works.

Herbicide Application

Herbicide applications by cut and paint, frill and fill, long stem scrape or spray will mainly use Glyphosate (or equivalent). Treatment of some noxious weeds species or grass weeds may require selective or residual herbicides. The use of herbicides on the site must be in accordance with labelling instructions and MSDS's and comply with the NSW Pesticides

Act 1999. Herbicides should generally be applied when wind speeds are generally low. Where possible herbicide application should take place after two consecutive days with no rain; application should be delayed if rain is forecasted. Appropriate PPE should be worn during herbicide application.

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. A-1

FIGURE TITLE Construction Boundary and Vegetation Mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY JT14432

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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Appendix B River Flat Eucalypt Forest Management Plan

River Flat Eucalypt Forest was not recorded in the Access Road and Pipeline Construction Footprint. The following management plan is only relevant to the Stage 2B works but should be communicated to all staff at a general induction.

River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (River Flat Eucalypt Forest) is an endangered ecological community listed under the Biodiversity Conservation Act 2016. River Flat Eucalypt Forest occurs throughout the bottom of the valley within the Eurobodalla Southern Storage Site being associated with alluvial soils and higher levels of groundwater compared to the surrounding slopes and ridges. Approximately 7.68 hectares of River Flat Eucalypt Forest has been mapped in the in the Eurobodalla Storage site with 0 hectares occurring in the Access Road and Pipeline Construction Footprint. This management plan aims to protect areas of River Flat Eucalypt Forest not occurring in the Access Road and Pipeline Construction Footprint and regenerate the areas that are only temporarily impacted by the construction works. Table B-1 outlines the purpose and outcomes of relevant management actions applied to the River Flat Eucalypt Forest within and immediately adjacent to the Access Road and Pipeline Construction Footprint.

Table B-1. River Flat Eucalypt Forest management actions

Management action	Purpose	Timing
Sediment control measures (detailed in the SWMP)	To minimise sediment-laden run-off from the construction works into the waterways that support River Flat Eucalypt Forest.	Pre-construction
	To minimise the spread of weed and invasive flora seed and material into the adjacent River Flat Eucalypt Forest.	
	To prevent temporary and permanent changes in hydrology that impacts groundwater availability	
Delineate areas of River Flat Eucalypt Forest adjacent to the Access Road and Pipeline Construction Footprint. Areas are to be marked with in high-vis flagging rope.	To prevent the accidental additional clearing of areas of River Flat Eucalypt Forest	Pre-construction
	To prevent the spread of weed and invasive flora seed and material via plant and machinery into the adjacent River Flat Eucalypt Forest.	
	To prevent the clearing of trees into areas of adjacent River Flat Eucalypt Forest and causing additional damage.	
Hygiene controls (see *Appendix A: Weeds and pathogens management subplan*)	To prevent the spread of weed and invasive flora seed and material via plant, machinery and personnel into the adjacent River Flat Eucalypt Forest.	During construction
	To prevent the spread of plant pathogens and disease via plant,	

Management action	Purpose	Timing
	machinery and personnel into the adjacent River Flat Eucalypt Forest.	
	To prevent the spread of plant material, disease and pathogens away from the Access Road and Pipeline Construction Boundary and into areas of River Flat Eucalypt Forest outside the ESS Site.	
Weed control (see *Appendix A: Weeds and pathogens management subplan*)	To promote the regeneration of River Flat Eucalypt Forest temporarily cleared during the construction works.	Pre-construction, during construction and post-construction.
	To prevent the natural spread of weed and invasive flora species into adjacent areas of River Flat Eucalypt Forest.	
Monitoring work: River Flat Eucalypt Forest occurring adjacent to the Access Road and Pipeline Construction Footprint will be monitored for weeds and invasive flora species. The recovery of temporarily cleared River Flat Eucalypt Forest within the Access Road and Pipeline Construction Footprint will be monitored.	To assess the presence of weeds and invasive species in River Flat Eucalypt Forest adjacent to the Access Road and Pipeline Construction Footprint.	Post-construction: monitoring works are to be conducted every six months for 5 years.
	To assess the presence of weeds and invasive species in the temporarily cleared and recovering area of River Flat Eucalypt Forest.	
	To assess the presence of re-colonising native species in the temporarily cleared and recovering area of River Flat Eucalypt Forest.	

Appendix C Consultation with DPIE Fisheries

From: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Sent: Tuesday, 21 September 2021 2:38 PM
To: Anthony MOLL
Subject: RE: SSD-7089 - Request for CEMP and CSWMP Consultation - Eurobodalla Southern Storage Access Road and Pipeline

HI Anthony,

Thank you for this notification.

DPI Fisheries has reviewed the Construction Environmental Management Plan, Soil and Water Management Plan, and Construction Flora and Fauna Management Plan for the Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary that were attached to your email below.

DPI Fisheries supports these plans and has no changes to recommend to these documents.

Regards,
Carla Ganassin | Senior Fisheries Manager - South | Coastal Systems
NSW Department of Primary Industries | Fisheries
Block E, Level 3, 84 Crown Street, Wollongong NSW 2500
SEND MAIL TO: PO Box 97, Huskisson NSW 2540
T: (02) 4222 8342 | M: 0447 644 357 | E: carla.ganassin@dpi.nsw.gov.au

---

From: Anthony MOLL <Anthony.Moll@smec.com>
Sent: Thursday, 16 September 2021 11:06 AM
To: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>; Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Cc: Jessica MILLER <Jessica.Miller@smec.com>; Harvey Lane <harvey.lane@esc.nsw.gov.au>; Bob TILBURY <Bob.Tilbury@smec.com>
Subject: SSD-7089 - Request for CEMP and CSWMP Consultation - Eurobodalla Southern Storage Access Road and Pipeline

Good morning Carla,

I hope this email finds you well. I write on behalf of SMEC's client, Eurobodalla Shire Council, regarding the upcoming scope of works to construct the Access Road and Pipeline to property boundary (early works construction activities) for the Eurobodalla Southern Storage Project (the Project). The Eurobodalla Southern Water Supply Storage was granted Development Consent from the Department of Planning, Industry and Environment (DPIE) on 17 October 2019 (Significant State Development SSD-7089). I note that you were the contact for the associated Eurobodalla Southern Storage - Tuross River Intake Pipeline works (TRIPS), undertaken by Quay

Civil last November 2020 (under the same SSD Consent SSD-7089).

We are required by the Conditions of Development Consent SSD-7089 to consult with DPI Fisheries regarding proposed erosion and sediment controls and vegetation clearing for the construction of this scope of works. The further details of this matter are spelled out in the letter which is attached to this email.

I have also attached a copy of our proposed Construction Environmental Management Plan and Construction Soil and Water Management Plan (ESCP appended) and Construction Flora and Fauna Management Plan.

We look forward to hearing back from you regarding this project.

Best regards,

Anthony Moll
Environmental Scientist - Environment
T +61 2 9925 5541 E Anthony.Moll@smec.com
Level 5, 20 Berry Street, North Sydney, NSW, 2060, Australia
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Appendix D Construction Traffic Management Plan

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Construction Traffic Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
12 October 2021

SMEC INTERNAL REF. 30012835

Document Control

Document:	Construction Traffic Management Plan
File Location:	
Project Name:	Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary
Project Number:	30012835
Revision Number:	2

Revision History

Revision No.	Date	Prepared by	Reviewed by	Approved for Issue by
1	3 November 2020	T Gibbons	M Davey	M Davey
2	12 October 2021	A Moll	J Miller	J Miller

Issue Register

Distribution List	Date Issued	Number of Copies
Eurobodalla Shire Council	12 October 2021	1 electronic
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Important Notice

This document is confidential and is provided solely for the purposes of outlining the environmental management measures to be implemented by Eurobodalla Shire Council while carrying out the activities outlines in this management plan. This document is provided pursuant to a Consultancy Agreement between SMEC Australia Pty Limited ("SMEC") and Eurobodalla Shire Council, under which SMEC undertook to perform a specific and limited task for Eurobodalla Shire Council. This document is strictly limited to the matters stated in it and subject to the various assumptions, qualifications and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the document covers all matters which you may regard as material for your purposes.

This document must be read as a whole. The CEMP and any subsequent document must be read in conjunction with this report.

The document supersedes all previous draft or interim documents, whether written or presented orally, before the date of this document. This document has not and will not be updated for events or transactions occurring after the date of the document or any other matters which might have a material effect on its contents, or which come to light after the date of the document. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the document for anything that occurs, or of which SMEC becomes aware, after the date of this document.

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Glossary and Abbreviations

Abbreviation	Detail
CEMP	Construction Environmental Management Plan
EIS	An Environmental Impact Statement
EPA	Environment Protection Authority
ESC	Eurobodalla Shire Council
ESWSS	Eurobodalla Shire Water Supply Storage
GVM	Gross Vehicle Mass
OH&S	Occupational Health and Safety
RFS	Rural Fire Service
RSA	Road Safety Audit
RMS	Roads and Maritime Services
ROL	Road Occupancy License
SCADA	Supervisory control and data acquisition
SSD	State Significant Development
SWMS	Safe Working Method Statement
TRIPS	Tuross River Intake Pump Station
TCP	Traffic Control Plan
CTMP	Traffic Management Plan
TfNSW	Transport for New South Wales
VMP	Vehicle Management Plan
WTP	Water treatment plant

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1 Introduction

1.1 Purpose

This Construction Traffic Management Sub-plan (CTMP) forms part of the Construction Environmental Management Plan (CEMP) for initial sections of the Storage Access Road and Storage Inlet Pipeline for the Eurobodalla Southern Water Supply Storage Project (the Project).

The early works construction activities covered by this CTMP are shown in Figure 1-1 and include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

Further details on these construction activities are provided in the CEMP.

The Project is located approximately 30 kilometres south of Moruya, within the Eurobodalla Local Government Area (LGA). While the Storage Site is within the Bodalla State Forest, the construction works covered by this CTMP are not. The construction works covered by this CTMP cease at the boundary of the Bodalla State Forest.

The Storage Site is north-facing, bound by Bullockys Hut Road to the west, Eurobodalla Road to the north and Big Rock Road to the south-east. The Storage Site is comprised of at least 20 un-named creeks and waterways that come together to flow into a section of the Tuross River approximately 8.5 kilometres south-west of the town of Bodalla.

The works covered by this CTMP are shown in Figure 1-1 and comprise:

- construction of the Storage Access Road from Eurobodalla Road to the boundary of the Bodalla State Forest
- construction of the Storage Inlet Pipeline from the limit of the TRIPS contract works (on the Tuross River side of Eurobodalla Road) to the boundary of the Bodalla State Forest
- upgrades to the intersection of Eurobodalla Road and the Storage Access Road to facilitate safe access and egress to the Storage Site and TRIPS site.

The purpose of this CTMP is to meet the requirements as stipulated in Condition B28 of Part B of the Development Consent (SSD-7089) for the Project. Further details of the requirements relating to consent conditions are contained in Section 1.4.

1.2 Objectives

The objectives of the CTMP include the following:

- achieve full compliance with relevant legislative requirements and the conditions of consent
- ensure safe and continuous traffic movement for construction workers and the general public
- maintain the capacity of existing roads where possible during construction in order to minimise road user delays
- maintain continuity of access to local roads and properties
- undertake appropriate consultation with impacted residents and businesses and stakeholders
- implement traffic control operations to minimise delays to road users taking into consideration traffic volumes including peak times of the day and seasonal traffic
- avoid road occupancy where possible
- plan all construction vehicle movements to minimise disruption to traffic flow on roads within the Project area and surrounds
- minimise impacts on, and complaints from, the community and stakeholders.

DATE 30/10/2020

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Extent of Pipeline Construction covered under this CTMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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1.3 Consent conditions

Table 1-1 details the elements from B28 of Part B and the Revised Management and Mitigation Measures of Section 7, Appendix 2 of the Development Consent (SSD-7089) for the Project to be included in this CTMP.

Table 1-1 Traffic Management Plan Consent Conditions

Condition reference	Condition	Where Addressed in CTMP
B28	The CTMP must:	
	a) be prepared by a suitably qualified and experienced person(s);	
	b) Include a Road Safety Audit for the Eurobodalla Road/Nerrigundah Mountain Road intersection in accordance with the relevant Austroads guidelines	Section 2 Appendix A
	c) Detail the measures that are to be implemented to ensure road safety during construction	Sections 4 Section 6
	d) Detail heavy vehicle routes, access and parking arrangements; and	Section 3
	e) Include procedures for notifying residents of the duration and times when heavy vehicles are accessing the site via routes and in particular Waincourt Road	Section 4
Appendix 2, item 7.1	A Construction Traffic Management Plan (CTMP) would be prepared prior to construction and would be included in the CEMP. The CTMP would:	This document
	• identify the traffic management requirements during construction	Section 4 Section 5
	• describe the general approach and procedures to be adopted when producing specific traffic control plan	
	• identify designated parking areas for construction workforce.	
	• determine temporary speed restrictions to ensure safe driving environment around work zones, including on unsealed roads, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road)	This will be detailed in the Traffic Control Plan to be prepared by the traffic control Contractor
	• identify any high-risk periods (such as during school bus operations), and whether delivery to site, and material haulage can be undertaken outside of these hours	Section 4 Section 5
	• identify opportunities to stagger heavy vehicle arrivals to site (e.g. use of minimum headways between arriving haul trucks), to avoid the potential for heavy vehicle convoys arriving on site	

Condition reference	Condition	Where Addressed in CTMP
	• identify and provide **temporary works, such** as for site access, turn-around bays, parking areas for heavy vehicle dwelling, and minor site distance clearing around local road intersection sites (e.g. at the access points to the construction site)	
	• provide temporary warning and advisory signposting, such as during periods of material haulage, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road), where there will be increased traffic activity	This will be detailed in the Traffic Control Plan to be prepared by the traffic control Contractor
	• where practicable, program deliveries of construction plant such as over-mass and over-dimension vehicles) outside peak traffic periods identify steps to minimise construction traffic, such as car-pooling by construction staff to site	Section 4 Section 5
	• regularly review and modify the CTMP (such as at changes of construction stages), to ensure the CTMP remains valid and appropriate	
	• document **communication protocols amongst heavy vehicle operators, such as when approaching higher risk areas. This could be through the establishment of a call point system, whereby call point Signage** is erected on the approach to higher risk areas, such as the intersection of Nerrigundah Mountain Road and Eurobodalla Road, or the single lane Tuross River (Tyrone) bridge, and access points to the construction site maintain access to private properties (and liaise with property owners), particularly that off Bullockys Hut Road, which may be used as a site access identify a contact person (and phone number) for liaison and complaints, by project stakeholders and the community.	This will be detailed in the Traffic Control Plan to be prepared by the traffic control Contractor
	Consultation with various stakeholders will also be undertaken in the development and periodic review of the Construction CTMP, including:	This will be detailed in the Traffic Control Plan to be prepared by the traffic control Contractor
	• ensuring all relevant requirements from emergency service providers are included, including from NSW Rural Fire Service, NSW Ambulance Service and NSW Police	
	• consultation with the respective road authorities including Roads and Maritime Services and Eurobodalla shire Council	
	• consultation with other relevant parties including school bus operators	
	• periodic notification of construction activities and changes in traffic control arrangements would be publicly notified, including through local newspapers, community noticeboards, and through a letter box drop off for residents in proximity to the construction site as appropriate.	
	Detailed traffic control plans would be developed for each construction phase. These would include:	
	• provision for emergency services passage through construction zones	
	• Only accredited traffic controllers would be permitted to prepare and implement traffic control plans.	
Appendix 2, item 7.2	Impacts to local roads during construction	Section 4 Section 5
	Council will undertake a photographic inspection of local roads and undertake a pre-dilapidation survey of local road pavements before construction commences, in order to document the state and condition of local roads.	

Condition reference	Condition	Where Addressed in CTMP
	Periodic surveys will be undertaken during construction activities to identify any road damage, with road damage to local roads being repaired by Council as soon as practical.	
	The construction contractor will also monitor the incidence of mud tracking off the construction site and onto local roads and will sweep or clean local roads to minimise mud tracking. The contractor will preferably install controls to minimise the incidence of mud-tracking in the first instance, such as by use of by grids at site access points.	
	Construction personnel will also be encouraged to report road hazards and road damage.	
Appendix 2, item 7.3	Impacts to local roads during operation Council will develop a traffic plan to show the new storage access road for maintenance purposes which will be provided to the rural fire service.	This will be detailed in the Traffic Control Plan to be prepared by the traffic control Contractor

1.4 Approvals, licences, permits and requirements

A Road Occupancy Licence may be required for Storage Access Road and Storage Inlet Pipeline construction works on or adjacent to Eurobodalla Road. Eurobodalla Shire Council shall allow ten business days for applying for a ROL as per the RMS Road Occupancy Licence Manual. The ROL will have certain limitations that must be followed such as location of road occupied, time and date of road occupancy, and speed zone authorisations. The construction contractor is also responsible for monitoring and updating the ROL as required with Council.

A Traffic Control Plan (TCP) is to be submitted along with each ROL application. The TCP must be developed by someone who holds an RMS Orange and Red card. The TCP shall highlight the area of work, nature of work to be performed, traffic control devices to be implemented, proposed dates and times for road occupancy.

2 Existing environment

2.1 Road network

The Storage Access Road and Storage Inlet Pipeline construction site would be accessed from the Princes Highway via Eurobodalla Road. It is anticipated that delivery of all major plant and equipment would be from the Princes Highway and then along Eurobodalla Road to the Storage Access Road and Storage Inlet Pipeline construction site. This route is also expected to be used by the construction workforce. The existing conditions of each key road in the area is summarised below:

- Princes Highway serves as the major arterial (State) road connecting Bodalla with Sydney and south to Victoria. Between the towns of Moga and Bodalla, the Princes Highway generally has one lane in each direction with overtaking permitted through some sections. The posted speed limit along the Princes Highway varies between 80 to 100 kilometres per hour through rural areas, and down to 50 kilometres per hour within townships.
- Eurobodalla Road is a local road which operates as a two-lane sealed carriageway connecting to the Princes Highway at Bodalla. The posted speed limit along Eurobodalla Road is generally 80 kilometres per hour. Through the township of Bodalla, the posted speed of Eurobodalla Road is 50 kilometres per hour. The road is typically seven metres wide (3.5 metre travel lanes), with no sealed shoulders, typical of rural roads.

The existing conditions of each key road intersection in the area is summarised below:

- Princes Highway forms a T-intersection with Eurobodalla Road, with widened shoulders provided for turning vehicles.
- Eurobodalla Road forms a T-intersection with Nerrigundah Mountain Road, with turning vehicles along Eurobodalla Road required to store in the travel lane before turning into Nerrigundah Mountain Road.

Specific access to the construction sites would be detailed in the Traffic Control Plan (TCP).

2.2 Existing traffic

Traffic along the existing road network within the study area comprises of:

- local residential traffic
- local farm traffic, including trucks servicing local dairy farms
- trucks transporting materials from the nearby Rewlee soil extraction operation, the Cadgee Quarry and other extractive operations in the area
- trucks transporting forestry timber
- a school bus route operates on both Eurobodalla Road and Nerrigundah Mountain Road
- light and heavy vehicle traffic associated with the Eurobodalla Quarry operations.

Traffic counts were previously undertaken in 2006 (Masson Wilson Twiney, 2006). These included counts east and west of the Tyrone Bridge (Nerrigundah Mountain Road) intersection. Traffic counts were also sourced for the Princes Highway south of Bodalla (sourced from NSW Roads and Maritime permanent count station).

To provide the most recent analysis of traffic in the study area, additional traffic count information has been sourced, and where traffic counts have been unavailable, informed assumptions have been made, to bring traffic counts to a 2017 basis, as shown in Table 2-1.

Table 2-1 Traffic counts in the study area

Count Road	Location	Count type	2006	2017
Princes Highway	South of Bodalla	Average annual daily traffic	3,672	5,191 (10.8% heavy vehicles)
Eurobodalla Road	East of Nerrigundah Road	Manual daily count	328 (17% HV)	464 (17%)
Eurobodalla Road	West of Nerrigundah Road	Automatic daily count	142	214 (17%)

Count Road	Location	Count type	2006	2017
Nerrigundah Road	North of Eurobodalla Road	Average annual daily traffic	-	250 (17%)

Most heavy vehicles using Eurobodalla Road and Nerrigundah Mountain Road relate to the operation of the existing Eurobodalla Quarry. The Eurobodalla Quarry recently received project approval for the expansion of existing quarrying operations, which sought to increase the maximum annual extraction from 100,000 tonnes to 175,000 tonnes. The future (approved) average heavy vehicle movement associated with the quarry haulage increased from 23 movements per day (two-way), to peak demand of 94 movements per day (two-way).

2.3 Crash history

The five-year crash history (April 2012 to March 2017) for roads associated with access and haulage routes in the study area were sourced from NSW Roads and Maritime. Crash statistics included:

- Princes Highway (in vicinity of the Eurobodalla Road intersection): There were two crashes reported in the vicinity of Eurobodalla Road intersection, including a vehicle entering the highway from a driveway (non-casualty), and a loss of control (serious injury) crash
- Eurobodalla Road: There were two crashes (both casualty) involving a vehicle leaving the road, being one loss of control and one hit object
- Waincourt Road: no reported crashes along the length of the road
- Nerrigundah Mountain Road: no reported crashes along the length of the road
- Bullockys Hut Road: no reported crashes along the length of the road.

There were two left-road crashes reported on Eurobodalla Road. The locations of the reported run-off road crashes are included within the scope of works for a proposed upgrade of Eurobodalla Road, funded under the Federal Government's Blackspot program, where the road will be upgraded by 2018 to provide sealed shoulders, and protection (or removal) of roadside hazards.

3 Impact assessment

Traffic impacts that may result from the Storage Access Road and Storage Inlet Pipeline construction would mainly occur on Eurobodalla Road due to increase traffic volumes. Key traffic impacts and issues may include:

- traffic disruptions due to construction activities associated with the Eurobodalla Road / Storage Access Road intersection upgrades
- increased traffic volumes due to heavy vehicle access to the site for delivery of machinery, equipment, and materials
- increased construction traffic volumes leading to increased travel times, primarily along Eurobodalla Road, for non-construction related vehicles (i.e., local traffic)
- potential impacts to road safety
- potential impacts to road condition.

3.1 Eurobodalla Road / Storage Access Road intersection upgrades

The scope of works covered by this CTMP includes upgrades to the intersection of Eurobodalla Road and the Storage Access Road / entry to the TRIPS site. These upgrades are required enable safe access and egress to both the storage and TRIPS sites. Construction works would require disruptions to traffic flow along Eurobodalla Road. These are likely to include:

- reduced speed limits for the construction zone to reduce safety risk to construction personnel
- full or half road (e.g., lane) closures requiring temporary diversions or stop/go
- rough surfaces
- increased construction traffic volumes and construction vehicle movements
- construction noise and dust impacts.

3.2 Increased construction traffic

Construction vehicles associated with the Storage Access Road and Storage Inlet Pipeline construction works would generally access the site from the Princes Highway and then Eurobodalla Road. This would result in a temporary increase in vehicle movements and traffic volumes along these routes during construction. The biggest impacts would likely be during earthworks activities where truck movements would be more regular due to removal of cut material from the site.

Increased traffic movements would be associated with construction personnel access to site, and construction plant, equipment and material delivery to site.

Access to the construction areas would only be through approved access points. These would be detailed in the TCP. Where construction traffic turns to access the site, there may be minor traffic flow impacts relating to turning of heavy or oversize vehicles. This may cause minor delays to existing road users. The impact on the Princes Highway likely to be less pronounced due to the higher existing traffic volumes including heavy vehicles.

3.3 Local roads and access

Through traffic on the Princes Highway, Eurobodalla Road and all other local roads in the vicinity of the construction site would continue to operate. No changes to access arrangements on local roads, or most private properties would be required. Construction vehicles would be parked within the construction footprint in designated areas that would be determined by the contractor.

3.4 Road conditions and safety

Increased heavy vehicle traffic movements on Eurobodalla Road may lead to deterioration of the road surface and shoulders. Road pavement condition would be impacted at the intersection contrition zone this would be managed through a specific TCP. Road pavement conditions may also be impacted along routes of increase heavy vehicle movement for the construction of the Storage Access Road and Storage Inlet Pipeline, particularly during wet weather periods when water sitting on roads can facilitate potholing and pavement wear.

Deterioration of road surfaces, and increased traffic movements and volumes could affect road safety for all users. This would be managed through the measures outlined in Section 4.

4 Management measures

Environmental requirements and management measures relating to traffic impacts were identified in the EIS, the conditions of the Development Consent and relevant Roads and Maritime documents. Specific measures and requirements to address traffic and transport impacts are provided in Table 4-1.

With regard to the pre-dilapidation survey, a suitably qualified civil engineer with road design and construction experience will review any defects recorded in the survey and specify any road repair works that need to occur prior to or during construction. Maintenance of roads associated with the construction work will follow the general maintenance principles as follows:

- regular visual inspections
- use of a recognised, standard road condition classification system
- documentation of the type, degree and extent of distress to determine the appropriate response
- repairs to be undertaken on road segments that are classified as poor and very poor
- the Site Supervisor or delegate is required to monitor the incidence of mud tracking off the construction site and onto local roads and will sweep or clean local roads to minimise mud tracking.

Table 4-1 Traffic and Transport revised environmental management measures

Impact	Environmental Safeguards	Responsibility	Timing
Construction traffic	A Construction Traffic Management Plan (CTMP) would be prepared prior to construction and would be included in the CEMP. The CTMP would: • Identify the traffic management requirements during construction • Describe the general approach and procedures to be adopted when producing specific traffic control plan • Identify designated parking areas for construction workforce. • Determine temporary speed restrictions to ensure safe driving environment around work zones, including on unsealed roads, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road) • Identify any high-risk periods (such as during school bus operations), and whether delivery to site, and material haulage can be undertaken outside of these hours • Identify opportunities to stagger heavy vehicle arrivals to site (e.g. use of minimum headways between arriving haul trucks), to avoid the potential for heavy vehicle convoys arriving on site • Identify and provide temporary works, such as for site access, turn-around bays, parking areas for heavy vehicle dwelling, and minor site distance clearing around local road intersection sites (e.g. at the access points to the construction site) • Provide temporary warning and advisory signposting, such as during periods of material haulage, and at major intersections (e.g. Nerrigundah Mountain Road and Eurobodalla Road), where there will be increased traffic activity • Where practical, program deliveries of construction plant and materials (such as over-mass and over dimension vehicles) outside peak traffic periods • Identify steps to minimise construction traffic, such as car-pooling by construction staff to site • Regularly review and modify the CTMP (such as at changes of construction stages), to ensure the CTMP remains valid and appropriate • Document communication protocols amongst heavy vehicle operators, such as when approaching higher risk areas. This could be through the establishment of a call point system, whereby call point signage is erected on the approach to higher risk areas, such as the intersection of Nerrigundah Mountain Road and Eurobodalla Road, or the single lane Tuross River (Tyrone) bridge, and access points to the construction site • Maintain access to private properties (and liaise with property owners), particularly that off Bullockys Hut Road, which may be used as a site access	Construction contractor	Detailed design Pre-construction During construction

Impact	Environmental Safeguards	Responsibility	Timing
	• Identify a contact person (and phone number) for liaison and complaints, by project stakeholders and the community. Consultation with various stakeholders will also be undertaken in the development and periodic review of the CTMP, including: • Ensuring all relevant requirements from emergency service providers are included, including from NSW Rural Fire Service, NSW Ambulance Service and NSW Police • Consultation with the respective road authorities including Roads and Maritime Services and • Consultation with other relevant parties including school bus operators • Periodic notification of construction activities and changes in traffic control arrangements would be publicly notified, including through local newspapers, community noticeboards, and through a letter box drop off for residents in proximity to the construction site as appropriate. Detailed traffic control plans would be developed for each construction phase. These would include • Provision for emergency services passage through construction zones. Only accredited traffic controllers would be permitted to prepare and implement traffic control plans.		
Impacts to local roads during construction	Council will undertake a photographic inspection of local roads and undertake a pre-dilapidation survey of local road pavements before construction commences, in order to document the state and condition of local roads. Periodic surveys will be undertaken during construction activities to identify any road damage, with road damage to local roads being repaired by Council as soon as practical. The construction contractor will also monitor the incidence of mud tracking off the construction site and onto local roads and will sweep or clean local roads to minimise mud tracking. The contractor will preferably install controls to minimise the incidence of mud-tracking in the first instance, such as by use of grids at site access points. Construction personnel will also be encouraged to report road hazards and road damage	Council	Pre-construction, During construction

5 Compliance management

5.1 Introduction

This section provides information on CTMP compliance including administration, inductions, and consultation/ notification requirements, review and improvement, as well as auditing and disciplinary procedures.

Eurobodalla Shire Council or their contractors would be responsible for the development and effective maintenance of CTMP registers throughout the duration of construction. These registers are detailed in Table 5-1.

Table 5-1 CTMP Registers

REGISTER TYPE	DESCRIPTION
Key personnel register	This register will identify all key personnel and provide contact details for the Construction Contractor and include the Project Manager, Site Supervisor, key subcontractors, as well as contact details for relevant roads authorities.
Incident register	The incident register will record all incidents that occur on site, including date and time of the incident, date-stamped photographs of signs and devices in the vicinity of the incident.
Variations register	The purpose of the variations register will be to record any modifications to approved traffic management measures, including reason for the modification, date and time of modification and residual risk.
Complaints register	The complaints register will record any complaints received including party making the complaint, contact details, nature of the complaint, and any follow up actions that have been identified and subsequently taken.
Consultation register	Contact details for key stakeholders who have been consulted during the preparation of the CTMP will be recorded in this register. An overview of the main issues raised during consultation will also be provided for each of the consultees.

5.2 Roles and responsibilities

The roles and responsibilities of project and construction staff relevant to the implementation of this CTMP are listed in the CEMP. Roles and responsibilities of project and contract personnel specific to this CTMP are outlined in Table 5-2.

Table 5-2 Project staff roles and responsibilities – specific to CTMP

Role	Responsibility
Project Manager / Project Engineer / Site Supervisor	• Hold current RMS accreditations (Blue, Yellow and Red Card) • Review, approve and ensure compliance with the Construction Method Statements, and Work Method Statements and SWMS • Ensure compliance with relevant specifications such as RMS G10 and Council Specifications • Approve and complete Inspection and Test Plans (ITPs) and checklists.
Traffic Control Supervisors (as required)	• Management of daily traffic control operations including coordination of staff and resources on site • Ensure correct TCPs are available and implemented as applicable • Ensure sufficient staff and equipment are available and utilised for each VMP and TCP • Assist with all traffic management planning such as checking ROLs • Manage daily prestart safety and site coordination briefings • Coordinate with the construction team on site for both project works and deliveries • Inspect and audit all traffic management plans, personnel and devices and • Collect and maintain site records.

Role	Responsibility
Traffic Controllers (as required)	• Hold current RMS accreditations (Blue and Yellow Card) • Implement TCPs under the supervision of the Traffic Control Supervisor • Maintain traffic control signs and devices • Assist during attendance to site of external stakeholders for both planned and emergency situations.

5.3 Inductions and daily toolbox talks

All project construction personnel and contractors will an induction to the CTMP. This would be a condition of engagement. The induction will provide general awareness of the requirements and implementation of the CTMP to ensure that personnel and contractors are aware of the need to comply with the CTMP.

The induction would include an:

- overview of the permitted transport, access and egress routes for construction personnel, construction vehicles, construction deliveries
- adherence to local speed limits
- standard environmental, occupational health and safety driver protocols and emergency procedures.

Toolbox talks are to occur at the beginning of each day to highlight specific daily traffic and transport activities, and how these are to be managed. The toolbox talk would include a reminder of how drivers are to comply with CTMP, provide details of CTMP enforcement, and consequences for any breaches of the CTMP or local traffic rules.

5.4 Consultation/ notification requirements

As required, communication with local residents, local community representatives, TfNSW, NSW Police and NSW Rural Fire Services statutory consultees would occur prior to and throughout construction. Consultation would include provision of information about traffic and transport activities which have potential to cause disruption, such as abnormal load deliveries or alterations to traffic control arrangements on Eurobodalla Road. The telephone number of the Site Supervisor or delegate will be made available during construction operational hours, and construction traffic movements to respond to calls and resolve any issues.

5.5 Disciplinary procedure

All Eurobodalla Shire Council and contractor personnel must adhere to the requirements of the CTMP. It is the responsibility of Eurobodalla Shire Council to ensure that contractors disseminate requirements of the CTMP to their sub-contractors. Failure to adhere to the requirements of this CTMP will lead to disciplinary action/ enforcement including:

- Eurobodalla Shire Council construction personnel:
  - first offence – personnel receives a warning
  - second offence – personnel dismissed from duties on the project
- Eurobodalla Shire Council contractor / supplier:
  - first offence - contractor/supplier receives a warning letter
  - second offence - contractor/supplier banned from providing services on the Project.

5.6 Complaints procedure

Eurobodalla Shire Council is committed to managing traffic related complaints from affected community members or stakeholders in a proactive and conciliatory manner. As such, the following measures will be available for community enquiries and complaints for the duration of construction of the Storage Access Road and Storage Inlet Pipeline:

- contact details of the relevant person with which to lodge a complaint
- a postal address to which written complaints and enquiries may be sent
- an email address to which electronic complaints and enquiries may be transmitted

- the contact details above, shall be provided to sensitive receivers identified during the EIS, displayed on signage at the entrance to the construction site, and published on the Project website.

5.7 Incident Procedures

Any reportable incidents that occur within an area subject to the CTMP and/ or TCP will be notified immediately to the construction personnel or authority. Emergency response and management is to be undertaken in accordance with the requirements specified in the Fire and Emergency Response Plan that accompanies the CEMP.

If a traffic incident occurs within a construction works zone or any other location affected by the works, this will be recorded and reported in accordance with the Roads and Maritime Traffic Control at Work Sites Technical Manual. In case of emergency closure of Eurobodalla Road during the project works, light vehicles and emergency vehicles would be diverted from the Princes Highway to the site, via Big Rock, Bullockys Hut and Waincourt Roads.

Incident reporting will include a description of controls in place at the accident site, including traffic control devices and location, as well as photographic evidence of the signage and the incident. The record would be provided to TfNSW within 2 days of the incident. Actions arising from any investigation of an incident will be actioned through the report and immediately corrected for prevention of further incidents.

Serious incidents shall be notified immediately to SafeWork NSW as an urgent investigation may need to be undertaken. Serious incidents include:

- an incident where there has been a fatality
- an incident where there has been a serious injury or illness
- an incident where there is an immediate threat to life, such as major damage to machinery or buildings.

In the event of a serious incident, following assistance and removal of any injured personnel and securing the site of any immediate hazard risks, the area where the incident occurred shall not be disturbed and shall be barricaded to allow an investigation. Work in the area can only recommence where SafeWork has authorised so.

6 Traffic management

This Section provides an overview of the traffic management measures to be implemented to manage construction personnel, construction vehicle and heavy vehicle movements to and from the site to minimise adverse impacts on the road network.

6.1 A driver's code of conduct

Operators of vehicles doing construction activities for the Storage Access Road and Storage Inlet Pipeline works must:

- undertake an induction
- hold a valid driver's licence for the relevant class of vehicle
- operate the vehicle in a safe manner within and external to the project site
- comply with the direction of authorised site personnel when operating within the site.

6.2 Heavy vehicle speeds

There are two types of speeding relevant to the construction activities covered by this TMP:

- where a vehicle travels faster than the posted speed limit
- where a driver operates a vehicle at inappropriate speeds for the road conditions (e.g., fog or rain).

All site personnel and contractors operating vehicles while undertaking activities for the Storage Access Road and Storage Inlet Pipeline construction or travelling to and from site must adhere to posted speed limits at all times. For the Project site and adjacent road network, this includes:

- the Princes Highway – Eurobodalla Shire Council personnel and construction contractors are likely to access Eurobodalla Road from the Princess Highway at Bodalla. The Princess Highway is a major arterial (State) road connecting Bodalla with Moruya and Sydney to the north, south to Narooma and the Victorian border. Between the towns of Moga and Bodalla, the Princes Highway generally has one lane in each direction with overtaking permitted through some sections. The posted speed limit along the Princes Highway in this section varies between 80 to 100 kilometres per hour through rural areas, and down to 50 kilometres per hour within townships.
- Eurobodalla Road is a local road connecting Nerrigundah with Bodalla, via Cadgee and Eurobodalla. Access to the Project site is via Eurobodalla Road. Eurobodalla Road operates as a two-lane sealed carriageway with a posted speed limit of 80 kilometres in rural areas and 50 kilometres per hour through townships. The road is typically seven metres wide (3.5 metre travel lanes), with no sealed shoulders.

Vehicle speed limits on public roads are enforced by the NSW Police Service. There are three types of penalties established under Heavy Vehicle National Law and Regulations (HVNL):

- infringeable offences – an offence which results in the issue of an infringement notice. It gives the person issued the notice the option of either paying the penalty set out in the notice or electing to have the matter dealt with by a court.
- court imposed penalties – some offences are not infringeable and must be dealt with by a court. The HVNL sets out the maximum penalty level that the court may apply.
- demerit points – are managed through each state and territories' road traffic law (NHVR, Penalties and infringements, 2017).

All Eurobodalla Shire Council construction and contractor personnel are to observe the posted speed limits, and speeds are to be adjusted appropriately to suit the road environment and prevailing weather conditions, to comply with the NSW Road Rules & HVNL. Vehicle speeds must be appropriate to ensure the safe movement of vehicles based on vehicle configuration.

6.3 Driver fatigue

National heavy vehicle driver fatigue laws apply to fatigue-regulated heavy vehicles, which include:

- vehicles with a Gross Vehicle Mass (GVM) of over 12t
- a combination when the total of the GVM is over 12t
- a truck or a combination including a truck, with a GVM of over 12t with a machine or implement attached.

All personnel and contractors operating vehicles for activities associated with construction of the Storage Access Road and Storage Inlet pipeline are to be aware of their Fatigue Management Scheme and operate within its requirements. By law, all drivers have a duty to not drive a fatigue-regulated heavy vehicle on a road while impaired by fatigue.

6.4 Traffic control plan

Eurobodalla Shire Council or their construction traffic contractor will develop a TCP (or TCPs) for construction activities. The TCP must include provisions for access through the construction zones in the event of emergency and show the type and location of all temporary signage as required. Temporary signage is to include notices of any reduction in the posted speed limit as required by the TCP and temporary warning and advisory notices in any areas of increased traffic activity and major intersections. Eurobodalla Shire Council would consult direction from relevant roads authorities for installation of any temporary signage, including restoring the existing speed limit on completion of the Project.

Prior to construction commencing, Eurobodalla Shire Council is to determine the interaction of construction vehicle movements with local school bus routes and timetables. This information is to be used to specify construction traffic curfew times to minimise interaction between construction traffic and school traffic. This information is to be detailed in the TCP.

The local road network is used by school buses during typical school pick up and drop off times. Staff vehicles are unlikely to conflict with school bus services, as they will be accessing and egressing the site prior to and after school hours. Heavy vehicles will be scheduled to minimise any potential conflict with local school buses by confirming typical times buses run through the area and scheduling heavy vehicle deliveries outside of these times.

The TCP is to include a schedule for delivery of construction equipment and materials to site. Delivery of road and pipeline materials is to be scheduled to avoid convoy lengths or platooning on roads, and minimise the movement of heavy vehicles, as practicable, in peak traffic periods.

Eurobodalla Shire Council or their traffic control contractor will liaise with construction personnel, sub-contractors and suppliers and develop a response to local climate conditions that may affect road safety, such as fog, dust, wet weather and flooding. This information is to be included int eh TCP.

6.5 Management of dirt tracked onto the public road n etwork

In order to minimise the impact of dirt tracked onto the public road network, wheel cleaning facilities (i.e., grid at site access points) will be put in place at the site for the duration of construction work. In addition, the Site Supervisor will carry out inspections and deploy where necessary a road sweeper on routes affected by construction traffic and at construction access points prior to commencement of construction and subject to regular review.

6.6 CTMP review, improvement and auditing

Revisions to the CTMP will be in accordance with relevant requirements and will be made in consultation with key stakeholders to ensure they remain relevant to the work being undertaken. The CTMP will be updated in response to the identification of hazards, near misses, incidents, accidents, or other processes and procedures that require clarification, or where deficiencies and improvement opportunities have been identified.

Any amendments to the CTMP will be submitted by Eurobodalla Shire Council to all relevant authorities and all necessary approvals sought, as required. When amendments are made the entire document will be updated. The revision number will be updated, and amendments recorded on a revision sheet.

Eurobodalla Shite Council will regularly monitor traffic related construction activities and associated mitigation both on and off site in order to assess the performance and effectiveness of the CTMP. An assessment of the road network will be undertaken before works start, as well as monthly throughout the period of work activities. The monitoring will focus on determining the adequacy of proposed mitigation measures by assessing the performance of the plan against objectives, such as minimising road user delay, maintaining existing network performance and limiting construction impacts.

The monitoring will assist in determining the need for additional mitigation, if the original traffic management measures are not deemed effective. This will ensure that measures in place are effective and achieving desired and intended outcomes. The monitoring process will check that the safety of road users is being maintained.

Auditing of the CTMP will be used to confirm compliance. Audits will be undertaken monthly by Eurobodalla Shire Council to review the performance and progress of the CTMP. Auditing will report on compliance with processes, procedures and directions provided in the CTMP. Any non-conformances will be identified, and corrective measures recommended and actioned to prevent the incident occurring again.

Compliance auditing will include:

- on-site inspections to ensure compliance with site rules relating to movement and management of all vehicles, as well as with transport movement plans
- off-site inspections to ensure compliance with traffic control plans, transport movement plans, temporary and permanent traffic management measures, nominated truck haulage routes, measures to manage trucks on routes with sensitive receptors and off-site staff parking

Monthly auditing reports are to be maintained to provide evidence of conformity to the CTMP.

7 Summary

This CTMP has been prepared to satisfy:

- conditions of Development Consent (SSD 7089) Part B, section B28
- conditions of Development Consent (SSD 7089) Appendix 2, Revised Management and Mitigation Measures, Section 7.

This CTMP sets out proposed traffic management and contingency planning measures to enhance road safety and limit adverse effects of construction traffic on the surrounding road network for the some of the early works activities of the overall Project. The early works of the activities that this CTMP relates to are:

- construction of the Storage Access Road from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Storage Access Road and TRIPS site and Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the TRIPS construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

Eurobodalla Shire Council and any construction contractors will adhere to the proposed traffic management measures contained in this CTMP and any TCPs. Any material deviation from the proposed measures will be agreed in writing with the relevant road's authorities prior to implementation.

Appendix A Road Safety Audit

Member of the Surbana Jurong Group

Road Safety Audit Stage 5 (EXISTING ROAD)

Eurobodalla Road & Nerrigundah Mountain Road intersection, Eurobodalla

Prepared for: Department of Planning, Industry and Environment
2/12/2019

Client Contact: Mark Davey, SMEC North Sydney on behalf of Department of Planning, Industry and Environment
Road Safety Auditors: Thomas Meadows
Paul Golema

Document/Report Control Form

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Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
1	10/12/2019	Thomas Meadows	Paul Golema	Mark Davey

Issue Register

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Audit Summary

Audit Details	
Audit ID	12328
Project	Eurobodalla water storage facility
Client	Department of Planning, Industry and Environment C/- SMEC North Sydney
Address	53 Berry Street, North Sydney NSW 2060
Telephone	(02) 9867 6021
Client Project Manager	Mark Davey
Audit Team	Thomas Meadows (Lead Auditor) Paul Golema (Level 2)
Audit Stage	Stage 5 – Existing road
Audit Date	19/11/2019
Previous Audits	No previous audits have been undertaken for this project

Summary of Audit Findings

- Narrow road carriageways
- Tight horizontal and vertical curves
- Vegetation affecting sight distance
- Steep embankments / drops along Eurobodalla Road
- Poor Delineation – limited reflective delineation, no linemarking
- Lack of facilities for cyclists and pedestrians
- Signage placed incorrectly
- Incorrect installation of safety barriers and terminals
- Hazards in clearzone
- Loose material in roadway from the quarry access

1. Introduction

1.1. Background

The Department of Planning, Industry and Environment engaged SMEC Australia to undertake a Road Safety Audit (Existing Road) of the intersection of Eurobodalla Road and Nerrigundah Mountain Road and surrounds as part of the Eurobodalla water storage facility project.

This report details the findings of the Existing road Road Safety Audit undertaken on the 19th of November 2019. The audit was conducted by Thomas Meadows (Lead Auditor), and Paul Golema (Level 2 Auditor).

1.2. Project Location

The project is located on the South Coast of NSW, within the suburb of Eurobodalla and within the Local Government Area (LGA) of Eurobodalla Shire Council. The area audited and documented is shown in Figure 1-1 below. The site location extends along Eurobodalla Road approximately 500m east and west of the Eurobodalla Road/ Nerrigundah Mountain Road intersection. Along Nerrigundah Mountain Road, the audit extends from the Eurobodalla Road/ Nerrigundah Mountain Road intersection to the Quarry Access Road approximately one kilometre west of the intersection.

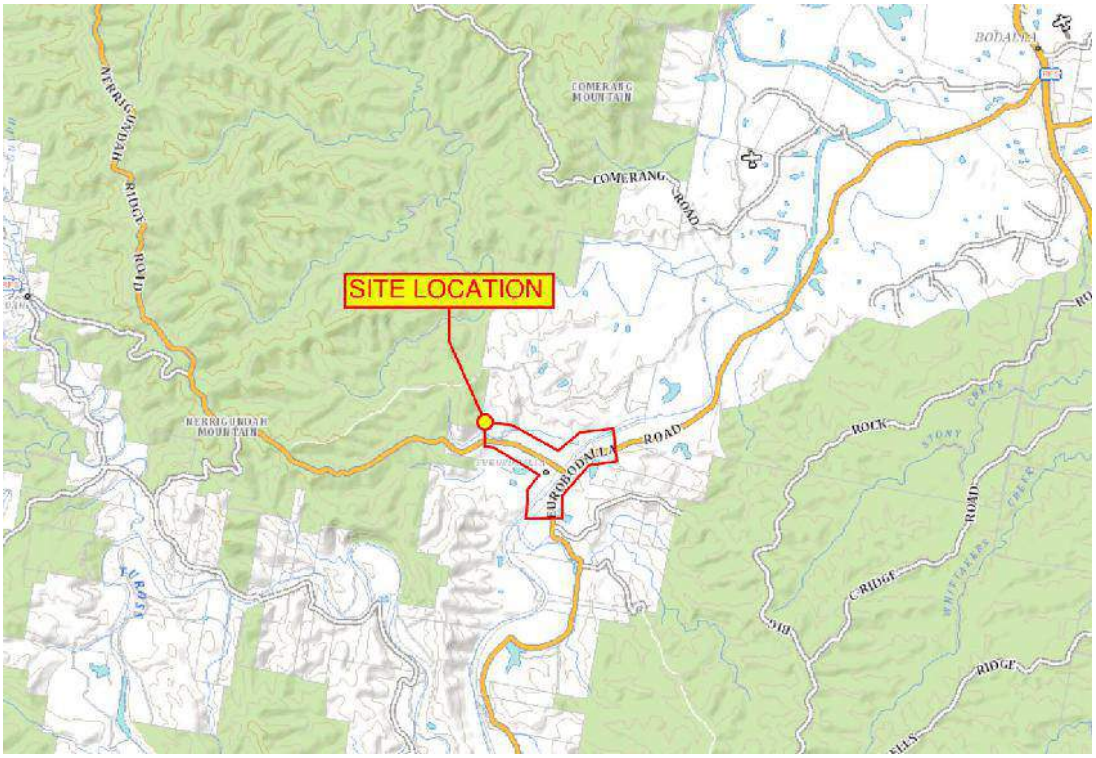


Figure 1-1: Project Locality Sketch

1.3. Previous Audits

There have been no previous audits undertaken on this location.

2. Road Safety Audit Details

2.1. Road Safety Audit

A road safety audit is a formal examination of a future road or traffic project or an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance. The road safety audit process concerns the safety of all road users.

The Lead Auditor and audit team must be independent, so that the road is viewed with "fresh eyes". The purpose of the audit is not to rate the road, but rather to identify any road safety concerns.

In reviewing the safety aspects of a road, the reporting procedure is not intended as a redesign process, but to outline potential or existing road safety issues and establish a basis upon which ongoing works may produce an acceptable solution to the safety problem.

The objectives of the road safety audit are to:

1. Select an audit team which is independent and has appropriate skills for the particular project.
2. Provide the audit team with all the necessary information to allow an adequate assessment of the project.
3. Ensure the design team understands the audit process; to provide the audit team with any additional information, identify key issues, constraints and potential issues requiring specific consideration.
4. Safety audit the designs and background information and form conclusions about the safety performance and crash potential of the road.
5. See how the proposal interacts with its surroundings and nearby roads; to visualise potential impediments and conflicts for road users.
6. Report on the audit's findings, and if requested by the client, recommendations regarding how identified safety deficiencies may be addressed.
7. Discuss the findings and recommendations for corrective action.
8. Deal with audit findings or recommendations in an effective manner; to judge whether the recommendations of the road safety audit should be implemented and, where it is decided otherwise, to give reasons in writing for the decision; to put agreed audit recommendations into effect.
9. To disseminate the knowledge gained from an audit, for the wider benefit of road and traffic designers.

This report covers items 1 – 7 above, the final two objectives follow on from this report and are the responsibility of the project manager/road authority.

2.2. Audit Team Details

Client:	Department of Planning, Industry and Environment	
Lead Road Safety Auditor:	Thomas Meadows, SMEC	
	Auditor level:	Level 3 (Lead)
	Auditor ID:	RSA-02-1041
Audit Team Member:	Paul Golema, SMEC	
	Auditor level:	Level 2
	Auditor ID:	RSA-02-0771

2.3. Commencement Meeting

A commencement meeting was undertaken for this road safety audit between Thomas Meadows (SMEC) and Kathy Burton (SMEC) on 19th November 2019 over the phone. The road safety audit has been undertaken in accordance with Austroads Guide to Road Safety Part 6 – Road Safety Audit.

2.4. Site Inspection and Audit

The day-time site visit and audit were undertaken on the 19th November 2019 commencing at 15:30 and concluding at approximately 19:30. The night time audit was undertaken on the 19th November 2019 commencing at 20:30 and concluding at approximately 21:30.

The weather conditions during the day audit were fine and sunny throughout the audit. The weather during the night time audit was also fine. The road surface was dry.

2.5. References and Documentation Audited

The following general standards and guidelines were used as a reference in conducting this Road Safety Audit:

- Austroads "Guide to Road Safety, Part 6: Managing Road Safety Audits", 2019.
- Austroads "Guide to Road Safety, Part 6A: Implementing Road Safety Audit", 2019.
- Austroads, Guide to Road Design Series, 2015-2017.
- Standards Australia "AS 1742 Series 2009: Manual of uniform traffic control devices", 2009.
- Austroads Road Safety Engineering Toolkit
  - Sydney Metro North-West Finishing and Ancillary Works: Civil Engineering Works Design Report

The audit has considered the following items:

- Road alignment and cross section
- Pedestrian and cyclist infrastructure
- Linemarking and signage
- Roadside hazards

- Safety barriers
- Intersection layout
- Drainage and utilities.
- Property accesses
- Lighting

2.6. Limitations on this Audit

The following items are to be considered when reviewing the findings of the audit:

- Although site observations were taken and assessed, no detailed site measurements and subsequent detailed assessments of the horizontal and vertical geometry have been undertaken.
- Given the visual inspection nature of a road safety audit, the provided recommendations are not to be treated as design advice. Further investigation is required by suitably qualified and experienced practicing professionals to determine the optimum treatment to address the safety issues identified within this audit report
- Due to the narrow width of the bridge, the audit team did not walk on or cross the bridge on foot and therefore could only make observations while driving over it.

3. Assessment Methodology and Details

3.1. Risk Assessment System

Identified issues and deficiencies have been rated in order of importance based on estimated crash frequency, crash severity and level of risk in accordance with *Austroads Guide to Road Safety, Part 6A: Implementing Road Safety Audits (2019).* Austroads specifies that this is not a *scientific system and professional judgement should be used.*

Crash Frequency

The probable frequency of an incident or crash occurring has been estimated for each issue listed in the Road Safety Audit findings based on the options listed in Table 3-1.

Table 3-1: Crash Frequency

Frequency	Description
Frequent (F)	Once or more per week
Probable (P)	Once or more per year (but less than once a week)
Occasional (O)	Once every five or ten years
Improbable (I)	Less often than once every ten years

Crash Severity

The severity of a crash identified in the Road Safety Audit is assessed based on the options listed in Table 3-2**.**

Table 3-2: Crash Severity

Severity	Description	Examples
Catastrophic (C)	Likely multiple deaths	• High-speed, multi-vehicle crash on a freeway. • Car runs into crowded bus stop. • Bus and petrol tanker collide. • Collapse of a bridge or tunnel.
Serious (S)	Likely death or serious injury	• High or medium-speed vehicle/vehicle collision. • High or medium-speed collision with a fixed roadside object. • Pedestrian or cyclist struck by a car.
Minor (M)	Likely minor injury	• Some low-speed vehicle collisions. • Cyclist falls from bicycle at low speed. • Left-turn rear-end crash in a slip lane.
Limited (L)	Likely trivial injury or property damage only	• Some low-speed vehicle collisions. • Pedestrian walks into object (no head injury). • Car reverses into post.

Level of Risk

Findings are rated for their importance according to a four tiered system based on the matrix in Table 3-3 with a suggested treatment approach outlined in Table 3-4.

Table 3-3: Risk Matrix

	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

Table 3-4: Treatment Approach

Risk	Suggested treatment approach
Intolerable	Must be corrected.
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high.
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.
Low	Should be corrected or the risk reduced, if the treatment cost is low.

3.2. Safe Systems

"The Safe Systems approach is regarded as international best practice in road safety and provides an outcome whereby death and serious injury are virtually eliminated amongst users of the road system. Safe Systems is the "management and design of the road system such that impact energy on the human body is firstly avoided or secondly managed at tolerable levels by manipulating speed, mass and crash angles to reduce crash injury severity." (Austroads 2018b – AP-R560-18).

With the adoption of the Safe Systems approach it is important that it is integrated into the Road Safety process. There is currently only limited guidance on how this integration should be done and Austroads (Guide to Road safety Part 6, 2019) suggest that "road safety auditors are given the freedom on how to go about meeting these requirements". This section describes how the Safe Systems approach has been integrated into this Road Safety Audit.

Integration – Severity

One of the suggested ways of integration of the Safe Systems approach in a Road Safety audit is "relating possible crash forces to tolerable levels of the human body before fatal and serious injury (FSI) occurs (regardless of the likelihood) when identifying and assessing FSI risks". This is covered with the use of the crash severity matrix shown in Table 3-2, where Catastrophic (C) and Serious (S) highlight the finding that could result in a fatal or serious injury. One minor adjustment with the assessment of severity will be the use of the Safe Systems speed, discussed below.

Integration – Crash Type

A method used to improve System alignment is the adoption of treatments that reduce exposure, likelihood and severity in a compensatory way across key crash types. These crash types are:

- Car/pedestrian/cyclist
- Car/motorcyclist
- Car/tree pole
- Car/car (side impact, intersection)
- Car/car (head-on)

So, by highlighting the audit finding that relate to these types of crashes, mitigation measures or recommendations can be aligned with the Safe System approach. A separate column is provided in the findings table to assign a crash type where applicable.

Integration – Speed

Embedding Safe System principles in RSA practice is obviously a key to integration. Understanding and applying these new principles is something that is strongly encouraged within SMEC and is fundamental to the development of all our staff and not just the road safety auditors. To aid the auditors a more quantitative approach to assessing the potential severity of a crash is to use critical speed thresholds to determine if a fatality or serious injury could occur. There is some research done in this area, but Austroads recognise that more needs to be undertaken. Reviewing this research, the document *Relationships between bullet vehicle impact speed and probability of a MAIS 3+ injury to a target vehicle occupant for different crash configurations* (Jurewicz, Sobhani et al., 2015) provides a comprehensive approach.

Table 3-5: Relationships between vehicle impact speed and probability of serious injury

Austroads 2015 (AP-R498-15 Fig 4.8)			
Crash Type	10% severe injury risk	50% severe injury risk	100% severe injury risk
	Bullet vehicle impact speed		
Car → Pedestrian/cyclist/motorcyclist	20	38	75
Car → Tree/pole			
Car → Car (Adjacent direction)	30	42	75
Car → Car (Opposing-turning)	30	54	100
Car → Car (Head-on)	30	42	75
Car → Car (Rear-end)	55	83	>100

It must be noted that the speed referred to is impact speeds, which has many contributing factors, such as weather conditions, distance of hazard from travel lane, road geometry etc, and it will be imperative that the auditor takes all the factors into consideration when determining the impact speed.

A separate column is provided in the findings table to assign impact speed where applicable.

Integration – Categorising Audit Findings/Recommendations

The final area where Road Safety auditing is integrated with Safe Systems is to categorise the findings/recommendations based on their alignment with the Safe Systems approach.

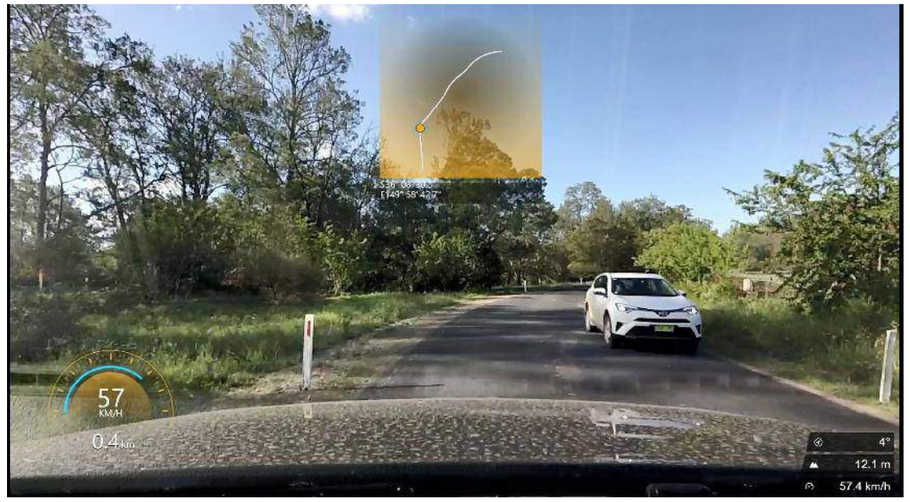
4. Road Safety Audit Findings

4.1. Audits Findings

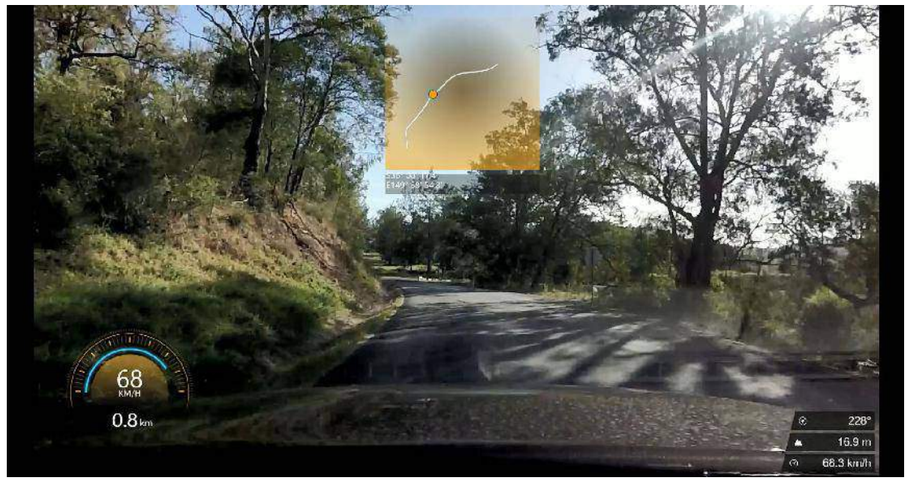
Table 4-1 below details the findings from the road safety audit.

Table 4-1 - Audit findings

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
001	Full corridor	Full corridor	Road alignment and cross section	Car/car (side impact, intersection)	>70	The road pavement on both Eurobodalla Road and Nerrigundah Mountain Road is narrow with minimal clearance between roadside vegetation and travel lanes. The road pavement allows 2 light vehicles to pass with minimal additional pavement. For a heavy vehicle to pass another vehicle (light or heavy vehicle), the passing vehicle would have to partially leave the roadway. Both roads were signposted as school bus routes, entailing that large vehicles already use the corridor. In addition, semi- trailers were observed using Nerrigundah Mountain Road. This may lead to side swipe crashes and head-on crashes  	Occasional	Serious	High	Moderate	- Delineation of road centreline - Widening of pavement on all roadways

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
002	0.3 (NB)	0.4 (NB)	Road alignment and cross section	Car/car (head-on)	>70	On Eurobodalla Road, south of the Eurobodalla Road/ Nerrigundah Mountain Road intersection, there is a tight horizontal curve. This alignment of the curve and the narrow pavement makes it difficult for 2 vehicles to pass each other and navigate the curve. Vehicles travelling north may track to the inside of the curve, further reducing the pavement available to southbound vehicles to navigate the curve. In addition, there is roadside vegetation in close proximity to the roadway on the inside of the curve, this may cause southbound vehicles to track towards the outside of the curve to avoid the vegetation. This vegetation also limits the sight distance of vehicles navigating the curve in both directions making it difficult to identify vehicles travelling in the opposite direction. This may cause head on collisions. This will be exacerbated by heavy vehicles using the corridor.  	Occasional	Serious	High	Moderate	- Delineation of road centreline to convey appropriate vehicle tracking through curve - Widening of pavement to accommodate vehicle movements - Removal of roadside vegetation to improve sight distance

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
003	Eurobodalla Road	Eurobodalla Road	Roadside hazards	Car/tree pole	>70	There is vegetation and steep drops within close proximity of the Eurobodalla Road alignment that pose a significant risk to motorists. The narrow cross section of Eurobodalla Road means that there is little margin for error for motorists and no provision of shoulders means there is no area for errant vehicles to correct themselves. This could lead to head on collisions with trees or roll over crashes down steep embankments  	Occasional	Serious	High	Moderate	- Remove roadside vegetation within clearzone of roadway - Provision of safety barrier at locations where vegetation cannot be removed, large drops/ steep batters are present
004	Eurobodalla Road	Eurobodalla Road	Delineation	Car/tree pole	>70	The existing delineation of Eurobodalla Road does not provide adequate guidance on the alignment of the roadway particularly at horizontal curves. Currently only guideposts are provided at regular intervals. This does not provide adequate indication of the location and curvature of horizontal curves, indication of roadside hazards such as culverts or steep drops and indication of intersections. The lack of delineation may lead to head on collisions between vehicles travelling in opposing directions and between vehicles and roadside hazards as they are unable to appreciate a horizontal curve in the roadway	Occasional	Serious	High	Moderate	- Install additional delineation such as RRPMs, guideposts and linemarking to better delineate the alignment of the roadway

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
005	0.7 (NB)	0.9 (NB)	Road alignment and cross section	Car/car (side impact, intersection)	>70	The road alignment of Eurobodalla Road immediately north of the Eurobodalla Road/ Nerrigundah Mountain Road intersection impedes driver sight distance when travelling southbound. The horizontal and vertical curves hide the alignment of the roadway and vehicles may confuse the side road with the through alignment leading to T-bone crashes between vehicles waiting on the side road and through traffic 	Improbable	Serious	Medium	Moderate	- Additional delineation of the roadway to guide drivers through the intersection. This may include curve advisory markers, centreline delineation and Raised Reflective Pavement Markers (RRPM) - Undertake embankment widening works to provide sufficient sight distance around the curve

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
006	Eurobodalla Road	Eurobodalla Road	Cyclist infrastructure	Car/ pedestrian/ cyclist	>70	There are several markers along Eurobodalla Road indicating that cyclists are encouraged to utilise the corridor. Given the narrow corridor, poor alignment and no provision of exclusive cycle facilities, it is believed that cyclists will need to occupy the travel lane and motorists may not be able to see cyclists on the roadway in time to avoid collisions with them. This will lead to unwanted interactions between cyclists and motorists 	Improbable	Serious	Medium	Moderate	- Remove cyclist route signage - delineate shoulders for cyclists usage - Widening of pavement to allow cyclist to travel within shoulder

007	0.8 (NB)	0.8 (NB)	Traffic signs	Car/car (side impact, intersection)	50-70	The GIVE WAY signage at the Eurobodalla Road/ Nerrigundah Mountain Road intersection (eastern approach to bridge) is positioned incorrectly. The signage is too far back from the intersection which may lead to motorists missing the sign and not understanding the priority given to Eurobodalla Road at the intersection which may lead to T-bone and rear end crashes. However, if eastbound vehicles do stop at the current position of the GIVE WAY sign, they may be in the vehicle path for westbound vehicles to pass them, as it was observed vehicles turning right off Eurobodalla Road onto Nerrigundah Mountain Road would often cut the corner which may lead to head on collisions between stopped vehicles and turning vehicles.  	Improbable	Serious	Medium	Moderate	- Move GIVE WAY signage to more appropriate location at the intersection - Provide linemarking to reinforce priority at the intersection

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
008	Eurobodalla Road/ Nerrigundah Mountain Road intersection	Eurobodalla Road/ Nerrigundah Mountain Road intersection	Intersections	Car/ car (head on)	40	It was observed during the audit that most vehicles travelling south on Eurobodalla Road and turning right into Nerrigundah Mountain Road to travel west would start turning early and cutting the corner and travelling on the pavement used for vehicles turning left out of Nerrigundah Mountain Road. In addition, there is no delineation of the centre of Nerrigundah Mountain Road on the eastern approach to the bridge to delineate the positioning of east and west bound vehicles. This may lead to head on collisions at the intersection. 	Improbable	Serious	Medium	Moderate	- Provide centreline delineation of Nerrigundah Mountain Road in conjunction with GIVE WAY line marking

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
009	1.0 (EB)	1.0 (EB)	Road alignment and cross section	Car/ car (head on)	50-70	The vertical alignment of Nerrigundah Mountain Road immediately west of the bridge considerably restricts the sight distance of vehicles travelling in both directions. This means that vehicles travelling west leaving the bridge will not be able to be seen. This may lead to head on collisions as vehicles leave the bridge. In addition, vehicles travelling east will be unable to see the GIVE WAY linemarking and other delineation at the bridge due to the crest. 	Improbable	Serious	Medium	Moderate	- Relocate GIVE WAY signage to crest of vertical crest curve - Extend line marking further west past the substandard vertical crest curve. - Realign Nerrigundah Mountain Road to eliminate substandard vertical geometry

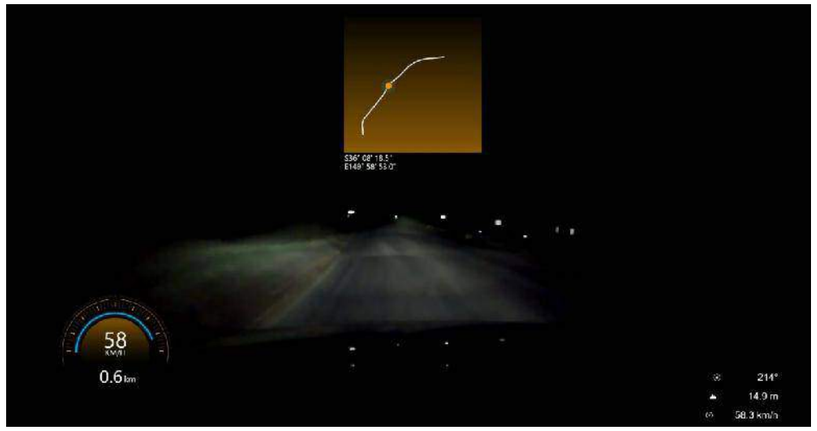
Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
010	1.0 (EB)	1.0 (EB)	Safety barriers	Car/ car (head on)	50-70	The safety barrier and end terminals on the western approach to the bridge begin within the Nerrigundah Mountain Road carriageway restricting the narrow corridor further. There is minimal flaring of the terminal to guide vehicles into the single lane bridge and the terminals begin immediately following the substandard vertical crest curve ensuring that eastbound vehicles are unable to see the beginning of the safety barrier. This may lead to spearing crashes between westbound vehicles and the safety barrier  	Improbable	Serious	Medium	Moderate	- Extend safety barrier to begin west of the substandard vertical geometry - Realign safety barrier to begin outside of corridor and taper to edge of bridge gradually

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
011	1.1 (EB)	1.2 (EB)	Pedestrian infrastructure	Car/ pedestrian/ cyclist	40	There is no provision for cyclists or pedestrians on the bridge. The cross section of the bridge is narrow and would not allow for a vehicle to pass a pedestrian or cyclist. This could lead to unwanted interactions between pedestrians/ cyclists and vehicles. It is noted that pedestrian demand in the area would be very low as the remainder of the corridor does not cater for them 	Improbable	Serious	Medium	Moderate	- Amend bridge cross section to provide pedestrian and cyclist facilities - Prohibit the movement of pedestrians and cyclists across the bridge

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
012	0.4 (EB)	0.4 (EB)	Bridge structures	Car/ car (head-on)	>70	There is a large bridge sized culvert on Nerrigundah Mountain Road at which the road cross section narrows considerably. Safety barriers are also provided at the culvert however this further restricts the narrow corridor. Light vehicles observed during the site visit would travel in the middle of the carriageway, allowing no room for other vehicles to pass. There is no advance warning signs of the narrowing cross section and no signage to establish which direction has priority at the site. As such, motorists may not be aware of the hazard. The narrowing cross section may lead to head on crashes between vehicles travelling in opposing directions   	Improbable	Serious	Medium	Moderate	- Provide advanced warning signs for the narrowed cross section - Provide signage to establish which traffic direction has priority if two vehicles arrive at the same time. - Widen culvert and roadway to accommodate two-way traffic

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
013	0.4 (EB)	0.4 (EB)	Safety Barriers	Car/ tree pole	50-70	At the large bridge sized culvert on Nerrigundah Mountain Road, the safety barrier used has minimal room for dynamic deflection to be able to function properly and redirect vehicles back on to the carriageway. This may mean that vehicles will still fall over the edge of the roadway at the culvert leading to roll over crashes.  	Improbable	Serious	Medium	Moderate	- Replace existing safety barrier with safety barrier that requires dynamic deflection to suit the available space - Widen carriageway and culvert to allow for dynamic deflection of the existing safety barrier

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
014	0.4 (EB)	0.4 (EB)	Safety Barriers	Car/ tree pole	50-70	The existing safety barrier does not cover hazard of the culvert adequately. It appears that the majority of the existing length is devoted to the leading end terminal. The posts used in end terminals are designed to break away and allow vehicles to travel through them. This means that the majority of the safety barrier will allow vehicles to travel through potentially falling off the edge of the carriageway at the culvert. This will lead to roll over crashes. 	Improbable	Serious	Medium	Moderate	- Extend existing guardrail to ensure point of need for the culvert.

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
015	0.8 (NB)	0.8 (NB)	Intersections	Car/car (side impact, intersection)	>70	The intersection is very difficult to identify at night with minimal visual cues to identify it, for example there is no reflective delineation of the terminals, minimal guide posts/ RRPMs and the intersection signage is very small and difficult to read. This may lead to vehicles initially missing the intersection at first before braking hard or turning without looking ahead. This will lead to rear-end and T-bone crashes and potentially roll over crashes in the case of heavy vehicles  	Occasional	Minor	Medium	Moderate	- Improve delineation of the intersection by the provision of guide posts, linemarking, delineating the end terminals and RRPMs - Provide larger signage at the intersection

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
016	0.2 (EB)	0.2 (EB)	Intersections	Car/ car (side impact, intersection)	50-70	The access to the quarry is very difficult to identify as there is no visual clues to indicate its presence. This is especially the case at night when there is no street lighting or delineation of the roadway or intersections. This may lead to vehicles missing the entrance, especially at night, and braking heavily or turning sharply. This may lead to rear-end, T-bone or roll over crashes. This will become more prevalent during the project as more truck movements will occur in and out of the quarry and the potential for drivers unfamiliar with the area is higher. 	Improbable	Serious	Medium	Moderate	- Provide visual cues for the intersection - delineation, RRPMs, intersection signage

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
017	0.6 (NB)	0.8 (NB)	Intersections	Car/ car (side impact, intersection)	>70	The alignment of Eurobodalla Road and road side vegetation south of the intersection obscures the sight distance vehicles turning out of Nerrigundah Mountain Road. The reduced sight distance may lead to vehicles unable to identify safe gaps to enter the Eurobodalla Road traffic stream. This may lead to increased T-bone and rear end crashes 	Improbable	Minor	Low	Highly	- Remove roadside vegetation

018	Nerrigundah Mountain Road	Nerrigundah Mountain Road	Roadside Hazards	Car/tree pole	>70	There are several small, unprotected transverse culverts along Nerrigundah Mountain Road. These culverts are within the clearzone for the roadway and provide a roadside hazard for errant vehicles. The presence of these culverts may lead to vehicle damage if struck by an errant vehicle and potentially roll over crashes  	Improbable	Minor	Low	Highly	- Provide protection for these culverts in the form of safety barriers - Remove culverts from within the clear zone of the roadway

Finding No	Chainage		Category	Crash Type	Crash Speed (km/h)	Audit Finding	Risk Assessment			Alignment with Safe Systems	Recommendation
	To	From					Frequency	Severity	Level of Risk		
019	0.2 (EB)	0.2 (EB)	Road pavement	Car/tree pole	40	At the quarry intersection the entrance to the quarry is unsealed and as a result loose material has encroached on the Nerrigundah Mountain Road corridor. This section of the corridor is an area where the potential for emergency braking is higher than other sections due to the lack of visual cues on approach for the intersection. As such, loose material on the roadway will greatly increase the stopping distance required due to the loss of traction. This will lead to greater chances of damage caused to errant vehicle from roadside features or other vehicles.  	Improbable	Minor	Low	Highly	- Seal the quarry entrance at the intersection to stop material being transported on to the through road by vehicles

5. Audit Statement

We, the undersigned, have undertaken a Stage 5 – Existing road Road Safety Audit in accordance with the Austroads Guide to Road Safety – Part 6. An assessment the existing Eurobodalla Road/ Nerrigundah Mountain Road intersection and its surroundings, was undertaken for the purpose of identifying any features which could potentially impair road safety.

Whilst every care and diligence has been taken to identify potential safety concerns (as detailed in this report), we do not warrant that every safety issue has been identified.

Date: 10/12/2019

Thomas Meadows (Level 3 Road Safety)

LEAD ROAD SAFETY AUDITOR

Date: 10/12/2019

Paul Golema (Level 2 Road Safety)

ROAD SAFETY AUDITOR

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Appendix B Traffic Control Plan

To be provided by Eurobodalla Shire Council or their construction traffic contractor.

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Appendix E Construction Noise Management Plan

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Construction Noise and Vibration Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
12 October 2021

SMEC INTERNAL REF. 30012835

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1	30 October 2020	Raymond Sim (Resonate Consultants	Darren Jurevicius (Resonate Consultants)	M Davey
2	12 October 2021	A Moll	J Miller	J Miller

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1 Introduction

1.1 Purpose

This Construction Noise and Vibration Management Sub Plan (CNVMP) forms part of the Construction Environmental Management Plan (CEMP) for the construction of an initial sections of the Storage Access Road and Storage Inlet Pipeline (to the extent shown in Figure 3-1) for the Eurobodalla Southern Water Supply Storage (the Project). This CNVMP and related CEMP relate only to the activities to be undertaken for the component of the project outlined in this document.

The purpose of this CNVMP is to describe how Eurobodalla Shire Council is to manage potential impacts to noise that may result during construction of the initial sections of the Access Road and water intake pipeline for the Project.

The purpose of this CNVMP is to meet the requirements as stipulated in Condition B34 of Part B of the Development Consent (SSD-7089) and item 8 of Appendix 2 of the Development Consent (SSD 7089) for the ESWSS Project. Further details of the requirements relating to consent conditions are contained in Section 1.3.

1.2 Development consent conditions relating to construction noise and vibration

Table 1-1 outlines the Development Consent conditions that are relevant to management of noise impacts associated with the construction of the initial sections of the Access Road and water intake pipeline for the Project.

Table 1-1: Development Consent Conditions – Noise

<table>
<tr><th>Condition</th><th>Requirements</th></tr>
<tr><td>B31</td><td>The Applicant must comply with the hours in Table 3, unless otherwise agreed in writing by the Planning Secretary
Table 3 Hours of Work
<table>
<tr><th>Activity</th><th>Day</th><th>Time</th></tr>
<tr><td>Earthworks and construction (other than blasting)</td><td>Monday – Friday
Saturday
Not permitted on public holidays</td><td>7 am to 6 pm
8 am to 1 pm</td></tr>
</table></td></tr>
<tr><td>B32</td><td>Work outside of the hours identified in Condition B31 may be undertaken in the following circumstances:
(a) Works that are inaudible at the nearest sensitive receivers; or
(b) For the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
(c) Where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or
(d) Where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works.</td></tr>
<tr><td>B33</td><td>The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in Appendix 2 of the Development Consent SSD 7089.</td></tr>
<tr><td>B34</td><td>The Applicant must prepare a Construction Noise and Vibration Management Plan for the development. The Plan must form part of the CEMP in accordance with Condition C2 and must:
(a) Be prepared by a suitable qualified and experienced noise expert;
(b) Describe procedures for achieving the noise management levels in EPA’s Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time);</td></tr>
</table>

Condition	Requirements
	(c) Describe the measures to be implemented to manage high noise generating works such as blasting, in close proximity to sensitive receivers; and (d) Include strategies that have been developed with the affected sensitive receivers for managing high noise generating works.
B35	The Applicant must: (a) Not commence construction of any relevant stage until the Construction Noise and Vibration Management Plan is prepared in accordance with Condition B34; and (b) Implement the most recent version of the Construction Noise and Vibration Management Plan for the duration of construction.

1.3 Purpose and scope

The purpose of this CNVMP is to describe how Eurobodalla Shire Council will manage construction noise and vibration during the construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline. The CNVMP has been developed to ensure the requirements of the Development Consent and associated environmental documentation requirements are achieved to ensure the successful delivery of the initial sections of the Storage Access Road and Storage Inlet Pipeline.

This CNVMP is only applicable to the pre-construction and construction phase of the initial sections of the Storage Access Road and Storage Inlet Pipeline and does not include the management of other elements of the Storage Site construction and operational noise and vibration. There will be no blasting activities during the component of works covered by this CNVMP and it is therefore excluded from this CNVMP. Should blasting activities be required they will be subject to a separate Blasting Management Plan.

The key components covered in this CNVMP include:

- identification of background noise levels and construction noise and vibration management criteria
- evaluation and assessment of potential noise and vibration impacts on receptors
- description of environmental management controls to mitigate potential noise and vibration impacts on receptors
- procedures for monitoring and auditing of noise and vibration impacts against noise and vibration goals
- procedures for the management of complaints and non-compliance.

1.4 Objectives

The objectives of the CNVMP are to:

- minimise unreasonable noise and vibration impacts on receptors.
- avoid structural damage to buildings as a result of construction vibration.
- comply with relevant construction noise and vibration management levels as described in Chapter 5.
- undertake active community consultation and maintain positive working relationships.

2 Legislative and Regulatory Requirements

Eurobodalla Shire Council have an obligation to ensure that construction work complies with all relevant regulatory requirements and guidelines. All site employees and construction personnel will be made aware of environmental regulations and best industry practices as part of an environmental induction process and construction management system. The relevant legislation, policies and approvals are identified in the following sections.

2.1 Relevant legislation

2.1.1 Environmental Planning and Assessment Act 1979.

The Environmental Planning and Assessment Act 1979 (EP&A Act) is the overarching environmental planning and assessment legislation for the proper management, development and conservation of the State's natural and built environment. Part 3A of the EP&A Act provides an assessment and approval process for State Significant Development (SSD). The Project is declared to be an SSD because it triggers the criteria in Clause 21 of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP), as it is development for the purpose of water storage that has a capital investment value of more than $30 million.

2.1.2 Protection of the Environment Operations Act 1997.

The *Protection of the Environment Operations Act 1997* (POEO Act) details offences and penalties for a range of environmental aspects, including noise, and sets out the duty to notify the Environment Protection Authority (EPA) of any actual or potential environmental harm. The Act also details scheduled activities that require an Environment Protection Licence (EPL).

2.2 Guidelines and standards

This CNVMP has been prepared in accordance with the following standards and guidelines:

- *Noise Policy for Industry* (NPI) (EPA,2017)
- *Road Noise Policy* (RNP) (DECCW, 2011)
- *Interim Construction Noise Guideline* (ICNG) (DECC, 2009).
- *Assessing Vibration: A technical guideline* (AVATG) (DEC, 2006)
- *Standards Australia AS1055-1997™ (AS1055) - Description and Measurement of Environmental Noise, Parts 1, 2 and 3*
- *Standards Australia AS IEC 61672.1-2004™ (AS61672) - Electro Acoustics - Sound Level Meters Specifications*
- *Standards Australia AS 2436-2010™ (AS2436) - Guide To Noise And Vibration Control On Construction, Demolition And Maintenance Sites*

2.3 Development consent

This CNVMP has been developed to address Conditions B31 to B35 of the Development Consent for SSD 7089 dated 17 October 2020. These conditions are presented in Table 1-1.

3 Project Description

3.1 All Project works

The Project was granted Development Consent from the Department of Planning, Industry and Environment (DPIE) on 17 October 2019. The conditions that are associated with noise are provided in Table 1-1.

The Project consists of an off-stream water storage facility and associated ancillary facilities. Raw water would be extracted from the Tuross River using a new river intake pump station and an existing borefield for transfer to the new water storage facility.

Water would be pumped from the Tuross River to the water storage facility in accordance with the Water Sharing Plan for the Tuross River Unregulated and Alluvial Water Sources 2016 (Tuross River WSP). The Tuross River WSP defines the total daily extraction limit (TDEL) of water from the Tuross River and permits a maximum amount of water that can be taken from the Tuross River depending on current flow conditions. Water would be stored in the storage facility to supplement the existing water supply network during periods of drought. The proposed water storage facility would supplement peak summer demands and provide sufficient water storage to allow the system to provide a secure yield and comply with the requirements of the Tuross River WSP. As water would be selectively withdrawn from the Tuross River depending on flow conditions, environmental stress on the Tuross River system would be minimised.

Key features of the proposed water storage facility:

- 3,000 megalitre storage capacity
- a 370 metre long embankment, 39 metres in height and a crest width of 20 metres located on an unnamed tributary of the Tuross River
- a spillway
- permanent erosion control structures located downstream of the spillway
- inlet works to convey and dissipate raw water transferred from the river intake pump station through a pipeline constructed along the left abutment to the proposed water storage facility
- outlet works to allow transfer of water from the storage to the existing southern water treatment plant (WTP)
- instrumentation to monitor seepage, reservoir levels and water quality
- a consequence category of “High C” for both flood and sunny day scenarios in accordance with the Australian National Committee on Large Dams (ANCOLD) Guidelines on the consequence categories of dams (2012)
- a thermal stratification control system
- a boat ramp at the storage for maintenance and water quality monitoring
- safety and perimeter fencing at the storage.

Key features of the ancillary facilities include:

- new river intake pump station with a total river extraction capacity made up of a combination of flows from the river intake (up to 26 megalitres) and the borefield (up to six megalitres)
- installation of the following new pipelines:
  - a pipeline with a capacity of 26 megalitres per day to transfer raw water from the new river intake pump station to the storage inlet chute
  - a cross connection to the proposed water storage inlet pipeline with a capacity of six megalitres per day providing connection to supply water from the storage to the balance tank at the existing WTP
  - a pipeline connection from the existing borefield pipeline to the river intake pump station.
- a new storage access road that is about one kilometre in length and extends from Eurobodalla Road opposite the existing WTP to the embankment crest
- basic right-turn and basic left-turn treatment at the intersection of the new storage access road and Eurobodalla Road would be provided
- a new access road that would provide a route for vehicles to access the new river intake pump station
- power supply including the construction of new sub-stations located near the storage and the river intake pump station.

3.2 Construction activities covered under this CEMP

This CNVMP relates only to the early works construction activities for the Project specified below. Separate management sub-plans would be prepared and submitted for approval for subsequent construction stages of the Project.

The early works construction activities covered by this CEMP are shown in Figure 3-1and include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

3.2.1 General description of early works construction activities covered under this CEMP

3.2.1.1 Storage Access Road

This CEMP covers only the construction of the Storage Access Road to the forestry property boundary. This will allow the initial section of the Storage Access Road to be constructed, prior to the storage site clearing activities as the latter are bound by timing conditions specified in the Environmental Impact Statement (EIS) and Development Consent. The extent of the Storage Access Road construction covered by this CEMP is shown in Figure 3-2.

The Storage Access Road is required to provide vehicular access to Storage Site. The design of the Storage Access Road and intersection with Eurobodalla Rd has been developed based on the requirements of the following design standards (in order of precedence):

- Eurobodalla Shire Council Infrastructure Design Standard
- RMS Supplement to Austroads
- Austroads Design Guidelines.

The Storage Access Road would have a design and posted speed of 40 km/h. Its maximum longitudinal grade would be 12.5%, with a maximum 3% crossfall. The width of the Storage Access Road would be 6.5 meters sealed, comprising two, 3.25 metre sealed lanes, plus a 0.75 metre unsealed shoulder. The pavement treatment proposed for the Storage Access Road and shoulder widenings consists of a thin wearing course over a granular base. A temporary pavement would be provided during construction to suit construction vehicle loading.

The construction works for the Storage Access Road have an impact on existing surface stormwater flow along the side of the existing, steep embankment. To alleviate this, new stormwater drainage infrastructure is to be installed under the Storage Access Road to follow the existing valleys along the embankment. Swales along the high side of the Storage Access Road would capture stormwater from the upper catchments created by the new works. The swales are typically trapezoidal, 0.6 metres deep and 4.2 metres wide with a base width of 0.5 metres. The drainage pipes under the Storage Access Road are typically 450 millimetre diameter Reinforced Concrete Pipe (RCP) with headwall outlets and either headwall or grated pit inlets.

3.2.1.2 Intersections upgrades

This CEMP covers the upgrades required for the Eurobodalla Road and Storage Access Road / TRIPS site intersection. This intersection upgrade is required to facilitate safe access and egress to both the TRIPS and Storage sites. The extents of these intersection upgrades are shown in Figure 3-3.

As per the recommendations of the Stony Creek 2 Off Stream Facility Transport Report (Masson Willson Twiney, 2007), a BAL/BAR intersection treatment would be provided at the intersection of the Storage Access Road/ TRIPS site with Eurobodalla Road and would be designed per the geometry requirements of Austroads Guide to Road Design Part 4 and 4A.

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 3-1

FIGURE TITLE Extent of Pipeline Construction covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
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DATE 30/10/2020

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 3-2

FIGURE TITLE Extent of Storage Access Road covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
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DATE 30/10/2020

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 3-3

FIGURE TITLE Eurobodalla Road Intersection Upgrades

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

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3.2.1.3 Storage inlet pipeline

This CEMP covers only the construction of the Storage Inlet Pipeline from the limits of the TRIPS construction contract, which is on the Tuross River side of Eurobodalla Road, to the forestry property boundary. This will allow the initial section of the Storage Inlet Pipeline to be constructed, prior clearing of the storage site as the latter is bound by specific timing conditions specified in the EIS and Development Consent.

The Storage Inlet Pipeline will transfer water from the TRIPS to the inlet chute for the storage. The design flow for the pipeline is 0.3 cubic metres per second (26 ML/d), which is the capacity of the TRIPS when all three pumps are in operation. The Storage Inlet Pipeline is proposed to be a two-way pipeline and is therefore designed to deliver flows from the storage outlet chamber to the existing water treatment plant balance tank, via the Storage Inlet Flow Meter Pit on the western verge of Eurobodalla Road. The Storage Inlet Pipeline is designed as an OD710 PE PN16 pipeline with an internal diameter of approximately 577.6 millimetres. The design velocity during maximum flow (0.3 cubic metres per second) is approximately 1.14 metres per second.

Where the Storage Inlet Pipeline crosses Eurobodalla Road, the pipeline would be constructed using trenchless construction techniques. Due to the proximity of services on the western verge of Eurobodalla Road, micro-tunnelling is proposed and as such the pipe diameter reduces to OD630 PE PN16 (ID512.6 millimetres) and will be constructed within a DN825 RC Class 4 enveloper pipe. Alternative trenchless methodologies (e.g., Horizontal Directional Drilling) would also be feasible in this location, depending on the Contractor's preference. The depth to the invert of the pipeline at the road crossing is approximately 2.8 metres to allow for the potential future lowering of Eurobodalla Road.

The alignment of the pipeline between Eurobodalla Road and the Storage Inlet Chute, is generally within the road shoulder of the Storage Access Road. The pipeline will typically be in cut with the exception of where the road alignment crosses natural gullies. At these locations, the pipeline alignment has been designed to provide adequate side support to the pipeline.

Figure 3-4 Extent of pipeline construction covered under this CEMP

4 Existing environment

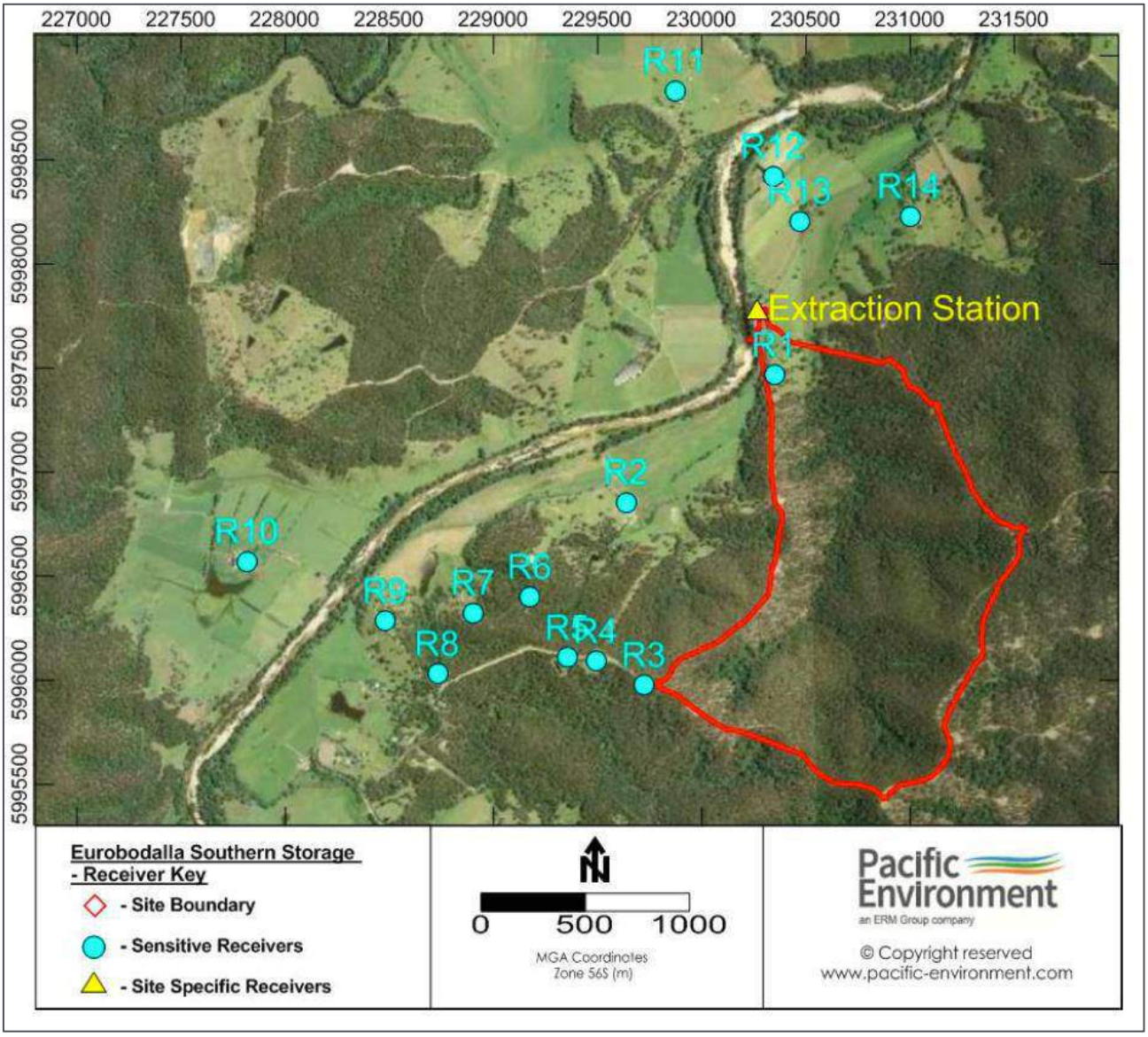
4.1 Sensitive receivers

The nearest sensitive receivers are located to the west and north of the proposal. The closest residence is located approximately 440 metres to the west of the proposal. The receivers are summarised in Table 2-1 and presented in Figure 2-1.

Table 4-1: Nearest sensitive receivers

Receiver ID	Address	Receiver type	Approximate closest distance to site boundary (metre)
1[1]	644 Eurobodalla Road	Residence	Within boundary
2	758 Eurobodalla Road	Residence	700
3	198 Waincourt Road	Residence	60
4	168 Waincourt Road	Residence	310
5	156 Waincourt Road	Residence	450
6	818-820 Eurobodalla Road	Residence	740
7	818-820 Eurobodalla Road	Residence	940
8	97 Waincourt Road	Residence	1050
9	93 Waincourt Road	Residence	1340
10	51-53 Nerrigundah Mountain Road	Residence	2050
11	350 Comerang Forest Road	Residence	1120
12	585 Eurobodalla Road	Residence	640
13	586 Eurobodalla Road	Residence	450
14	530 Eurobodalla Road	Residence	820

1. This receiver is likely to be acquired over the course of the proposal, and has been included in the EIS assessment for comparative purposes.
2. This receiver is a commercial land use but also appears to comprise of a residential dwelling, and has therefore been treated as a residence in the EIS assessment.



1. This figure has been extracted from the Eurobodalla Southern Storage Water Supply Noise Impact Assessment report prepared by Pacific Environment in 3 November 2017.

Figure 4-1 Sensitive receiver locations

4.2 Acoustic environment

The existing acoustic environment was characterised by review of historical monitoring and short term (attended) noise measurements. The proposal is located in a rural noise amenity area. The primary activities which dominate the local noise environment are local traffic on Eurobodalla Road, farming activities and seasonal cicada noise.

According to the EIS *Eurobodalla Southern Storage Water Supply Noise Impact Assessment* (NIA) prepared by Pacific Environment, the rating background noise levels (RBL) are expected to be low (30 dB(A) or below) and therefore the NIA adopted minimum RBLs of 35 dB(A) and 30 dB(A) were adopted for the noise assessment for the daytime/evening and night-time periods respectively in accordance with AS1055:1 *Acoustics – Description Environmental Noise Part 3*.

5 Construction Noise and Vibration Criteria

5.1 Construction noise

Construction noise in New South Wales is assessed using the NSW EPA's *Interim Construction Noise Guideline* (ICNG). The ICNG is also defined as the relevant guideline for construction noise and vibration by the development consent issued by DPIE.

The ICNG aims to manage noise from construction works regulated by the EPA. It is also intended to provide guidance to other interested parties in the management of construction noise, and has therefore been adopted for this construction noise assessment.

The ICNG prescribes $L_{Aeq,15min}$ Noise Management Levels (NML) for sensitive receivers as part of a quantitative construction noise assessment. Where the predicted or measured construction noise level exceeds these management levels, then all feasible and reasonable work practices should be implemented to reduce construction noise, and community consultation regarding construction noise is required to be undertaken.

5.1.1 Standard hours of construction

The ICNG recommended standard hours of construction are as follow:

- Monday to Friday, 7 am to 6 pm
- Saturday, 8 am to 1 pm
- No work on Sundays or Public Holidays.

To encourage work during the Standard Hours of Construction, and to reflect the lower impact of work at these times, the ICNG prescribes less stringent Standard Hours NMLs. The construction hours described in Condition B31 of the development consent aligns with the ICNG Standard Hours.

It should be noted that the Standard Hours of Construction are only applicable to residential (or similar) land uses. At educational or commercial land uses, where evening amenity and sleeping is not a concern, the impact of construction noise is assessed based on the times that the land use operates.

5.1.2 Residential land uses

The daytime standard work hours NMLs prescribed for residential land uses by the ICNG are presented in Table 5-1. The ICNG out of hours NMLs would not be applicable to this project as Condition B32 states that construction work outside of the hours identified in Condition B31 may only be undertaken in the following circumstances:

- works that are inaudible at the nearest sensitive receivers
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm
- where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works.

5.1.3 Other sensitive land uses

The ICNG also prescribes NMLs for other sensitive land uses, including educational buildings and offices. The NMLs for other non-residential sensitive land uses are summarised in Table 5-2 and apply only when those land uses are in used.

For those receivers where an internal NML applies, it is common to assume an outdoor-to-indoor noise reduction of 10 dB(A). This is based on a standard educational building facade with windows partially opened.

As there no other sensitive land uses in close proximity to the project, the NMLs for other non-residential sensitive land uses would not be applicable to the project. These NMLs have been presented in this CNVMP for completeness.

Table 5-1: Noise management levels for residential land uses

Time of day	NML, $L_{Aeq, 15min}$	Application notes
Recommended Standard Hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected: RBL + 10 dB(A)	May be some community reaction to noise. • Where the predicted or measured construction noise level exceeds the noise affected level, all feasible and reasonable work practices should be applied to meet the noise affected level. • All residents potentially impacted by the works should be informed of the nature of the works, the expected noise levels and duration, and provided with site contact details.
	Highly noise affected: 75 dB(A)	May be strong community reaction to noise. • Where construction noise is predicted or measured to be above this level, the relevant authority may require respite periods that restrict the hours that the very noisy activities can occur. • Respite activities would be determined considering times identified by the community when they are less sensitive to noise, and if the community is prepared to accept a longer period of construction to accommodate respite periods.
Outside recommended Standard Hours	Noise affected: RBL + 5 dB(A)	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the affected noise level. • Where all feasible and reasonable practices have been applied and noise is more than RBL + 5 dB(A) above the affected noise level, the proponent should negotiate with the affected community.

Table 5-2: Noise management levels for other sensitive land uses

Land use	**NML $L_{Aeq,15min}$ (applies when property in used)**
Classrooms at schools and other educational institutions	Internal noise level of 45 dB
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation).	External noise level of 60 dB
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion).	External noise level of 65 dB
Offices, retail outlets	External noise level of 70 dB

5.1.4 Project specific noise management levels

The project shall be constructed with the aim of achieving the construction noise management levels detailed in Table 5-3 which summarises the NMLs applicable to sensitive land uses around the site during the construction phase. The NMLs are based on the assumed background noise levels as presented in the NIA.

Table 5-3: Project Specific Noise Management Levels

Land use	NML $L_{Aeq,15min}$ for time period, dB(A)		
	Standard Hours	Outside of Standard Hours	
	Day	Day/Evening	Evening/Night
Residential land uses	45 75 (Highly noise affected)	40 75 (Highly noise affected)	35 75 (Highly noise affected)

5.2 Road traffic noise

The principle guidance for assessing the impact of road traffic noise associated with the construction of the project on surrounding residential receivers is in the NSW EPA's *Road Noise Policy* (RNP).

It is anticipated that road trucks will deliver all equipment and material. The vehicle movement route would generally be limited to Eurobodalla Road and Bullockys Hut Road prior to accessing the new Storage Access Road.

The project shall be constructed with the aim of achieving the construction road traffic noise goals as detailed in Table 5-4.

Table 5-4 presents the road noise assessment criteria for these road categories and are reproduced from Table 3 of the RNP. It should be noted that such criteria apply to permanent situations and is therefore conservative for the temporary nature of the construction activities proposed as part of the project. Further assessment is typically conducted where existing noise levels are increased by more than 2 dB due to the construction related traffic.

Table 5-4: Road traffic noise criteria for residential land uses

Road category	Type of project/development	Noise criteria, dB(A)	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq,1\ hour}$ 55 (external)	$L_{Aeq,1\ hour}$ 50 (external)

5.3 Construction vibration

Ground vibration generated by construction can have a range of effects on buildings and building occupants. The main effects are generally classified as:

- human disturbance – disturbance to building occupants: vibration which inconveniences or interferes with the activities of the occupants or users of the building
- effects on building structures – vibration which may compromise the condition of the building structure itself.

In general, vibration criteria for human disturbance are more stringent than vibration criteria for effects on buildings. Building occupants will normally feel vibration readily at levels well below those which may cause a risk of cosmetic or structural damage to a structure. However, it may not always be practical to achieve the human comfort criteria. Furthermore, unnecessary restriction of construction activities can prolong construction works longer than necessary, potentially resulting in other undesirable effects for the local community.

Construction vibration criteria have been adopted from the following sources:

- Cosmetic and structural damage to buildings: German Standard DIN 4150-3, 1999, *Structural Vibration – Part 3: Effects of vibration on structures*
- Human comfort: Assessing Vibration – A Technical Guideline (the Vibration Guideline)

The project shall be constructed with the aim of achieving the construction vibration goals as detailed in Sections 5.3.1 and 5.3.2.

5.3.1 Cosmetic and structural damage

DIN 4150-3 summarises structural and cosmetic damage assessment criteria for different types of buildings, which are presented in Table 5-5, which are widely used for the assessment of construction vibration effects on buildings in Australia. The criteria are specified as Peak Particle Velocity (PPV) levels measured in any direction at or adjacent to the building foundation.

Table 5-5: DIN 4150-3 vibration cosmetic and structural damage criteria

Structure type	Peak Particle Velocity (PPV), mm/s			
	Foundation of structure			Vibration at horizontal plane of highest floor at all frequencies
	<10 Hz	10-50 Hz	50-100 Hz	
Buildings used for commercial, industrial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwelling and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in rows 1 and 2, and are of great intrinsic value (e.g. heritage-listed buildings)	3	3 to 8	8 to 10	8

DIN 4150-3 states that exposing buildings to vibration levels higher than that recommended would not necessarily result in damage. Rather, it recommends these values as maximum levels of short-term construction vibration at which experience has shown damage reducing the serviceability of structures will not occur due to vibration effects.

DIN 4150-3 is considered to be suitable for the assessment of both structural and cosmetic damage as it considers a reduction in serviceability of the structure is deemed to have occurred if:

- cracks form in plastered surfaces of walls
- existing cracks in the building are enlarged
- partitions become detached from loadbearing walls or floors.

5.3.2 Human comfort

The ICNG recommends that vibration from construction works be assessed under *Assessing Vibration – a technical guideline* (the Vibration Guideline).

The vibration assessment criteria defined in the Vibration Guideline are for human comfort and represent goals that, where predicted or measured to be exceeded, require the application of all feasible and reasonable mitigation

measures. Where the maximum value cannot be feasibly and reasonably achieved, the operator would need to negotiate directly with the affected community.

The Vibration Guideline defines vibration assessment criteria for continuous, impulsive and intermittent vibration. Vibration can be classified according to the following definitions:

- Continuous vibration: continues uninterrupted for a defined period. Applies to continuous construction activity such as tunnel boring machinery.
- Impulsive vibration: rapid build-up to a vibration peak followed by a damped decay or the sudden application of several cycles of vibration at approximately the same magnitude providing that the duration is short. Applies to very occasional construction activities that create distinct events such as the occasional dropping of heavy equipment.
- Intermittent vibration: interrupted periods of continuous vibration (such as a drill) or repeated periods of impulsive vibration (such as a jack hammer).

The majority of construction activities as part of the proposed works would be expected to be continuous or intermittent in nature.

Table 5-6 presents the management levels for continuous and impulsive vibration at different land uses. The management levels specified are as overall unweighted RMS vibration velocity levels. The Vibration Guideline specifies the management levels as suitable for vibration sources predominantly in the frequency range 8-80 Hz as would be expected for construction vibration.

For intermittent vibration, the Vibration Dose Value (VDV) is used as the metric for assessment as it accounts for the duration of the source, which will occur intermittently over the assessment period. The VDV management levels at different land uses for intermittent vibration sources are presented in Table 5-7.

Table 5-6: Vibration velocity management levels for continuous and impulsive vibration

Land use	Continuous vibration – RMS vibration velocity, mm/s		Impulsive vibration – RMS vibration velocity, mm/s	
	Preferred	**Maximum**	**Preferred**	**Maximum**
Critical areas[1]	0.1	0.2	0.1	0.2
Residences and hospital wards – daytime[2]	0.2	0.4	6.0	12.0
Residences and hospital wards – night time[3]	0.14	0.28	2.0	4.0
Offices, schools	0.4	0.8	13.0	26.0
Workshops	0.8	1.6	13.0	26.0

1. Critical operating areas include hospital operating theatres and precision laboratories where sensitive operations are occurring.
2. Daytime is defined by the Vibration Guideline to be 7 am to 10 pm.
3. Night time is defined by the Vibration Guideline to be 10 pm to 7 am.

Table 5-7: VDV management levels for intermittent vibration

Land use	VDV – intermittent vibration, m/s1.75	
	Preferred	**Maximum**
Critical areas[1]	0.1	0.2
Residences and hospital wards – daytime[2]	0.2	0.4
Residences and hospital wards – night time[3]	0.13	0.26
Offices, schools	0.4	0.8
Workshops	0.8	1.6

1. Critical operating areas include precision laboratories where sensitive operations are occurring.
2. Daytime is defined by the Vibration Guideline to be 7 am to 10 pm.
3. Night time is defined by the Vibration Guideline to be 10 pm to 7 am.

5.3.3 Safe working distances

Safe working distances for typical vibration inducing equipment are listed in Table 5-8 below.

Table 5-8: Examples of safe working distances for typical vibration intensive plant

Plant Item	Rating/Description	Safe Working Distance – Cosmetic Damage	Safe Working Distance – Human Comfort
Vibratory roller	< 50 kN (Typically 1-2 tonnes)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4 tonnes)	6 m	20 m
	< 200 kN (Typically 4-6 tonnes)	12 m	40 m
	< 300 kN (Typically 7-13 tonnes)	15 m	100 m
	> 300 kN (Typically 13-18 tonnes)	20 m	100 m
	> 300 kN (> 18 tonnes)	25 m	100 m
Small hydraulic hammer	(300 kg – 5 to 12 t excavator)	2 m	7 m
Medium hydraulic hammer	(900 kg – 12to 18 t excavator)	7 m	23 m
Large hydraulic hammer	(1,600 kg – 18 to 34 t excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 to 20 m	20 m
Pile boring	≤800 mm	2 m	N/A
Jackhammer	Hand held	1 m (nominal)	Avoid contact with structure

6 Construction Methodology

This section provides an overview of the project construction methodology as relevant to this CNVMP and presents:

- an overview of the required work components
- a list of potential noise and vibration generating activities
- a summary of the approved hours of work
- the proposed construction schedule.

This CNVMP relates only to the construction activities detailed in Section 3-2.

6.1 Construction plant and equipment

A list of likely plant and equipment for each construction scenario is provided in Table 6-1. The plant and equipment in the list are considered to be representative of a worst-case period of construction in an active works area.

All plant and equipment used throughout the works should have an operating sound power level less than or equal to those in Table 6-1. These sound power levels have been extracted from the NIA.

Table 6-1: Construction plant and equipment maximum sound level

Plant and equipment item	Sound power level – dB(A)
Excavator	110
Roller	103
Moxies	108
Watercart	107
Dozer	114
Light vehicle	98
Piling rig[1]	115
Truck	104
Mulcher	115
Compressor	103
Generator	103
Concrete truck	103
Concrete pump	103
Concrete mixer	105
Crane	104
Grader	107
Shotcrete	106
Sheet piling[1]	116
Pipe jacking	98

Plant and equipment item	Sound power level – dB(A)
Concrete batching	113
Drilling rig	110

1. A 5 dB(A) penalty for annoying characteristic has been applied.

6.2 Construction program and period

Subject to approval of this CNVMP, it is expected that the early works construction activities covered under this CNVMP would commence in late 2021 to early 2022 and would take approximately nine months to complete.

Unless approval has been obtained from the Secretary, construction, upgrading and decommissioning activities on site can only be undertaken between the following hours:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturdays
- At no time on Sundays and NSW public holidays.

7 Construction Noise and Vibration Assessment

Construction noise and vibration impacts, as well as road traffic noise impacts associated with the construction of the project have been assessed in the NIA. The following sections provides a summary of the noise and vibration impact assessments presented in the NIA report.

7.1 Construction noise

Based on the construction noise assessment undertaken in the NIA, the project's construction noise levels have been assessed to satisfy the recommended NML at most receiver locations during ICNG standard hours. The exception to this are R1, R2, R12, R13 and R14, where exceedances of the recommended day standard hours NML have been assessed. As all construction activities, except for deliveries of oversized materials and equipment, would be carried out during ICNG standard hours, construction noise impact assessment outside of ICNG standard hours has not been conducted.

The assessment of NML compliance at some receivers and exceedances at others is not an uncommon finding for construction projects, which implies that feasible and reasonable mitigation practices should be considered and applied.

Further, given that the predictions assume simultaneous operation of plant and equipment at the nearest locations to the relevant sensitive receptors, it is likely that actual construction noise levels would be less than those predicted.

Notwithstanding, noise mitigation measures and application of good practice noise management have been considered. Noise mitigation and management measures are discussed in Chapter 8 of this plan.

7.2 Construction vibration

Based on the construction vibration assessment undertaken in the NIA, construction vibration impact is unlikely to occur throughout the construction of the project as vibration intensive plant are not expected to be working within 100 m of any residential property.

Given the distances between the development footprint and the items of local heritage significance listed above greatly exceed the minimum safe working distance for cosmetic damage and human comfort, the assessment predicts no vibration impacts will occur throughout the construction of the project. Notwithstanding, the plan provides safe working distances inside of which management measures are triggered. A complaints management procedure is also provided which would include those relating to construction vibration.

7.3 Road traffic noise during construction

Based on the road traffic noise assessment undertaken in the NIA, road traffic noise levels during construction works are predicted to be below the relevant criteria at all of the affected residential dwellings along the construction route of Eurobodalla Road and Bullockys Hut Road.

8 Environmental Management

This chapter outlines noise and vibration management measures that will be implemented as part of the construction works, including consultation and complaint handling procedures.

It may not be feasible to adopt all management measures at all times during construction, and identification of all reasonable and feasible mitigation methods will be conducted by the site supervisor and/or environmental representative on a regular basis during noisy works near sensitive land uses.

In relation to the implementation of mitigation measures, feasibility addresses engineering consideration regarding what is practical to build. Reasonableness relates to the application of judgment in arriving at a decision, considering the following factors:

- work hours
- noise reduction achieved
- number of people or other uses benefited
- cost of the measure
- delay to schedule and whether the measure will prolong exposure to noise
- community views
- pre-construction noise levels at receivers.

While the management measures presented will not necessarily result in mitigating all noise impacts at all times, they are expected to reduce impacts to levels most stakeholders should find acceptable considering the anticipated benefits of the completed project as a whole.

8.1 Controls

The controls to be implemented during the construction of the project are provided in Table 8-1. Appendix A provides further detail with respect to timing and responsibility for each control, as well as monitoring and reporting requirements.

Table 8-1: Environmental management controls

Control ref #	Environmental management controls
NV1	All potentially affected residences as identified in Figure 4-1 will be informed by letterbox drop of the construction works including working hours to be adhered to, and the level and duration of noise to expect during construction.
NV2	All potentially affected residences as identified in Figure 4-1 will be kept informed of any significant changes to construction activities or if out of hours of work is required.
NV3	Any complaints received related to noise or vibration will be dealt with in accordance with Chapter 10.
NV4	All site personnel will be instructed during a general induction as to their responsibilities in minimising noise and adhering to the noise minimisation measures.
NV5	Equipment operators are to report any faulty equipment to the Construction Contractor Site Supervisor.
NV6	Works will be undertaken during the hours of: a) 7:00am to 6:00pm Mondays to Fridays; b) 8:00am to 1:00pm Saturdays; and c) at no time on Sundays and public holidays. Any works outside of these hours shall be governed by the approved Out of Hours Work Protocol.

Control ref #	Environmental management controls
NV7	Activities resulting in impulsive or tonal noise emission (such as rock breaking, pile driving) shall only be undertaken: a) 7:00am to 6:00pm Mondays to Fridays; b) 8:00am to 1:00pm Saturdays; c) at no time on Sundays and public holidays; and d) 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.
NV8	In the case of an activity that requires work to be undertaken outside the specified hours, written approval must be sought from the Secretary. Any request to alter the hours of construction shall be: a) considered on a case-by-case basis; b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours and any other information necessary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site; and c) commenced only affected residential receivers are informed of the timing and duration of work approved under this condition at least 48 hours before that work commences.
NV9	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the levels detailed in Table 6-1.
NV10	Vibration intensive activities should not be located closer to sensitive receptors than the safe working distances allowable, where possible.
NV11	Construction equipment will be fitted with adequate noise and vibration control equipment where possible. Measures include earth moving equipment fitted with residential class mufflers, and acoustic enclosures for any diesel generators and/or air compressors.
NV12	Any equipment not in use for extended periods during construction work will be switched off.
NV13	All vehicles and equipment will be regularly serviced, as per manufactures instructions and maintained in proper working order.
NV14	Ensure deliveries are within the standard hours of works.
NV15	Simultaneous operation of noisy plant will be avoided wherever practicable.
NV16	Wherever practicable, noisy equipment will be: a) Positioned behind structures that act as barriers to identified receptors b) Positioned at the greatest distance from identified receptors c) Oriented to directed noise emissions away from identified receptors
NV17	“Quiet” practices will be employed wherever practicable when operating equipment
NV18	Any noise construction activities will be completed in the shortest time possible.
NV19	There will be no swearing or unnecessary shouting or loud stereos/radios on site.
NV20	There will be no dropping of materials from heights, throwing of metal items, or slamming of doors.

8.2 Roles and responsibilities

The overarching CEMP provides details of the roles and responsibilities relevant to this CNVMP and all sub-plans. The roles and responsibilities relevant for only the CNVMP are provided below in Table 8-2 and are consistent with the overarching CEMP.

Table 8-2: Roles and responsibilities

Role	Responsibilities
Project Manager	• Overall implementation of the Construction Noise and Vibration Management Plan • Authorise and confirm the implementation of mitigation measures
Construction Project Manager	• Implement methodology for avoiding excessive noise emissions • Coordinate monitoring and compile reports • Maintain internal records of monitoring • Collate and maintain records of complaints, respond to complainant • Identify Non-Conformances • Review and update the Noise Management Plan as required
Environmental Representative	• Undertake audits to ensure implementation of the CNVMP • Communication with EPA, as required

8.3 Training and awareness

All Project personnel, subcontractors, consultants and visitors will receive inductions into the Project's and the Construction Contractor's environmental obligations prior to commencing on site. All environmental inductions will be conducted as part of the site's Health and Safety Environmental Management System (HSEMS). Project induction and training will fall under the following categories:

- general project induction
- visitor induction
- job specific environmental training.

Information specific to construction noise and vibration will be included in the general project induction and will include:

- all relevant project specific and standard noise and vibration mitigation measures;
- relevant licence and approval conditions;
- permissible hours of work;
- location of nearest receptors;
- designated loading/unloading areas and procedures;
- site opening/closing times (including deliveries); and
- environmental incident and complaint procedures.

All inductions will be recorded in the training register held by the Construction Contractor.

8.4 Community and stakeholder consultation

Prior to implementation of this CNVMP and commencement of construction, this document will have been reviewed by the DPIE and approved by the Secretary or his nominee prior to commencement of construction.

At least 14 days prior to construction, all potentially affected residences will be informed by letterbox drop and/or email of the construction works including working hours to be adhered to, and the level and duration of noise to expect during construction. They will also be informed if there are any changes to construction activities and timing, including out of hours work.

9 Monitoring and Reporting

9.1 Monitoring and reporting schedule

Monitoring will be undertaken through regular inspections and may be undertaken by a variety of personnel including the Construction Contractor, Eurobodalla Shire Council's environmental representative and third-party environmental inspectors. It is the Construction Contractor Project Manager that is responsible for ensuring the scheduled monitoring is undertaken in accordance with this CNVMP. The inspectors will be required to report compliance to the CNVMP to the Eurobodalla Shire Council's Project Manager, in the form of checklists. These checklists are provided as an appendix to the overarching CEMP.

The Project Construction Contractor will include a summary of the results of the daily and weekly inspections, results of the attended noise monitoring, and summary any complaints to the overall weekly and monthly environmental reporting as per the EPC Contract. More information on the weekly reporting requirements for the project as a whole is provided in the overarching CEMP.

The following sections provide details specific to attended noise monitoring which is part of the monitoring program for this CNVMP.

9.1.1 Attended noise monitoring procedure

The measurements will be conducted in accordance with the procedures outlines in Australian Standard AS 1055 *Acoustics – Description and measurement of environmental noise* and in accordance with methods outlined in the NPI. The following points should be followed when conducting noise monitoring:

- a field calibration should be conducted before and after measurements;
- the sound level meters must be set to an A-weighting and Fast settings;
- the sound level meters sample period should be set to 15 minutes;
- the following descriptors should be measured as a minimum: L_{A1}, L_{Aeq} and L_{A90}; and
- measurements should be conducted a minimum of 3 metres from the nearest facade and/or solid fence/wall. If it is not possible to do this, corrections for facade reflection should be applied to the measurement results.

9.1.2 Monitoring of equipment procedure

In addition to the residential noise monitoring procedures described above, the following equipment measurements will be undertaken:

- Noise emission levels of all critical items of mobile plant and equipment will be checked for compliance by the site environmental officer for compliance with noise limits appropriate to those items prior to the equipment going into regular service
- for equipment and mobile plant used for construction works, L_{Aeq} measurements will be taken at an appropriate distance, normally 7 m and converted to a Sound Power Level
- an *Equipment Noise Certificate*, presenting relevant sound levels of the equipment tested, will be issued by the Construction Contractor's site environmental officer within the first week of the equipment commencing at the construction site.

The equipment sound power levels will be compared to the levels contained in Table 6-1. If noise checks on any equipment result in a prediction of non-compliance, noise mitigation strategies to achieve compliance will be developed.

9.1.3 Equipment

All acoustic instrumentation employed throughout the monitoring programme will comply with the requirements of AS IEC 61672.1-2004 Electroacoustics - Sound level meters – Specifications. All sound level meters must have current calibration certificate from a NATA accredited laboratory in accordance with NATA guidelines. Instrument calibration shall be checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dB.

9.1.4 Attended noise monitoring schedule for construction

Table 9-1 below provides a preliminary monitoring schedule for construction.

Table 9-1: Construction noise monitoring schedule

Monitoring schedule	Action	Reporting
During first month of construction	Complete one round of operator-attended 15 minute noise monitoring on separate days at site boundaries and closest residences Carry out equipment noise level checks on all critical items of plant and issue Equipment Noise Certificates	Reporting as detailed in Section 9.1.5 to be included in monthly report.
During subsequent months of construction period	Carry out equipment noise level checks on any new (untested) items of critical plant and issue Equipment Noise Certificates	

9.1.5 Reporting on attended noise monitoring

The following information must be included in the weekly reports when applicable:

- field calibration results (before and after measurements)
- measurement times and dates
- qualitative description of the noise environment during the measurements
- L_{A1}, L_{Aeq} and L_{A90} levels
- meteorological conditions during the measurements
- estimation of or recorded noise contribution from other major noise sources.

The Construction Contractor Project Manager shall establish and maintain a system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances. The Construction Contractor Project Manager shall establish and maintain procedures for the collection, indexing, filing, storage and maintenance of the records.

9.2 Auditing

The Independent Environmental Representative will undertake monthly audits to ensure compliance to the CNVMP. This will involve checking the regular weekly and monthly checklists have been completed and evaluation of compliance with the CNVMP. This includes analysis of the attended noise measurements against noise management objectives in Chapter 5.

The Independent Environmental Representative will report the outcomes of the audit to the Eurobodalla Shire Council's Project Manager.

Any external auditing is to be undertaken in accordance with the Compliance Tracking Program.

9.3 Non-compliance and corrective action

Non-compliances identified through the daily and weekly inspections should be responded to with a corrective action. This is the responsibility of the Construction Contractor Project Manager. Corrective actions should be documented in the inspection checklist.

If a non-compliance has been identified during monthly audits that has not been corrected, the Independent Environmental Representative will issue a non-conformance notification to the Eurobodalla Shire Council's Project Manager. The Eurobodalla Shire Council's Project Manager will issue a request for corrective action to the Construction Contractor Project Manager who will action the request as appropriate and provide updates on progress in addressing the issue at contractor meetings or as requested by the Eurobodalla Shire Council's Project Manager.

The Construction Contractor Project Manager is responsible for the initial reporting of significant non-compliances with this CNVMP or relevant legislation to the Eurobodalla Shire Council's Project Manager. The Eurobodalla Shire Council's

Senior Programme Manager will report such events to the relevant statutory authorities in accordance with legislative requirements.

10 Complaints Management

In the event of an environment-related complaint from the community regarding noise, the Independent Environmental Representative will notify the Eurobodalla Shire Council's Project Manager. The Eurobodalla Shire Council's Project Manager may issue a request for corrective action to the Construction Contractor Project Manager who will action the request as appropriate. A response should be provided to the complainant within 24 hours. Corrective actions may involve supplementary monitoring to identify any non-compliances, and/or may involve modification of construction or operational techniques to avoid any recurrence or minimise impacts. Complaints will be managed on an individual basis. Corrective actions which do not adversely impact the construction programme will be implemented as a priority.

Responses and actions to manage the complaint will be documented through Eurobodalla Shire Council's Incident Management process.

When a complaint is made, the Independent Environmental Representative will complete an Environmental Incident Report Form to record details of the occurrence and actions taken. Where applicable, completed forms should detail the following:

- the date and time of the complaint
- the method by which the complaint was made
- any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect
- the nature of the complaint
- description of noise source that is the subject of complaint, duration of event
- location of complainant during time of incident, and general area in which the noise source was located
- identification of project related noise activities and locations that could have or are known to have contributed to the incident
- if known, identification of non-project related noise emission activities and location at time of incident;
- meteorological conditions at the time of the incident
- the action taken in relation to the complaint
- any follow-up contact with the complainant
- if no action was taken, the reason why no action was taken.

All records are to be kept in a legible form, or in a form that can readily be reduced to a legible form and kept for at least 4 years after the complaint or event to which they relate took place. A complaints register should also be kept up to date with details of any complaints.

The Independent Environmental Representative will make available a report on complaints received to the relevant Government Agencies upon request. A summary will be included in the monthly environmental report.

11 CNVMP Review

This CNVMP is a living document which should be revised and updated as necessary throughout the construction phase of the Project and in accordance with the Development Consent requirements.

At a minimum it shall be reviewed by the Construction Contractor Project Manager on a monthly basis and if necessary revised.

The review should assess all relevant information to the CNVMP including but not limited to:

- historical monitoring data;
- changes in land use; and
- incidents related to noise emission exceedance and complaints.

The CNVMP would need to be modified to reflect any variation in monitoring frequency or variation in the monitoring procedure (for example, to take account of a new noise issue being introduced to site).

The CNVMP should be viewed as a live document and updated as necessary, noting that revision of the CNVMP may result in the monitoring regime increasing or decreasing.

All revisions of this document will be prepared in consultation with Eurobodalla Shire Council and relevant regulatory authorities, and are to be approved by Eurobodalla Shire Council's Project Manager. For each revision, the Quality Information table at the beginning of this document should be updated.

All personnel indicated in Table 8-2 should be made aware of revisions to the CEMP, and regulatory authorities notified where relevant.

Appendix A Summary of Environmental Controls

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
NV1	All potentially affected residences as identified in Section 4.1 will be informed by letterbox drop of the construction works including working hours to be adhered to, and the level and duration of noise to expect during construction.	At least 14 days prior to construction	Eurobodalla Shire Council's Environment Manager	Letterbox drop is recorded in the environmental consultation log.	Two weeks prior to construction	N/A – notify Eurobodalla Shire Council's Environment Manager and Project Manager	Construction Contractor Project Manager
NV2	All potentially affected residences as identified in Section 4.1 will be kept informed of any significant changes to construction activities or if out of hours of work is required.	As required	Eurobodalla Shire Council's Environment Manager	Environmental consultation log is maintained and kept up-to-date.	Weekly inspection	Weekly checklist	Construction Contractor Project Manager
NV3	Any complaints received related to noise or vibration will be dealt with in accordance with Section 10.	Construction	Eurobodalla Shire Council's Project Manager	Record of complaints, investigations and responses in Environmental Incidents Reports and complaints register.	Weekly inspection	Weekly checklist	Construction Contractor Project Manager
NV4	All site personnel will be instructed during a general induction as to their responsibilities in minimising noise and adhering to the noise minimisation measures.	Construction	Construction Contractor Project Manager	Records of inductions in training register.	Weekly inspection	Weekly checklist	Construction Contractor Project Manager
NV5	Equipment operators are to be report any faulty equipment to Construction Contractor Site Supervisor.	Construction	Construction Contractor Site Supervisor	Records of faulty equipment in vehicle	Monthly inspection	Weekly checklist	Construction Contractor Project Manager

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
				maintenance register.			
NV6	Works will be undertaken during the hours of: a) 7:00am to 6:00pm Mondays to Fridays; b) 8:00am to 1:00pm Saturdays; and c) at no time on Sundays and public holidays, unless prior approval received from DPIE and works are carried out in accordance with the Out of Hours Work Protocol identified within the CEMP.	Construction	Construction Contractor Site Supervisor	No work is undertaken outside allowed hours.	Daily inspection	Daily checklist	Construction Contractor Project Manager
NV7	Activities resulting in impulsive or tonal noise emission (such as rock breaking, pile driving) shall only be undertaken: a) 7:00am to 6:00pm Mondays to Fridays; b) 8:00am to 1:00pm Saturdays; c) at no time on Sundays and public holidays; and d) 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.	Construction	Construction Contractor Site Supervisor	No activities resulting in impulsive or tonal noise emission is undertaken outside allowed hours.	Daily inspection	Daily checklist	Construction Contractor Project Manager
NV8	In the case of an activity that requires work to be undertaken outside the specified hours, written approval must be sought from the Secretary. Any request to alter the hours of construction shall be:	Prior to varied hours of construction	Construction Contractor Site Supervisor	Written approval from the Secretary is obtained.	Weekly inspection	Weekly checklist	Construction Contractor Project Manager

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
	a) considered on a case-by-case basis; b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours and any other information necessary to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of receptors in the vicinity of the site; and c) commenced only affected residential receivers are informed of the timing and duration of work approved under this condition at least 48 hours before that work commences.						
NV9	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the levels in Table 6-1.	Construction	Construction Contractor Project Manager	Attended noise measurements as per Section 9.	As per noise monitoring schedule in Section 9.	Monthly report	Construction Contractor Project Manager
NV10	Vibration intensive activities should not be located closer to sensitive receptors than the safe working distances presented in Table 5-8.	Construction	Construction Contractor Site Supervisor	Vibration intensive activities are not located closer to sensitive receptors than the safe working distances presented in Table 5-8.	Daily inspection	Daily checklist	Construction Contractor Project Manager

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
NV11	Construction equipment will be fitted with adequate noise and vibration control equipment where possible. Measures include earth moving equipment fitted with residential class mufflers, and acoustic enclosures for any diesel generators and/or air compressors.	Construction	Construction Contractor Project Manager	Construction equipment fitted with noise and vibration control equipment where possible.	Monthly inspection	Monthly checklist	Construction Contractor Project Manager
NV12	Any equipment not in use for extended periods during construction work will be switched off.	Construction	Construction Contractor Site Supervisor	No equipment is left running without active use for more than 15 minutes.	Daily inspection	Daily checklist	Construction Contractor Project Manager
NV13	All vehicles and equipment will be regularly serviced, as per manufactures instructions and maintained in proper working order.	Construction	Construction Contractor Project Manager	Vehicles maintained in accordance with manufacturers requirements. Records of equipment maintenance logged in vehicle maintenance registers.	Monthly inspection	Weekly checklist	Construction Contractor Project Manager
NV14	Ensure deliveries are within the standard hours of works	Construction	Construction Contractor Project Manager	No deliveries occur outside standard hours of works.	Daily inspection	Daily checklist	Construction Contractor Project Manager

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
NV15	Simultaneous operation of noisy plant will be avoided wherever practicable.	Construction	Construction Contractor Site Supervisor	Attended noise measurements as per Section 9.	As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager
NV16	Wherever practicable, noisy equipment will be: a) Positioned behind structures that act as barriers to identified receptors b) Positioned at the greatest distance from identified receptors c) Oriented to directed noise emissions away from identified receptors	Construction	Construction Contractor Site Supervisor	Attended noise measurements as per Section 9 to confirm all measures to reduce noise emissions are effective and noise management levels are not exceeded.	As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager
NV17	"Quiet" practices will be employed wherever practicable when operating equipment.	Construction	Construction Contractor Site Supervisor		As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager
NV18	Any noise construction activities will be completed in the shortest time possible.	Construction	Construction Contractor Site Supervisor		As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager
NV19	There will be no swearing or unnecessary shouting or loud stereos/radios on site.	Construction	Construction Contractor Site Supervisor		As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager
NV20	There will be no dropping of materials from heights, throwing of metal items, or slamming of doors.	Construction	Construction Contractor Site Supervisor		As per noise monitoring schedule in Section 9.	Monthly in the weekly report as applicable.	Construction Contractor Project Manager

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Appendix F Air Quality Management Plan

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AIR QUALITY

Air Quality Management Plan

Eurobodalla Southern Water Supply Storage Early Works: Access Road and Pipeline to Property Boundary

Reference No. 30012835
Prepared for Eurobodalla Shire Council
12 October 2021

SMEC INTERNAL REF. 30012835

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1 Introduction

1.1 Purpose

This Air Quality Management Sub Plan (AQMP) forms part of the Construction Environmental Management Plan (CEMP) for the construction of an initial sections of the Storage Access Road and Storage Inlet Pipeline (to the extent shown in Figure 1-1) for the Eurobodalla Southern Water Supply Storage (the Project). This AQMP and related Construction Environmental Management Plan (CEMP) relate only to the activities to be undertaken for the component of the project outlined in this document.

The purpose of this AQMP is to describe how Eurobodalla Shire Council is to manage potential impacts to air quality that may result during construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline for the Project.

The purpose of this AQMP is to meet the requirements as stipulated in Condition B25, B26 and B27 of Part B of the Development Consent (SSD-7089) and item 12 of Appendix 2 of the Development Consent (SSD 7089) for the Project. Further details of the objectives relating to consent conditions are contained in Section 1.3.

1.2 Development consent conditions relating to air quality

Table 1-1 outlines the Development Consent conditions that are relevant to management of air quality impacts associated with the construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline for the Project.

Table 1-1 Development Consent Conditions – Air Quality

Condition	Requirements
B25, Dust minimisation	The Applicant must take all reasonable steps to minimise dust generated during all works authorised by this consent
B26, Dust minimisation	During construction, the Applicant must ensure that: (a) unsealed roads used for truck access and exposed surfaces and stockpiles within the construction area are regularly watered to suppress dust; (b) all trucks entering or leaving the site with loads have their loads covered; (c) trucks associated with the development do not track dirt onto the public road network; (d) public roads used by these trucks are kept clean; and (e) measures are implemented to minimise dust from exposed surfaces following vegetation clearing and until transfer of storage water to the WTP.
B27, Air quality discharges	The Applicant must install and operate equipment in line with best practice to ensure that the development complies with all load limits, air quality criteria/air emission limits and air quality monitoring requirements as specified in the EPL applicable to the site.
Appendix 2, item 1.2	The CEMP would include a number of sub plans identified in the safeguards and management measures and include: • Air quality management plan
Appendix 2, item 12.1	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager
Appendix 2, item 12.2	A Dust Management Plan will be prepared and implemented as part of the CEMP. The DMP will include, but not be limited to: • potential sources of air pollution and dust • air quality management objectives consistent with any relevant published EPA and/or OEH guidelines

Condition	Requirements
	• mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces.
Appendix 2, item 12.3	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.

1.3 Objectives

The objectives of this AQMP, that incorporates the requirements for a 'Dust Management Plan' (referenced at Appendix 2, item 12.2), are to ensure that air quality impacts, particularly dust generation that may result from the construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline are minimised. To achieve this objective, Eurobodalla Shire Council are to:

- implement appropriate controls and procedures during construction activities to address potential air quality impacts
- implement appropriate measures to address the requirements of the relevant mitigation measures that are outlined in the CEMP, the Environmental Impact Statement (EIS), Response to Submissions Report, Development Consent and all relevant guidelines, policies and specifications
- implement appropriate measures to comply with all relevant legislation and other requirements as described in this AQMP.

1.4 Targets

The following targets have been established for the management of air quality impacts during the construction of the initial sections of the Storage Access Road and Storage Inlet Pipeline:

- achieve full compliance with relevant legislative requirements and the conditions of consent
- undertake appropriate consultation with impacted residents and businesses and stakeholders
- minimise impacts on, and complaints from, the community and stakeholders.

To achieve the above objectives and targets, the following Key Performance Indicators (KPIs) have also been proposed for the management of air quality matters during construction of the Storage Access Road and Storage Inlet Pipeline as outlined in Table 1-2.

Table 1-2 Proposed Key Performance Indicators (KPIs) associated with the management of air quality

Measure	Target	Timeframe	Responsibility	Documentation
Meeting development consent conditions regarding air quality	Compliance with conditions	At all times	Site supervisor	Environmental inspection checklist Construction Compliance Report
Complaints regarding air quality	Zero complaints Any complaints would be investigated (see Section 6.4)	At all times	Site supervisor	Complaints register
Visible dust emissions	Any emissions of visible dust investigated immediately. Review controls applied and increase controls or modify activities	At all times	Site supervisor	Environmental inspection checklist Site supervisor's daily checklist

Measure	Target	Timeframe	Responsibility	Documentation
Spillage or track-out onto public roads	Any spillage or track-out on public roads to be cleaned immediately	At all times	Site supervisor	Environmental inspection checklist Site supervisor's daily checklist

1.5 Relevant legislation, guidelines, policies and standards

Provided below are the key relevant legislation, guidelines and other relevant documentation as they relate to air quality impacts during construction of the Project.

1.5.1 Legislation

Legislation relevant to the management of air quality for the Project includes:

- *Environmental Planning and Assessment Act 1979 (EP&A Act)*
- *Protection of the Environment Operations Act, 1997 (POEO Act)*
- *Protection of the Environment Operations (Clean Air) Regulation 2010 (POEO (Clean Air) Regulation 2010).*

1.5.2 Guidelines

Guidelines and other documentation relevant to the management of air quality for the Project includes:

- NSW EPA Local Government Air Quality Toolkit – Air Quality Guidance Note – Construction sites (NSW EPA, 2017)
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA, 2017)
- Guidance on the assessment of dust from demolition and construction (IAQM, 2014).

1.6 Approvals, licences, permits and requirements

1.6.1 POEO (Clean Air) Regulation

The Protection of the Environment Operations (POEO) (Clean Air) Regulation (2010) sets standards of concentration for emissions to air from both scheduled and non-scheduled activities, as defined through the POEO Act. For the activities performed at the Project site, the POEO (Clean Air) Regulation provides general standards of concentration of pollutants for non-scheduled premises which are presented in Table 1-3.

Table 1-3 POEO (Clean Air) Regulation – General standards of concentration

Air impurity	Activity	Standard of Concentration (Group C)[1]
Solid particles	Any activity or plant	100 $mg \cdot m^{-3}$
Smoke	Any activity or plant in connection with which liquid or gaseous fuel is burnt	Ringlemann 1 or 20 % opacity $mg \cdot m^{-3}$

Note: (1) Group C – pursuant to application made on or after 1 September 2005

Further to the requirements in Table 1-3 Part 4 Clause 15 of the POEO (Clean Air) Regulation requires that motor vehicles do not emit excessive air impurities which may be visible for a period of more than 10-seconds when determined in accordance with the relevant standard.

All vehicles, plant and equipment to be used either at the Project site or to transport materials to and from the Project site will be maintained regularly and in accordance with manufacturers' requirements, where these vehicles are under the operational control of the proponent.

1.6.2 NSW EPA Standards

The NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA, 2017) lists the statutory methods that are to be used to assess emissions of criteria air pollutants from stationary sources in NSW, and Section 7.1 of the Approved Methods outlines the assessment criteria for the Project. The criteria listed in the Approved

Methods are derived from a range of sources (including National Health and Medical Research Council (NHMRC), National Environment Protection Council (NEPC), Department of Environment (DoE), World Health Organisation (WHO), and Australian and New Zealand Environment and Conservation Council (ANZECC). Where relevant to this AQMP, the criteria have been adopted as set out in Section 7.1 of NSW EPA (NSW EPA, 2017) which are presented in Table 1-4 below.

Table 1-4 NSW EPA air quality standards and goals

Pollutant	Averaging period	Units	Criterion
Particulates (as PM_{10})	24 hours	$\mu g \cdot m^{-3}$	50
	1 year	$\mu g \cdot m^{-3}$	25
Particulates (as $PM_{2.5}$)	24 hours	$\mu g \cdot m^{-3}$	25
	1 year	$\mu g \cdot m^{-3}$	8
Particulates (as TSP)	1 year	$\mu g \cdot m^{-3}$	90
Particulates (as dust deposition)	1-year(a)	$g \cdot m^{-2} \cdot month^{-1}$	2
	1-year(b)	$g \cdot m^{-2} \cdot month^{-1}$	4

Notes: **(a):** Maximum increase in deposited dust level

(b): Maximum total deposited dust level

2 Project description

2.1 General description of early works construction activities covered under this AQMP

This AQMP relates only to some of the early works construction activities for the Project. These construction activities are described below. A separate AQMP would be prepared and submitted for approval for subsequent construction stages of the Project.

The early works construction activities covered by this AQMP are shown in Figure 2-1 and include:

- construction of the Storage Access Road, from Eurobodalla Road to the forestry boundary
- intersection upgrades required to facilitate access and egress from the Storage Access Road to Eurobodalla Road
- construction of the Storage Inlet Pipeline from the limit of the Tuross River Intake Pump Station (TRIPS) construction contract, which is on the Tuross River side of Eurobodalla Road to the forestry boundary.

2.1.1 Storage Access Road

The Storage Access Road and access tracks are required to provide vehicular access to the outlet valve pit, dam crest and boat ramp. The design of the Storage Access Road and intersection with Eurobodalla Rd has been developed based on the requirements of the following design standards (in order of precedence):

- Eurobodalla Shire Council Infrastructure Design Standard
- RMS Supplement to Austroads
- Austroads Design Guidelines.

This AQMP covers only the construction of the Storage Access Road to the forestry property boundary. This will allow the initial section of the Storage Access Road to be constructed, prior to the storage site clearing activities as the latter are bound by specific timing conditions specified in the EIS and Development Consent. The extent of Storage Access Road construction covered by this AQMP is shown in Figure 2-2.

The Storage Access Road would have a design and posted speed of 40 kilometres per hour ($km \cdot h^{-1}$). Its maximum longitudinal grade is 12.5 percent (%), with a maximum 3 % crossfall. The Storage Access Road width would be 6.5 metres (m) sealed, consisting of 2, 3.25 m sealed lanes, with a 0.75 m unsealed shoulder. The pavement treatment proposed for the Storage Access Road and shoulder widenings consists of a thin wearing course over a granular base. A temporary pavement would be provided during construction to suit construction vehicle loading.

The construction works for the Storage Access Road have an impact on the existing surface stormwater flow along the side of the existing, steep embankment. To alleviate this, new stormwater drainage infrastructure is to be installed under the Storage Access Road to follow the existing valleys along the embankment. Swales along the high side of the Storage Access Road would capture stormwater from the upper catchments created by the new works. The swales are typically trapezoidal in cross section, 0.6 m deep and 4.2 m wide with a base width of 0.5 m. The drainage pipes under the Storage Access Road are typically 450 mm diameter Reinforced Concrete Pipe (RCP) with headwall outlets and either headwall or grated pit inlets.

2.1.2 Intersections upgrades

This AQMP covers the upgrades required for the Eurobodalla Road intersection to facilitate access/egress to both the TRIPS and Storage sites. The extents of these intersection upgrades are shown in Figure 2-3.

As per the recommendations of the Stony Creek 2 Off Stream Facility Transport Report (Masson Willson Twiney, 2007), a BAL/BAR intersection treatment is provided at the intersection of the Storage Access Road/ TRIPS site with Eurobodalla Road and is designed per the geometry requirements of Austroads Guide to Road Design Part 4 and 4A.

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 2-1

FIGURE TITLE Extent of Pipeline Construction covered under this AQMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
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DATE 30/10/2020

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Metres
1:2,500

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COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 2-2

FIGURE TITLE Extent of Storage Access Road covered under this AQMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
Member of the Surbana Jurong Group

DATE 30/10/2020

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Metres
1:2,500

PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 2-3

FIGURE TITLE Eurobodalla Road Intersection Upgrades

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
Member of the Surbana Jurong Group

Location: \\AUSYFSV003\Group\projects\30012835 - Eurobodalla Southern Storage\160 GIS\Maps\CEMP\30012835_CEMP_F001_3_RoadIntUpg.mxd

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2.1.3 Storage inlet pipeline

This AQMP covers only the construction of the storage inlet pipeline from the limits of the TRIPS construction, which is on the Tuross River side of Eurobodalla Road, to the forestry property boundary. This will allow the initial section of the storage inlet pipeline to be constructed, prior to the storage site clearing activities as the latter are bound by specific timing conditions specified in the EIS and Development Consent. The extent of storage inlet pipeline construction covered by this AQMP is shown in Figure 2-4.

The storage inlet pipeline will transfer water from the TRIPS to the inlet chute for the storage. The design flow for the pipeline is 0.3 cubic metres per second ($m^3 \cdot s^{-1}$) which is approximately 26 megalitres per day ($ML \cdot d^{-1}$), which is the capacity of the TRIPS when all three pumps are in operation. The inlet pipeline is proposed to be a two-way pipeline and is therefore designed to deliver flows from the storage outlet chamber to the existing wastewater treatment plant balance tank, via the Storage Inlet Flow Meter Pit on the western verge of Eurobodalla Road. The pipeline is designed as an OD710 PE PN16 pipeline with an internal diameter of approximately 577.6 mm. The design velocity during maximum flow (0.3 $m^3 \cdot s^{-1}$) is approximately 1.14 metres per second ($m \cdot s^{-1}$).

Where the pipeline crosses Eurobodalla Road, the pipeline would be constructed using trenchless construction techniques. Due to the proximity of services on the western verge of Eurobodalla Road, micro-tunnelling is proposed and as such the pipe diameter reduces to OD630 PE PN16 (ID512.6 mm) and will be constructed within a DN825 RC Class 4 enveloper pipe. Alternative trenchless methodologies (e.g., Horizontal Directional Drilling) would also be feasible in this location, depending on the Contractor's preference. The depth to the invert of the pipeline at the road crossing is approximately 2.8 m to allow for the potential future lowering of Eurobodalla Rd.

The alignment of the pipeline between Eurobodalla Road and the Storage Inlet Chute, is generally within the road shoulder of the Storage Access Road. The pipeline will typically be in cut with the exception of where the road alignment crosses natural gullies. At these locations, the pipeline alignment has been designed to provide adequate side support to the pipeline.

DATE 30/10/2020

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Metres
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PAGE SIZE A4

COORDINATE SYSTEM GDA 1994 MGA Zone 56

FIG NO. 2-4

FIGURE TITLE Extent of Pipeline Construction covered under this AQMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Access Road and Pipeline CEMP

CREATED BY FA13847

SOURCES : Roadnet MDS 2019, Nearmap 20200312

SMEC
Member of the Surbana Jurong Group

Location: \\AUSYFSV003\Group\projects\30012835 - Eurobodalla Southern Storage\160 GIS\Maps\CEMP\30012835_CEMP_F001_4_ExtPipeline.mxd

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3 Existing environment

3.1 Sensitive receptor locations

To ensure that the selection of discrete receptors for the AQMP are reflective of the locations in which the population of the area surrounding the Project site reside, population-density data has been examined. Population-density data based on the 2016 census, have been obtained from the Australian Bureau of Statistics (ABS) for a 1 square kilometre (km^2) grid, covering mainland Australia (ABS, 2017).

For clarity, the ABS use the following categories to analyse population density (persons·km^{-2}):

- very high (>8 000)
- high (>5 000)
- medium (>2 000)
- low (>500)
- very low (<500)
- no population (0).

The Project site and receptors are located in an area of 'very low' population density (<500 persons·km^{-2}), which would be expected given the largely rural activities of the immediate area (refer Figure 3-1). It was found that 12 identified sensitive receptors are located within a radius of 3 km relative to the Project site as illustrated in Figure 3-1.

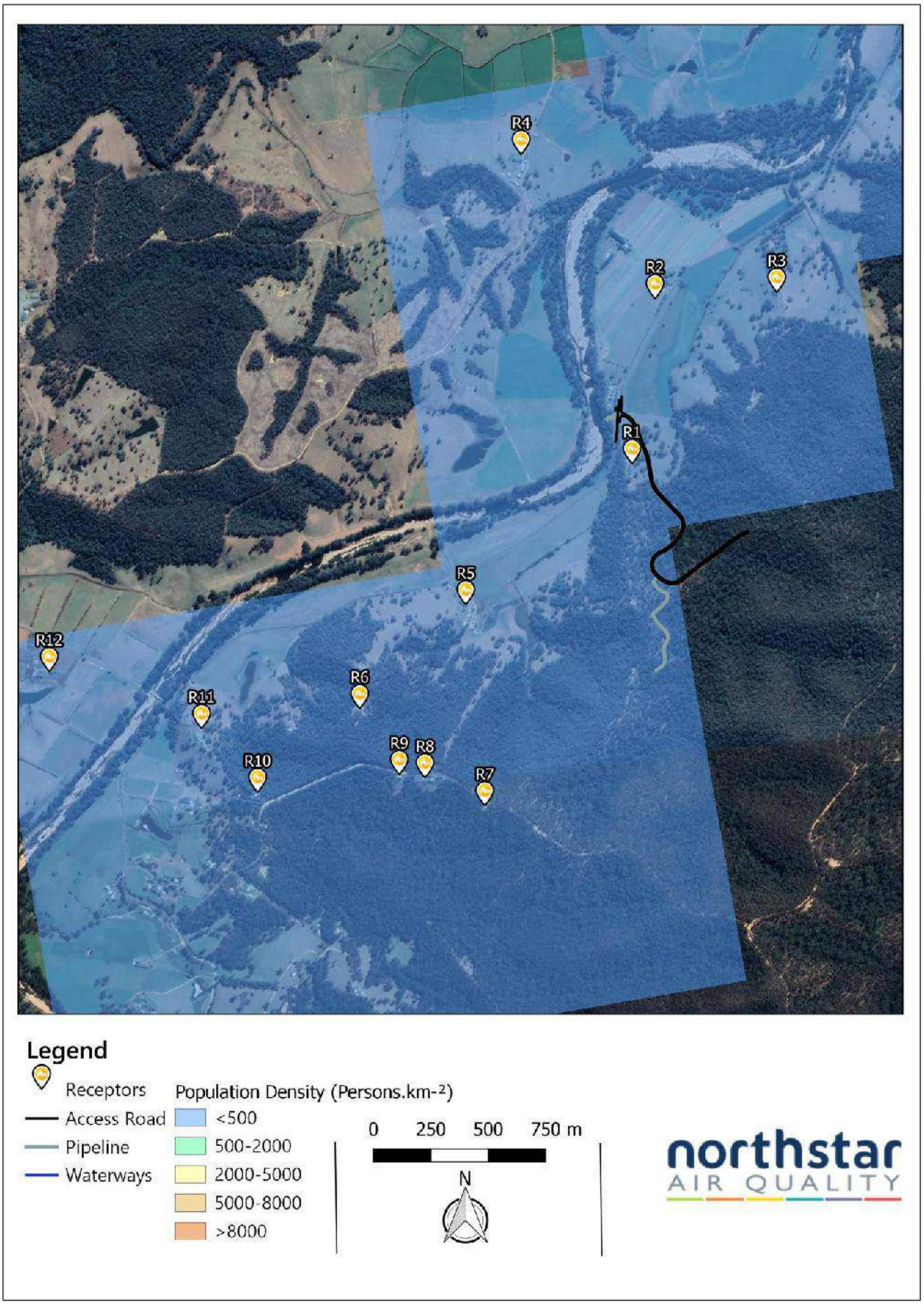
In accordance with the requirements of the NSW EPA, several receptors have been identified and the receptors adopted for use within this AQMP are presented in Table 3-1.

Table 3-1 is not intended to represent a definitive list of sensitive land uses, but a cross section of available locations, that are used to characterise larger areas, or selected as they represent more sensitive locations, which may represent people who are more susceptible to changes in air pollution.

Table 3-1 Receptor locations

Receptor ID	Location	Land Use	Location (UTM)	
			mE	mS
R1	644 Eurobodalla Road, Bodalla	Residential	230 350	5 997 469
R2	585 Eurobodalla Road, Bodalla	Residential	230 450	5 998 188
R3	530 Eurobodalla Road, Bodalla	Residential	230 981	5 998 216
R4	350 Comerang Forest Road, Bodalla	Residential	229 868	5 998 817
R5	758 Eurobodalla Road, Eurobodalla	Residential	229 626	5 996 854
R6	818-820 Eurobodalla Road, Eurobodalla	Residential	229 164	5 996 402
R7	198 Waincourt Road, Eurobodalla	Residential	229 710	5 995 979
R8	168 Waincourt Road, Eurobodalla	Residential	229 449	5 996 100
R9	156 Waincourt Road, Eurobodalla	Residential	229 337	5 996 114
R10	97 Waincourt Road, Eurobodalla	Residential	228 720	5 996 037
R11	93 Waincourt Road, Eurobodalla	Residential	228 475	5 996 315
R12	51-53 Nerrigundah Mountain Road, Eurobodalla	Residential	227 813	5 996 564

Figure 3-1 Locations of sensitive receptors



3.2 Meteorology

The meteorology experienced within an area, can govern the generation (in the case of wind-dependent emission sources), dispersion, transport and eventual fate of pollutants in the atmosphere. Meteorological observations are made by the Australian Government Bureau of Meteorology (BoM) at a number of locations surrounding the Project site. Data is collected on varying timescales (e.g. one minute, hourly, daily and monthly) and to appropriately characterise the varying wind conditions at the Project site, the closest automatic weather station (AWS) collecting wind speed and direction data on an hourly basis has been identified as Montague Island Lighthouse AWS and Moruya Airport AWS. Although Montague Island Lighthouse is shown to be the closest AWS station to the Project site, it is located on a small island off the mainland where the meteorological conditions may not accurately represent the conditions at the Project site due to significant differences in terrain and surrounding environment. Therefore, measurements taken from Moruya Airport AWS have been adopted for the purposes of this AQMP.

Although air quality is affected by other meteorological variables such as rainfall and temperature, the primary parameters which may impact dust generation at the Project site would be wind speed, with the wind direction and wind speed determining the direction in which any generated particulate emissions may be transported, and how far that transportation may occur before the suspended material is deposited back to ground.

The location of the nearest AWS collecting data on appropriate timescales are provided in Table 3-2.

Table 3-2 Meteorological monitoring stations surrounding the Project site

Site Name	Source	Approximate location (UTM)		Approximate distance
		mE	mS	km
Montague Island Lighthouse	BoM	250 875	5 984 543	25
Moruya Airport AWS	BoM	242 198	6 023 326	28

Details associated with the prevailing meteorological conditions at Moruya Airport AWS between 2015 and 2019 is presented in Appendix A.

In summary, from 2015 to 2019 winds at Moruya Airport AWS show similar patterns across each of the years, with a predominant westerly wind component on each of the assessed years.

The majority of wind speeds experienced at Moruya Airport AWS over the 5-year period are generally in the range <0.5 $m \cdot s^{-1}$ to 5.5 $m \cdot s^{-1}$ with the highest wind speeds (i.e., greater than 8 $m \cdot s^{-1}$) occurring from a north-easterly direction. Winds of this speed are not frequent, occurring 2.3 % of the observed hours over the 5-year period. Calm winds (i.e. <0.5 $m \cdot s^{-1}$) occur during 8.7 % of hours on average across the 5-year period.

3.3 Background air quality

The air quality experienced at any location will be a result of emissions generated by natural and anthropogenic sources on a variety of scales (local, regional and global). The relative contributions of sources at each of these scales to the air quality at a location will vary based on a wide number of factors including the type, location, proximity and strength of the emission source(s), prevailing meteorology, land uses and other factors affecting the emission, dispersion and fate of those pollutants.

When assessing the impact of any particular source of emissions on the potential air quality at a location, the impact of all other sources of an individual pollutant, should also be assessed. These 'background' (sometimes called 'baseline') air quality conditions will vary depending on the pollutants to be assessed and can often be characterised by using representative air quality monitoring data.

As noted in the Air Quality Impact Assessment (AQIA) performed to support the Project (Pacific Environment, 2018) the Project site is located at a significant distance from any air quality monitoring stations (AQMS). The locations of the nearest AQMS are briefly summarised in Table 3-3.

Table 3-3 Closest AQMS to the Project site

AQMS location	Source	Approximate distance to Project site (km)	Measurements		
			PM_{10}	$PM_{2.5}$	TSP
Monash (ACT)	ACT Health	114	✓	✓	×
Albion Park South	DPIE	188	✓	✓	×
Kembla Grange	DPIE	200	✓	✓	×

The closest representative AQMS is noted to be located at Monash, ACT approximately 114 km northwest of the Project site and is operated by ACT Health. Notwithstanding the large distances between the Project site and the available AQMS, this is considered to be the monitoring location most reflective of the conditions of the Project site. The adoption of air quality monitoring data often collected at significant distances from proposed projects, to represent conditions at those locations is a routinely adopted approach in NSW.

Appendix B provides a discussion of the background air quality monitoring data collected at the Monash AQMS between 2015 and 2019.

In summary, infrequent exceedances of both PM_{10} and $PM_{2.5}$ were observed between 2015 and 2019 at Monash AQMS. However, in general particulate measurements were predominantly below the NSW EPA air quality criteria (refer Section 1.6.2). It should be noted that particulate levels across many AQMS in NSW in late 2019 showed measurements above the EPA criterion due to increased smoke levels from widespread bushfires and the measured exceedances at Monash AQMS were primarily observed during this period.

4 Air quality assessment

4.1 Assessment to support Development Approval

An AQIA was performed to support the Project (Pacific Environment, 2018) which identified the main activities associated with the construction of the Project, assessed the potential risks to surrounding sensitive receptors resulting from those activities, and identified a number of recommended measures which should be implemented during construction to minimise any identified risks.

Following submissions by Government agencies, and a response to those submissions, the Project was approved as described in Section 2.

4.2 Construction activities and impacts

The activities to be performed during the construction of the Storage Access Road and Storage Inlet Pipeline associated with the Project which may have the potential to generate emissions to air include:

- earthworks including clearing and grubbing, stripping and stockpiling of topsoil, and excavation
- movement of plant and equipment on the Project site and heavy vehicles on unpaved areas
- construction of Storage Access Road and Storage Inlet Pipeline.

No blasting or burning of vegetation is proposed as part of the activities to be performed under this AQMP.

The activities identified above have the potential to generate emissions of particulate matter (dust) and also gaseous emissions through the combustion of fuel in vehicles, plant and machinery.

Of the activities outlined above, emissions associated with earthworks and the movement of heavy vehicles on unpaved areas have the greatest potential to impact on local air quality, and it is these activities which are examined in detail in this AQMP. However, the controls outlined in this AQMP consider all sources of emissions (refer Section 5).

The risk assessment performed as part of the AQIA to support the Project identified that there would be the following levels of risk associated with air quality on nearby receptors, without any mitigation applied:

- Dust soiling impacts:
  - *medium risk* of dust soiling impacts during earthworks and construction activities
  - *low risk* of dust soiling impacts associated with trackout from the Project site.
- Human health impacts:
  - *high risk* of human health impacts during earthworks and construction activities
  - *medium risk* of human health impacts associated with trackout from the Project site.
- Impacts on ecological receptors:
  - *high risk* of impacts on ecological receptors during earthworks and construction activities, and associated with trackout from the Project site.

The air quality management and mitigation measures identified in the AQIA (Pacific Environment, 2018) of relevance to the construction of the Storage Access Road and Storage Inlet Pipeline, are presented in Section 5.

Should the management and mitigation measures identified in the AQIA be implemented, the AQIA concluded that overall construction dust would not be likely to represent a significant ongoing issue, and with that through the implementation of appropriate and effective mitigation and management measures, the resultant risks would be 'not significant'.

The management and mitigation measures outlined in this AQMP include methods previously identified in the AQIA, additional best practice management measures for dust control and a staff training induction. Key Performance Indicators have also been determined to measure the success of the mitigation methods provided in this AQMP.

5 Management measures

Environmental requirements and management measures relating to air quality impacts were identified in the AQIA and EIS, the Development Consent (SSD 7089) and other relevant documents as specified in this AQMP. Specific measures and requirements to address air quality impacts are provided in Table 5-1.

5.1 Key management strategies

The air quality management measures to be adopted during the construction of the Storage Access Road and Storage Inlet Pipeline have been identified to manage the potential air emissions from the most significant potential sources, as outlined in Section 4.2. Measures outlined in Table 5-1 have been identified through review of (Countess Environmental, 2006), (Katestone Environmental, 2011) and (US EPA, 2011) that provide guidance on best practice management methods for dust control which are generally accepted by NSW EPA. Management and mitigation measures as outlined in the AQIA have also been reviewed and included in this AQMP.

The measures outlined in Table 5-1 include categorisation based on whether they are a proactive or reactive measure, and whether the aim of the measure is to prevent, control, or minimise impacts associated with air pollutants.

5.2 Dust minimisation

As discussed in Section 4, the construction of the Storage Access Road and Storage Inlet Pipeline may potentially result in dust emissions, which may be particularly associated with earthworks and heavy vehicle movement on unpaved roads. Table 5-1 outlines a number of mitigation methods to reduce dust generation associated with the Project.

5.3 Air quality discharges

The air quality risks associated with the construction activities are primarily driven by dust emissions. However, gaseous emissions are also anticipated to be generated through the combustion of fuel in vehicles and equipment to be used at the Project site. To minimise air quality impacts arising from vehicle and plant exhaust emissions, all equipment will be operated and maintained in accordance with the requirements of the POEO Act and POEO (Clean Air) Regulation (refer Section 1.6.1).

5.4 Contingency measures

Key Performance Indicators (KPIs) have been previously outlined in Section 1.4, and the success of the AQMP will be determined through compliance with the KPIs. Should complaints be continued to be received, a campaign of particulate monitoring at the site boundary would be implemented for a period of three months to quantify those potential impacts. After a period of three months the particulate concentrations would be reviewed and the requirement for continuation (or otherwise) of that monitoring program determined.

5.5 Training

All personnel, including employees, contractors and sub-contractors, are required to complete an induction containing relevant environmental information before they are authorised to work on the Project.

Air quality specific information to be covered in the project induction will include:

- obligations under the Project Conditions of Approval (including the AQMP), including the identification of potential sources of air pollutants of concern and the mitigation measures to be implemented, including specific measures) during weather conditions where high levels of dust are probable (e.g. use of water and covering exposed areas to suppress dust propagation)
- responsibilities relating to the management of air quality under the POEO Act and POEO (Clean Air) Regulation 2010
- identification of typical construction activities that may impact air quality, responsibilities and associated environmental safeguards
- incident response procedures.

Table 5-1 Air quality revised environmental management measures

Control Measure ID	Environmental Safeguards	Responsibility	Timing
Communications			
AQ1 Proactive Prevent/minimise/control	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary.	Site Supervisor	Construction
AQ2 Proactive/reactive Prevent/minimise/control Note – this document	A Dust Management Plan will be prepared and implemented as part of the CEMP. The DMP will include, but not be limited to: • potential sources of air pollution and dust • air quality management objectives consistent with any relevant published EPA and/or OEH guidelines • mitigation and suppression measures to be implemented • methods to manage work during strong winds or other adverse weather conditions • a progressive rehabilitation strategy for exposed surfaces.	Eurobodalla Shire Council	Pre-construction
Site Management			
AQ3 Reactive Prevent/minimise/control	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Site Supervisor	Construction
AQ4 Reactive	Make the complaints log available to the local authority.	Site Supervisor	Construction
AQ5 Reactive Prevent/minimise/control	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Site Supervisor	Construction
Monitoring			

Control Measure ID	Environmental Safeguards	Responsibility	Timing
AQ6 Proactive Prevent/minimise/control	Carry out regular site inspections to monitor compliance with the AQMP, record inspection results, and make an inspection log available to the local authority.	Site Supervisor	Construction
AQ7 Proactive/reactive Prevent/minimise/control	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being out and during prolonged dry or windy conditions carried out and during prolonged dry or windy conditions.	Site Supervisor	Construction
AQ8 Proactive Prevent/minimise/control	Should ongoing complaints be received during construction works, agree PM_{10} monitoring locations with the local authority.	Site Supervisor	Construction
Preparing and Maintaining the Site			
AQ9 Proactive Prevent	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Site Supervisor	Pre-construction
AQ10 Proactive/reactive Prevent	Avoid site runoff of water which may expose areas to wind erosion.	Site Supervisor	Construction
AQ11 Proactive/reactive Prevent/minimise/control	Keep site fencing, barriers and scaffolding clean using wet methods.	Site Supervisor	Construction
AQ12 Proactive/reactive Prevent/minimise/control	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below (AQ13).	Site Supervisor	Construction

Control Measure ID	Environmental Safeguards	Responsibility	Timing
AQ13 Proactive Prevent	Cover, seed or fence stockpiles to prevent wind whipping.	Site Supervisor	Construction
Operating vehicle/machinery and suitable travel			
AQ14 Proactive Prevent	Ensure all on-road vehicles comply with their relevant standards and are maintained to the manufacturer's specifications.	Site Supervisor	Construction
AQ15 Proactive Minimise	Ensure all vehicles switch off engines when stationary to minimise engine idling emissions.	Site Supervisor	Construction
AQ16 Proactive Prevent	If possible, avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Site Supervisor	Construction
AQ17 Proactive/reactive Prevent/minimise/control	Impose and signpost a maximum-speed-limit of 40 $km \cdot h^{-1}$ on surfaced and unsurfaced haul roads and in work areas. Haul roads should be treated with water carts and monitored during earthworks operations, ceasing works if necessary, during excessive winds where dust controls are not effective (and as identified through AQ6 and AQ7).	Site Supervisor	Construction
AQ18 Proactive Prevent/minimise	Install speed bumps on unsurfaced haul roads to ensure vehicles comply with speed limits.	Site Supervisor	Construction
AQ319 Proactive Prevent/minimise	Install gravel apron at trackout egress points on unsurfaced haul roads 7.5 m long by the road width to minimise wind erosion and wheel generated dust emissions.	Site Supervisor	Construction

Control Measure ID	Environmental Safeguards	Responsibility	Timing
AQ20 Proactive/reactive Prevent/minimise	Maintain the temporary road pavement to ensure minimisation of silt loading.	Site Supervisor	Construction
AQ21 Proactive Minimise	Ensure larger vehicles are used where possible to reduce the number of trips required.	Site Supervisor	Construction
AQ22 Proactive Prevent/minimise	If required, apply chemical suppressants to the road surface to reduce wheel generated dust emissions.	Site Supervisor	Construction
Operations			
AQ23 Proactive Minimise	Where practicable, only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, if performed in enclosed spaces.	Site Supervisor	Construction
AQ24 Proactive Prevent/minimise/control	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Site Supervisor	Construction
AQ25 Proactive Prevent/minimise	Where possible, use enclosed chutes and conveyors and covered skips.	Site Supervisor	Construction
AQ26 Proactive/reactive Minimise/control	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Site Supervisor	Construction

Control Measure ID	Environmental Safeguards	Responsibility	Timing
AQ27 Proactive/reactive Control	Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	Site Supervisor	Construction
AQ28 Proactive Minimise/control	Develop a progressive rehabilitation strategy to re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces and reduce wind erosion as soon as practicable.	Site Supervisor	Construction/post construction
AQ29 Proactive Minimise	Only remove the cover in small areas during work and not all at once.	Site Supervisor	Construction
AQ30 Proactive/reactive Prevent/minimise/control	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Site Supervisor	Construction
AQ31 Proactive Prevent	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Site Supervisor	Construction
AQ32 Reactive Minimise/control	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use during periods of heavy traffic and/or inclement weather.	Site Supervisor	Construction
AQ33 Proactive Prevent	Avoid dry sweeping of large areas.	Site Supervisor	Construction
AQ34 Proactive	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Site Supervisor	Construction

Control Measure ID	Environmental Safeguards	Responsibility	Timing
Prevent/minimise			
AQ35 Proactive/reactive Prevent/minimise	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Site Supervisor	Construction
AQ36 Proactive Prevent/minimise/control	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Site Supervisor	Construction
AQ37 Proactive Prevent/minimise	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Site Supervisor	Construction
AQ38 Proactive Prevent/minimise	Access gates to be located at least 10 m from receptors where possible.	Site Supervisor	Pre-construction
AQ39 Proactive/reactive Minimise/control	Install a wind cone (red/white) to allow the direction and wind speed to be easily observed and quantified allowing modification of activities.	Site Supervisor	Construction
AQ40 Proactive Minimise	Minimise stockpile heights to reduce wind velocity over surfaces and wind erosion.	Site Supervisor	Construction

6 Compliance management

6.1 Roles and responsibilities

The roles and responsibilities of all project staff of relevance to the AQMP are listed in the CEMP.

6.2 Monitoring

Onsite monitoring will be conducted to confirm that the objectives and targets identified in Section 1 are maintained. A daily site inspection will be performed by the Site Supervisor to ensure that the measures outlined in Table 5-1 are being practiced and that all vehicles, plant and equipment are maintained and operated in accordance with manufacturers' requirements. Reference will be made to the KPIs (refer Section 1.4) in assessing the success of the management measures for controlling dust generation associated with the construction activities.

Construction of the Storage Access Road and Storage Inlet Pipeline is anticipated to be completed over a nine-month period. Auditing will be performed during the sixth month of construction by a suitably qualified, experienced and independent expert to assess the operational status of the measures identified in Table 5-1.6.2

6.3 Non-compliance, corrective and preventive action

Environmental inspection and observation results are interpreted to identify actual and potential non-conformances and events that may result in nuisance, environmental harm and unacceptable loss of amenity or community complaints. The Environmental Representative and/or a public authority may also raise a non-compliance or improvement notice.

Where non-compliances are identified during regular inspections, corrective actions are raised, tracked and closed out through the inspection records.

Following the identification of a non-compliance, corrective and/or preventative actions will be identified and assigned to the appropriate person with set timeframes. Timeframes will be set to ensure any damage incurred is rectified and any chance of recurrence is eliminated as soon as practicable. An appropriate register will be used to assign, track and close out corrective actions.

6.4 Complaints handling procedure

Eurobodalla Shire Council will operate a telephone complaint line during the operating hours of the development site during construction, with the number publicly notified via the Eurobodalla Shire Council website. All complaints must be investigated, and feedback will be provided to the petitioner or the pertinent agency in a timely manner.

For any complaint received relating to air quality impacts from the construction activities, the following measures will be taken:

- site Supervisor to review and follow up all the complaints regarding air quality within one business day of receiving the complaint
- fill out the appropriate complaint form, including location of complaint and noting the time and date of the complaint/s and the identity and contact details of the complainant (if agreed to provide them)
- perform a site inspection, noting all air emission generating activities taking place and the mitigation methods being used. If the complaint was related to an event in the recent past, if possible, note any activities that were underway at that time and initiate any remedial action necessary
- as soon as possible, visit the area from where the complaint originated to ascertain if the issue persists
- it is important to verify if other source(s) of air emissions other than the construction activities of the Project may be causing or contributing to the complaint and collect appropriate evidence of this (photos and/or videos as appropriate)
- once investigations have been completed, contact the complainant to explain any problems found and remedial actions taken
- if necessary, update any relevant procedures to prevent any recurrence of problems and record any remedial action taken.

6.5 Record keeping

The Site Supervisor will keep a record of any complaint made to the development site or any employee or any agent of the development in relation to air quality from the development site. A complaint register will be maintained and will be produced to any authorised officer of the EPA if requested. Records of individual complaints will include:

- date and time of complaint
- method by which the complaint was made
- personal details of the complainant (if provided)
- nature of the complaint
- the details of an initial response to the complaint
- action taken and any follow up actions
- if no action was taken, the reason why no action was taken
- weather conditions corresponding to the time of the complaint will also be noted in the logbook for assessment purposes.

6.6 Reporting

Reporting will be performed in accordance with the development conditions relevant to the Project as outlined by the DPIE. The reporting conditions are provided in Table 6-1.

Table 6-1 Reporting conditions as outlined in the Development Consent

Condition	Requirements
Incident notification, reporting and response	
C9	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one), and set out the location and nature of the incident. Subsequent notification requirements must be given and reports submitted in accordance with the requirements must be given and reports submitted in accordance with the requirements set out in Appendix 3.
Non-compliance notification	
C10	The Department must be notified in writing to compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of any non-compliance.
C11	A non-compliance notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.
C12	A non-compliance which has been notified as an incident does not need to also be notified as a non-compliance.
Compliance Reporting	
C13	Construction Compliance Reports and a Pre-Operational Compliance Report of the project must be carried out in accordance with the Compliance Reporting Post Approval Requirements (Department 2018) or any revision as in force from time to time.
C14	The Applicant must make each Compliance Report publicly available no later than 60 days after submitting it to the Department and notify the Department in writing at least 7 days before this is done.

7 References

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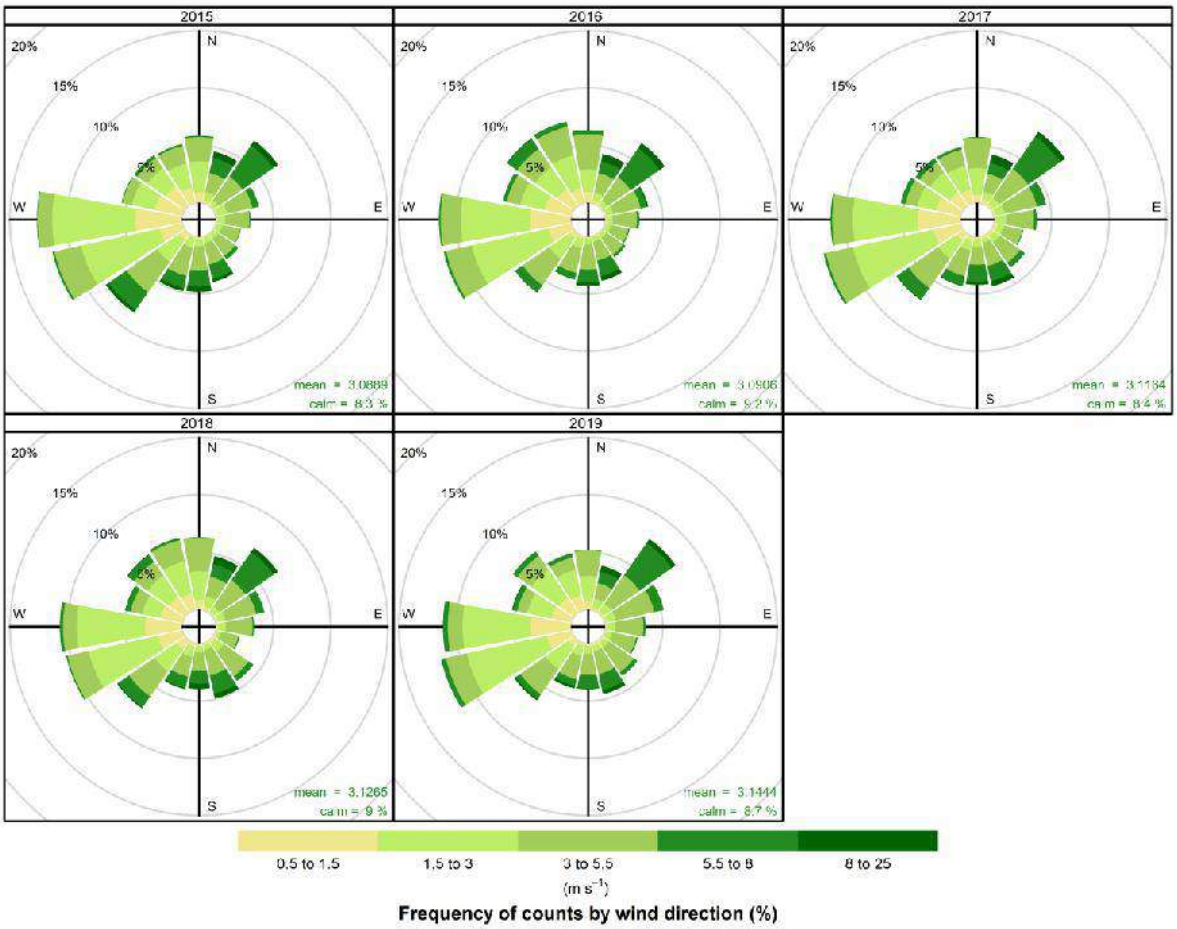
Appendix A

Meteorology

As discussed in Section 3.2, the meteorology of the area surrounding the Project site was characterised through the use of observations collected at the BoM Automatic Weather Station (AWS) located at Moruya Airport, approximately 28 km from the Project site. Wind roses showing the frequency of wind speed and direction from 2015 to 2019 are shown in Figure A-1.

Figure A-1 Annual wind roses 2015 to 2019, Moruya Airport AWS



The wind roses indicate that from 2015 to 2019, winds at Moruya Airport AWS show similar patterns across the years, with a predominant westerly wind direction.

The majority of wind speeds experienced at Moruya Airport AWS over the 5-year period, 2015 to 2019 are generally in the range <0.5 $m \cdot s^{-1}$ to 5.5 $m \cdot s^{-1}$ with the highest wind speeds (i.e. greater than 8 $m \cdot s^{-1}$) occurring from a north-easterly direction. Winds of this speed are not frequent, occurring 2.3 % of the observed hours over the 5-year period, at Moruya Airport. Calm winds (i.e. <0.5 $m \cdot s^{-1}$) occur during 8.7 % of hours on average across the 5-year period.

Appendix B

Background Air Quality

Air quality monitoring is performed by the NSW Department of Planning, Industry and Environment (DPIE) at three air quality monitoring stations (AQMS) within a 200 km radius of the Project site. Details of the monitoring performed at these AQMS is presented in Table B-1.

Table B-1 Closest AQMS to the Project site

AQMS location	Source	Approximate distance to Project site (km)	Screening parameters			
			2014 data	Measurements		
				PM_{10}	$PM_{2.5}$	TSP
Monash	ACT Health	114	✓	✓	✓	×
Albion Park South	DPIE	188	✓	✓	✓	×
Kembla Grange	DPIE	200	✓	✓	✓	×

Based on the sources of AQMS data available and their proximity to the Project site, Monash was selected as the candidate source of AQMS data for use in this assessment.

Summary statistics are for PM_{10} and $PM_{2.5}$ data are presented in Table B-2.

The measured values are compared to the NSW EPA criteria outlined in Section 1.6.2. Where there are measured exceedances of those criteria this is highlighted in red in Table B-2.

AQMS	Monash	
Years	2015-2019	
Pollutant	PM_{10}	$PM_{2.5}$
Averaging period	24-hour	24-hour
Data Points (number)	1 790	1 786
Mean ($\mu g \cdot m^{-3}$)	11.91	8.53
Standard Deviation ($\mu g \cdot m^{-3}$)	13.61	12.65
Skew[1]	*+8.26*	*+9.76*
Kurtosis[2]	*+103.69*	*+142.77*
Minimum ($\mu g \cdot m^{-3}$)	0.29	<0.01
Percentiles ($\mu g \cdot m^{-3}$)		
25	5.96	3.67
50	9.63	5.63
75	14.02	9.29
90	20.17	16.96
95	24.10	22.63
99	67.12	38.43

AQMS	Monash	
Maximum	260.92	264.63
Data Capture (%)	97.92%	97.70%

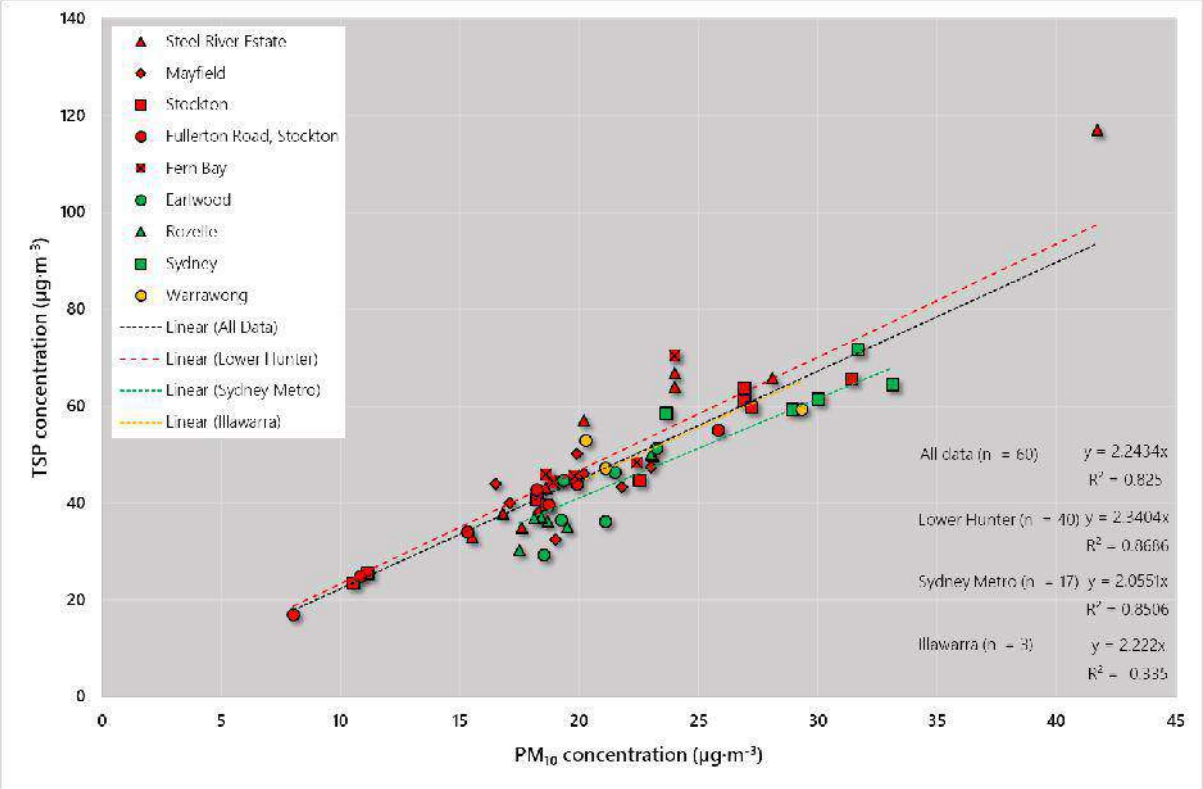
Notes: **1:** Skew represents an expression of the distribution of measured values around the derived mean. Positive skew represents a distribution tending towards values higher than the mean, and negative skew represents a distribution tending towards values lower than the mean. Skew is dimensionless.

2: Kurtosis represents an expression of the value of measured values in relation to a normal distribution. Positive skew represents a more peaked distribution, and negative skew represents a distribution more flattened than a normal distribution. Kurtosis is dimensionless.

Concentrations of TSP are not measured by the NSW DPIE or ACT Health at any AQMS surrounding the Project site. An analysis of co-located measurements of TSP and PM_{10} in the Lower Hunter (1999 to 2011), Illawarra (2002 to 2004), and Sydney Metropolitan (1999 to 2004) regions is presented in Figure B-1.

The analysis concludes that, on the basis of the measurements collected across NSW between 1999 to 2011, the derivation of a broad TSP:PM_{10} ratio of 2.3404:1 (i.e. PM_{10} represents ~43% of TSP) is appropriate to be applied to measurements in the Illawarra region, which most closely represents the area surrounding the Project site.

Figure B-1 Co-located TSP and PM_{10} measurements, Lower Hunter, Sydney Metro and Illawarra



Similarly, no dust deposition data is available for the area surrounding the development site. The incremental impact criterion of 2 $g \cdot m^{-2} \cdot month^{-1}$ as outlined within the Approved Methods has been adopted which effectively provides a background deposition level of 2 $g \cdot m^{-2} \cdot month^{-1}$ (the total allowable deposition being 4 $g \cdot m^{-2} \cdot month^{-1}$).

A summary of background air quality data for the site for the years 2015-2019 is presented in Table B-3.

Graphs presenting the daily varying PM_{10} and $PM_{2.5}$ data recorded at Monash for the years 2015-2019 are presented in Figure B-2 and Figure B-3, respectively.

Table B-3 Summary of background air quality data (Monash 2015-2019)

Pollutant	TSP	PM_{10}	$PM_{2.5}$	NO_2
Averaging period	**Annual**	**24-hour**	**24-hour**	**1-Hour**
Data Points (number)	1790	1790	1786	41,726
Mean ($\mu g \cdot m^{-3}$)	27.9	11.91	8.53	0.00
Standard Deviation ($\mu g \cdot m^{-3}$)	-	13.61	12.65	0.01
Skew	-	*+8.26*	*+9.76*	*+1.64*
Kurtosis	-	*+103.69*	*+142.77*	*+3.15*
Minimum ($\mu g \cdot m^{-3}$)	27.9	0.29	<0.01	<0.01
Percentiles ($\mu g \cdot m^{-3}$)				
25	-	5.96	3.67	<0.01
50	-	9.63	5.63	<0.01
75	-	14.02	9.29	0.01
90	-	20.17	16.96	0.01
95	-	24.10	22.63	0.02
99	-	67.12	38.43	0.03
Maximum	27.9	260.92	264.63	0.08
Data Capture (%)	97.92%	97.92%	97.70%	95.21%

Figure B-2 PM_{10} measurements, Monash 2015-2019

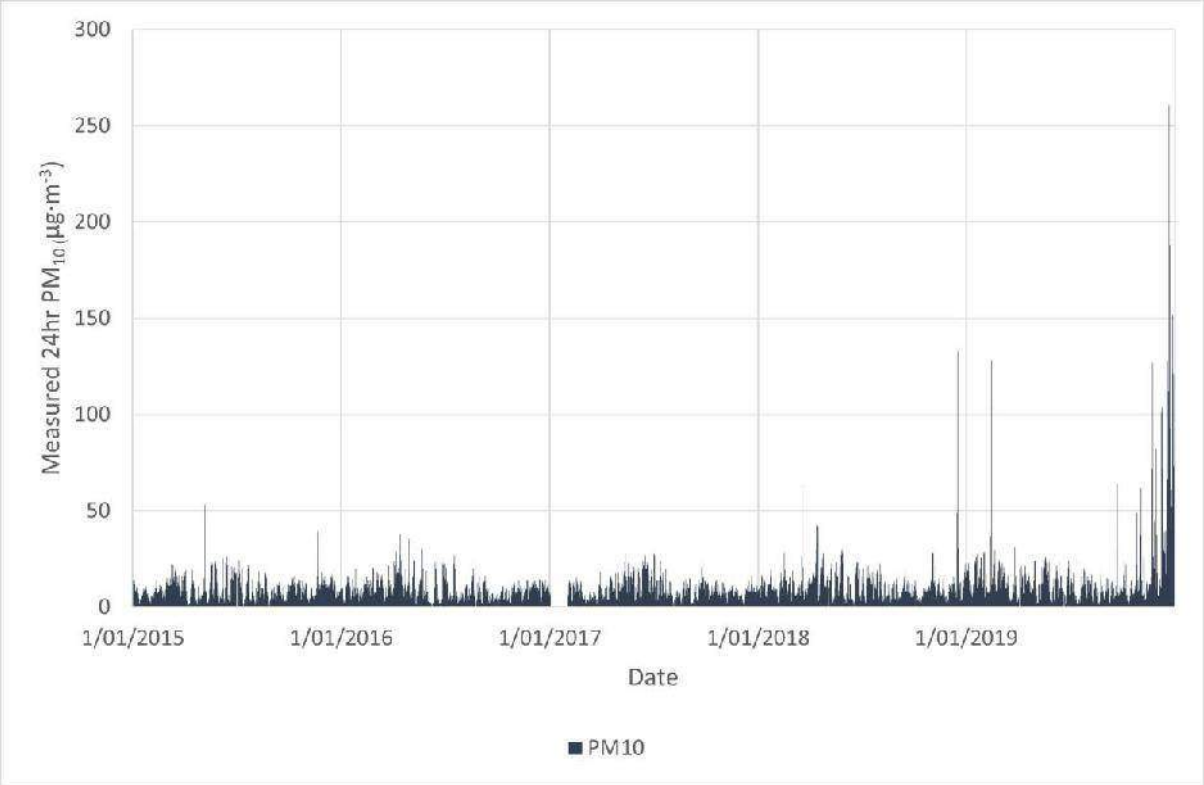
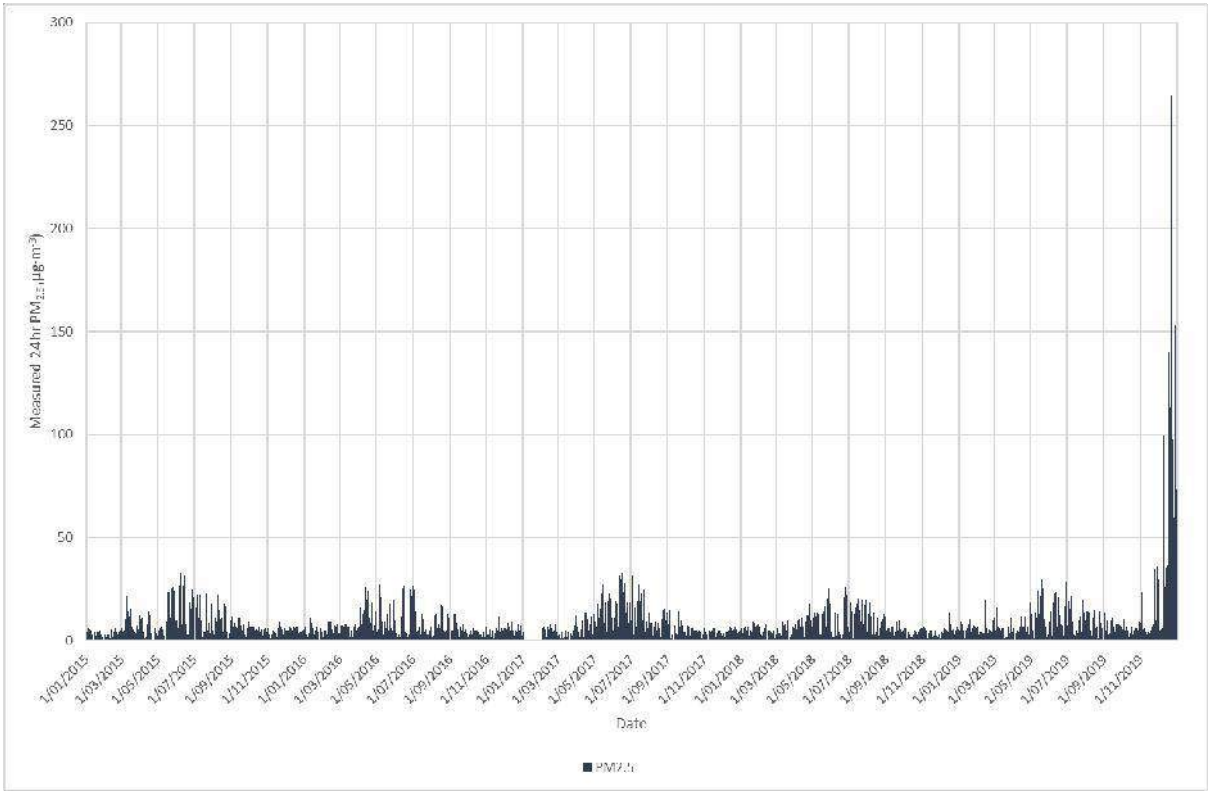


Figure B-3 $PM_{2.5}$ measurements, Monash 2015-2019



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Appendix G Fire and Emergency Response Plan

Bushfire Planning & Design
Central Coast, Newcastle, Hunter & Sydney
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Bushfire Risk Management Plan

Eurobodalla Southern Water Supply Storage (Lot 2531/-/DP853234).

Project Details	
Assessed as:	Infill Development.
Assessed by	Matthew Noone Accreditation No. BPAD-PD 25584
Project Description	Eurobodalla Southern Water Supply Storage Facility.
Report Number	BR-282020-A (Draft)
Date	30/10/2020

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

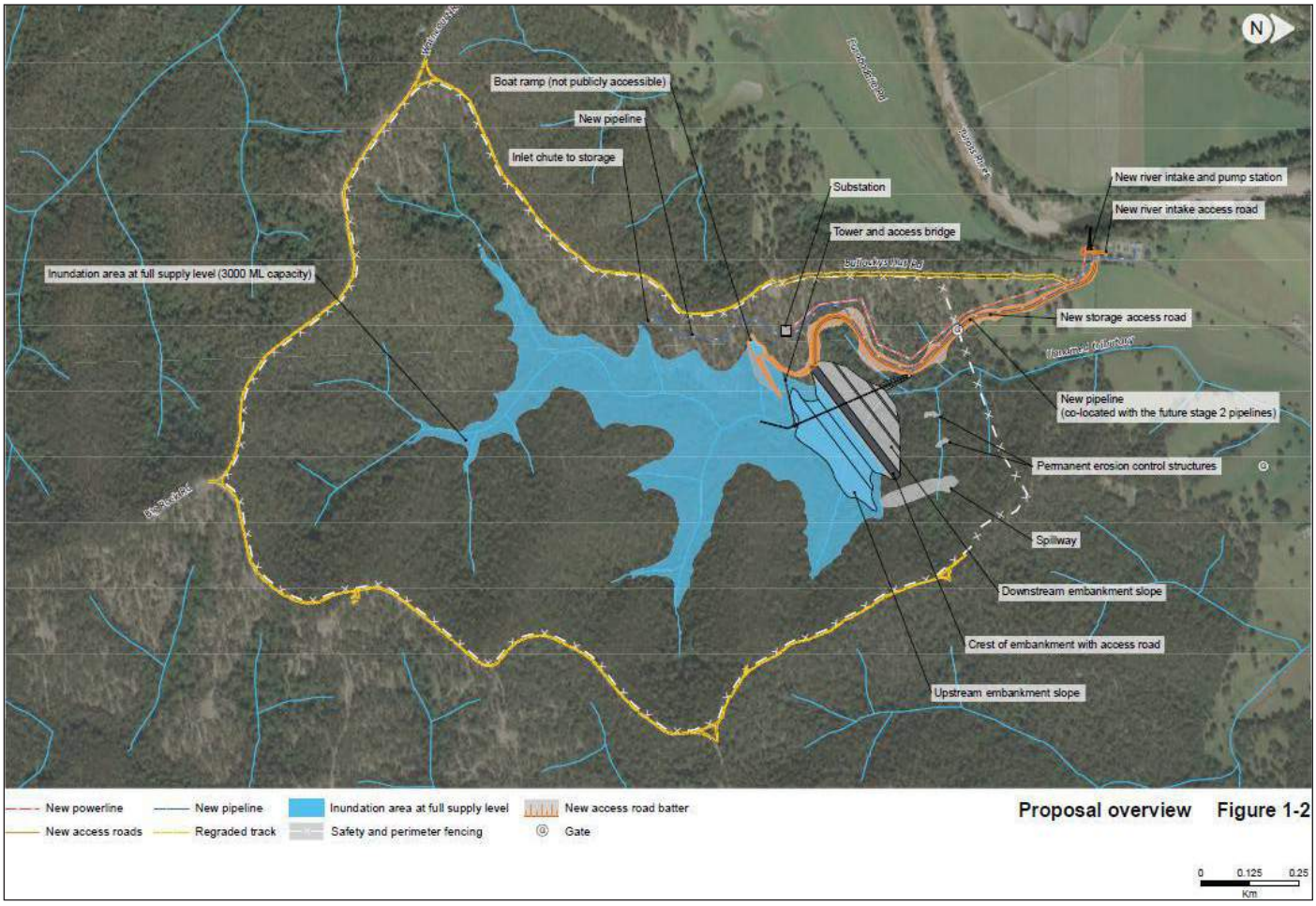
TABLE OF CONTENTS

SECTION 1.0. INTRODUCTION / DEVELOPMENT PROPOSAL

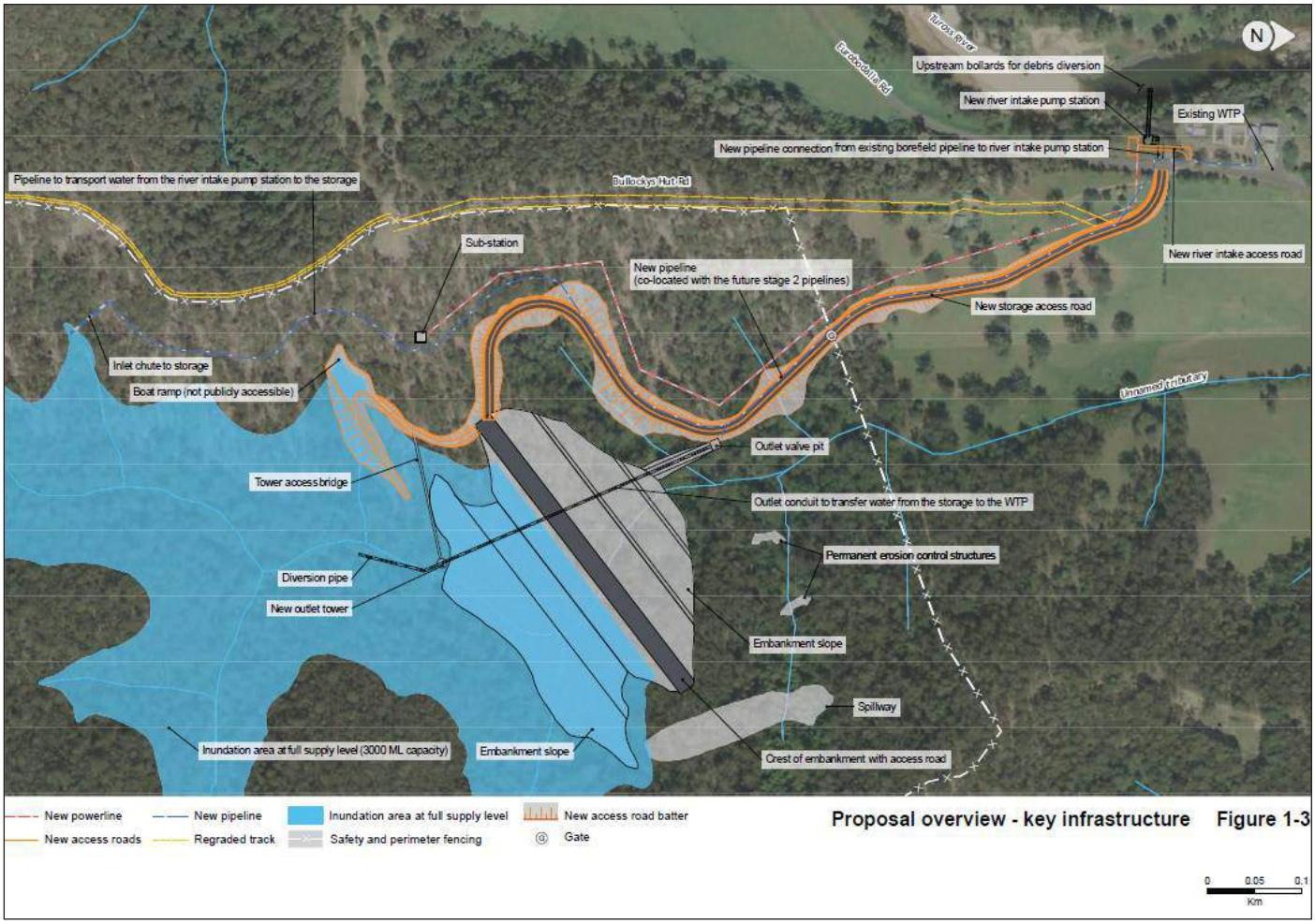
Eurobodalla Shire Council has obtained development consent from the Minister for Planning for the construction of an off-stream water storage facility (Eurobodalla Southern Water Supply Storage). The project is considered to be a State Significant Development. The water storage facility will have an approximate capacity 3000 ML capacity. The development also relates but is not limited to the following infrastructure and associated works;

- Raw water intake and water pumping station.
- Pipelines including connection to existing Tuross River borefield and Southern Water Treatment Plant.
- Substation, access roads and fencing.

Raw water will be extracted from the Tuross River from a new river intake pump station and an existing borefield for transfer to the new water storage facility. Water will be stored in the storage facility to supplement the existing water supply network during periods of drought. The proposed water storage facility would supplement peak summer demands and provide sufficient water storage to allow the system to provide a secure yield, while complying with the requirements of the Tuross River WSP (SMEC 2018).



1.2.1 Development Layout (Source SMEC EIS 27/08/2018)



1.2.2 Development Layout (Source SMEC EIS 27/08/2018)

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SECTION 1.3. SCOPE

As per Development Application number SSD 7089, Condition 10.1, a Hazard and Risk Management Plan (HRMP) is required to be prepared and implemented as part of the construction environmental management plan (CEMP).

The NSW Rural Fire Service document Planning for Bushfire Protection (2019) has been consulted to determine the appropriate level of management and catchment perimeter roads for construction and operation will be accessible for NSW RFS. The HRMP is to include but is not limited to the following;

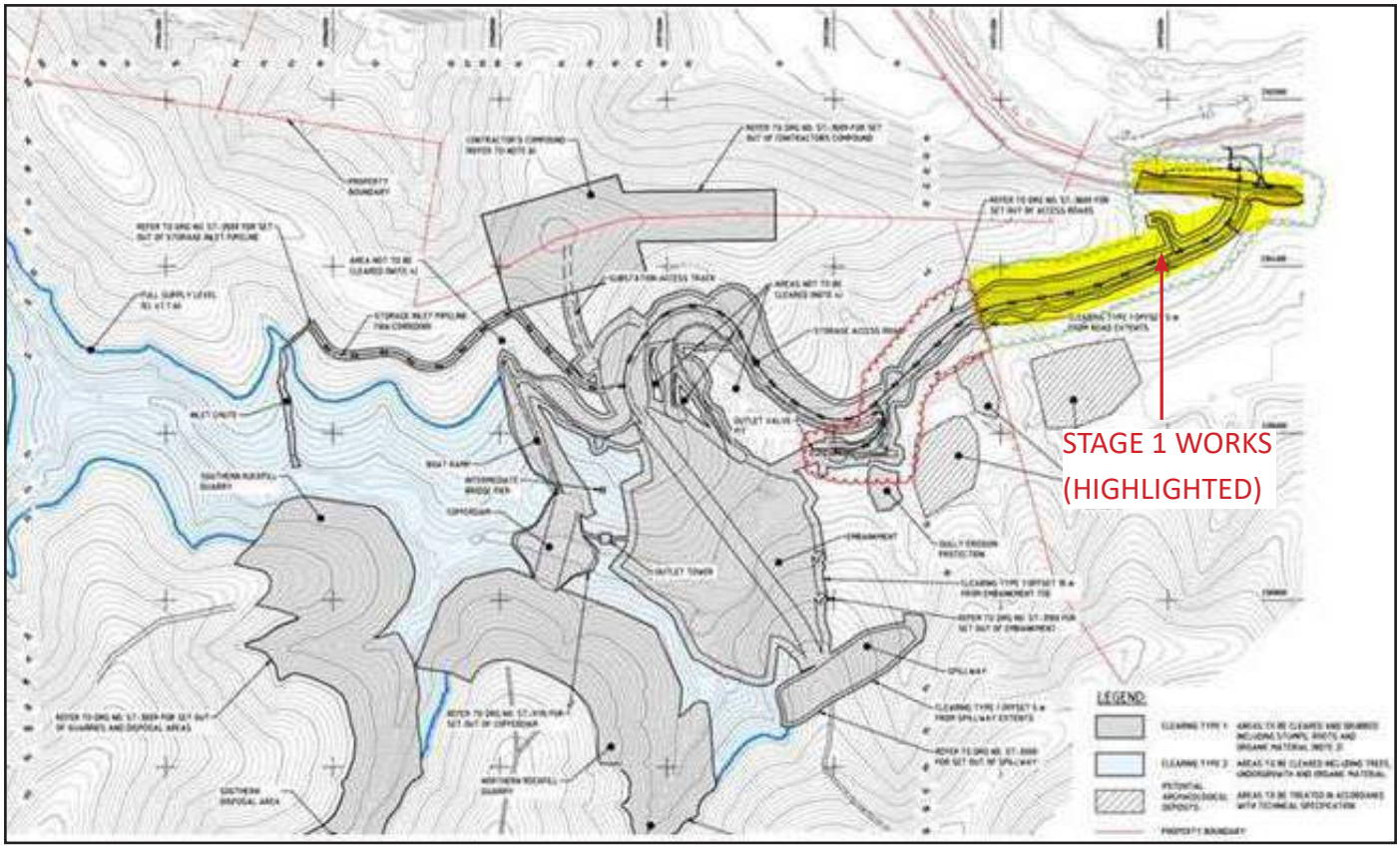
- Details of hazards and risks associated with the activity including bushfire management.
- Measures to be implemented during construction and operation to minimise these risks.

The development will consist of two stages. Stage 1 relates to the construction of the Access Road and Pipeline to the forestry boundary. Stage 2 relates to establishment of the Storage Site clearing and ground stabilisation (e.g., erosion and sediment control) only, no construction.

The recommendations within this document relate to Stage 1 works only (Refer Figure D).

Figure D - STAGE 1 WORKS

Overlay sourced from SMEC (Date 30/10/2020)



1.3.2 Development Layout (Source provided by SMEC October 2020).

SECTION 1.4. SITE LOCATION AND DESCRIPTION

The development site is located over parts of Lot 3/ DP438839 and Lot 2 / 1168581 an unnamed Lot bounded by Bullockys Hut Road and Big Rock Road, Bodalla. The proposed development is located approximately 7.3 kilometres south west of Bodalla. Tuross River is located in close proximity to the west of the existing Water Treatment Plant (WTP). Access to the site is from Eurobadalla Road directly to the south of the existing WTP. Eurobadalla Road runs quasi-parallel to Tuross River. The land surrounding Eurobadalla Road between Bodalla and the existing WTP is dominantly a grassland structure. Dampier State Forest is located to the north and north west of the Tuross River and Bodalla State Forest is located to the south and south east. The majority of the proposed works are located within Bodalla State Forest in close proximity to dense forest.

Figure B - SITE LOCATION (LGA)	Date of Issue 30/10/2020	
Overlay sourced from www.arcgis.com		
The subject site is indicated below.		

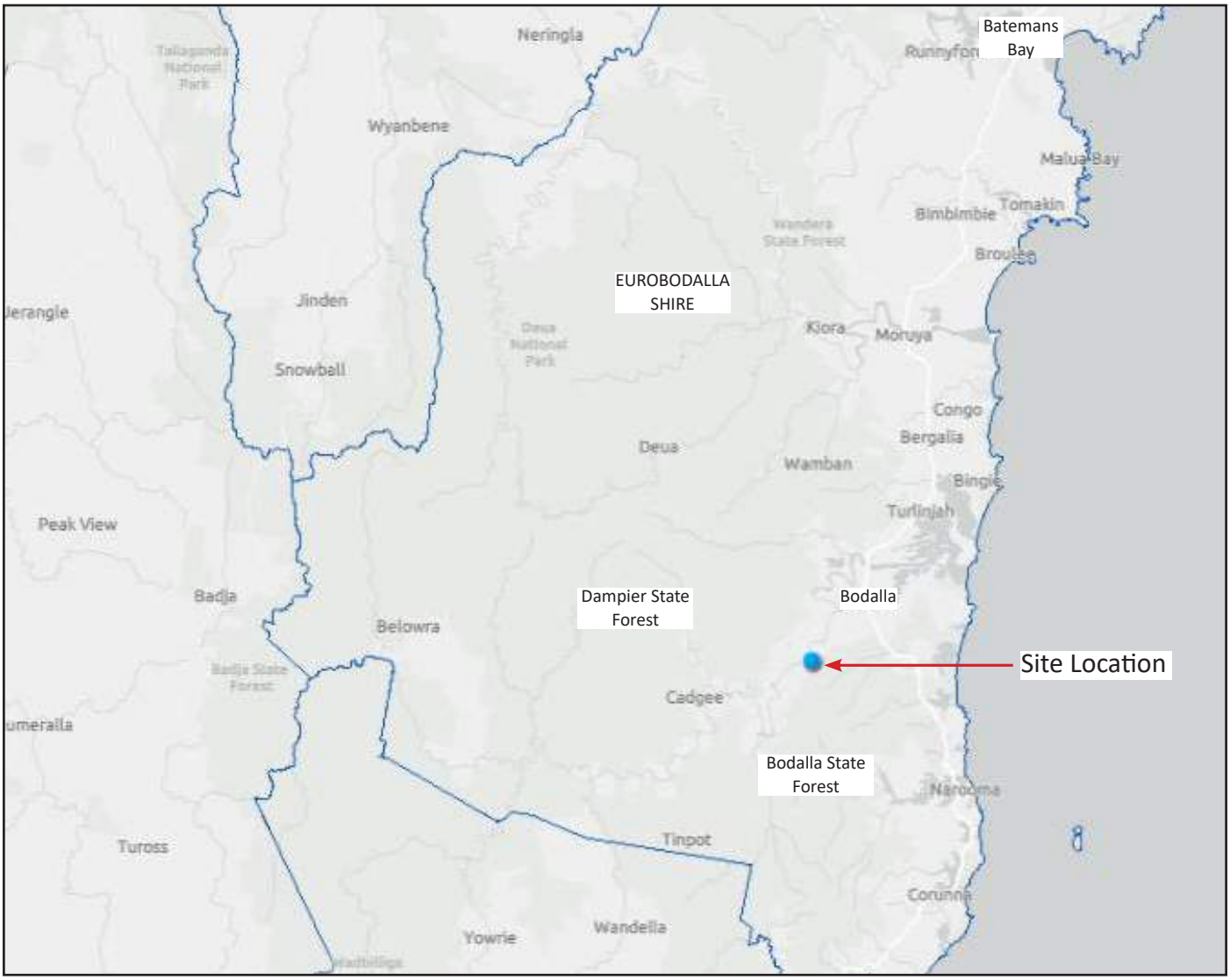


Figure C - SITE LOCATION

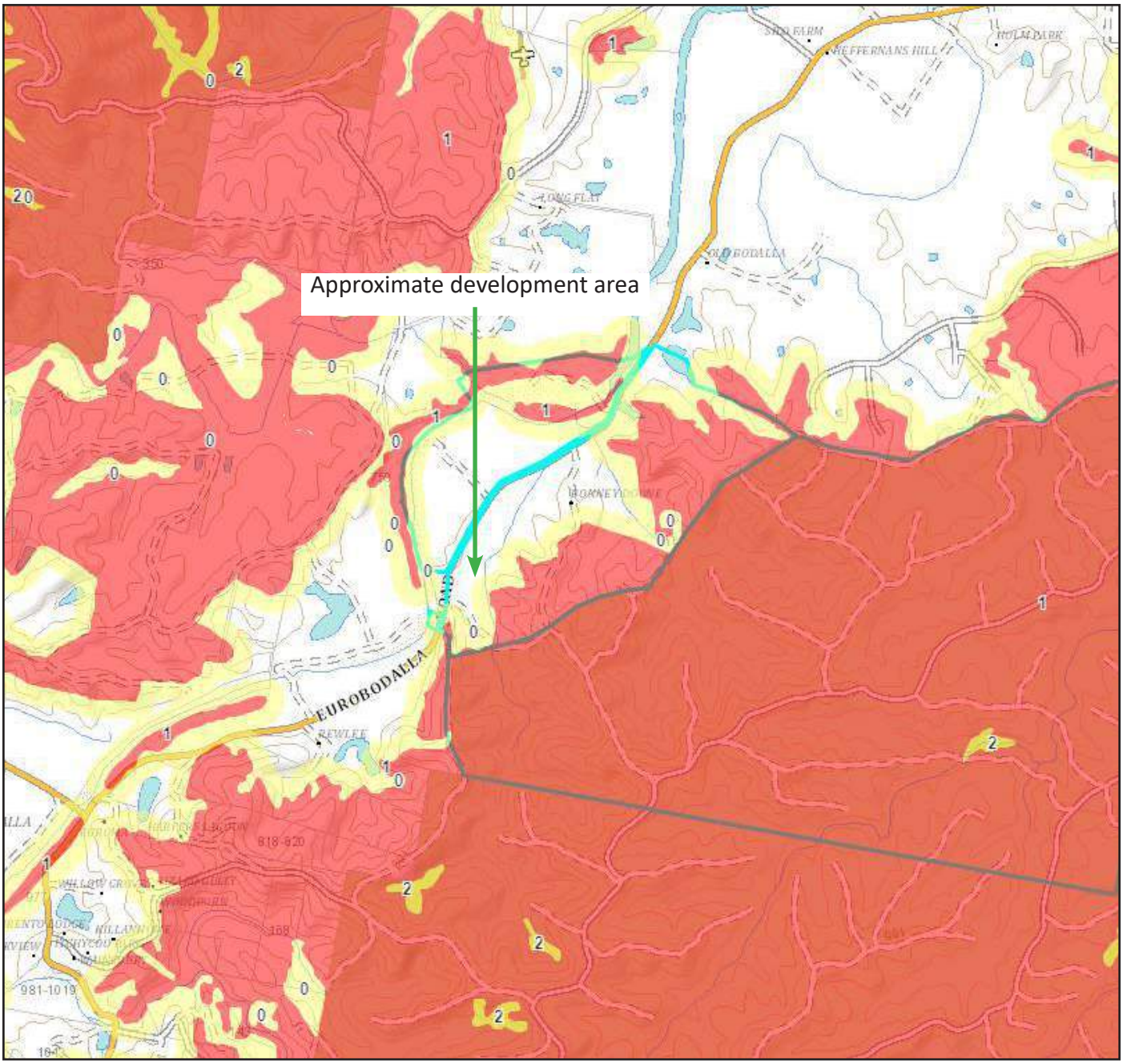
Overlay sourced from Google Earth (Date 30/10/2020)

1.3.1 Development Layout (Source Google Earth 30/10/2018)

Space left intentionally blank.

The subject site whether in whole or part is recorded as bushfire affected on a relevant map certified under Section 10.3 (2) of the Environmental Planning and Assessment Act 1979.

Figure A - BUSHFIRE PRONE LAND MAP	Date of Issue 30/10/2020	
Department of Planning, Industry and Environment (www.planningportal.nsw.gov.au).		
Certified Bushfire Prone Land Map extract obtained from the Planning Portal managed by the Department of Planning, Industry and Environment. Found at www.planningportal.nsw.gov.au. The subject site is mapped as bushfire affected.		



100m Buffer | Vegetation Category 2 | Vegetation Category 1

BUSHFIRE PLANNING AND DESIGN

P. 0406077222
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W.bushfireplannignanddesign.com

SECTION 2.0. RISK MANAGEMENT - INTRODUCTION

The NSW Rural Fire Service Bushfire Prone Land Mapping grades bush fire areas into three risk categories as; Category 1 (highest risk), Category 2 (lower risk than Category 1 or Category 3) and Category 3 (medium risk) with provision for a 100m and 30m buffer respectively. All categories are used to identify bushfire prone areas. The development area is identified as being within a bushfire prone area (Refer Figure A).

Development Application number SSD 7089, Condition 10.1, a Hazard and Risk Management Plan (HRMP) is required to be prepared and implemented as part of the Construction Environment Management Plan (CEMP). The bushfire components of this plan is to consider the appropriate level of management and catchment perimeter roads for construction and operation will be accessible for NSW RFS. The HRMP is to include but is not limited to the following;

- Details of hazards and risks associated with the activity including bushfire management.
- Measures to be implemented during construction and operation to minimise these risks.

The construction of the proposed development and ongoing management and operation of the facility could lead to the potential ignition at the development site or be impacted from bushfire travelling from other areas. The site could potentially be exposed to prolonged duration and/or increased intensity of a

bushfire. The construction of the development and on-going management after the establishment of the facility could expose the community, site workers, firefighters, roadway, infrastructure and the surrounding environment to high radiant heat and potential flame contact in the event of a bushfire.

2.1 Authority

The consenting authority for the development is the Minister for Planning. The Hazard and Risk Management Plan (HRMP) to which this document relates is prepared for the Shire of Eurobodalla. The Shire of Eurobodalla will be responsible for ensuring the Development Conditions stipulated in SSD 70890 have been met.

2.2 Stakeholder group

The main stakeholders in relation to this development and with regard to the ignition of bushfire are the Shire of Eurobodalla (Local Government Area and assumed land owner) and the New South Wales Rural Fire Service (RFS). In terms of the facility being affected by bushfire due to its construction or operations (site workers and roadway users) or due to an impending bushfire threat from areas outside of the development area the stakeholder group extends to SafeWork NSW, EPA, NSW Police, Local Government (and/or State) Authority. External authorities may take control of emergency response at the site.

2.3 Emergency Management Committees

The following over arching committees are responsible for dealing with bush fire prevention, preparedness, response and recovery:

- State Emergency Management Committee,
- Regional Emergency Management Committees,
- Local Emergency Management Committees and
- Bush Fire Management Committees

When a bush fire occurs, an emergency may be declared by the NSW Rural Fire Service. Once this occurs, a control centre will be established at the headquarters of the NSW Rural Fire Service.

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SECTION 3.0. RISKS - EXTERNAL BUSHFIRE THREAT

Potential Bushfire Risks	
1.	Fire embers enter site and ignites vegetation, construction materials and other flammables.
2.	Subsequent fire within the site prolongs duration or increases intensity of the bushfire.
3.	Fire within the site causes increased or dangerous hazard exposure to the community, site workers, roadway users, firefighters and the environment.

3.0.1 Analysis of Risks - External Bushfire Threat

There is little that can be done to avoid the potential impact and risk of ignition from burning embers generated from outside of the development area. The same applies to direct transfer of bushfire travelling within the State Forest through to the development area.

Any localised bushfire may pose considerable threat to on-site operations. Responders accessing an incident involving the site will prioritize the safety of personnel and, wind direction permitting, the protection of exposures and locally threatened operations. Ember attack transnational to high radiant heat and flame contact are the critical bushfire threats for the site.

The strategies identified in Section 5.0 will assist in mitigating the adverse affects of bushfire.

SECTION 3.1. RISKS - INTERNAL BUSHFIRE THREAT

Potential Bushfire Risks	
1.	Fire ignition due to plant, storage or transport vehicle causes a bushfire external to site that threatens communities, site workers, roadway users, other infrastructure and the environment.
2.	Storage materials ignite due to adverse bushfire conditions (high heat, lightening strikes, concentrated rays due to discarded glass (bottles, highly reflective surfaces).
3.	Fire ignition due to undue care in relation to smoking cigarettes.
4.	Fire ignition due to mechanical equipment failure.
5.	Fire ignition due to site construction activities eg. site welding, grinding, cutting of steel and other abrasives.

3.1.2 Analysis of Risks - Internal Bushfire Threat

Operations of construction works, movement of plant and vehicles as well as storage of construction materials and bulk waste will require strict monitoring to reduce the likelihood of fire developing or an ignition source transferring to bushland. Construction activities such site welding, steel and concrete cutting will need to be carefully monitored. A water supply, pump and hose should be readily available where these activities occur. Designated areas for smoking should be provided to minimise the risk of ignition of surrounding bushland due to careless discarding of cigarette butts.

The strategies identified in Section 4.1 will assist in mitigating the adverse affects of bushfire.

SECTION 4.1. RISK - EVALUATION

The establishment of this asset (Eurobodalla SWSS) should be added to or updated in the Eurobodalla Bush Fire Risk Management Plan Prepared by the Eurobodalla Bush Fire Management Committee; pursuant to Section 52 of the Rural Fires Act, 1997. The recognised bushfire threats can be reasonably mitigated using the recommendations provided (Refer 4.1). Other risks associated with bushfire relate to the adverse affects of the burnt environment on water quality due to ash, ground de-stabilisation and erosion due to the loss of ground cover and subsequent rainfall.

SECTION 5.0 RISK MITIGATION STRATEGIES

5.1.1 MITIGATION STRATEGIES - BEFORE COMMENCEMENT OF WORK.	
	Prior to works beginning on site, establish an Emergency Planning Committee (EPC) or Bushfire Liaison Officer (BLO). The role of the EPC or BLO is to; • Establish and implement emergency plans and procedures. • Identify duties and responsibilities of positions. • Formulate emergency procedures. • Ensure employees and other occupants are educated and trained on emergency procedures. • Ensure all occupants are aware of the emergency procedures for the development. • Regularly review the plan to ensure it remains practical and current. • Coordinate and arranging transport. • Physically relocating occupants from one place to another. • Ensuring all buildings are properly prepared to limit the impact of a bush fire (if applicable). • Initiate any bush fire protection measures such as sprinkler systems (if applicable). • Liaise with emergency services.

5.1.2 MITIGATION STRATEGIES - DURING CONSTRUCTION - AWARENESS AND PREPAREDNESS		
		A bushfire can occur at any time during the year. The designated bushfire period is October to March. Particular bushfire alertness and preparedness will be required on days of high bushfire danger.
	•	Check Fire Danger Ratings and Bush Fire Alerts at or on the Fires Near Me smartphone.
	•	Check Weather conditions on the Bureau of Meteorology website.
	•	Listen to RFS advice on high bushfire danger days (www.rfs.nsw.gov.au).
	•	Consider not having workers on site during days of elevated bushfire danger.
	•	Be aware of the emergency management plan to evacuate the site.
	•	If site work is necessary and unavoidable on high bushfire danger days, advise local Bodalla RFS unit that work is being carried out and provide them with the bushfire emergency management plan.
5.1.3 ON-SITE ACTIVITIES - DURING CONSTRUCTION - BUSHFIRE MITIGATION STRATEGIES		
	•	Provide a minimum 10m APZ adjacent to all roads and access points, plant storage, waste storage, assets and built structures.
	•	Recommend having a water supply, 5hp or 3kW petrol or diesel-powered pump, and hose and reel with a 19mm internal diameter adjacent to the storage of potential ignition sources eg. site welding, grinding, steel or concrete cutting activities. A transportable water cart would be advantageous.
	•	Impose a smoking ban within the development area. Provide a designated area where workers can smoke cigarettes and safety discard the smoking paraphernalia.
	•	A fire and hazardous materials incident management plan should be developed to inform workers how to identify, report and either safely extinguish a fire threat or evacuate from the site.
	•	The provision of an on-site bushfire response capability that includes the maintenance, regular testing/exercising of the activation of trained workers and on-site firefighting water storage will assist in preventing potential ignition from within the development area.
	•	Provide access to the facility in accordance with Planning for Bushfire Protection (2019) table 5.3b where applicable.
	•	Evacuation planning during a bushfire threat as per site procedures.
	•	Building construction standards as per Australian Standard AS 3959 Construction of Buildings in Bushfire Prone Areas - or utilisation of non-combustible materials throughout.

4.1.4 BUSHFIRE EMERGENCY EVACUATION AND PLANNING		
	•	Develop and test a Bushfire Emergency Plan for the site which is readily available to all key stakeholders. The bushfire emergency management and evacuation plan template found at www.rfs.nsw.gov.au is to be filled out by the Emergency Planning Committee (EPC) or Bushfire Liaison Officer (BLO).

SECTION 5.0 EMERGENCY SITUATION - FIRE AND SMOKE

It is anticipated that most of the material stored on-site is not flammable. However, it is possible for fire to occur due the ignition of surrounding native vegetation. In the event of fire or smoke detected, the following general procedure should be followed.

5.1 Emergency Situation: Fire On-site		
Action		
Stop Work	•	Abandon any plant, equipment or area immediately if it catches fire.
Assess the Risk	•	Check for Danger. Secure the area and Raise the Alarm.
	•	What has caused the fire? What is burning? Are you trained and competent to fight the fire? What firefighting equipment is available to fight the fire and is it adequate?
	•	Your priority should be to keep yourself and others safe. Decide if you are capable of managing the incident.
Notify	•	Report incident to site manager immediately. They may take responsibility for managing the incident. If they are not available, contact your area warden. Area Warden is to ensure the Communications Officer is aware of the incident.
	•	Area Warden to co-ordinate firefighting efforts and use of the firefighting equipment. They may instruct wardens to assist.
	•	Any people not involved in firefighting should proceed to the emergency assembly area at the entrance of the site. Wardens are to assist in ensuring all persons not involved in the firefighting area leave the area.
	•	The Chief Warden will contact the relevant authorities immediately: SafeWork NSW, EPA, NSW Police, NSW Health, NSW Fire and Rescue, Local Government (and/or State) Authority. External authorities may take control of emergency response at the site.

Control the Incident		The following Fire Control is available on-site: ○ Fire extinguishers ○ Fire hoses ○ Fire hydrant boosters ○ First Aid Kits ○ Emergency quarantine areas
Contain the Area		If possible, prevent the incident from spreading further. Note: fire-water may not be clean and therefore all possible measures should be taken to prevent fire-water from entering the drinking water catchment where possible.
Clean Up		Once the threat has been extinguished, assess the fire water for contaminations. Separate from potential flow into the drinking water catchment.
Report and Review		The Chief Warden will compile an incident report and provide a copy to the Communications Officer to keep on file. An investigation or serious incident review may be conducted. Staff may be required to assist external authorities with investigations.

SECTION 6.0 CONCLUSION

As per Development Application number SSD 7089, Condition 10.1, a Hazard and Risk Management Plan (HRMP) is required to be prepared and implemented as part of the construction environmental management plan (CEMP). We have identified the potential bushfire risks from both the land internal and external to the proposed development area. We have provided bushfire mitigation strategies to effectively address potential bushfire ignitions. We have also provided bushfire mitigation strategies for emergency management and evacuation for construction workers and teams on site.

Should you wish to discuss any of the content, pleas contact the undersigned.

Regards,

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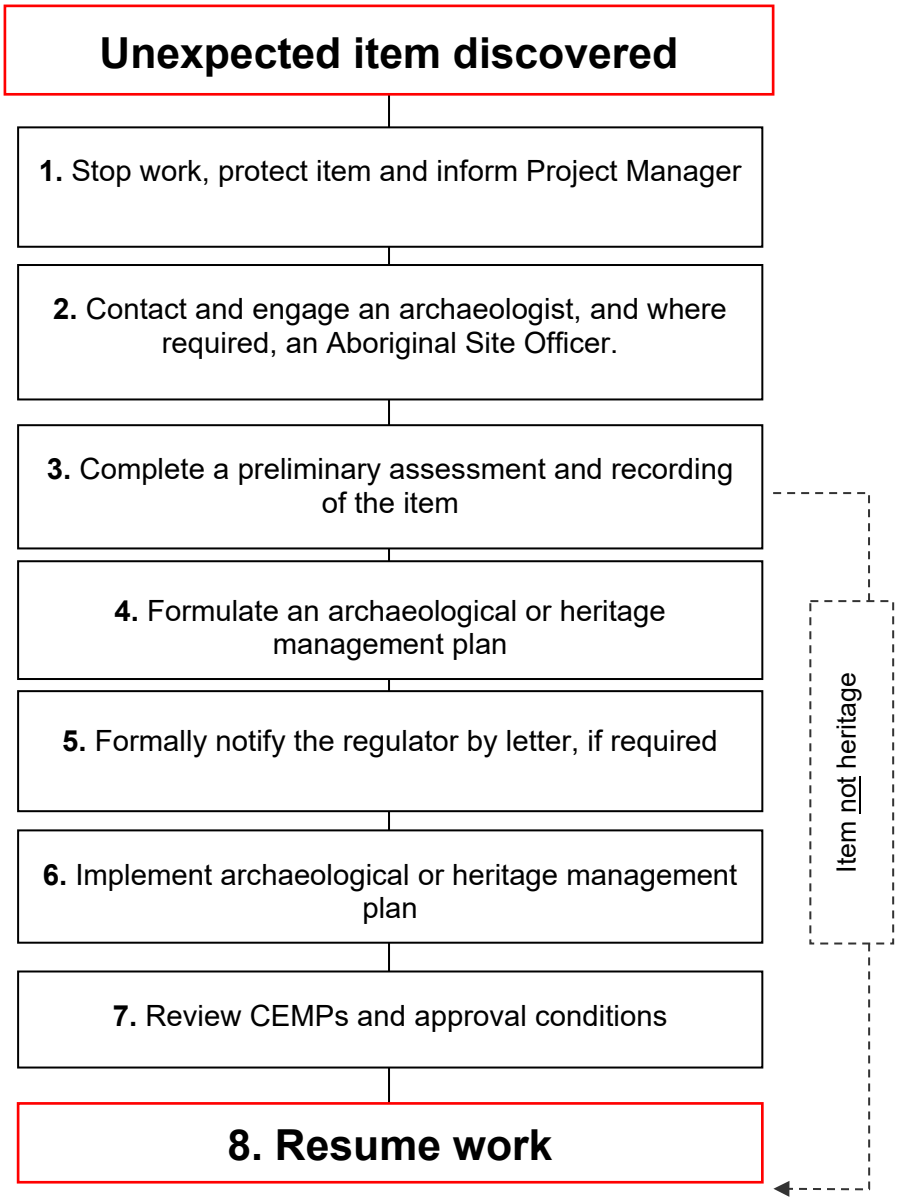
BPAD Bushfire Planning & Design Accredited Practitioner Level 2

SECTION 7.0 REFERENCES

AS3959 (2018)	Australian Standard, Construction of buildings in bushfire-prone areas, AS 3959, Third edition 2018 Standards Australia International Ltd, Sydney.
EPA Act (1979)	Environmental Planning and Assessment Act 1979, NSW Government, NSW, legislation found at www.legislation.nsw.gov.au
PBP (2019)	Planning for Bushfire Protection, a Guide for Councils,Planners, Fire Authorities, Developers and Home Owners. Rural Fire Service 2019, Australian Government Publishing Service, Canberra.
RFS (2015)	Rural Fire Service, Guide For Bush Fire Prone Land Mapping, Version 5b.

Appendix H Unexpected Finds Procedure


Unexpected item discovered
1. Stop work, protect item and inform Project Manager
2. Contact and engage an archaeologist, and where required, an Aboriginal Site Officer.
3. Complete a preliminary assessment and recording of the item
4. Formulate an archaeological or heritage management plan
5. Formally notify the regulator by letter, if required
6. Implement archaeological or heritage management plan
7. Review CEMPs and approval conditions
8. Resume work
Item not heritage

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