

Construction Environmental Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

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Glossary and Abbreviations

Abbreviation	Detail
CEMP	Construction Environmental Management Plan
CFFMP	Construction Flora and Fauna 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	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
SRD SEPP	<i>State Environmental Planning Policy (State and Regional Development) 2011</i>
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) forms part of the Construction Environmental Management Plan (CEMP) and details the for partial clearing of the permanent works design area, ancillary works and inundation areas, herein referred to as the “Partial Clearing works”, for the Eurobodalla Southern Water Supply Storage Project (the Project). The extent of the Partial Clearing works area is herein referred to as the “clearing boundary” as shown in Figure 1-1.

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 1-2). The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP).

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 1-3):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area (further detailed in the CSWMP). Forestry will ensure that the area has been left with soil in a stable condition for the successful construction contractor to complete the remainder of the site clearing and construction in future stages of the Project.

The Partial Clearing works will reduce the complexity of future stages of clearing works associated with the Project and prevent delays as a result of logistical and safety issues associated with multiple contractors undertaking clearing and construction activities concurrently. The minimising and avoidance of delays during clearing works will in turn minimise erosion and sedimentation risks by:

- Minimising the duration of exposure of disturbed areas
- Minimising the duration of ground disturbance works
- Reducing logistical and safety complexities which may compromise the implementation of environmental controls and measures outlined in this CEMP
- Minimising delays to the commencement of dam filling and wet commissioning of the Project

The Partial Clearing works covered under this CEMP are confined to vegetation clearing only. Minor earthworks may be required to facilitate access to the site and establish loading areas for the plant and equipment required to undertake the clearing.

1.2.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the Construction Soil and Water Management Plan (CSWMP, Appendix B). Progressive erosion and sediment control would be installed during initial partial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of 'no-go zones' with the installation of high-visibility bunting to clearly mark these areas.
- implementation of a nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (FFMP; Appendix B).

1.2.2 Clearing within Partial Clearing works clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs). Figure 1-2 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Nest Box Management Plan (Appendix C).

Within Clearing Area 1 (refer Figure 1-3), localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

As required, soil and erosion control works shall be completed progressively during clearing operations to minimise soil erosion. Soil and erosion control works shall be carried out in accordance with the conditions of the Development Consent, and the CSWMP (Appendix B).

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.




Clearing activities to be undertaken by Forestry would include:

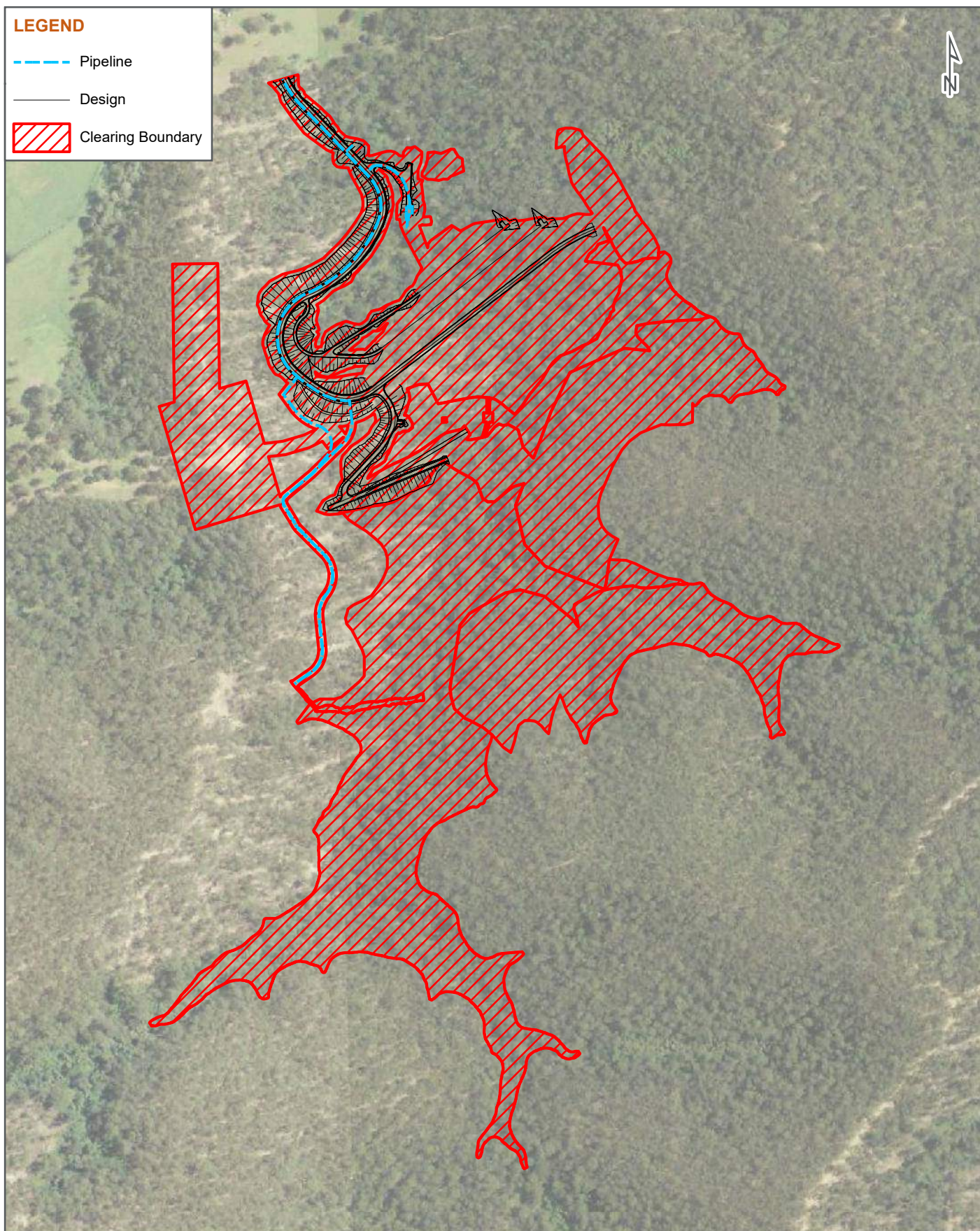
- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with the methodology outlined in Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

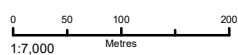
- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



DATE 13/12/2021



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Extent of Partial Clearing works covered under this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works CEMP

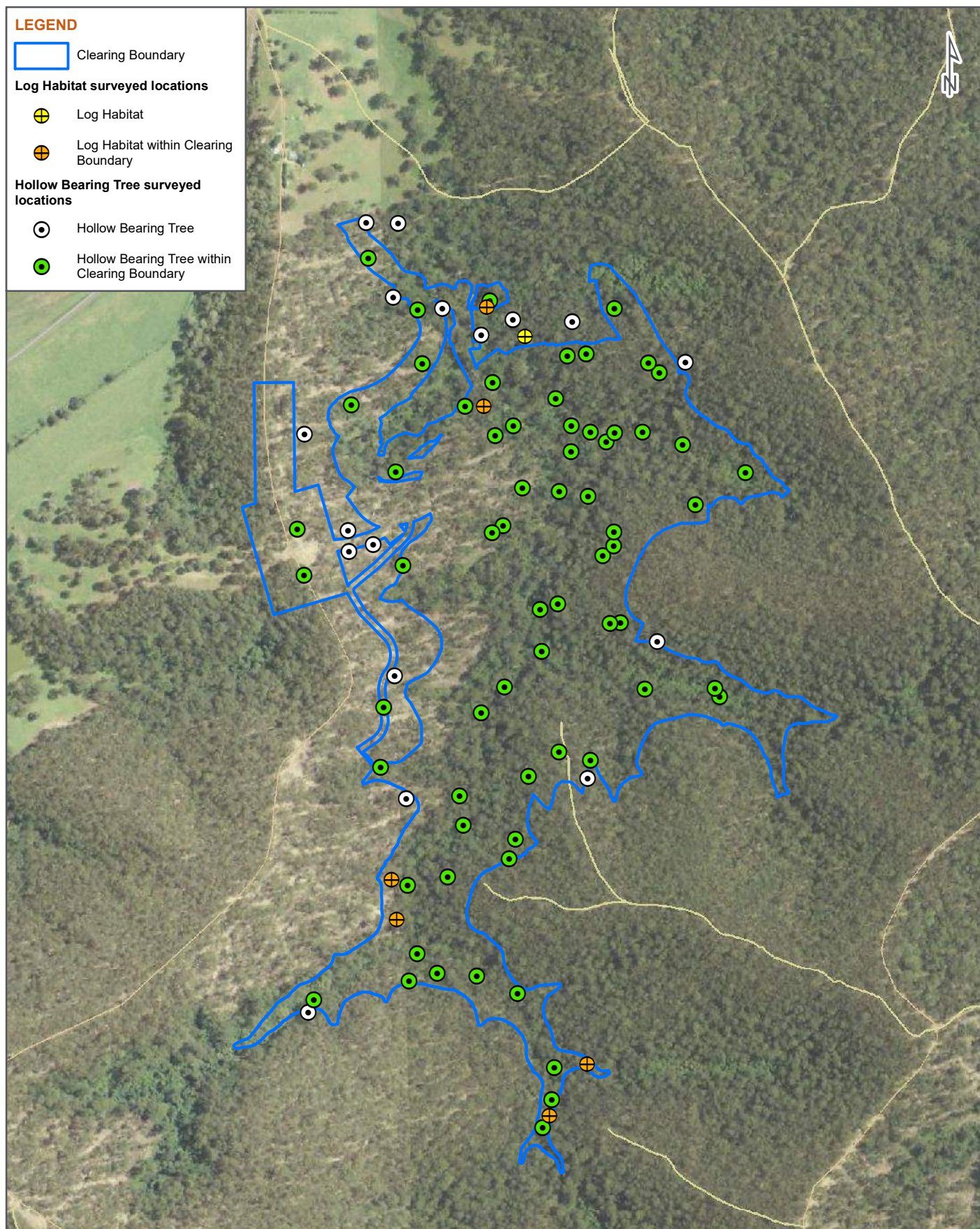
CREATED BY FA13847

SOURCES : Roadnet MDS 2019, public_NSW_Imagery: © Department of Customer Service 2020

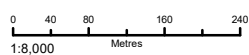


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DATE 13/12/2021



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-2

FIGURE TITLE Hollow-bearing tree mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CEMP

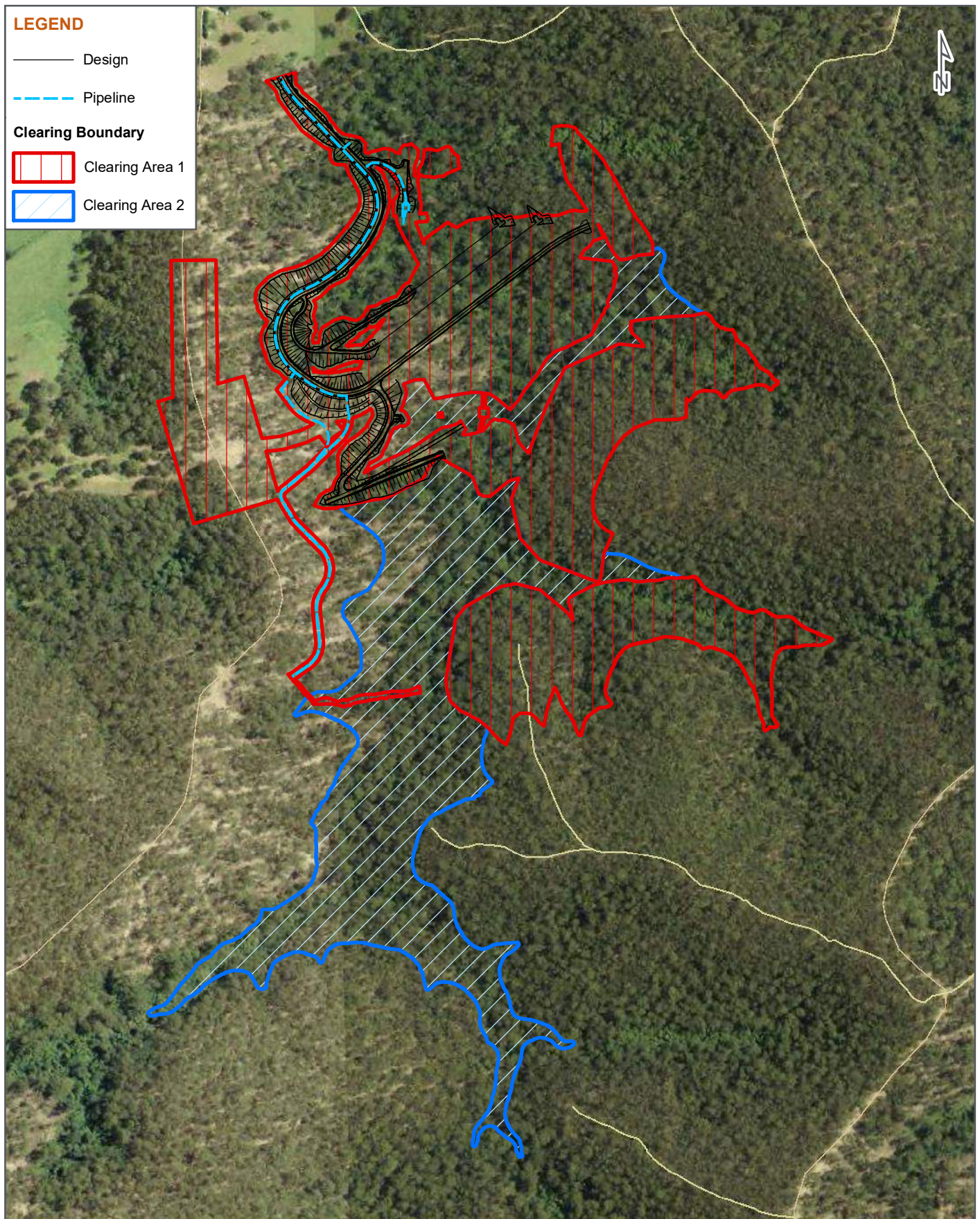
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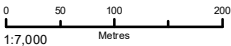

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DATE 23/11/2020		PAGE SIZE A4	COORDINATE SYSTEM GDA 1994 MGA Zone 56	
FIG NO. 1-3	FIGURE TITLE Clearing Area Type Mapping			
PROJECT NO. 30012835	PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works CEMP			
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1.3 Construction program

Subject to approvals, the Partial Clearing works covered under this CFFMP will be undertaken by the Forestry and the independent arborist contractor from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period.

Unless approval has been obtained from the Secretary, clearing 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.

Works outside the hours outlined above may be undertaken under the following circumstances:

- works that are inaudible at the nearest sensitive receivers
- for the delivery of materials outside these hours as required by the NSW Police Force or other authorities for safety reasons
- where it is required in an emergency to avoid the loss of life, 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.

1.4 Applicant

Eurobodalla Shire Council is the applicant for the Project.

1.5 Purpose of this CEMP

This CEMP covers the Partial Clearing works as discussed in Section 1.2 and shown in Figure 1-1. This CEMP has been prepared to outline and describe how Eurobodalla Shire Council will be responsible for the clearing 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 clearing activities to be undertaken and their timing
- identifies the planning approval requirements, legal obligations, permits, licences, standards and guidelines that clearing 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 clearing activities covered under this CEMP.

1.6 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	<p>Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:</p> <ul style="list-style-type: none"> (a) details of: <ul style="list-style-type: none"> (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions) (ii) any relevant limits or performance measures and criteria (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: <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> (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	<p>As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:</p> <ul style="list-style-type: none"> • 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	<p>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:</p> <ul style="list-style-type: none"> • Construction Air Quality Management Plan (Appendix G) • Construction Erosion and Sediment Control Plan (Appendix C)

Condition	Requirements
	<ul style="list-style-type: none"> Bushfire Management Plan (Appendix D).

1.7 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
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
<i>Environment Protection and Biodiversity Conservation Act 1999</i> (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
<i>Environmental Planning and Assessment Act 1979</i>	Changes to the approved scope of SSD-7089 would require modification to the project approval under the <i>Environmental Planning and Assessment Act 1979</i> (EP&A Act).	DPIE
<i>Protection of the Environment Operations Act 1997</i>	Any unauthorised pollution of waters is considered an offence under section 120 of the <i>Protection of the Environment Operations Act 1997</i> (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
<i>Biodiversity Conservation Act 2016</i>	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
<i>National Parks and Wildlife Act 1974</i>	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
<i>Biosecurity Act 2015</i>	Priority weeds are regulated under the <i>Biosecurity Act 2015</i> 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)
<i>Rural Fires Act 1997</i>	Sections 63(1) and 63(2) of the <i>Rural Fires Act 1997</i> 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
<i>Contaminated Land Management Act 2017</i>	As per Section 6 of the <i>Contaminated Land Management Act 2017</i> , ensure only EPA-approved VENM and ENM are brought to site, keep records of the same and provide copies to DPIE if requested.	EPA
<i>Fisheries Management Act 1994</i>	Section 37 of the <i>Fisheries Management Act 1994</i> 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 <i>Fisheries Management Act 1994</i> . This matter is to be resolved with DPI – Fisheries in the event that fish passage is to be blocked.	DPI - Fisheries
<i>Water Sharing Plan for the Tuross River Unregulated and Alluvial Water Sources 2016.</i>	Water extracted from the Tuross River for use as construction process water during storage site clearing 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 the Partial Clearing works 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 site clearing 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	<p>The Partial Clearing works area clearing boundary encompasses an area of 43.58 ha. The Partial Clearing works would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all HBTs. Localised grubbing and clearing will be required within Clearing Area 1 (Figure 1-3) for harvestable trees greater than 30cm in diameter. No grubbing will occur within gullies. Localised grubbing and clearing will be required for establishing loading areas to facilitate the Partial Clearing works. The remainder of vegetation within the clearing boundary not cleared as part of the Partial Clearing works, will be cleared in future stages of works for the Project.</p> <p>In total the Project will not clear more than 54.61 ha of native vegetation.</p>
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 C.
B4	<p>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:</p> <ul style="list-style-type: none"> (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 	<p>CFFMP included as Appendix C.</p> <p>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.</p>

Condition reference	Condition Requirement	Condition Delivery
	<p>be revegetated within the site and use elsewhere within the local area;</p> <p>(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</p> <p>(f) details on rehabilitation and revegetation including:</p> <p>(i) use of locally indigenous plant species including collection of seed prior to clearing for this purpose;</p> <p>(ii) for construction areas outside the full supply level including the construction compounds, on-site quarry areas and the new storage access road batters;</p> <p>(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.</p>	
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 C.
B6	<p>Applicant must:</p> <p>(a) not commence any clearing work until the CFFMP is approved by the Planning Secretary; and</p> <p>(b) implement the most recent version of the CFFMP approved by the Planning Secretary for the duration of works.</p>	CFFMP included as Appendix C.
B13	<p>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:</p> <p>(a) guidelines and procedures to reuse dirty water collected in sediment basins with reuse prioritised over discharge to receiving waters;</p>	CSWMP included as Appendix B.

Condition reference	Condition Requirement	Condition Delivery
	<ul style="list-style-type: none"> (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	<p>Erosion and sediment control measures must:</p> <ul style="list-style-type: none"> (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). 	<p>CSWMP included as Appendix B. Erosion and Sediment Control Plan (ESCP) included as Section 6 of the CSWMP.</p>
B15	<p>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).</p>	<p>Construction activities governed by this CEMP would comply with s.120 of the POEO Act.</p> <p>Construction activities governed by this CEMP do not require an EPL.</p> <p>The CSWMP (Appendix B) includes an ESCP which would be implemented to avoid pollution of waters.</p>
B16	<p>The Applicant must store all chemicals, fuels and oils used on-site in accordance with:</p> <ul style="list-style-type: none"> (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. 	<p>Refer to Section 3.5.</p>

Condition reference	Condition Requirement	Condition Delivery
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 3.5.
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 G.
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 Plan (AQMP) provided in Appendix F includes dust management procedure.
B26	During construction, the Applicant must ensure that: <ul style="list-style-type: none"> (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 Plan (AQMP) provided in Appendix F 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 site clearing 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 site clearing 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 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 H). This procedure must be complied with during the Partial Clearing works detailed in Section 1.2.

3.2 Waste management

A Waste Management Register will be maintained until the completion of the Partial Clearing 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 Partial Clearing works detailed in Section 1.2, 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 Partial Clearing works detailed in Section 1.2:

- 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.

No potential archaeological deposits were identified within the Partial Clearing works clearing boundary during surveys undertaken to inform the EIS. Known potential archaeological deposits (PAD) occur in proximity to the Storage Access Road. The alignment of the Storage Access Road and Storage Inlet Pipeline was designed to avoid these deposits. These PAD areas would be protected during works to ensure no inadvertent impacts occurred.

3.4 Site management

General site management procedures to be implemented during the Partial Clearing works detailed in Section 1.2 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 Partial Clearing works detailed in Section 1.2:

- 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 Partial Clearing works roles and responsibilities

Role	Responsibility
Forestry Project Manager	<ul style="list-style-type: none"> 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.
Forestry Site Supervisor	<ul style="list-style-type: none"> 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 (including independent arborist)	<ul style="list-style-type: none"> contribute to effective environmental management at the site for the life of the project, by implementing this CEMP within their area of 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 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 Partial Clearing works covered 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
- 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 Site Supervisor or delegate. All contractors for the Partial Clearing 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 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 Site Supervisor for the Partial Clearing 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 Partial Clearing works detailed in Section 1.2 are provided in Table 4-2.

Table 4-2 Emergency contact details relevant to the Partial Clearing 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
Forestry	Site Supervisor	TBA
Independent arborist contractor	-	TBA

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 Partial Clearing works detailed in Section 1.2
- 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 Partial Clearing works would include:

- notice to local residents of proposed clearing 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 clearing works outlined in Section 1.2. 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, 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 Eurobodalla Shire Council 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 effect
- 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: <ol style="list-style-type: none"> act to control and correct the non-compliance 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: <ol style="list-style-type: none"> reviewing the non-compliances determining the cause of the non-compliances 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 Partial Clearing works covered by this CEMP, as detailed in Section 1.2.1, is only five months (February 2022 to end of June 2022). 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

Appendix B Construction Soil and Water Management Plan



Construction Soil and Water Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
28 January 2022

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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) and relates to the partial clearing of the permanent works design area, ancillary works and inundation areas, herein referred to as the “Partial Clearing works”, for the Eurobodalla Southern Water Supply Storage Project (the Project). The Partial Clearing works area is herein referred to as the “clearing boundary”.

Subject to approvals, the Partial Clearing works covered under this CFFMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 1-1). Figure 1-2 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP). Further details of the Partial Clearing works covered under this CSWMP are provided in Section 5.1.

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 1-3):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability (as depicted in Figure 1-5). No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required. An example of an indicative loading area is depicted in Figure 1-4.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area. Non-harvestable organic matter would be spread over disturbed areas to provide soil and erosion stability. This is understood to be common Forestry practice during clearing operations and is depicted in Figure 1-5.

The site is intended to be left in a stable condition after Partial Clearing works, with the storage construction contractor to complete the remainder of the site clearing (post Partial Clearing works) in future stages of the Project (further details provided in Section 1.2). This will be addressed in subsequent CEMP documents to be prepared by the successful construction contractor.

The Partial Clearing works will reduce the complexity of future stages of clearing works associated with the Project and prevent delays as a result of logistical and safety issues associated with multiple contractors undertaking clearing and construction activities concurrently. The minimising and avoidance of delays during clearing works will in turn minimise erosion and sedimentation risks by:

- Minimising the duration of exposure of disturbed areas
- Minimising the duration of ground disturbance works
- Reducing logistical and safety complexities which may compromise the implementation of environmental controls and measures outlined in this CEMP
- Minimising delays to the commencement of dam filling and wet commissioning of the Project

The Partial Clearing works covered under this SWMP are confined to vegetation clearing only. Excavation and earthworks may be required to facilitate access to the site and establish loading areas for the plant and equipment required to undertake the clearing.

This CSWMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the clearing 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 Partial Clearing works by providing a structured approach to ensure appropriate mitigation measures and controls are implemented.




1.2 Background and project description

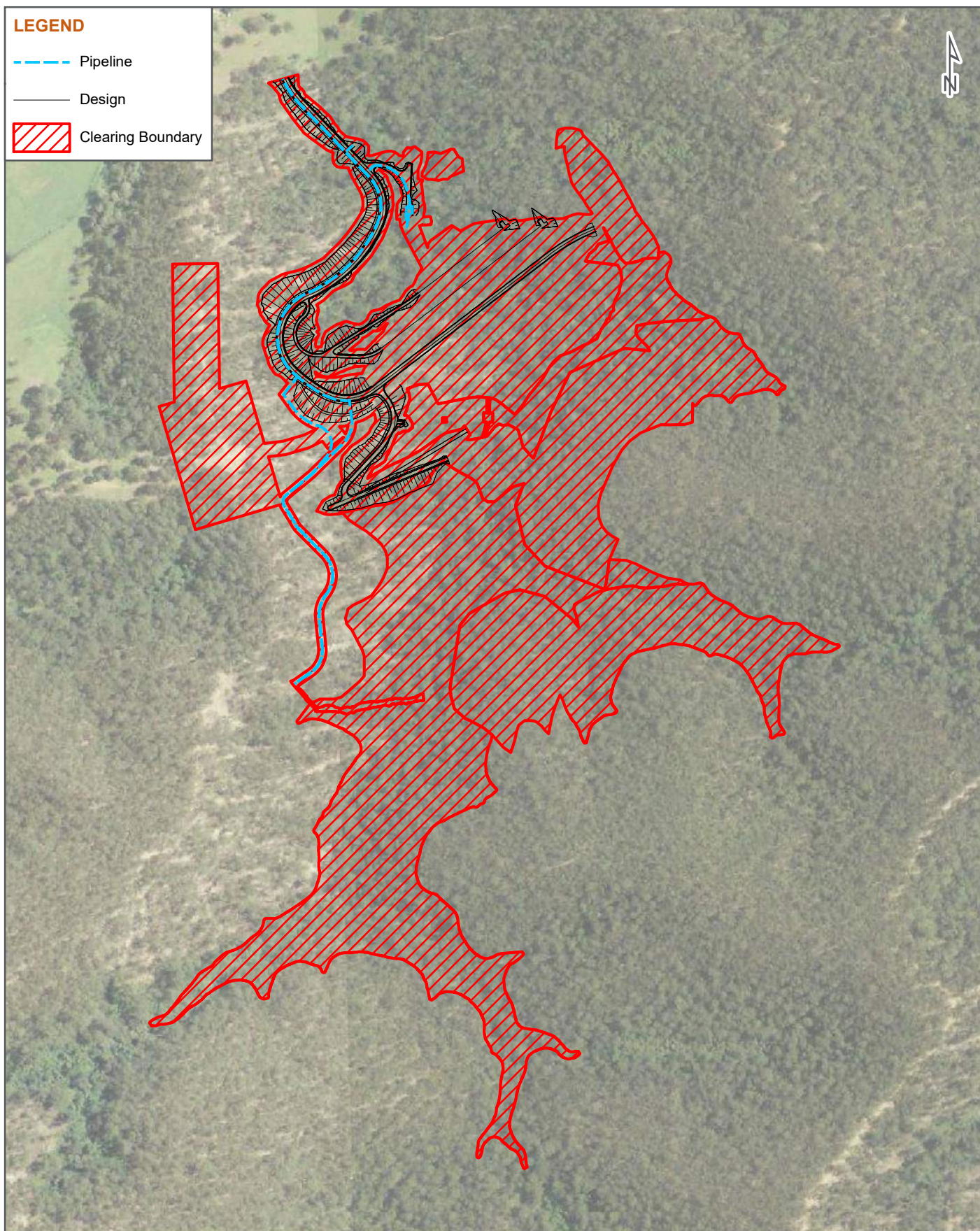
The EIS assessed the impacts of construction and operation of the Project regarding soil and water within Chapter 7 (Water resources and geomorphology) and Chapter 14 (Soils etc.). A Response to Submissions was subsequently prepared, which included additional information and safeguards pertaining to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

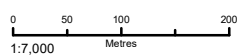
The Project is located approximately 30 kilometres south of Moruya, within the Eurobodalla Local Government Area (LGA). The Permanent Works area are within the Bodalla State Forest. The Storage Site is north-facing, bound by Bullockys Hut Road to the west, Eurobodalla Road to the north and Big Rock Road 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. Figure 1-1 provides an outline of the clearing boundary and scope of works.

LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



DATE 13/12/2021



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Partial Clearing works scope covered under this CSWMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CSWMP

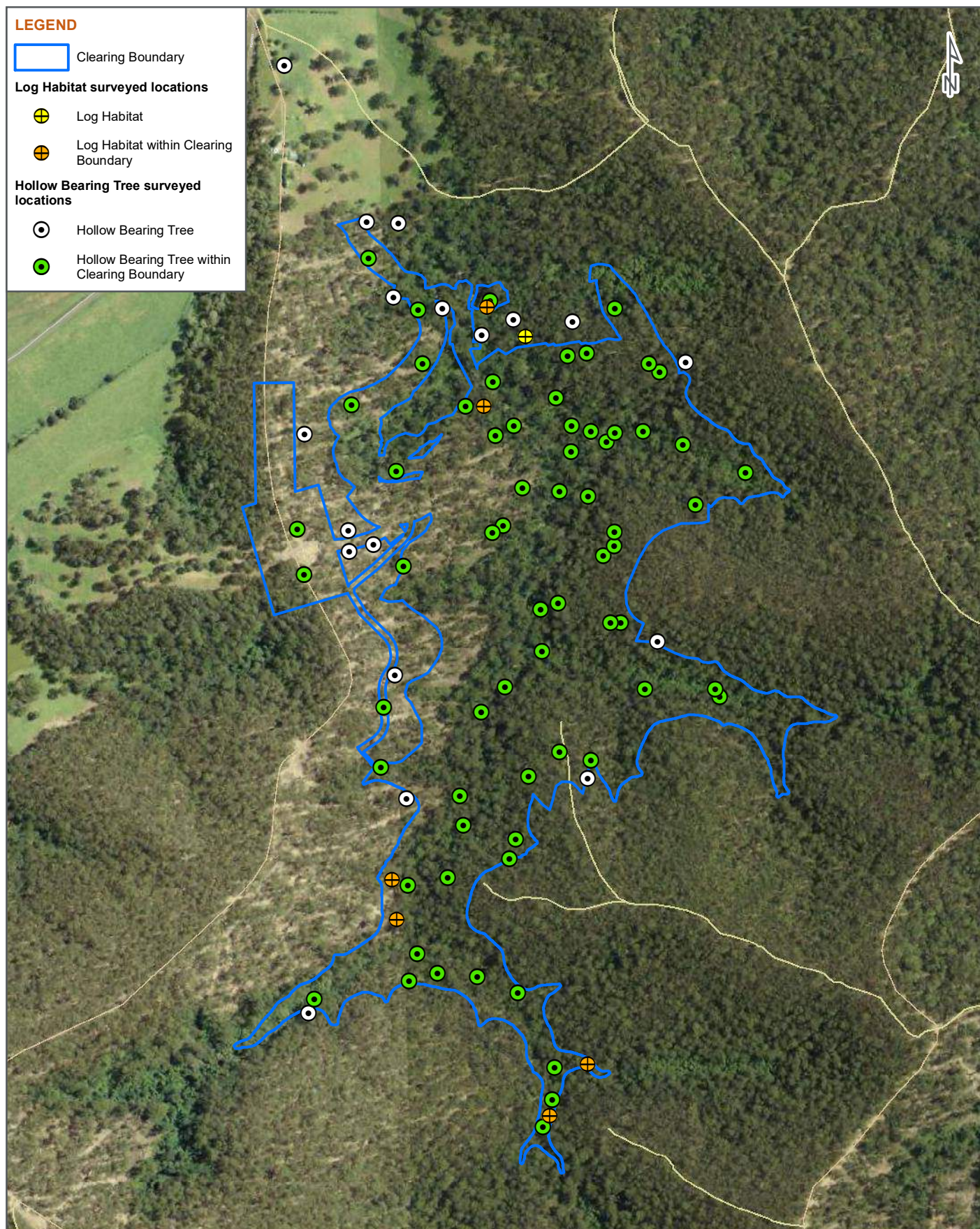
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FIG NO. 1-2

FIGURE TITLE Hollow-bearing tree mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Partial
Clearing works - CSWMP

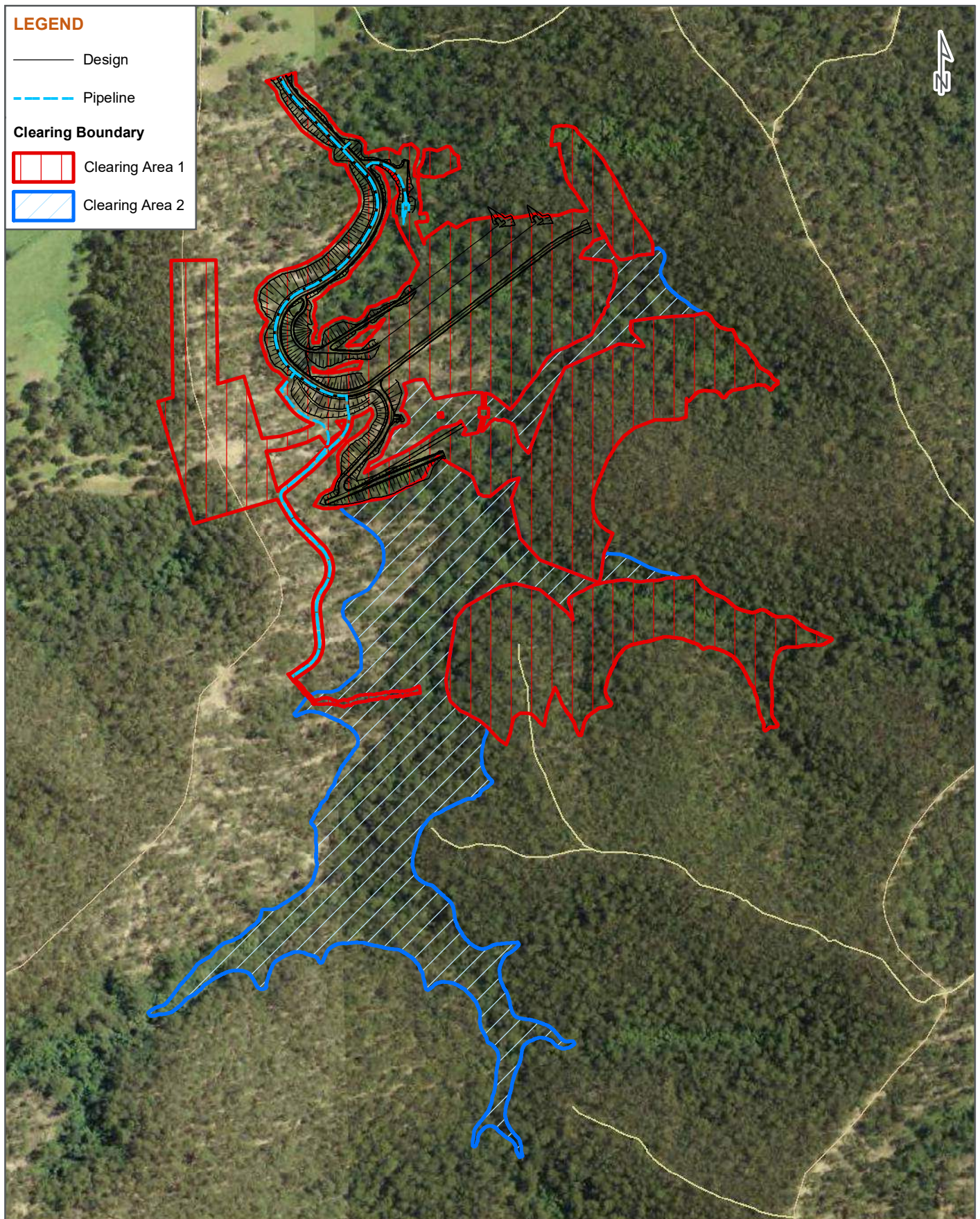
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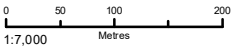

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DATE 23/11/2020		PAGE SIZE A4	COORDINATE SYSTEM GDA 1994 MGA Zone 56	
FIG NO. 1-3	FIGURE TITLE Clearing Area Type Mapping			
PROJECT NO. 30012835	PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works CSWMP			
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Figure 1-4 Typical loading area arrangement



Figure 1-5 Retaining and use of non-harvestable organic material to treat cleared areas to provide erosion and soil stability

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 Partial Clearing works .

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 Permanent Works Area clearing:

- 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 1.1 Appendix A Appendix B
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 90 th or 95 th percentile 5-day rainfall depth where possible.	Section 4.3
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 (b) the NSW EPA's Storing and Handling of Liquids: Environmental Protection – Participants Manual if the chemicals are liquids.	Section 6.4.3

Condition reference	Condition	Where addressed in CSWMP
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 Partial Clearing works 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 clearing 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 Partial Clearing works.

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.

The Project itself intercepts an unnamed third order ephemeral stream and this minor catchment area comprises the Bodalla State Forest, owned and managed by the Forestry Corporation of NSW. The catchment area for the water storage land usage consists of semi-dense forested areas at the upper reaches of the valley with a transition to cleared pasturelands towards the lower reaches. During recent monitoring by Council, ephemeral streams have been observed to flow in certain high rainfall conditions (i.e. after rainfall events of approximately 30 millimetres/day or more).

Figure 4-2 is taken from the Conceptual Erosion Sediment Control Plan (CESCP) (SMEC, 2018c) outlines the location and expected surface flow behaviours of the Partial Clearing works clearing boundary and broader Project Site. It also identifies conceptual construction catchments for the major elements of the Project in accordance with the proposed design. Note that construction works associated with the design and water storage facility do not form part of the Partial Clearing works scope. The construction catchments outlined in the CESCP would be subject to further refinement as detailed erosion hazard assessments are carried out in future stages of the Project.

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 Permanent Works Area. A summary of relevant soil landscapes within the Permanent Works 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 Site Clearing works 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 Site Clearing works are located within this landscape.
- **Tuross River (ts)** – This soil landscape occurs on floodplains, levees and channels of the Tuross River. Soils are described as quaternary alluvium comprising coarse sand and sandy loams, to sandy clay loams, with gravel and cobble layers common. Soils in this landscape have limitations associated with high energy flooding, and extensive streambank erosion. The current land use is for grazing on cultivated and improved pastures.

The Partial Clearing works 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 carried out within the Permanent Works 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 5 m depth ranging from gravelly clay/silt through to imbricated clast supported cobble deposits were encountered in the creek bed.

The following points outline the findings of geotechnical investigations carried out for key features of the Permanent Works Area. Further details are presented within the Geotechnical Investigations Factual Report (SMEC, 2018a) and Geotechnical Investigations Interpretive Report (SMEC, 2018b). Figure 4-1 details the location of geotechnical investigations discussed below.

- Emerson aggregate testing (Emerson Class AS1289.3.8.1) was carried out to assess soil dispersion properties at twelve test pits locations as shown in Figure 3-3. The test pits were located within the following Project design elements;
 - Reservoir Rim: Eight test pits (TP-US1 to TP-US8) were excavated around the ‘rim’ of the proposal full supply level between approx. 40 to 50 m AHD, with the exception of one test pit (TP-US4) located within the existing ephemeral creek approximately 25 m AHD.
 - Embankment: Five test pits (TP-D4, TP-D6, TP-D8, TP-D10 and TP-D11) were excavated within the footprint of the embankment structures on valley slopes between 25 and 45 m AHD, with the exception of one test pit (TP-D8) located within the existing ephemeral creek / valley at approximately 17 m AHD.
- From engineering logs, subsurface conditions typically comprised 0.3-0.6 m thick layer of topsoil comprising gravelly and clayey silt, overlying sedimentary rock described as siltstone, brown-red-orange and grey, extremely to highly weathered.
- Relevant geotechnical testing included particle size gradings (% gravel, sand and silt/clay), Atterberg limits (Liquid Limit, Plastic Limit and Plasticity Index) and Emerson class. AS1289.3.8.1 - 2006 Methods of testing soils for engineering purposes Soil classification tests Dispersion – Determination of Emerson class number of a soil, was carried out on up to twelve sampling locations, targeting various depth intervals within extremely to highly weathered sedimentary rock material (between 0.5 m and 2.0 m below ground level).
- It is noted that test results represent rock between 0.5 m and 2.0 m within extremely to highly weathered siltstone, and no samples were taken within overlying layer of topsoil (approximately 0.4 m thick).

With respect to this erosion and sediment control plan, an interpretation of the results is as follows:

- the Emerson class results indicate the extremely to highly weathered siltstone sedimentary rock as having either a slight to moderate dispersion potential (Class 3 or Class 5) or moderate to very high dispersion potential (Class 2). Negligible dispersion potential (Class 7) was noted at six locations (TP-US1, TP-US2, TP-US8, TP-D4, TP-D10 and TP-D11) which were located on steep valley slopes above 25 m AHD.
- in general, exposed soils with Emerson Class 1 to 4 (in particular class 1 and 2) need to be treated with extra caution in dam construction (Fell et al “Geotechnical Engineering of Dams, 2nd edition”, (2015), London, Taylor and Francis Group). On a preliminary level, the Emerson test results indicate there is a risk the exposed rock in some areas is dispersive, thus presenting some risks to earthworks if subjected to water flow and/or if not treated or managed.
- a site-specific assessment of soil erodibility factor (K-factor) was carried out using the derivation methods outlined in the Bluebook (Appendix A, pA6-A7 & Figure A3, Landcom, 2004) and the results of geotechnical investigations and testing. Required input parameters include particle size analysis, organic matter (%), soil structure, (i.e. very granular, fine granular, medium and coarse granular, or blocky, platy and massive) and profile permeability (Ksat). The soil erodibility factor (K-factor) was calculated using the above geotechnical laboratory test data (test location TP-US1) within the proposed northern quarry area. As a conservative assumption, the percentage of sand, silt and clay was adopted (i.e. % passing the 2.36 mm sieve). A K-factor of 0.042 was estimated based on assumed very fine granular soil structure and slow permeability materials.

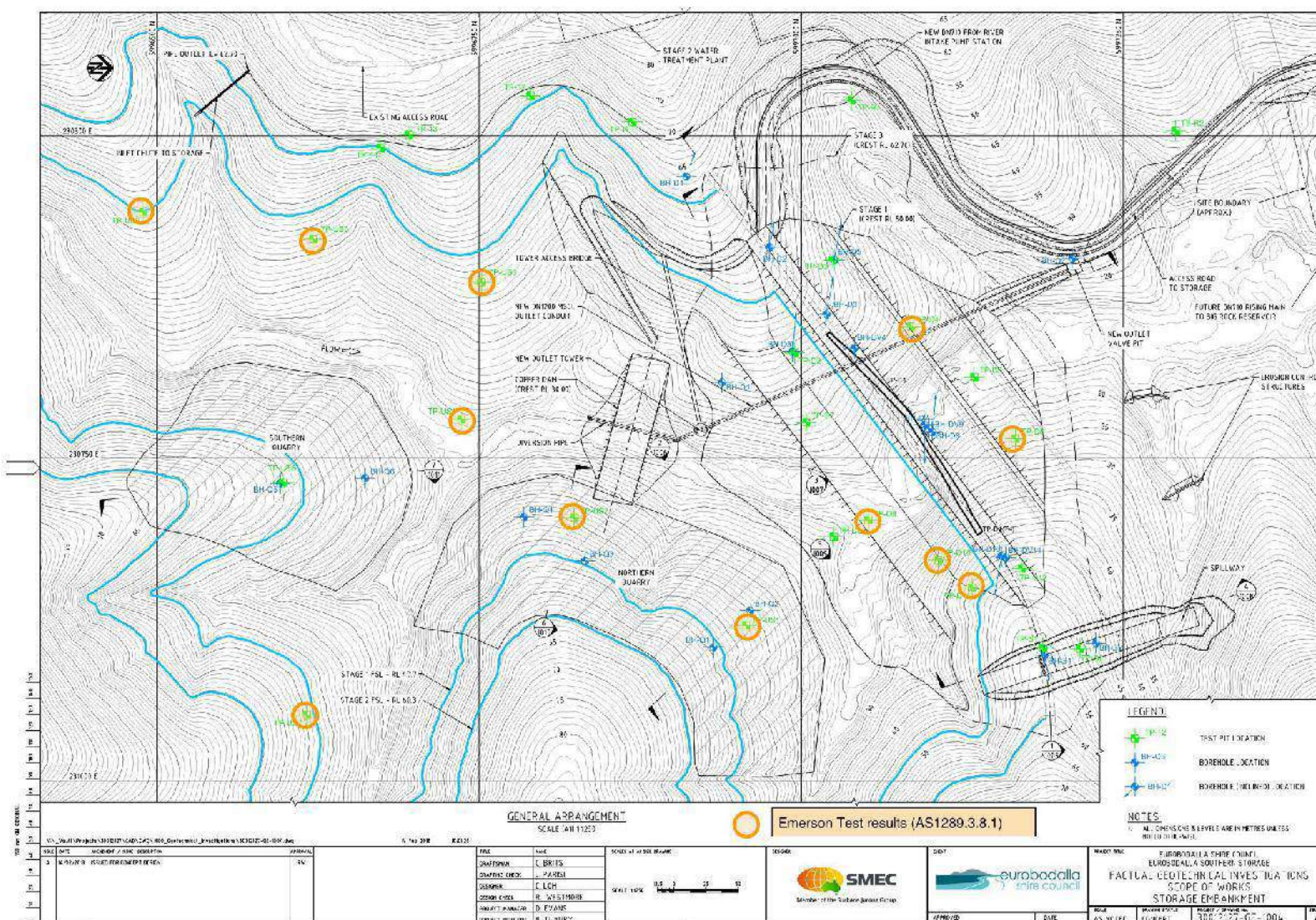


Figure 4-1 Geotechnical Investigation Locations

4.3 Erosion hazard

This section outlines the erosion hazard assessment that was carried out as part of the Conceptual Erosion and Sediment Control Plan (CESCP, Ref: 30012127_R10) for the Project, using the Revised Universal Soil Loss Equation (RUSLE). The assessment considers the erosion hazard associated with the water storage facility construction.

The Partial Clearing works would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs). Localised grubbing and clearing will be required during the clearing of trees greater than 30cm in diameter with Clearing Area 1 (refer Figure 1-3) and for establishing loading areas to facilitate the clearing works. No grubbing is proposed within gullies. It is the intent of the Partial Clearing works to retain non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area. In areas requiring grubbing with Clearing Area 1, grubbed organic material (tree stumps, roots) will be spread across the disturbed area to provide soil stability. Therefore, the erosion hazard of the Partial Clearing works is considered to be lower than for future site clearing and construction stages of the Project.

Nonetheless, the CESCP assessment highlights the need to appreciate the erosion hazard within the Partial Clearing works clearing boundary and has been used to inform this CSWMP. A detailed erosion hazard assessment is recommended to be undertaken during the development of progressive ESCPs for future stages of the site clearing and construction for the Project.

The RUSLE formula is as follows:

$$A = R \times K \times LS \times P \times C$$

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 normally required. However as discussed earlier in this section, given the reduced scope of the Partial Clearing works compared to future clearing and construction stages of the Project and the preservation of undergrowth and non-commercially viable timber/organic matter, sediment basins may not be practical to implement. Consideration has instead been given to the use of intact and non-commercially viable vegetation as the basis of erosion and sediment management (refer to Section 6). The sizing and location of sediment basins would need to be considered during the development of progressive ESCPs for future stages of the Project.

Table 4-1 summarises the RUSLE assessment finding for the Storage Site Clearing works construction catchments as defined in Figure 4-2. The RUSLE calculation sheets are available in Appendix D.

Soil loss for the construction activities associated with the generally range from High to Very High. The Soil Loss Class is a measure of erosion hazard that underpins the erosion control aspects of these guidelines.

Note that Construction Catchment C5-4 is associated with the Stage 1 Storage Access Road and Inlet Works and Catchment 8 is associated with the Stage 1 TRIPS Construction works. These catchments are considered in separate Environmental Management Plans and are considered outside the scope of works associated with the Partial Clearing works.

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)	Soil loss class	Erosion Hazard
Catchment 1	C1-1	1.17	1819	1632	7	Extremely High
	C1-2	1.02	1094	858	6	Very High
	C1-3	0.49	1093	412	6	Very High
Catchment 2	C2-1	0.79	2015	1223	7	Extremely High
	C2-2	0.99	2039	1553	7	Extremely High
	C2-3	0.77	1996	1175	7	Extremely High
	C2-4	1.27	1924	1883	7	Extremely High
Catchment 3	C3-1	0.33	1115	284	6	Very High
	C3-2	0.25	1928	366	7	Extremely High
Catchment 4	C4-1	3.75	3188	9198	7	Extremely High
	C4-2	3.21	3418	8427	7	Extremely High
Catchment 5	C5-1	0.98	698	526	5	High
	C5-2	0.98	2177	1637	7	Extremely
	C5-3	1.63	1464	1834	6	Very High
	C5-4*	0.86	62	41	1	Very Low
Catchment 6	C6-1	0.16	1274	158	6	Very High
	C6-2	0.39	3335	1012	7	Extremely High
	C6-3	0.14	2576	279	7	Extremely High
Catchment 7	C7-1	2.2	997	1686	6	Very High
Soil loss classes and erosion hazard: Extremely high (7), Very high (6), High (5), Moderate (4), Low-moderate (3), Low (2), Very low (1)						
*Construction Catchment C5-4 is associated with the Stage 1 Storage Access Road and Inlet Pipeline Works and is considered separately from the Storage Site Clearing works covered in this plan.						

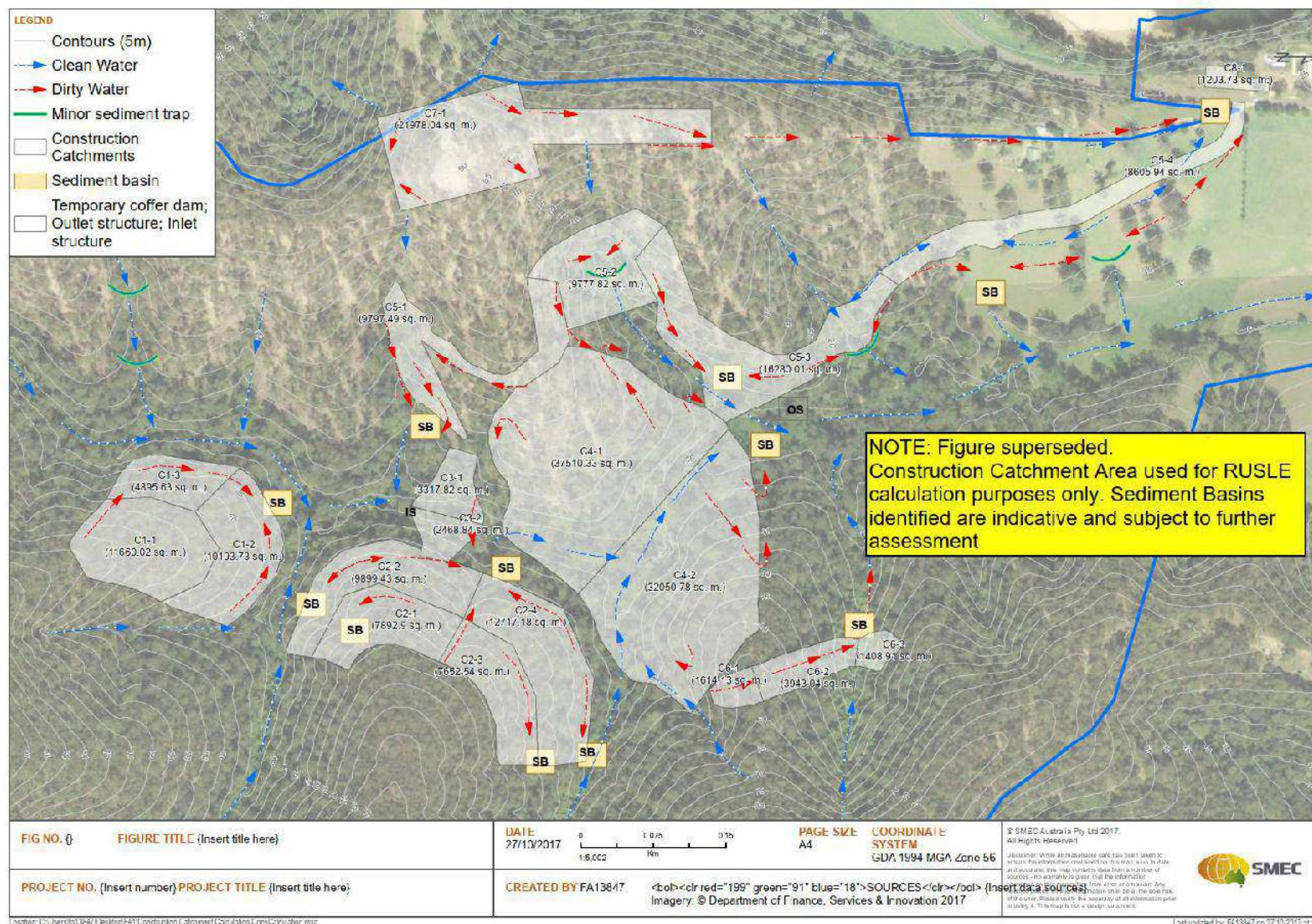


Figure 4-2 Conceptual Construction Catchments used for RUSLE calculations (SMEC, 2018c). Note that construction of the water storage facility is outside the Partial Clearing works scope and that the construction catchments presented here will be further refined in future stages of the Project.

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 Partial Clearing works 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 Partial Clearing works

The Partial Clearing works are outlined in this section. More generally, clearing activities will typically include:

- site establishment activities typically including:
 - establishment of haul routes and loading areas within the Partial Clearing works clearing boundary
 - temporary and permanent erosion control structures including construction catch drains
- clearing of access tracks, haul routes and loading areas
- on-going establishment and implementation of erosion control measures
- clearing of Partial Clearing works area.

Subject to approvals, the Partial Clearing works covered under this CFFMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 1-1). Figure 1-2 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP). The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 1-3):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability (as depicted in Figure 1-5). No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required. An example of an indicative loading area is depicted in Figure 1-4.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area. Non-harvestable organic matter would be spread over disturbed areas to provide soil and erosion stability. This is understood to be common Forestry practice during clearing operations and is depicted in Figure 1-5.

The Partial Clearing works covered under this SWMP are confined to vegetation clearing only. Excavation and earthworks may be required to facilitate access to the site and establish loading areas for the plant and equipment required to undertake the clearing.

5.1.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the CSWMP (this plan). Progressive erosion and sediment control would be installed during initial partial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of 'no-go zones' with the installation of high-visibility bunting to clearly mark these areas.

- implementation of a nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (CFFMP).

5.1.2 Clearing within Partial Clearing works clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs). Figure 1-2 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Nest Box Management Plan (Appendix C).

Within Clearing Area 1 (refer Figure 1-3), localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

As required, soil and erosion control works shall be completed progressively during clearing operations to minimise soil erosion. Soil and erosion control works shall be carried out in accordance with the conditions of the Development Consent, and the CSWMP (this plan).

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

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 Partial Clearing works and their interaction with the natural environment. If inadequately managed, Partial Clearing works 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 minor earthworks

- exposed 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 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

The following sections outline the key management strategies that underpin this CSWMP and have been developed from the Blue Book principles including:

- delineation of ‘no-go zones’ with the installation of high-visibility bunting to clearly mark these areas.
- staged clearing of existing vegetation within the clearing boundary to prevent soil destabilisation
- minimising extent and duration of disturbance
- preserving groundcover and smaller/non-harvestable trees as much as practicable, with complete grubbing and clearing of areas minimised and limited to establishment of access tracks and loading areas
- diversion berms to divert water into vegetated areas
- utilisation of intact vegetation and non-harvestable organic matter to provide soil stability in areas of ground disturbance
- buffer zone of 5m for machinery access from ephemeral creeks/major gullies, with removal of vegetation to be carried out by machinery reaching in from outside the buffer zone
- 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, with on-going monitoring and assessment of erosion and sediment controls by to be performed by a suitably qualified independent erosion and sediment control specialist.
- scheduling construction activities outside of inclement heavy rainfall periods or high river flows.
- works carried out Environmental Work Method Statements (EWMS) prepared by Forestry, including effective consultation and implemented by construction personnel (including independent arborist contractor).

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

This Erosion and Sediment Control Plan (ESCP) includes the minimum requirements to be progressively installed by Forestry during the works. Standard controls are identified where relevant to the Partial Clearing works in the following sections.

Further, due to the dynamic nature of the Partial Clearing works, a risk based approach is proposed whereby management strategies outlined in this ESCP would be implemented on a “Trigger Action Response” basis. A “Trigger Action Response Plan” (TARP) has been developed and informed by this ESCP and is attached in Appendix A to define the implementation of erosion and sediment management strategies.

6.3.1 Consultation with agencies

Eurobodalla Shire Council 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. To date, agency responses to consultation have been received from the NSW EPA (received 20 January 2022) and DPI Fisheries (received 20 December 2021). No response has been received from NRAR (request for consultation sent on 21 December 2021). Evidence of consultation with agencies is provided in Appendix B.

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 6-1 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 6-1 Standard erosion and sediment controls, Storage Site Clearing works

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
Temporary waterway crossing	SD 5-1	5-14 Blue Book	Y
Rock check dams	SD 5-4	5-22 Blue Book	Y
Earth Bank (low flow) ¹	SD 5-5	5-25, Blue Book	Y
Sediment Fence	SD 6-8	6-36 Blue Book	Y
Stabilised Site Access	SD 6-14	6-48 Blue Book	Y
Temporary batter drains – typical arrangement	C2	Vol 2D Appendix C, p57	Y
Check dams in drains and gullies	C3 Figure 32	Vol 2D Appendix C, p58 NSW OEH (2012), p41	Y
Sediment Traps at drop inlets	C5	Vol 2D Appendix C, p60	Y
Catch drains	Figure 16	NSW OEH (2012)	Y
Temporary cross drain	Figure 14	NSW OEH (2012)	Y
Temporary crossing (Culvert)	Figure 27	NSW OEH (2012)	Y
Batter slope stabilisation (various)	Table D1 Group 1	Vol 2D Appendix C, p61	Y – (if required)

¹Earth banks and water diversion berms are considered the primary water diversion control to be implemented as part of the Partial Clearing Works. Examples of diversion berms utilised by Forestry are provided in Figure 6-1.



Figure 6-1 Water diversion earth banks/berms

6.3.3 Higher Risk Catchments

6.3.3.1 Works within ephemeral creek and steep valley slopes

The Partial Clearing works clearing boundary encompasses several indicative construction catchments that are located within or near existing ephemeral creek lines and on steep valley slopes (refer to Figure 4-2).

Proposed clearing activities and earthworks within the ephemeral creek are likely to include:

- vegetation clearing (detailed in Section 5.1)
- creek bank stabilisation
- construction of temporary and permanent erosion control structures
- construction of storage access road, temporary haul routes and temporary creek crossings.

The following erosion and sediment control measures should be considered:

- providing controls in accordance with the objectives for Category 3 Bank Stability and Water Quality (Section 5.2 of Bluebook). This includes:
 - using pipes or other engineering devices as last resort
 - Ensure that road crossings are designed to maintain clean water flow through the site.
- buffer zone of 5m for machinery access from ephemeral creeks/major gullies, with removal of vegetation to be carried out by machinery reaching in from outside the buffer zone
- early installation of ‘temporary creek crossings’ along the haul route to ensure clean water diversions are effective. Temporary crossings should be made by laying a clean layer of rock within a shallow section of the crossing, with clean water diverted beneath via a ribbed culvert pipe. To protect the mainly dry watercourse, a sediment weir with downstream rock for scour protection may also be required. Locations of typically clean water flow paths and creeks are shown in Figure 6-2 and would be referenced to determine the need for a temporary creek crossing should a track/haul route need to be established.

6.3.3.2 Inundation Area

Elevated risks are present within the inundation area (corresponding to Clearing Area 2, refer to Figure 1-3), including up-gradient of the proposed temporary coffer dam, to the limits of vegetation clearing. If unmanaged, there is potential for destabilised topsoil properties and steep land slopes following land clearing of vegetation to pose ‘very high erosion risks’ through exposure to raindrop impact (sheet, rill erosion) and concentrated water flows within gullies and wind erosion. Destabilised soils have the potential to wash into the construction area, increasing the volume of sediment laden water requiring treatment and management.

Proposed activities within the inundation are likely to include:

- vegetation clearing, tree felling
- installation of temporary erosion and sediment controls and batter stabilisation measures
- haul routes

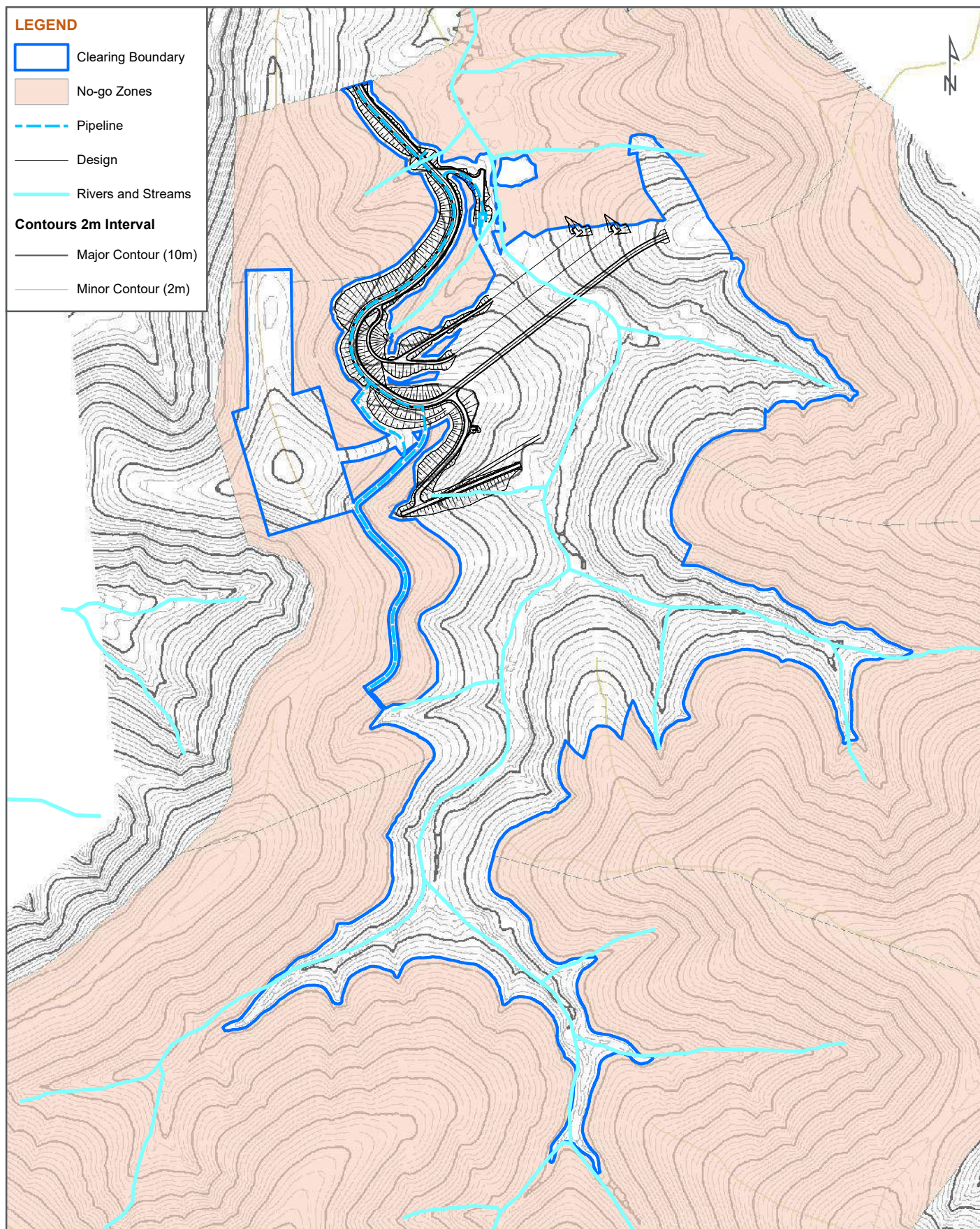
The following with respect to erosion and sediment control measures should be considered:

- staged vegetation clearing and progressive stabilisation measures are to occur where appropriate within exposed slopes of this catchment to prevent erosion and sediment risks during construction phase
- ‘tree stumps’ remain in the ground where possible. This will assist in the stabilisation of soils from potential wind and water erosion on exposed cleared areas and batter slopes
- cleared areas should be protected using standard erosion and sediment control measures for slopes (i.e. use of non-harvestable organic material- as cover, breaking up slope length with berm catch drains or installation of sediment fencing).

6.3.4 Maintaining vegetation and use of non-harvestable organic material

Vegetation clearing, including tree felling and slashing within the clearance boundary is required to be carried out during the Partial Clearing 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:

- delineation of 'no-go zones' with the installation of high-visibility bunting to clearly mark these areas (Figure 6-2 "No-go" zones and creek mapping.
- preserving groundcover and smaller/non-harvestable trees as much as practicable
- grubbing and soil disturbance should be minimised and limited to clearing of trees with diameter greater than 30cm within Clearing Area 1 (Figure 1-3) and the establishment of haul routes and loading areas. No grubbing will take place within gullies in Clearing Area 1. Retained roots can assist in soil stabilisation and some regrowth and coppicing can assist in the rehabilitation stage post construction
- utilisation of intact vegetation and non-harvestable organic matter to provide soil stability in areas of ground disturbance (e.g. spread over disturbed earth). This is demonstrated in Figure 6-3.
- 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 within Clearing Area 2 (Figure 1-3). Where localised grubbing has occurred within Clearing Area 1, grubbed organic matter (tree stumps, roots) will be spread over the disturbed area to provide soil stability.
- no vegetation clearing is to be carried out in "No-go" zones as defined in Figure 6-2.



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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 6-2

FIGURE TITLE "No-go" zones and creek mapping

PROJECT NO. 30012835

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

CREATED BY FA13847

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Figure 6-3 Spreading of non-harvestable organic matter for soil stability where ground cover has been disturbed, typical practice of by Forestry during tree clearing

6.3.5 Stockpile Management

Stockpiling of material is not expected to occur during the Partial Clearing works. Minor earthworks are required for the establishment of haul routes and loading areas; however, these activities aren't expected require stockpiling of material. No other earthworks are proposed. Should the need for stockpiling occur, the 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.

6.3.6 Weed control and management

Weed control will be carried out prior to vegetation clearing for the Partial Clearing 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.

6.3.7 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.'

Mulching of organic matter is not proposed as part of the Partial Clearing activities, however non-harvestable organic matter will be used to cover cleared/disturbed areas. Eurobodalla Shire Council would assess and employ tannin management control measures wherever organic matter is re-used onsite (e.g. as ground cover over disturbed areas). Reference would be made to suitable control measures within the RMS Environmental Direction (RMS, 2012) including but not limited to:

- preserving groundcover and smaller/non-harvestable trees as much as practicable
- visual monitoring during wet weather events for evidence of tannins. Tannin impacted water can be readily identified visually as dark coloured ponded water.
- organic matter would be spread evenly and placed along the contours (where practicable) to reduce concentrated flows

6.3.8 Batter stabilisation

- During the Partial Clearing works, undergrowth and non-harvestable trees are to remain intact as far as practicable on steep embankments. Haul routes and loading areas would not be established on steep embankments. Where required, slope lengths will be reduced by breaking up the slope along the contour with the use of sediment fencing or berm drains are proposed to be used (at least every 25 m where practical)

- Where practical or where vegetation undergrowth cannot be maintained, polymer stabilisation methods will be used over areas of exposed soils, particularly steep slopes. Suitable polymer products will be identified by the Partial Clearing works independent qualified erosion and sediment control specialist where required.

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
- on-going monitoring and assessment of performance and adequacy of erosion and sediment controls by to be performed by a suitably qualified independent erosion and sediment control specialist.
- additional visual monitoring inspections to be undertaken during wet weather (heavy rainfall) as outlined in Section 7.3.1.

6.4.2 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
- 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 an independent 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
Forestry Project manager/Environment Coordinator	<ul style="list-style-type: none"> develop/review Environmental Work Method Statements for compliance with this CSWMP review and update of Progressive Erosion and Sediment Control Plans (as required) monitoring and inspections within this CSWMP complete self-audits and monitor compliance with this CSWMP.
Independent qualified erosion and sediment control specialist	<ul style="list-style-type: none"> on-going monitoring as assessment of the performance and adequacy of erosion and sediment controls

7.2 Training

Training of all contractors and management staff will be conducted prior to the Partial Clearing 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 Partial Clearing 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 Partial Clearing 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 Site Supervisor/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 Partial Clearing works clearing boundary directed towards Tuross river
- tannin impacted runoff from use of non-harvestable organic matter
- 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 Site Supervisor/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 Partial Clearing works, noting that vegetation clearing activities will not involve any major earthworks adjacent to or have 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 8-1 outlines 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	<p>A Hydrology and Consequence Assessment would be carried out to inform the detailed design.</p> <p>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.</p>	Council	Detailed design
Flooding	<p>Construction planning would consider flood risk for all compounds and work sites.</p> <p>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.</p>	Construction contractor	Pre-construction Construction
Hydrology	<p>Measures to further avoid and minimize the construction footprint will be investigated during detailed design and implemented where practicable and feasible.</p> <p><i>Note that the design has been revised since the EIS was submitted to further avoid and minimize environmental impacts.</i></p>	Council	Detailed design
Hydrology	<p>Additional assessment of scour potential would be undertaken as necessary during the detailed design. This would include the development of appropriate mitigation measures.</p> <p><i>Note that the design has been revised since the EIS was submitted. The current design would prevent scour.</i></p>	Council	Detailed design
Hydrology	<p>Works within or near watercourses would be undertaken with consideration given to the DPI Water's guidelines for controlled activities.</p>	Construction contractor	Pre-construction Construction
Water quality	<p>Water quality control systems would be incorporated into the detailed design to ensure that relevant WQOs can be met during water discharge.</p>	Council	Detailed design

Impact	Environmental safeguards	Responsibility	Timing
	<i>This does not relate to the Partial Clearing works as no discharges are proposed.</i>		
Water quality	<p>The current WQMSP will be revised (as necessary) and implemented during construction and operation of the proposal. The plan will specify:</p> <ul style="list-style-type: none"> • 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. 	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	<p>Discharges would be monitored to ensure compliance with WQOs and discharge criteria in the Environment Protection Licence.</p> <p><i>This does not relate to the Partial Clearing works as no discharges are proposed.</i></p>	Construction Contractor Council	Pre-construction Construction Operation
Water flows	<p>Water extraction will be in accordance with the Tuross River WSP</p> <p><i>This does not relate to the Partial Clearing works as no extractions are proposed.</i></p>	Council	Operation
Temporary structures	<p>Temporary in stream structures will be constructed in accordance with the NSW DPI policy guideline and will:</p> <ul style="list-style-type: none"> • 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. • If require, dewatering of temporary in-stream structure should follow the following guidelines: 	Construction contractor	Pre-construction of storage site and in-stream works for TRIPS site. Construction

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> — 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. <p><i>This does not relate to the Partial Clearing works as no in-stream construction and no de-watering of in-stream structures is proposed.</i></p>		

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	<p>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.</p> <p><i>This does not relate to the Partial Clearing works as no discharges are proposed.</i></p>	Construction Contractor	Construction
Water quality	<p>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.</p> <p><i>This does not relate to the Partial Clearing works as no discharges are proposed.</i></p>	Construction Contractor	Construction
Water quality monitoring	<p>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.</p> <p><i>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.</i></p>	Construction Contractor Council	Pre-construction Construction Operation

9 References

- Fairfull, S. 2003.** *Department of Primary Industries Policy and guidelines for fish habitat conservation and management*, . Sydney : Department of Primary Industries, NSW Government, 2003.
- IECA. 2008.** *Best Practice Erosion and Sediment Control*. s.l. : International Erosion Control Association Australasia, 2008.
- NSW OEH. 2012.** *Erosion and Sediment Control on Unsealed Roads*. Sydney : NSW Office of Environment and Heritage, 2012.
- SMEC. 2019c.** *Eurobodalla Southern Storage - Storage Design Report*. North Sydney : SMEC Australia, 2019c. 30012127_R18_V02.
- . **2018c.** *Eurobodalla Southern Storage Conceptual Erosion and Sediment Control Plan*. North Sydney : SMEC Australia, 2018c. 30012127_R110, Revision 02.
- . **2017.** *Eurobodalla Southern Storage Water Quality Monitoring and Sampling Plan*. North Sydney : SMEC Australia, 2017. 30012127_R01.
- . **2018a.** *Eurobodalla Southern Storage, Storage Geotechnical Investigation - Factual Report*. North Sydney : SMEC Australia, 2018a. 30012127_R14_V01.
- . **2018b.** *Eurobodalla Southern Storage, Storage Geotechnical Investigation - Interpretive Report*. North Sydney : SMEC Australia, 2018b. 30012127_R15_V03.
- Talau, M. J. 2002.** *Soil Landscapes of the Narooma 1:100,000 Sheet*. Sydney : Department of Land and Water Conservation, 2002.
- Witheridge, Fairfull &. 2003.** *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*. 2003.

Appendix A Erosion and sediment control plan (TARP)

Aspect	Trigger	Action/Response	Notifications
Water diversion	Clean water bypasses through dirty water areas	<p>Inspect and repair clean water diversions (earth banks, berms)</p> <p>Review CSWMP and design capacity of clean water diversion structures (earth banks, berms)</p> <p>Where review of the sediment and erosion controls is undertaken, additional controls be recommended, where relevant, to prevent a recurrence</p>	Alert Forestry Project Manager/Environment Coordinator
Water diversion	Haul route or track use is finished and no longer needed	Establish clean water diversion structures (earth banks, berms) on haul route/tracks of disturbed areas to divert water into vegetated areas	Alert Forestry Project Manager/Environment Coordinator
Creek Crossings	Planned haul route or track to be established over creek	<p>Implement Standard Control Temporary waterway crossing (SD 5-1, Blue Book 5-14)</p> <p>Creek mapping (CSWMP Figure 6-2) should be referenced to confirm the presence of creek</p>	Alert Forestry Project Manager/Environment Coordinator
Wet Weather	Forecast of inclement wet weather flooding or extreme precipitation event	<p>Establish clean water diversion structures (earth banks, berms) on tracks/upstream of disturbed areas to divert water into vegetated areas</p> <p>Inspection of erosion and sediment control structures to ensure integrity</p>	Alert Forestry Project Manager/Environment Coordinator
General Erosion and Sediment Control	One (1) or more areas have indicated surface erosion in the form of movement of sediment from an area of disturbance/clearing	Review the effectiveness of current erosion and sediment controls implemented and seek to stabilise the area to stop the erosion process. This can include the use of further non-harvestable organic matter as groundcover or other standard control measures outlined in CSWMP Section 6.3.2.	Alert Forestry Project Manager/Environment Coordinator

Aspect	Trigger	Action/Response	Notifications
Erosion and Sediment Control in higher risk catchments	One (1) or more areas within higher risk catchments (i.e. steeper embankments and slopes or creeks) have indicated surface erosion in the form of movement of sediment from an area of disturbance/clearing	<p>Review the effectiveness of current erosion and sediment controls implemented and seek to stabilise the area to stop the erosion process. This can include the use of further non-harvestable organic matter as groundcover or other standard control measures outlined in CSWMP Section 6.3.2.</p> <p>Reduce slope lengths breaking up the slope along the contour with the use of sediment fencing or berm drains are proposed to be used (at least every 25 m where practical)</p> <p>Installation of rock check dams within creek and gully channels as per standard control measures outlined in CSWMP Section 6.3.2.</p> <p>Where review of the sediment and erosion controls is undertaken, additional controls be recommended, where relevant, to prevent a recurrence</p>	Alert Forestry Project Manager/Environment Coordinator
Discharges from Clearing Boundary	Observed or suspected discharges of dirty/sediment laden water from the clearing boundary	<p>Investigate source of discharge and whether it is sourced from areas of disturbance/clearing</p> <p>Review the effectiveness of current erosion and sediment controls implemented and seek to stabilise the area to stop the erosion process. This can include the implementation of controls outlined the ESCP (CSWMP Section 6.3) or standard control measures outlined in CSWMP Section 6.3.2.</p> <p>Where review of the sediment and erosion controls is undertaken, additional controls be recommended, where relevant, to prevent a recurrence</p>	Alert Forestry Project Manager/Environment Coordinator
Discharges to the Tuross River	Observed turbid plumes forming within the river	<p>Investigate source of discharge and whether it is sourced from areas of disturbance/clearing within the Partial Clearing works clearing boundary</p> <p>Temporarily stopping works (where appropriate and where observed turbid plumes are as a result of the Partial Clearing Works)</p>	<p>Alert Project Manager/Environment Coordinator</p> <p>Immediate notification to the NSW EPA upon applicant becoming aware of a material harm incident</p>

Aspect	Trigger	Action/Response	Notifications
		<p>Review and amendment to Environmental Work Method Statements</p> <p>Inspecting and maintaining erosion and sediment control measures</p> <p>Review the effectiveness of current erosion and sediment controls implemented and seek to stabilise the area to stop the erosion process. This can include the implementation of controls outlined the ESCP (CSWMP Section 6.3) or standard control measures outlined in CSWMP Section 6.3.2.</p> <p>Where review of the sediment and erosion controls is undertaken, additional controls be recommended, where relevant, to prevent a recurrence</p> <p>Incident investigations and reporting of notifiable incidents (where appropriate)</p>	<p>Written Notification to DPIE within seven days after applicant becomes aware of a material harm incident</p>

Appendix B Correspondence



Reference: DOC21/1135852
Date: 24 January 2022

The General Manager
Eurobodalla Shire Council
PO Box 99
Moruya NSW 2537

Attention: Harvey Lane – Water and Sewer Project Engineer

Eurobodalla Southern Water Supply Storage – Eurobodalla Shire Council
Partial Clearing of the Permanent Works and Inundation Area

I refer to the draft Construction Soil and Water Management Plan (CSWMP) developed by SMEC on behalf of Eurobodalla Shire Council and provided to the NSW Environment Protection Authority (EPA) on 21 December 2021. The CSWMP relates to the partial clearing of the permanent works design area, ancillary works, and inundation areas which is part of the larger Eurobodalla Southern Water Supply Storage project (SSD-7089).

Thank you for providing the EPA with the opportunity to review the CSWMP associated with this stage of the project. The EPA understands that, as per the conditions of Development Consent SSD-7089, the EPA is required to be consulted on the CSWMP; however, the EPA does not approve or endorse management plans. The EPA has reviewed the CSWMP and provides the following comments.

During a meeting held on 26 November 2021 between Eurobodalla Shire Council, Public Works Advisory, Department of Planning and Environment and the EPA, the EPA discussed and provided comment on the CSWMP. The EPA notes that the matters discussed during meeting including the development of a Trigger Action Response Plan (TARP) and the requirement for an independent soil management contractor to be engaged to review and assess erosion and sediment control works, have been incorporated into the CSWMP. The TARP identifies numerous triggers and response actions. The EPA recommends that where the TARP actions identify a review of the sediment and erosion controls be undertaken, additional controls be recommended, where relevant, to prevent a recurrence.

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

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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.

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

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 Matthew Rizzuto on (02) 6229 7002, or at EPA.southopsregional@epa.nsw.gov.au

Yours sincerely

A handwritten signature in black ink, appearing to read 'Janine', with a long horizontal stroke extending to the right.

JANINE GOODWIN
Unit Head
Regulatory Operations Regional

From: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Sent: Wednesday, 22 December 2021 11:25 AM
To: Harvey Lane
Subject: RE: Eurobodalla Southern Storage - Partial Clearing Works - Draft CSWMP

Hi Harvey,

DPI Fisheries has reviewed the 'Construction Soil and Water Management Plan: Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works an Inundation Area (SMEC, Reference No. 30012835, 20 December 2021)' and has no objections to or suggested edits to make to this plan.

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: Harvey Lane <Harvey.Lane@esc.nsw.gov.au>
Sent: Wednesday, 22 December 2021 8:41 AM
To: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Cc: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>
Subject: Eurobodalla Southern Storage - Partial Clearing Works - Draft CSWMP

Dear Carla,

As per our recent phone discussion, and further to previous documents submitted for your review in relation to various construction stages of the Eurobodalla Southern Water Supply Storage, please find attached the draft Construction Soil and Water Management Plan for the partial clearing of the site of harvestable timber and hollow bearing trees. The scope of these works and this subsequent document has been discussed at length with the EPA and Biodiversity and Conservation Division with the intent of determining the best way to facilitate project progress whilst managing the potentially conflicting interests of managing soil and water runoff, threatened species and contractor interface/WHs.

This is being submitted for your review and comment in accordance with condition B13 of the Development Conditions of Consent.

The draft Construction Flora and Fauna Management Plan will be forwarded in a separate email.

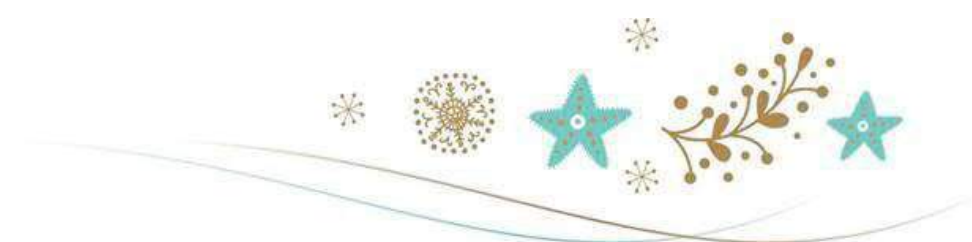
Please don't hesitate to call me to discuss any elements of this document at any stage.

Kind regards,

Harvey Lane

Water & Sewer Project Engineer

t 02 4474 1342



Season's greetings from everyone at Eurobodalla Shire Council

Council offices, depots and libraries will be closed for the Christmas holidays from 12.30pm Friday 24 December 2021, reopening 8.30am Tuesday 4 January 2022.

Our essential services continue during the closure, including household waste collection. Please call Council's after hours services on 1800 755 760 for urgent assistance.



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Eurobodalla Shire Council acknowledges the traditional custodians of the land on which we work.

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From: Harvey Lane <Harvey.Lane@esc.nsw.gov.au>
Sent: Tuesday, 21 December 2021 4:20 PM
To: tim.baker@nrar.nsw.gov.au; rachel.daly@nrar.nsw.gov.au
Cc: nrar.servicedesk@dpie.nsw.gov.au
Subject: Eurobodalla Southern Storage - Partial Clearing Works - Draft CSWMP
Attachments: 30012835.009.06 - SWMP ESWSS Partial Clearing works_Rev_2_20122021.pdf

Dear Tim/Rachel,

Thank you sincerely for your time and input at the workshop of the 26th November at Eurobodalla Shire Council offices to discuss the proposed approach for staging of the clearing works of the Southern Water Supply storage. This approach is being taken to try and best balance the potentially competing interests of

Further to previous documents submitted for your review in relation to various construction stages of the Eurobodalla Southern Water Supply Storage, please find attached the draft Construction Soil and Water Management Plan for the partial clearing of the site of harvestable timber and hollow bearing trees. The scope of these works and this subsequent document has been discussed at length with the EPA and Biodiversity and Conservation Division with the intent of determining the best way to facilitate project progress whilst managing the potentially conflicting interests of managing soil and water runoff, threatened species and contractor interface/WHs.

This is being submitted for your review and comment in accordance with condition B13 of the Development Conditions of Consent.

Please don't hesitate to call me to discuss any elements of this document at any stage.

Kind regards,

Harvey Lane
Water & Sewer Project Engineer

t 02 4474 1342

Appendix C Baseline Water Quality Monitoring Report



DRAFT Baseline Water Quality Monitoring Report

Eurobodalla Southern Storage

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

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

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Eurobodalla Shire Council

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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
CRM RM	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 m³ of material within the storage inundation area for use onsite
- Importation of around 163,000 m³ 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.

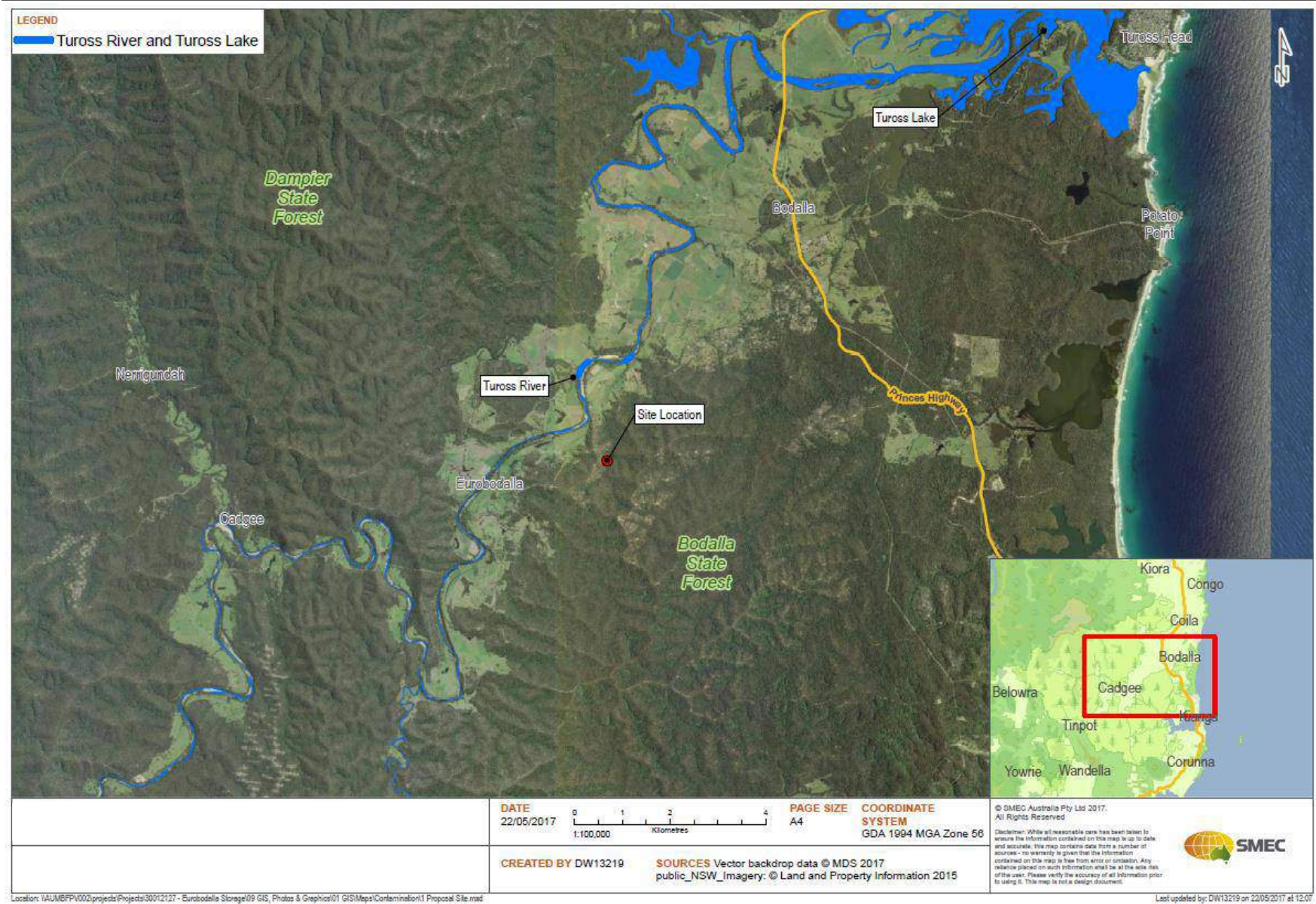


Figure 1.1: Site location and regional context

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, 29 th 1999	337.3, 6 th 1971	179.6, 21 st 1914	293.4, 8 th 1945	272.8, 28 th 1900	162.6, 5 th 1899	160.0, 11 th 1957	132, 12 th 1929	143.5, 28 th 1970	187.6, 14 th 1976	141.0, 5 th 1973	159.0, 9 th 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.

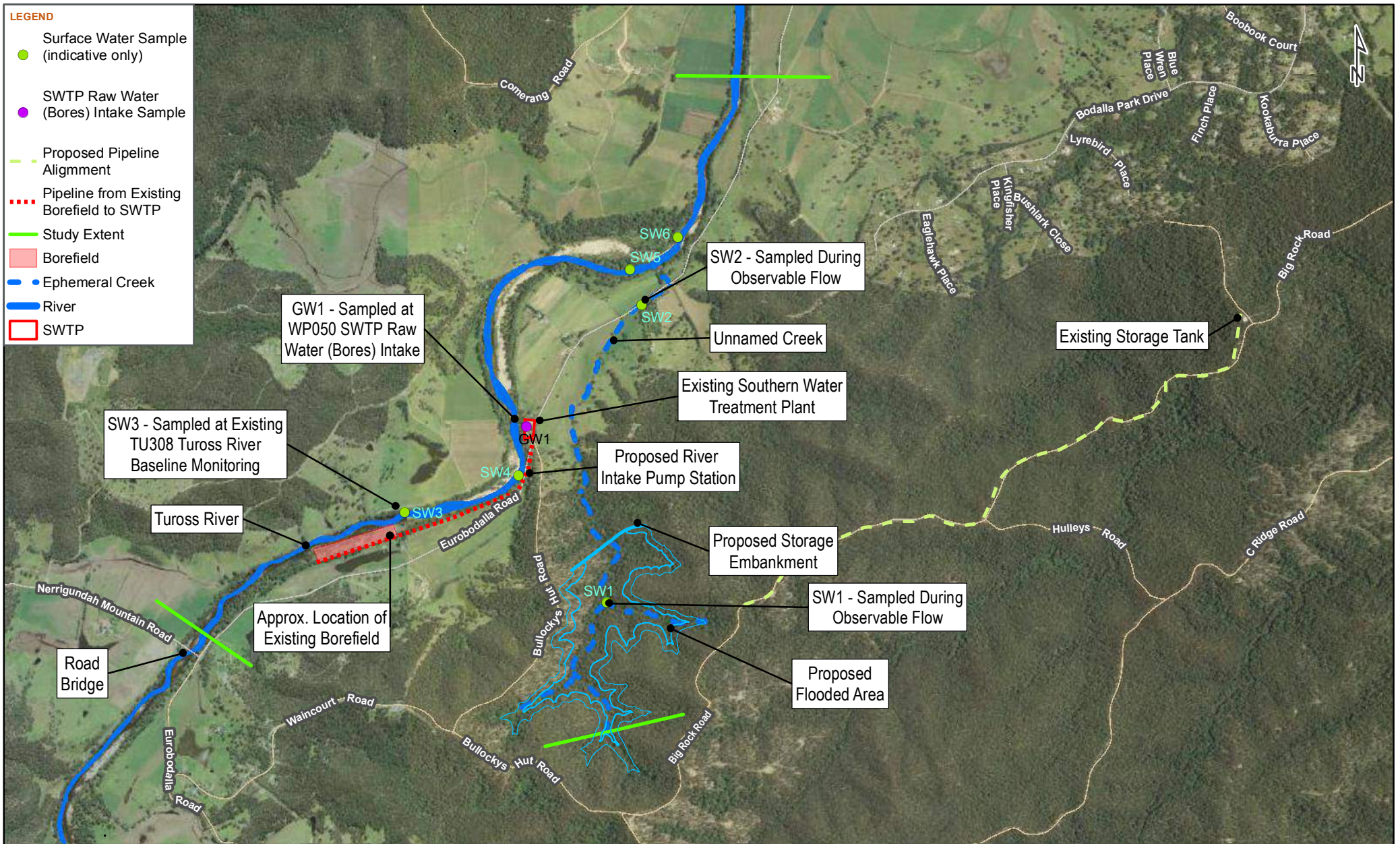
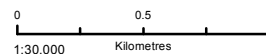


FIG NO. 2

FIGURE TITLE Proposal Site Features and Water Quality Monitoring Locations

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04/08/2017



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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

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PROJECT NO. 30012127

PROJECT TITLE Eurobodalla Southern Storage

CREATED BY FN12672

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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, 29 th 1999	337.3, 6 th 1971	179.6, 21 st 1914	293.4, 8 th 1945	272.8, 28 th 1900	162.6, 5 th 1899	160.0, 11 th 1957	132. 12 th 1929	143.5, 28 th 1970	187.6, 14 th 1976	141.0, 5 th 1973	159.0, 9 th 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

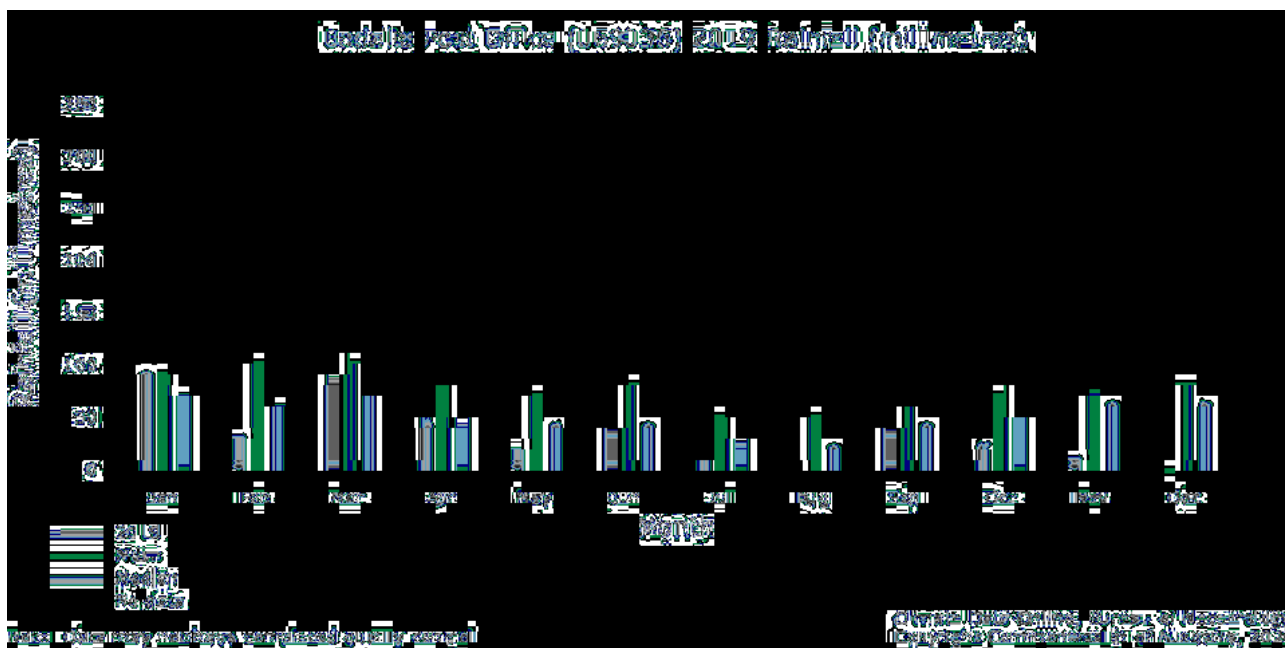


Figure 2.2: Monthly rainfall summary for 2019 comparing the mean and median results

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.

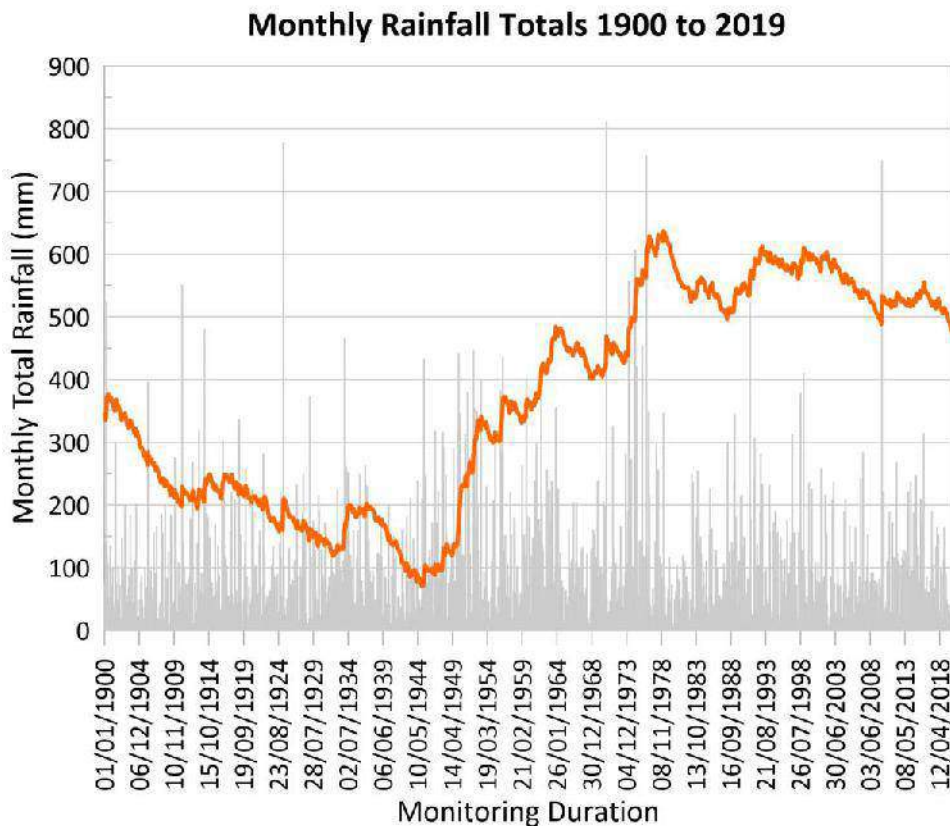


Figure 2.3: Monthly total rainfall from 1900 to 2019 with cumulative residual monthly rainfall mass (orange line)

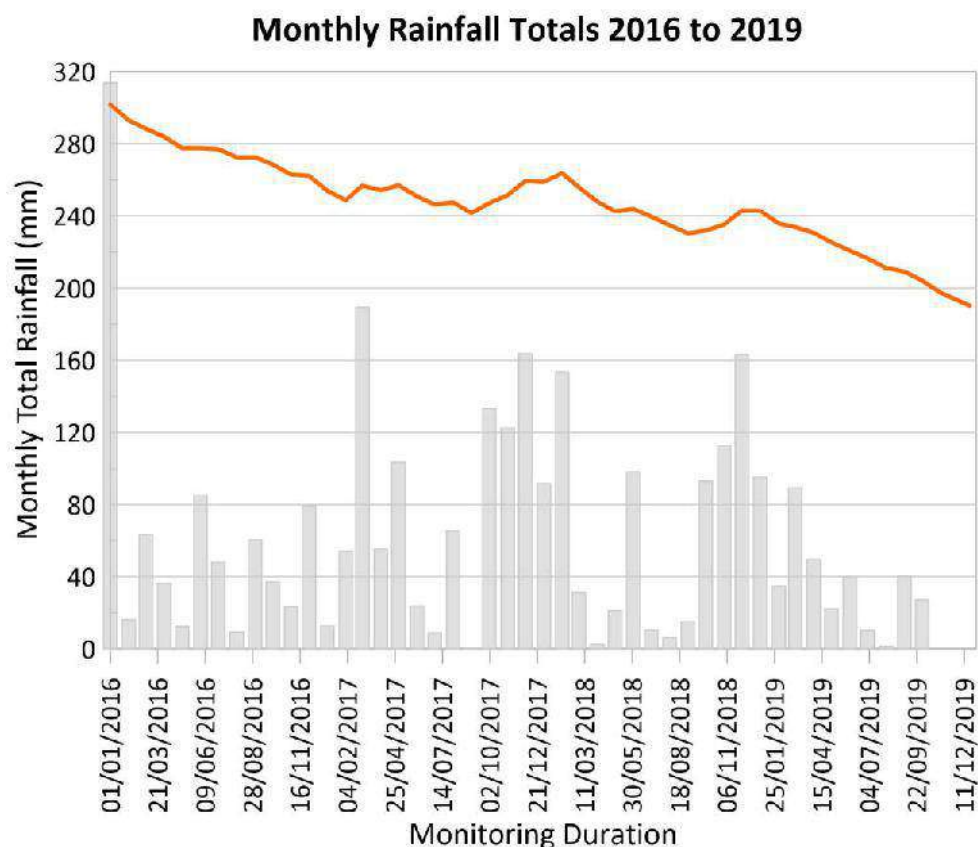


Figure 2.4: Monthly total rainfall from 2016 to 2019 with cumulative residual monthly rainfall mass (orange line)

2.3 Catchment and Geology

2.3.1 Tuross River Catchment

The Tuross River catchment covers an area of around 1814 km² 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.

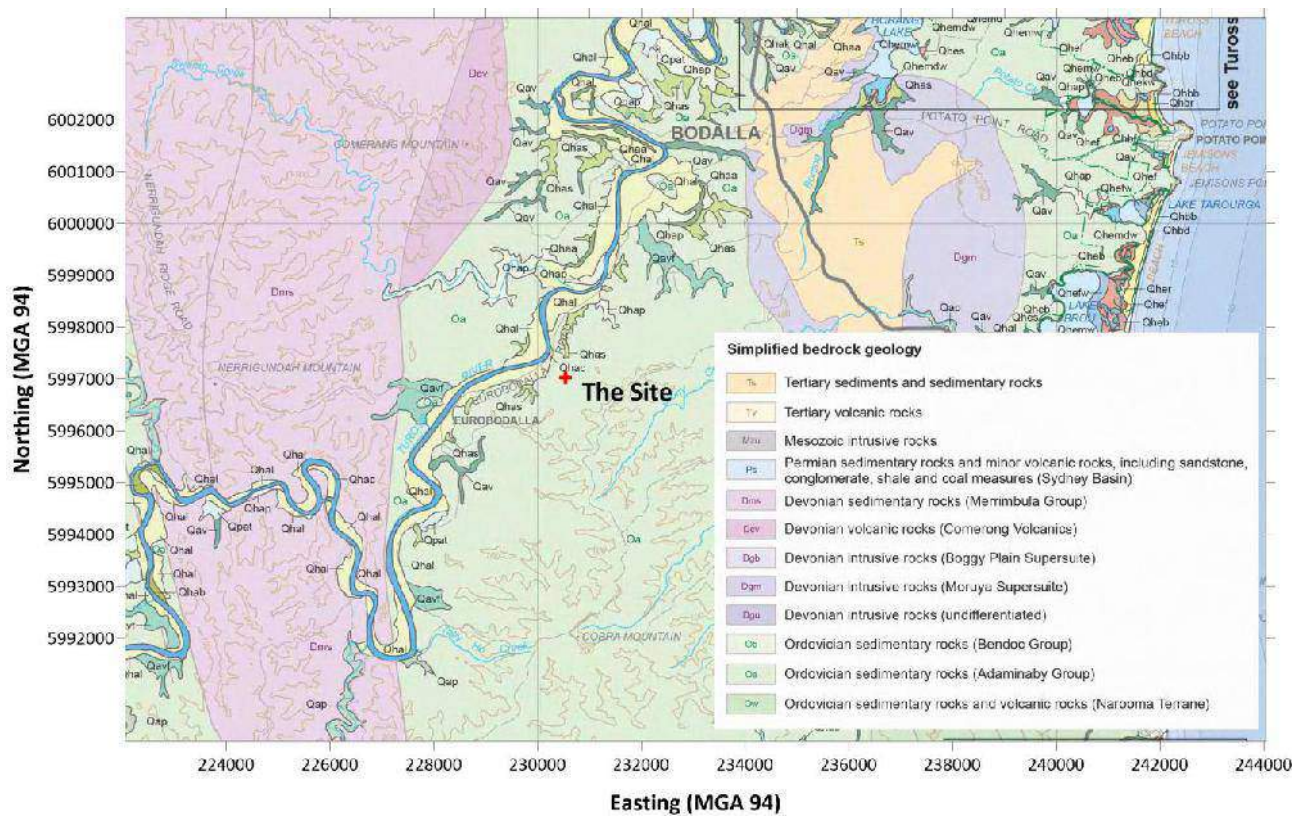


Figure 2.5: 1:100,000 coast quaternary geology map for Eurobodalla (modified from Troedson and Hashimoto 2013)

2.4 River data

The Tuross River has real-time continuous 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 gauging 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.

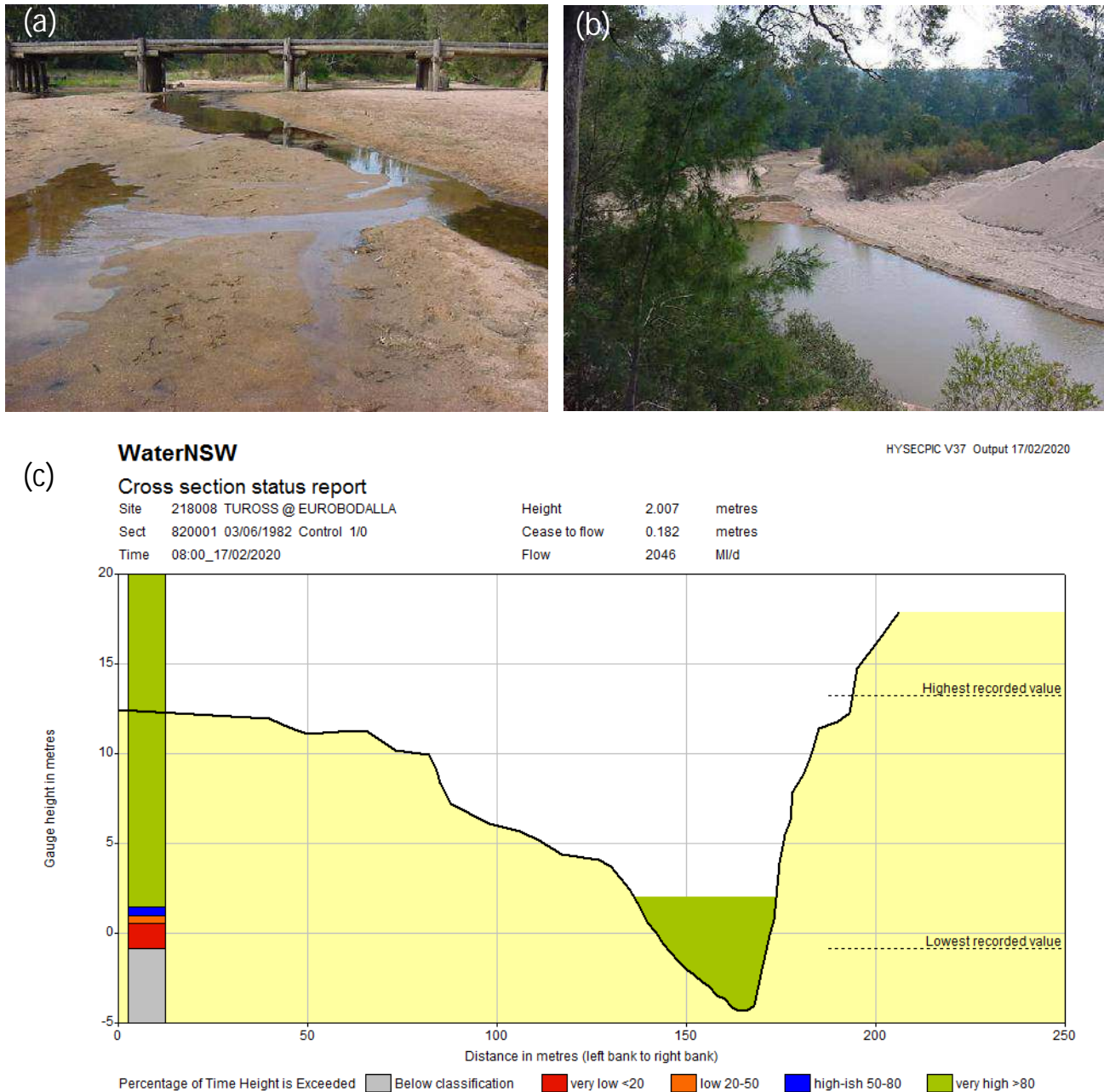


Figure 2.6: Tuross River gauge location view upstream (a), downstream (b) and cross section details (c) (WaterNSW, 2020)

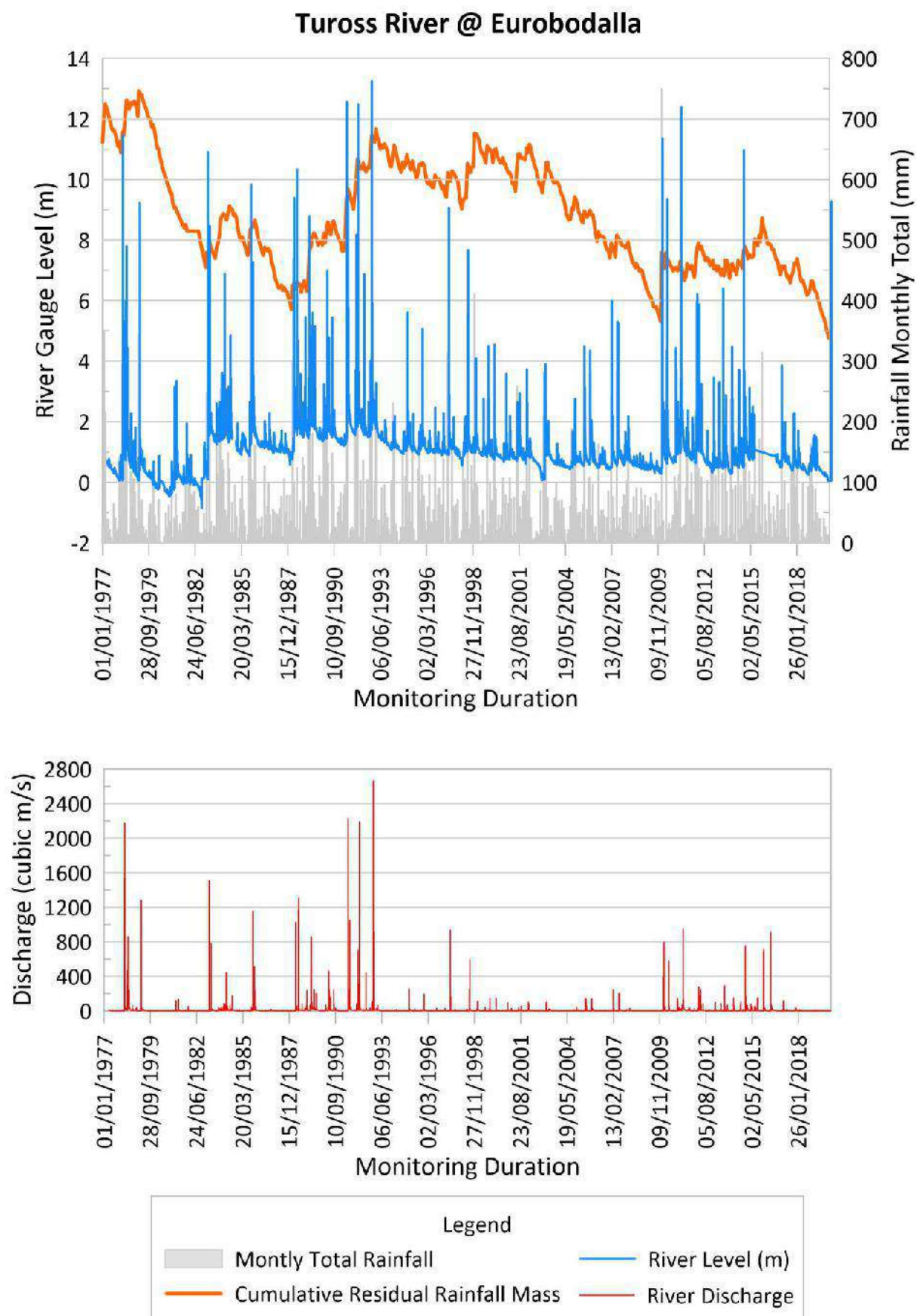


Figure 2.7: Tuross River discharge from 1977 to February 2020 (WaterNSW, 2020)

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.

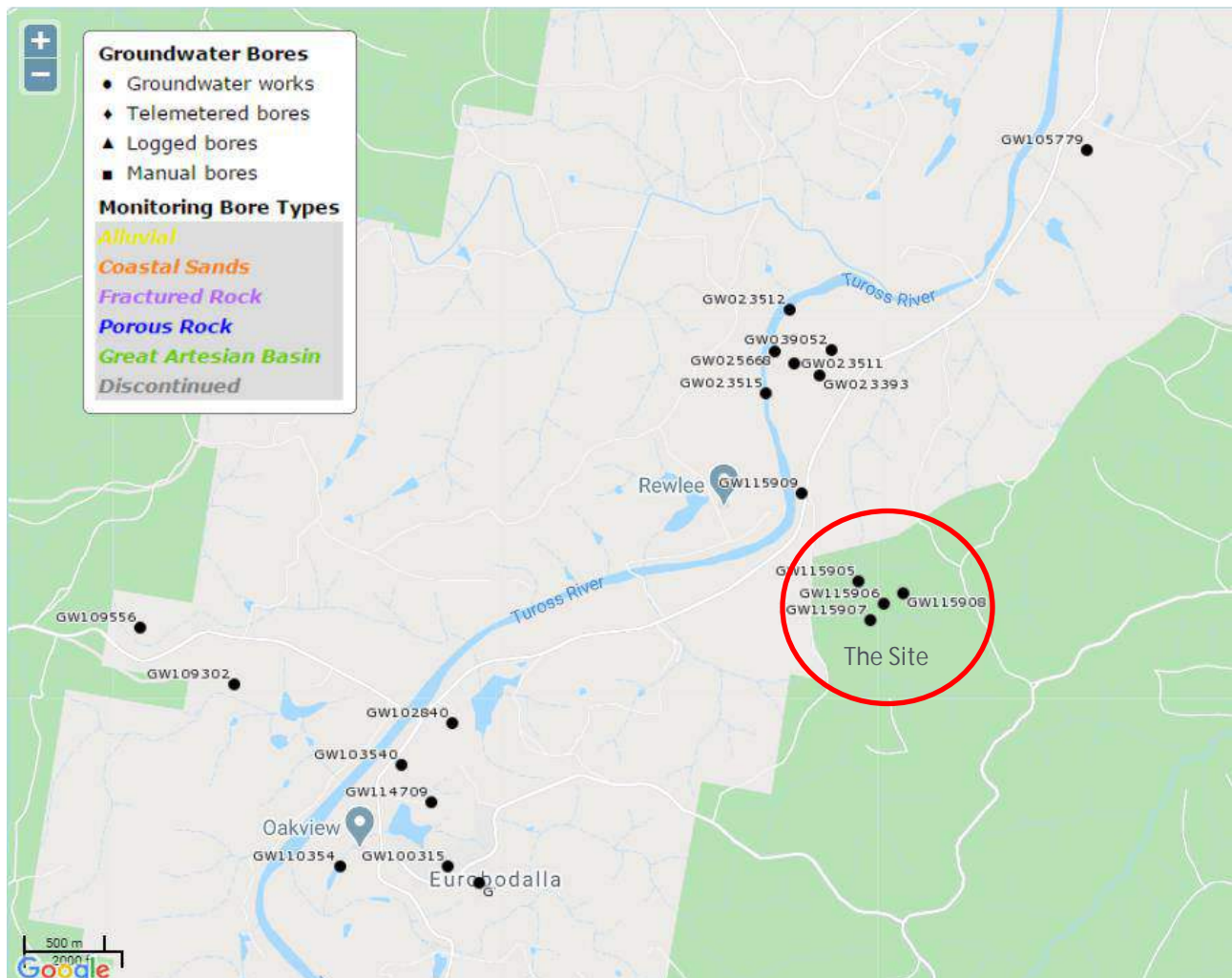


Figure 2.8: Groundwater Bores in the Tuross River Basin (WaterNSW Online) and standpipes installed by SMEC in 2017 (red circle)

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).

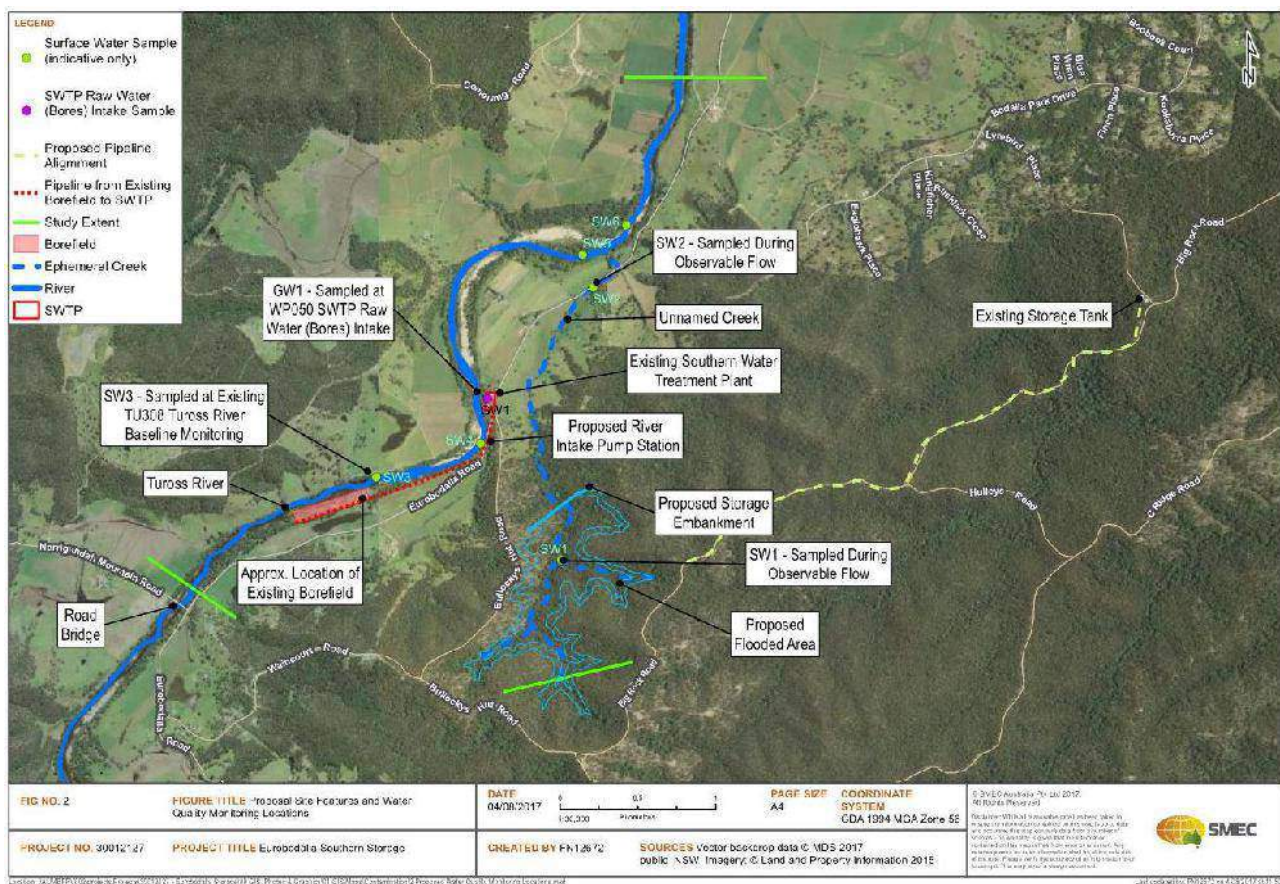


Table 3-1: Monitoring network location summary

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	
<i>E. coli</i> (Escherichia Coli)	Weekly – SW3 only (see note 3) Monthly – GW1 (see note 3) Quarterly* – SW2 and SW6 only
Protozoa – Cryptosporidium, Giardia	
Bacteria – Campylobacter	
Viruses – Noroviruses (or other cultivable human enteric virus, such as adenoviruses)	
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
- Spray 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.
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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/100m L	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 NH ₄ ⁺)	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 PO ₄)	µg/L	26	ANZECC (2000)
Inorganics, Anions and Cations	Chlorophyll a	µg/L	3	ANZECC (2000)
	Chloride	mg/L	175	ANZECC (2000)
	Fluoride	mg/L	2	Drinking Water Guidelines (Health)
	Sulphate (as SO ₄)	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-dichlorophenol	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 $\mu\text{S}/\text{cm}$ occurs for most results and whilst exceedance of the ANZECC (2000) IL values these than 125 $\mu\text{S}/\text{cm}$ are not considered to a risk and generally represent more pristine environments.

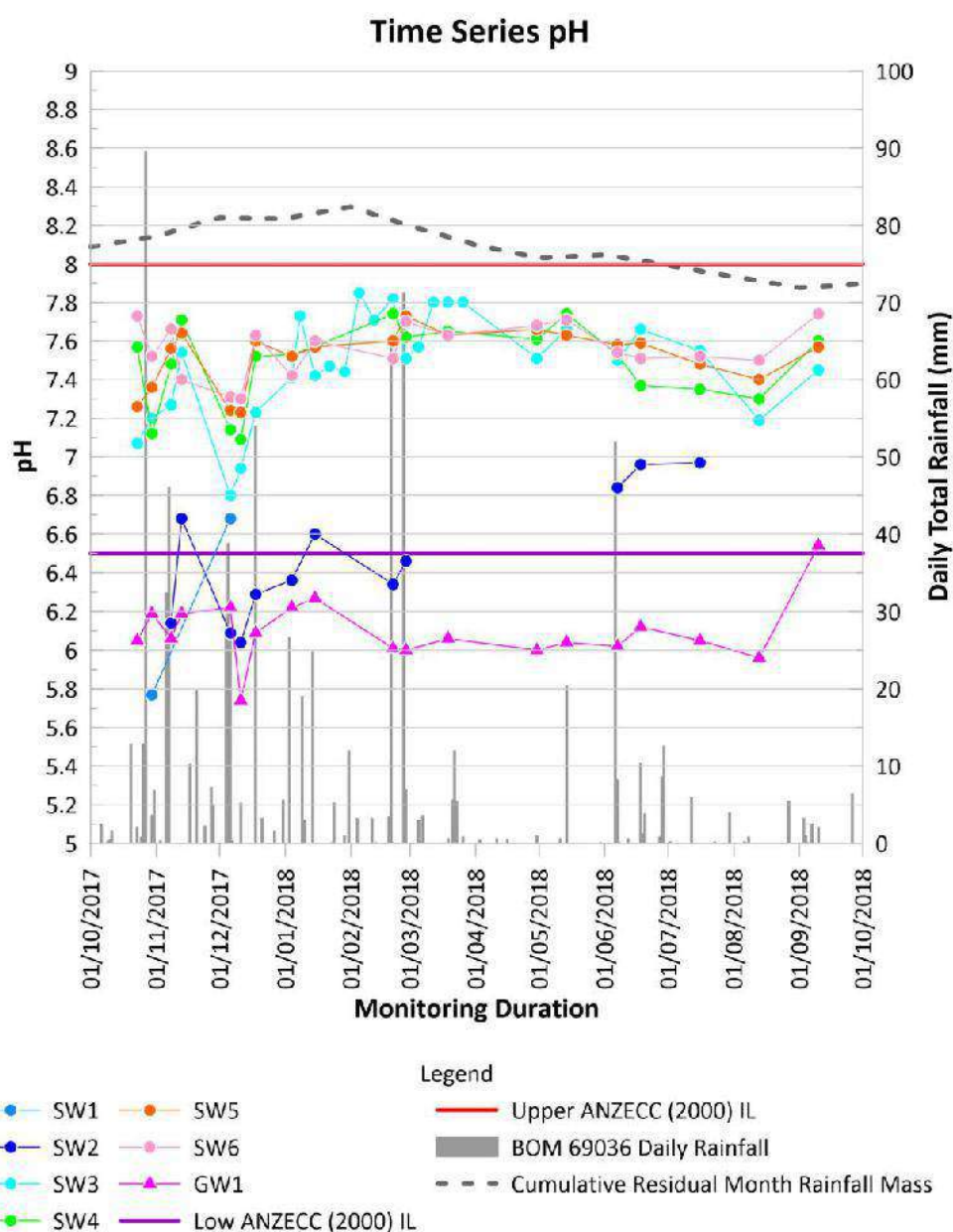


Figure 5.1: Time series plot of field pH with rainfall, CRMRM and ILs

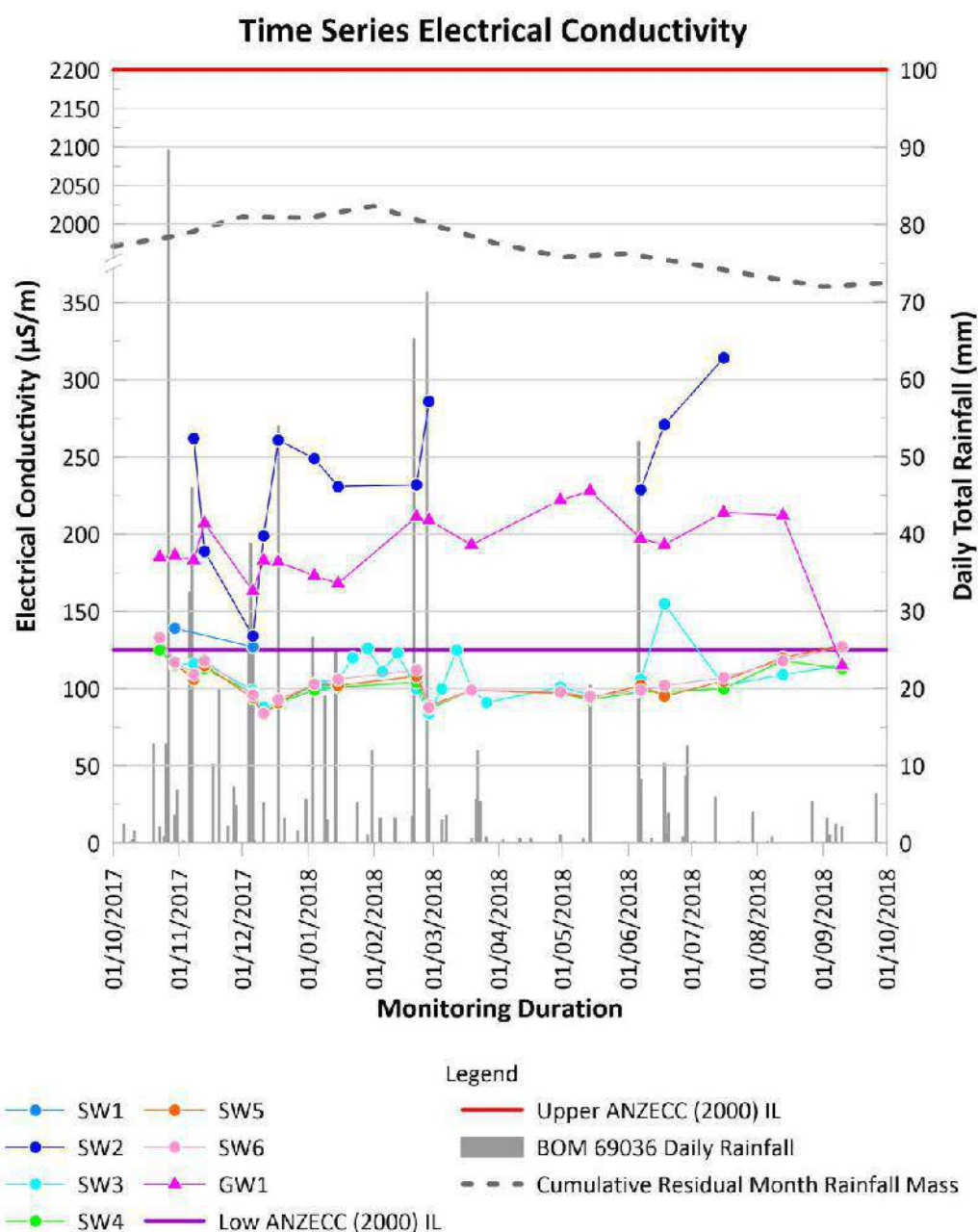


Figure 5.2: Time series plot of field electrical conductivity with rainfall, CRMRM and ILs

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.

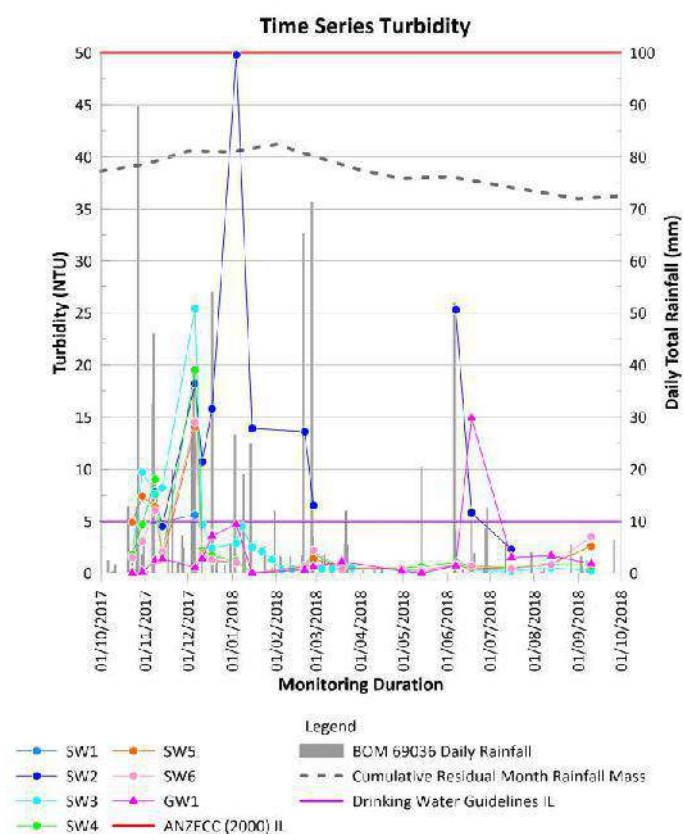


Figure 5.3: Time series plot of turbidity with rainfall, CRMRM and ILs

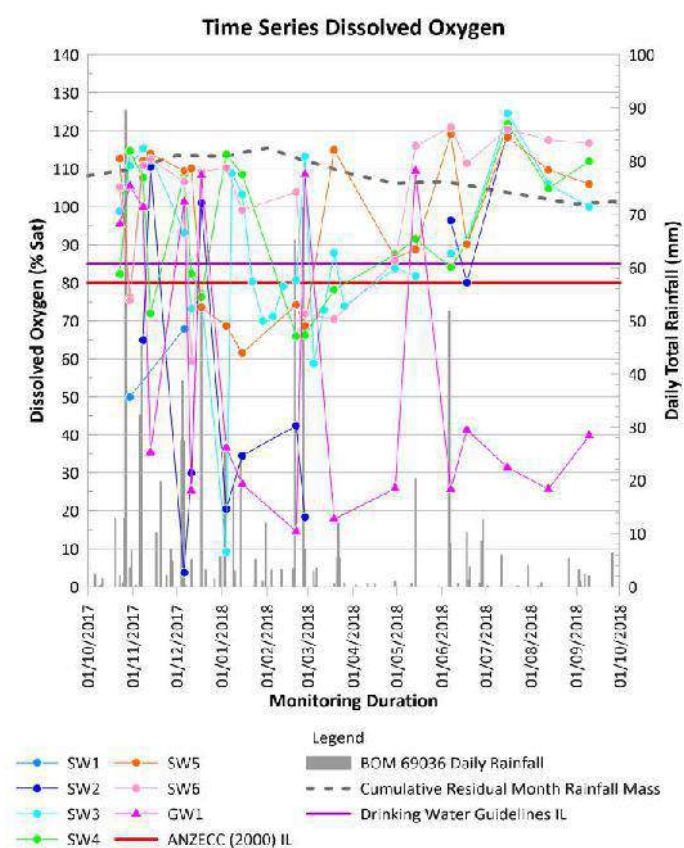


Figure 5.4: Time series plot of dissolved oxygen with rainfall, CRMRM and ILs

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 whilst GW1 and SW3 to SW6 remain relatively stable;

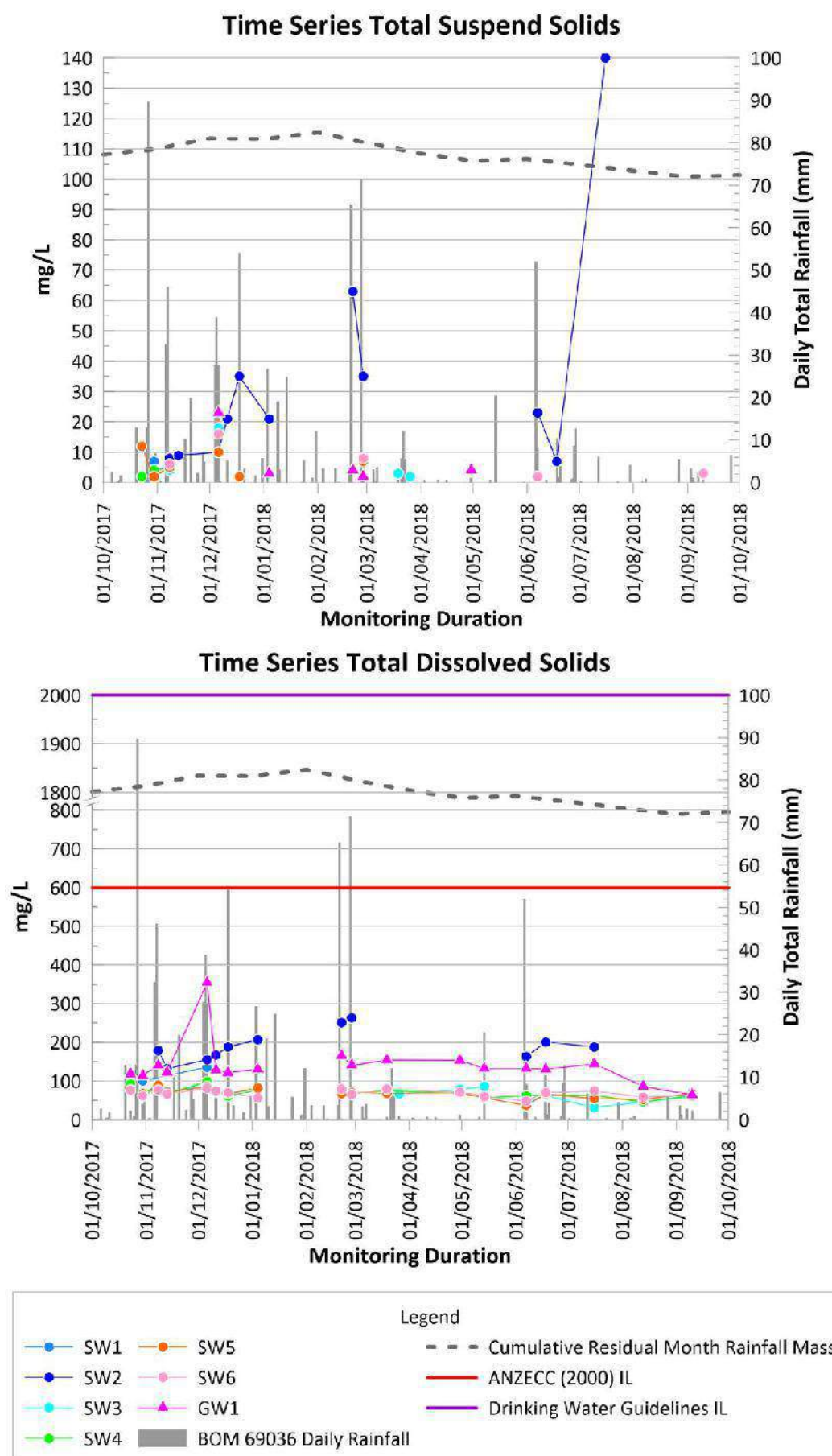


Figure 5.5: Time series plot of TDS and TSS with rainfall, CRMRM and ILs

- 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.

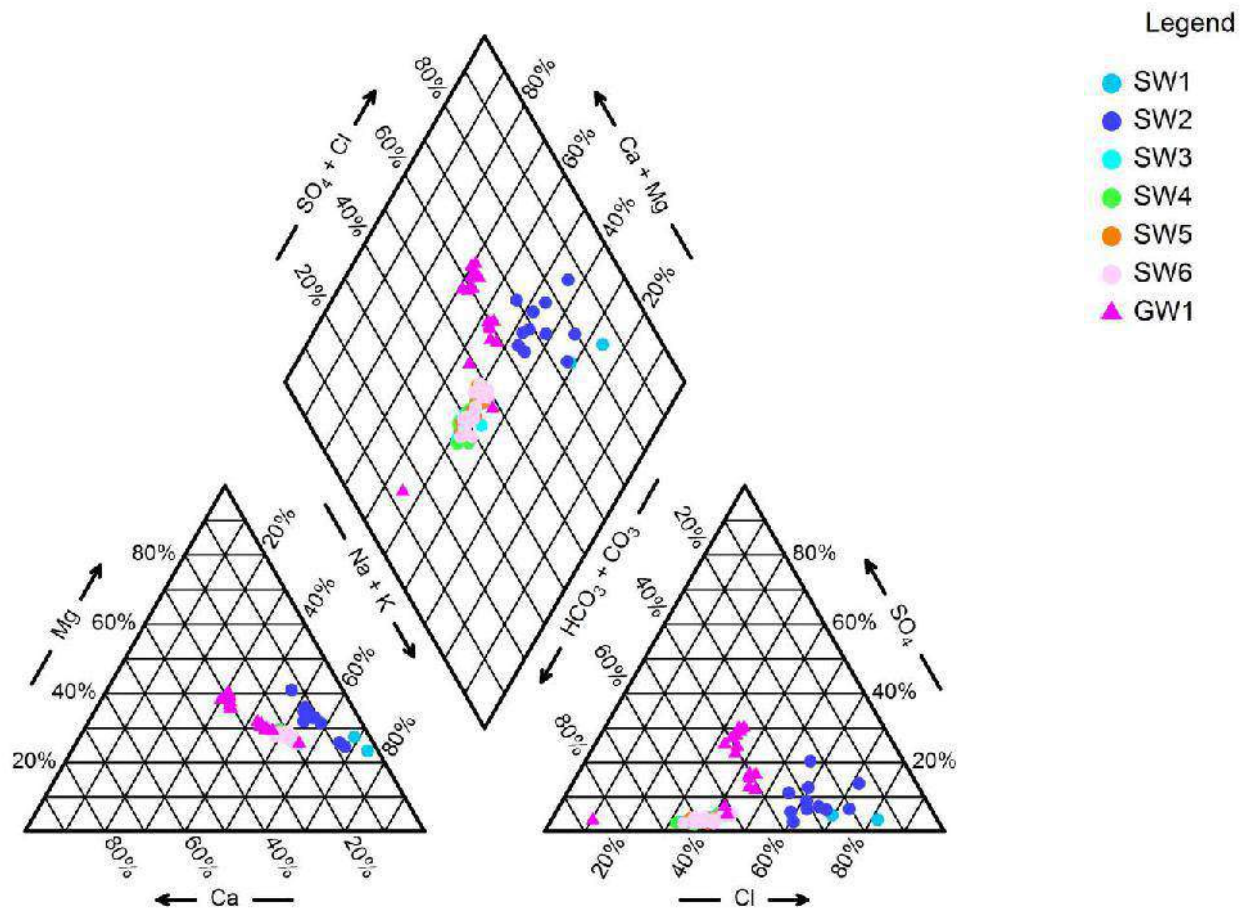


Figure 5.6: Piper diagram plot of water samples from 2017 to 2018

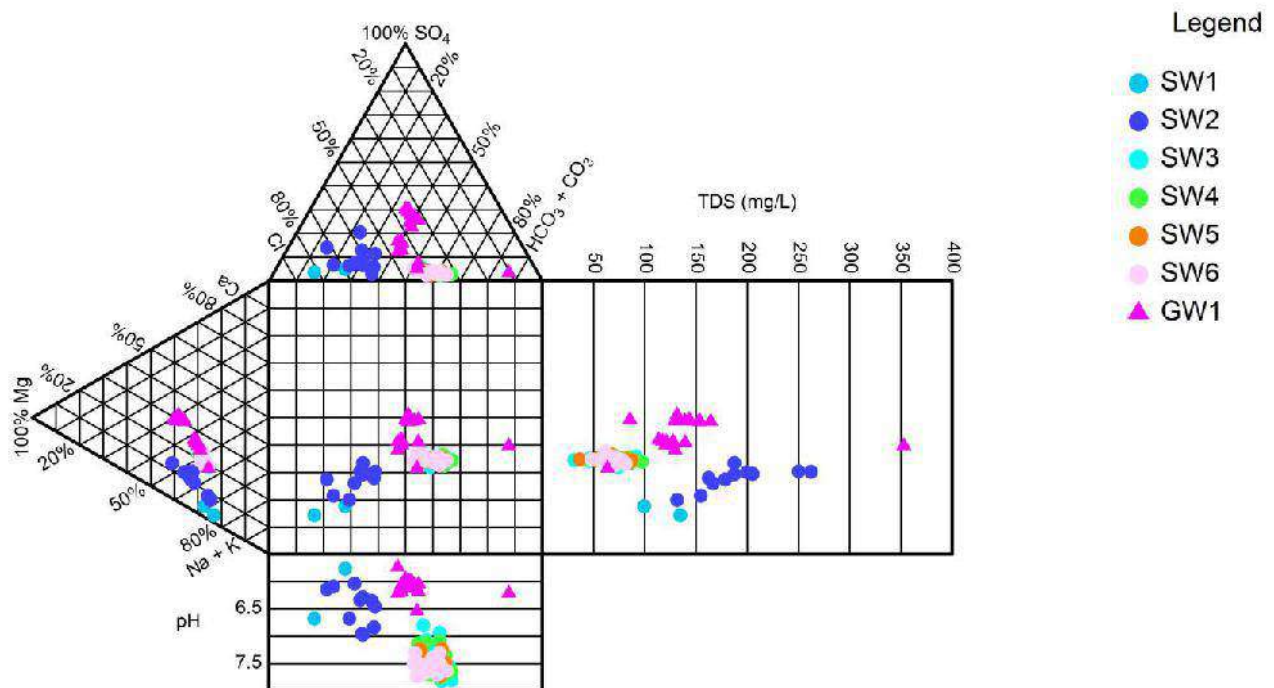


Figure 5.7: Durov diagram plot of water samples from 2017 to 2018

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 seen 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 for 4 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 than 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 SW6
 - SW6 generally has higher concentrations than SW3;
- Chromium:
 - 5 results for SW2 are above the IL;
- Cobalt:
 - all 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 Metals:
 - 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 $\mu\text{S}/\text{cm}$ with values less than this level at surface water samples from the Tuross River. The river is known to be in good health and EC values between 0 and 125 $\mu\text{S}/\text{cm}$ 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 $\mu\text{g/L}$ and 3000 $\mu\text{g/L}$, 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.

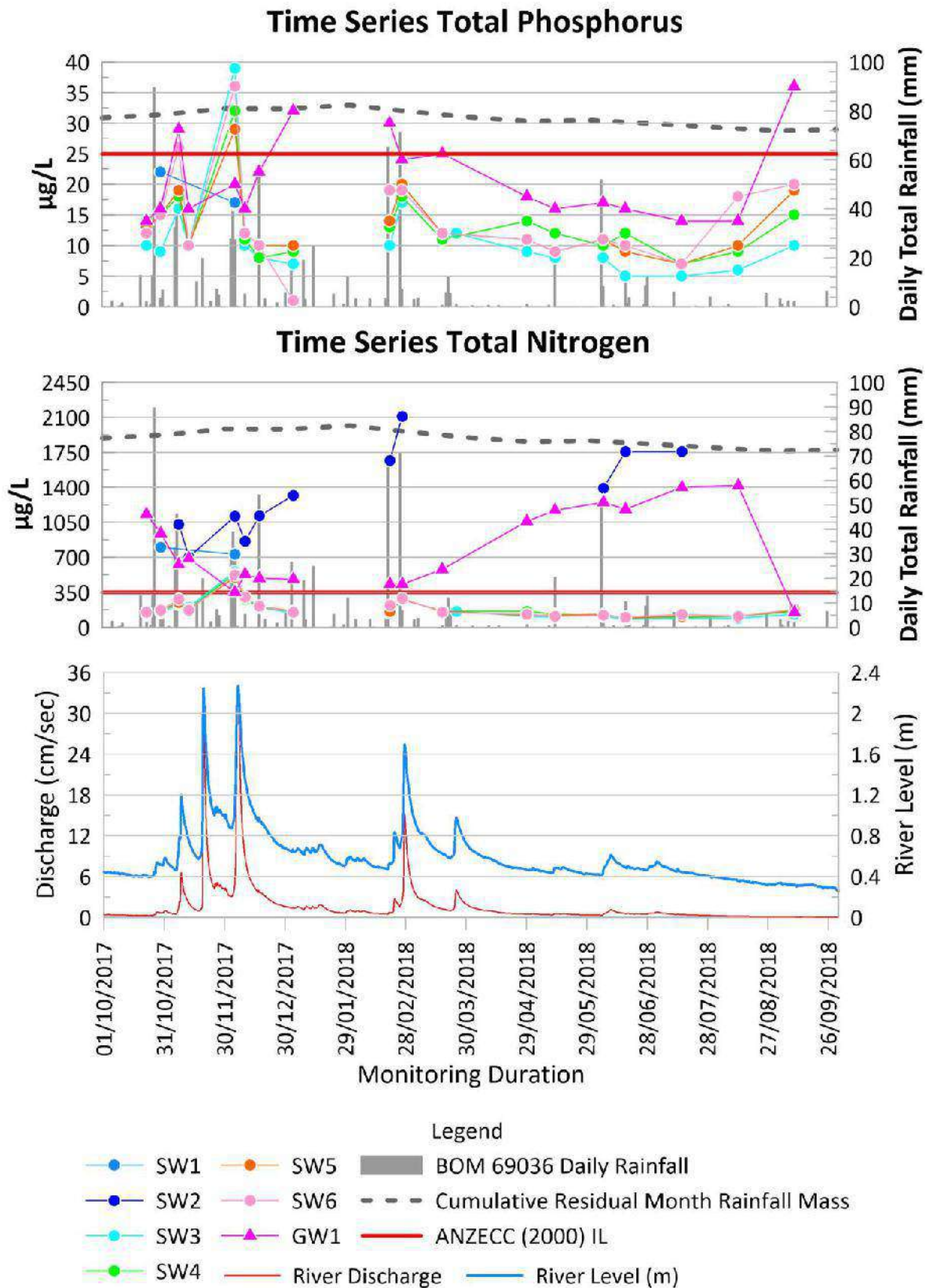


Figure 6.1: River discharge and level with Total Nitrogen and Total Phosphorus results from 2017 to 2018

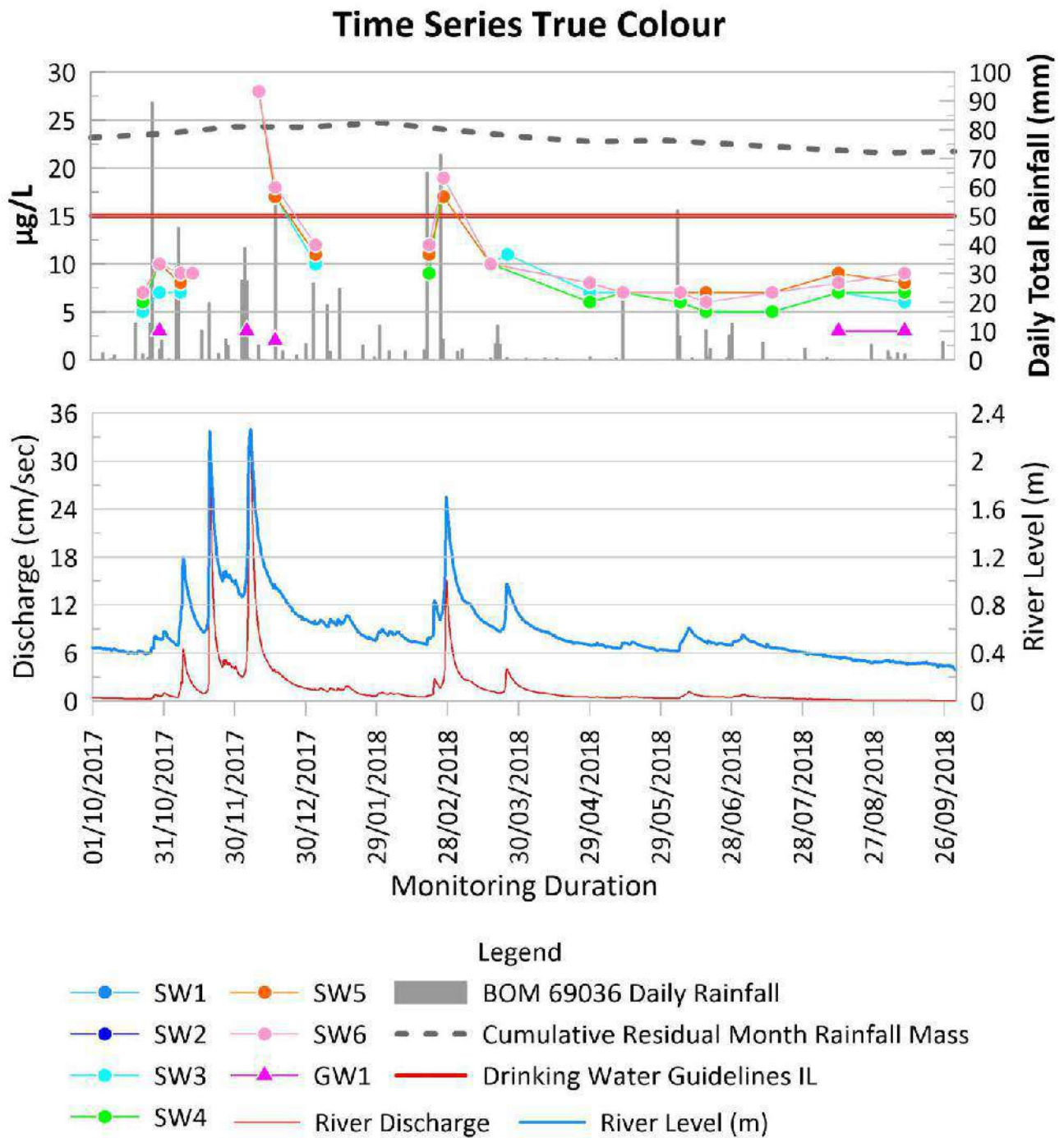


Figure 6.2: River discharge and level with true colour results from 2017 to 2018

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 available 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 borefield 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 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 (20 th Percentile)
			>8.0		ANZECC (2000)
	Electrical conductivity	µS/m	Level 1:	>300	Site Specific (1STV on the 95 th 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 NH ₄ ⁺)	µg/L	220		Site Specific (95 th 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 PO ₄)	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 SO ₄)	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	Drinking Water Guidelines (Aesthetic)
			Level 2:	1,200	
			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)
Polycyclic Aromatic Hydrocarbons (PAHs)	Xylene (Total)	µg/L	20		Drinking Water Guidelines (Aesthetic)
	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)
Organochlorine Pesticides (OCP)	Total PAHs	µg/L	No Criteria		
	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-dichlorophenol	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, F, 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

Appendix A – Monitoring locations 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

Appendix A – Monitoring locations photographs



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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Appendix D Construction RUSLE Calculations (SMEC, 2018c)

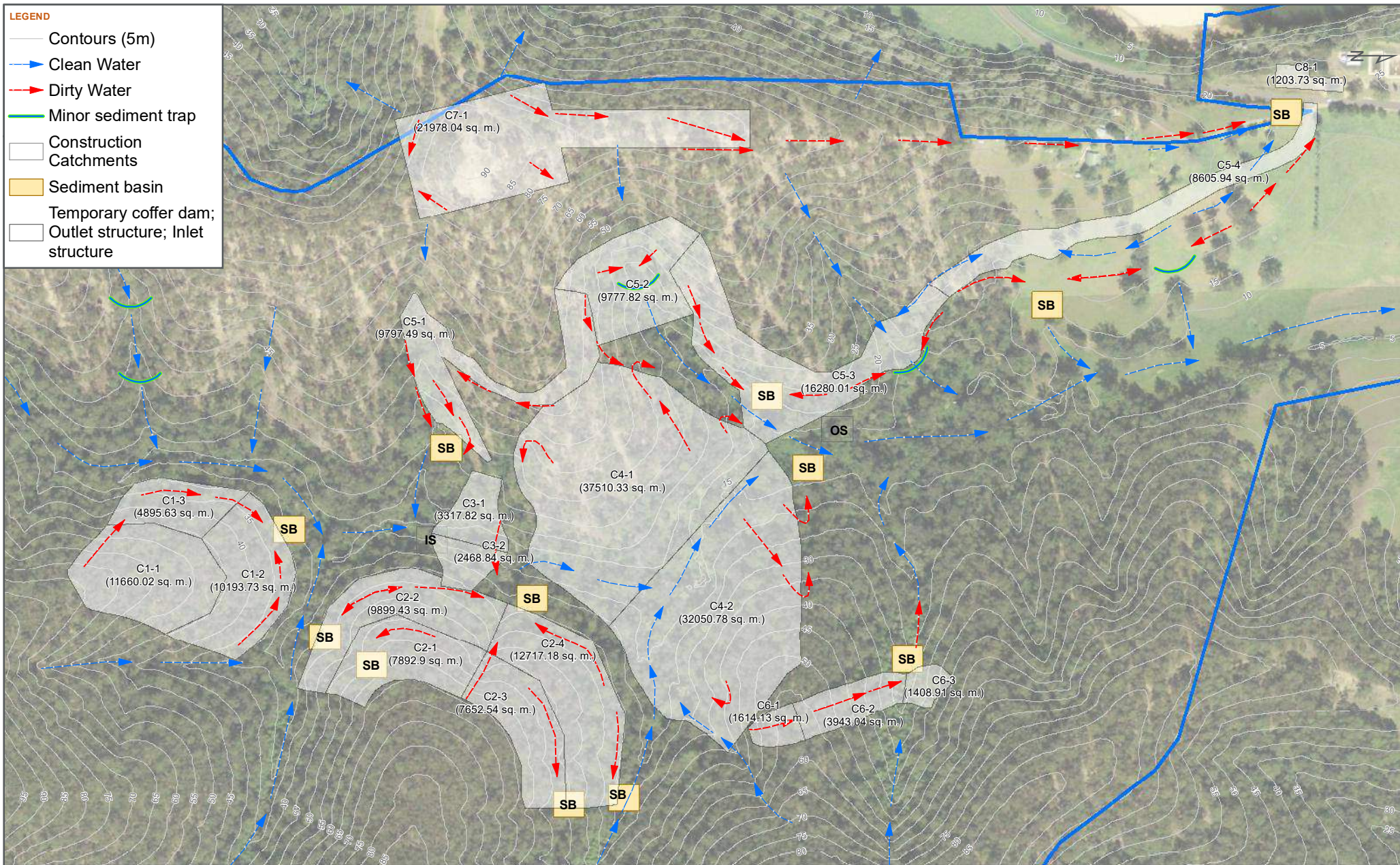


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PROJECT NO. {Insert number} PROJECT TITLE {Insert title here}

CREATED BY FA13847

SOURCES {Insert data sources}

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	RUSLE LS factor calculated for a high rill/interrill ratio.
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	
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 - Coffe 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	
IFD: 2-year, 6-hour storm (if known)							Only need to enter one or the other here

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			RUSLE LS factor calculated for a high rill/interrill ratio.
Slope length (m)	422.1	95.6	344	431			
Slope gradient (%)	4.73821	20.9205	8.72093	1.16009			
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		RUSLE LS factor calculated for a high rill/interrill ratio.
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		
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

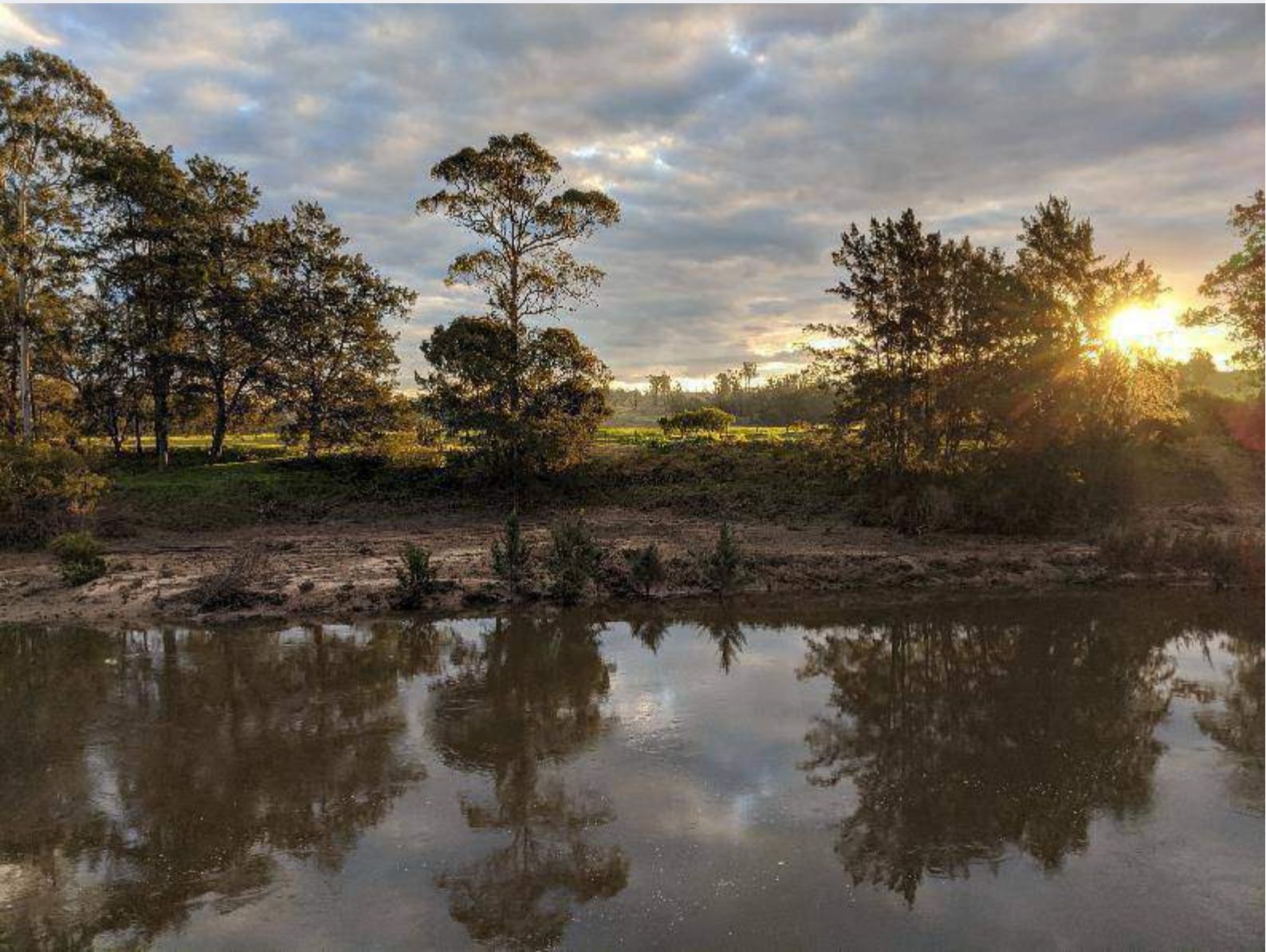
Soil loss (t/ha/yr)	1274	3335	2576	997	992		
Soil Loss Class	6	7	7	6	6		See Table 4.2, page 4-13
Soil loss (m ³ /ha/yr)	980	2566	1982	767	763		Conversion to cubic metres
Sediment basin storage (soil) volume (m ³)	158	1012	279	1686	92		See Sections 6.3.4(i) for calculations
Sediment basin settling (water)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



Construction Flora and Fauna Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
2 February 2022

Document Control

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Eurobodalla Shire Council

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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) and details the partial clearing of the design area, ancillary works and inundation areas (herein referred to as the “Partial Clearing Works” and further for the Eurobodalla Southern Water Supply Storage Project (the Project). The extent of the Partial Clearing works area is herein referred to as the “clearing boundary” as shown in Figure 1-1.

Subject to approvals, the Partial Clearing works covered under this CFFMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area (further detailed in the CSWMP). Forestry and the arborist contractor will ensure that the area has been left with soil in a stable condition for the project construction contractor to complete the remainder of the site clearing in future stages of the Project.

1.1.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the Erosion and Sediment Control Plan (Section 6 CSWMP). Progressive erosion and sediment control would be installed during initial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of ‘no-go zones’ with the installation of high-visibility bunting to clearly mark these areas.
- implementation of the nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (FFMP; Appendix B).

1.1.2 Partial clearing of the vegetation within the clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 3-1). The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Nest Box Management Plan (Appendix C).

Within the area largely comprising the permanent works area, localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. Localised grubbing within the permanent works area is further detailed in the CSWMP.

Localised grubbing and clearing will also be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.

- clearing of HBTs with machinery in accordance with Section 4.7.2 if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

Measures to minimise erosion during the clearing activities will include:

- ground cover and smaller trees will remain intact as much as is practical, and non-harvestable organic material (heads, branches, leaves bark etc) will be left on site and spread in areas where ground cover has been disturbed to aid soil stability
- stabilisation of the area within the clearing boundary will be undertaken in accordance with the CSWMP in preparation for earthworks and other activities to be undertaken in the future stages of the main construction package of works.
- Water diversion berms to divert water are to be installed where required
- in areas where vegetation clearing is undertaken in ephemeral creeks and gullies, a buffer of 5 metres will occur for machinery access. Any vegetation to be removed in these areas, including HBTs, are to be with machinery reaching in from outside of the buffer area. No grubbing is to occur in gullies and within the buffer areas. This will leave all ground cover and non HBTs and harvestable timber intact for the purposes of erosion and sediment control.

Additional erosion control measures will be addressed in subsequent CEMP documents for the main construction works contract. These will be submitted by the successful construction contractor after tender award. As required, soil and erosion stabilisation works shall be completed progressively during clearing operations to minimise soil erosion. Soil and erosion stabilisation works will be carried out by Forestry and the independent arborist contractor in accordance with the CSWMP.

1.2 Objectives

This CFFMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the clearing 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.

The objectives of this CFFMP are to describe how clearing impacts on flora and fauna will be minimised and managed. 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

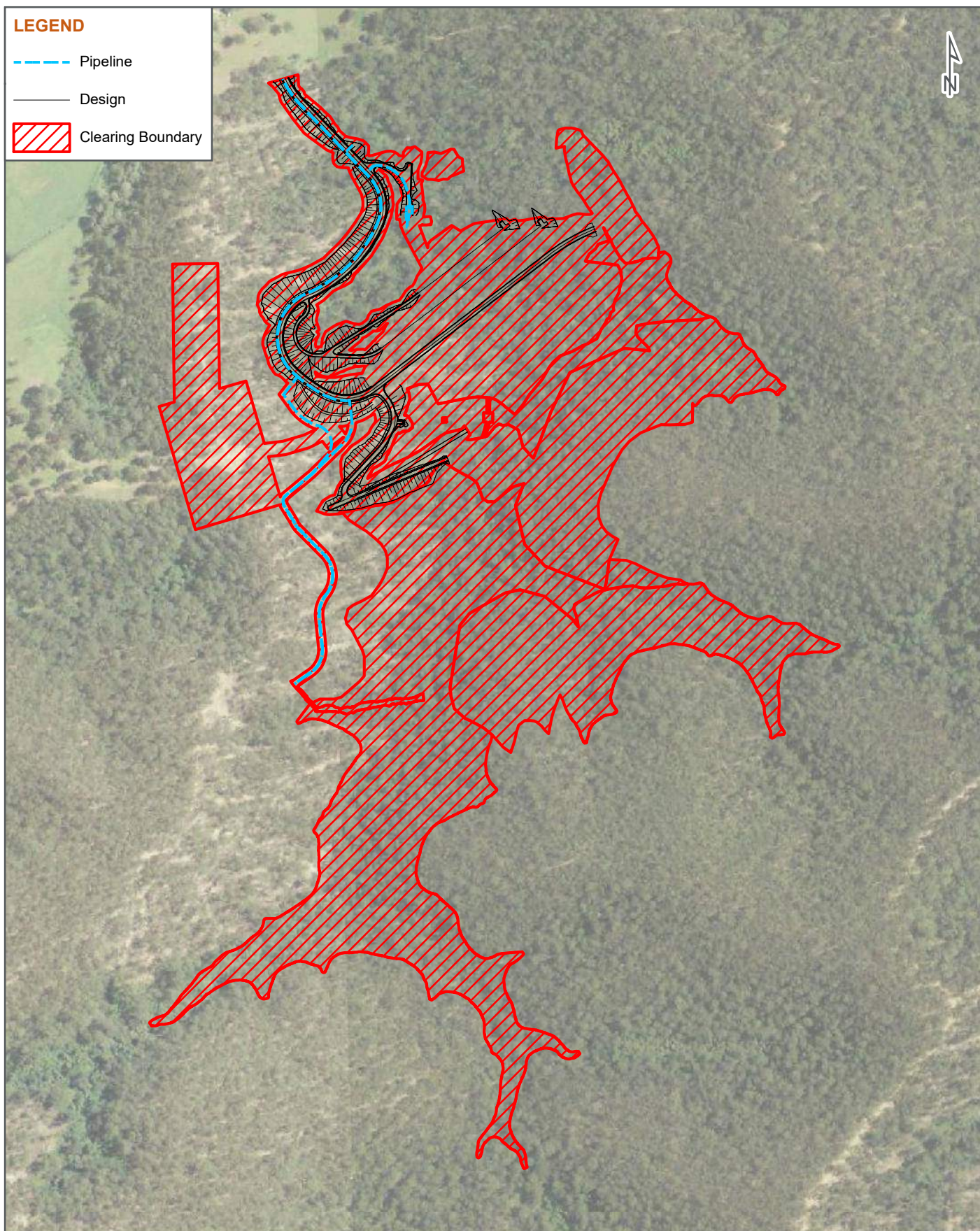
Condition reference	Condition	Where addressed in CFFMP
B2	No more than 54.61 ha of native vegetation is to be cleared.	<p>Section 3</p> <p>The Partial Clearing works area clearing boundary encompasses an area of 43.58 ha (Figure 1-1). The Partial Clearing works would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all HBTs. Localised grubbing and clearing will be required within the area largely comprising the permanent works area for harvestable trees greater than 30cm in diameter (detailed further in the CSWMP). No grubbing will occur within gullies. Localised grubbing and clearing will be required for establishing loading areas to facilitate the Partial Clearing works. The remainder of vegetation within the clearing boundary will be cleared in subsequent stages of works to Partial Clearing works.</p> <p>The project would not clear more than 54.61 ha of native vegetation which is the area within the clearing boundary.</p>
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
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;	<p>Section 4.1</p> <p>Section 4.2</p>
	(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;	<p>Weed Management Plan</p> <p>Appendix A</p>
	(c) method of vegetation removal and measures to minimise impacts outside the storage site construction boundary and within the perimeter of the access road boundary as a result of	Section 4

Condition reference	Condition	Where addressed in CFFMP
	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;	Section 4.4
	(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 Appendix C
	(f) details on rehabilitation and revegetation including:	
	(i) use of locally indigenous plant species including collection of seed prior to clearing for this purpose	Section 5
	(ii) for construction areas outside the full supply level including the construction compounds, on-site quarry areas, the storage site wall and the new storage access road batters	Section 5
	(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.	Not applicable for this CFFMP
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:	
	(g) not commence any clearing work until the CFFMP is approved by the Planning Secretary; and	This document
	(h) implement the most recent version of the CFFMP approved by the Planning Secretary for the duration of works.	This document

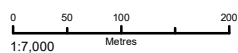
Condition reference	Condition	Where addressed in CFFMP
B11	The Operational Flora and Fauna Management required under Condition C5, must include details on:	
	(a) management and maintenance of revegetated areas until vegetation is established	Appendix B
	(b) fauna habitat maintenance and nest box maintenance and monitoring, and	Appendix C
	(c) control of pest and weed species.	Appendix B

LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



DATE 13/12/2021



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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Extent of Partial Clearing works covered under this CFFMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

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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. The management sub-plan for River Flat Eucalypt Forest has been included as Appendix B.

Section 3.9 *Impact on native fauna and their habitat* of Appendix 2 of the Development Consent specifies that the CFFMP will 'include a nest box strategy to be implemented prior to vegetation removal'. A nest box strategy has been included as Appendix C.

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 and relocated 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 DPI Fisheries

Eurobodalla Shire Council undertook consultation with DPI Fisheries via email on 22 December 2021 regarding the CFFMP as per Condition B3 of the Conditions of Consent. DPI Fisheries provided a response via email on 22 December 2021. No changes were recommended to the CFFMP by DPI Fisheries. Evidence of consultation with DPI Fisheries is provided in Appendix F.

2 Existing environment

2.1 Location and surrounding environment

The Project is located approximately 30 kilometres south of Moruya, within a small section of Bodalla State Forest which is part of the Eurobodalla Local Government Area (LGA). 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.

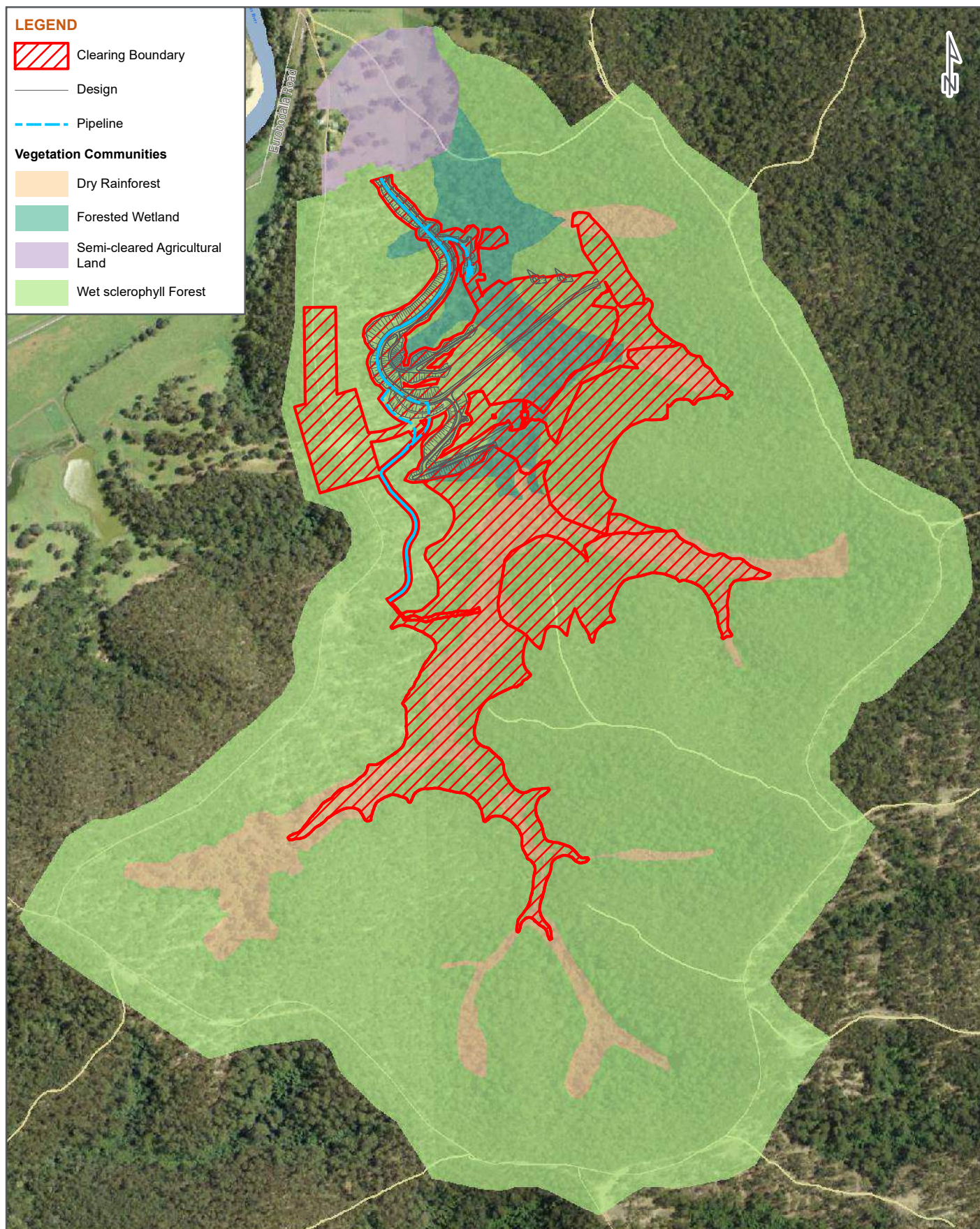
2.2 Existing vegetation

The area within the clearing boundary supports three vegetation types; wet sclerophyll forest, dry rainforest and forested wetland (Figure 2-1).

Wet sclerophyll forest covers 27.81 hectares, occurring on the slopes between the valley floor and the ridgeline associated with Bullockys Hut Road (Figure 2-2). 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 forested wetland (Figure 2-4) – covering 6.20 hectares - occurs across the valley floor of the Storage Site/Reservoir. Characteristic canopy species of this vegetation type includes *E. elata* (River Peppermint), *E. botryoides-saligna* intergrade, *E. baueriana* (Blue Box), *Angophora floribunda* (Rough-barked Apple) and the occasional *E. cypellocarpa* (Monkey Gum). This vegetation conforms to the endangered ecological community – under the Biodiversity Conservation Act – River Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

The dry rainforest (9.57 hectares) was restricted to the deeper gullies towards the south of the Storage Site. The dry rainforest was comprised primarily of *Backhousia myrtifolia* (Grey Myrtle) and *Acmena smithii* (Lilly Pilly) (Figure 2-3).



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GDA 1994 MGA Zone 56

FIG NO. 2-1

FIGURE TITLE Clearing Boundary and Vegetation Mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

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Figure 2-2. Wet sclerophyll forest is the main vegetation type on the site and found on valley slopes. This vegetation was burned during the summer bushfires of 2019/2020.



Figure 2-3 Example of dry rainforest found in steeper gullies. Canopy of grey myrtle and lillypilly is recovering from moderate scorching during the 2019-2020 fires.



Figure 2-4 Forested wetland. The Forested wetland vegetation community occurred along the bottom of the valley and was the most severely burnt of the vegetation communities by the bushfires of 2019/2020 although ground - cover recovery has been the strongest.

2.3 Threatened Ecological Communities

The endangered ecological community (EEC) *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* (from here on in referred to as River-Flat Eucalypt Forest) occurs within the Storage Site clearing boundary. This EEC corresponds to the Forested wetlands vegetation community covering an area of approximately 6.20 hectares. A specific management sub-plan has been developed for this EEC and provided at Appendix B.

2.4 Threatened flora

No threatened flora species were recorded in the clearing boundary 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 during surveys undertaken to inform the EIS. All five habitat types occur in the clearing boundary footprint and are described in Table 2-1. The post-fire assessment (SMEC, 2020) concluded that all five habitat types still occur in the clearing boundary footprint; however, 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, nesting, roosting and sheltering for birds, reptiles, amphibians, arboreal and terrestrial mammals and bat species. High quality habitat available for species with large home ranges including, but not limited to <i>Dasyurus maculatus</i> (Spotted-tailed Quoll), <i>Tyto novaehollandiae</i> (Masked Owl), <i>Ninox strenua</i> (Powerful Owl) and <i>Ninox connivens</i> (Barking Owl).
Hollow bearing trees	Nesting, roosting and sheltering habitat for numerous threatened and non-threatened birds, arboreal mammals and microbats. Species predicted to occur that may utilise this resource on site include <i>Callocephalon fimbriatum</i> (Gang Cockatoo), <i>Tyto novaehollandiae</i> (Masked Owl) and various microbat species.
Shrubby midstory	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.

2.6 Threatened fauna

Threatened fauna species identified during surveys undertaken to inform the EIS, as well as those predicted to occur using the Biobanking Calculator are listed in Table 2-2. 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 project. The vegetation clearing strategy adopted for the Partial Clearing works covered by this CFFMP are detailed in Section 4.7. The breeding periods for species likely (and some previously recorded) in the clearing boundary area are shown in Table 2-2. Five of the six species utilise hollows for breeding whereas the 6th species, Varied Sittella, builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.

Table 2-2 Threatened species potentially occurring in the Project development area and breeding periods of those recorded

Common name	Scientific name	BC Act	EPBC Act	Recorded	Breeding period listed in the EIS
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE	-	
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	-	✓	October to January
Varied Sitella	<i>Daphoenositta chrysoptera</i>	V	-	✓	June to April
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	V	E	-	
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	-	-	
Little Lorikeet	<i>Glossopsitta pusilla</i>	V	-	-	
Little Eagle	<i>Hieraaetus morphnoides</i>	V	-	-	
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-	-	
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	V	-	✓	Winter breeding, young in a crèche until autumn
Southern Myotis	<i>Myotis macropus</i>	V	-	-	
Turquoise Parrot	<i>Neophema pulchella</i>	V	-	-	
Barking Owl	<i>Ninox connivens</i>	V	-	-	
Powerful Owl	<i>Ninox strenua</i>	V	-	-	
Scarlet Robin	<i>Petroica boodang</i>	V	-	-	
Koala	<i>Phascolarctos cinereus</i>	V	V	-	
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V	-	✓	Winter breeding, young at foot until autumn
Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V	-	✓	Winter breeding, young at crèche until autumn
Diamond Firetail	<i>Stagonopleura guttata</i>	V	-	-	
Masked Owl	<i>Tyto novaehollandiae</i>	V	-	✓	Any time of year but generally winter

It should be noted that the Koala and the Southern Myotis have been assumed to be present on the site in response to comments received from the DPIE EES on the Biodiversity Assessment Report (BAR) submitted with the EIS.

2.7 Aquatic fauna

No habitat for aquatic fauna occurs in the clearing boundary footprint. The Tuross River and an un-named creek occur downstream of the clearing boundary area 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 clearing boundary footprint. The Tuross River and an un-named creek occur downstream of the clearing boundary footprint and may support such habitat. These waterways have been considered in sections 3 and 4.

3 Potential environmental impacts

3.1 Vegetation clearing activities

Clearing of vegetation within the clearing boundary footprint will involve the direct removal of native vegetation. As stated within the Development Consent conditions, no more than 54.61 hectares of native vegetation can be cleared across the entire project. Clearing of the clearing boundary footprint for the Project will include 43.58 ha of native vegetation (Table 3-1). As discussed in Section 1, the Partial Clearing works will involve the clearing of harvestable timber (trees greater than 15cm in diameter), localised grubbing within the area comprised of the permanent works area for harvestable trees greater than 30cm in diameter and localised grubbing and clearing for the establishment of loading areas. The remainder of clearing of material not cleared within the clearing boundary during the Partial Clearing works will occur in future stages of the Project. As such, the Partial Clearing works comprise a sub-set of the required clearing for the Project,

Table 3-1 Required vegetation clearing

Vegetation community	TEC equivalency	Required clearing (hectares)
Wet sclerophyll forest	N/A	27.81
Dry rainforest	N/A	9.57
Forested Wetland	River-Flat Eucalypt Forest	6.20

3.2 Ecological impacts

Potential biodiversity impacts associated with project are discussed in the EIS, BAR and Aquatic Ecology Report. Those that relate to the clearing boundary footprint are summarised in Table 3-2.

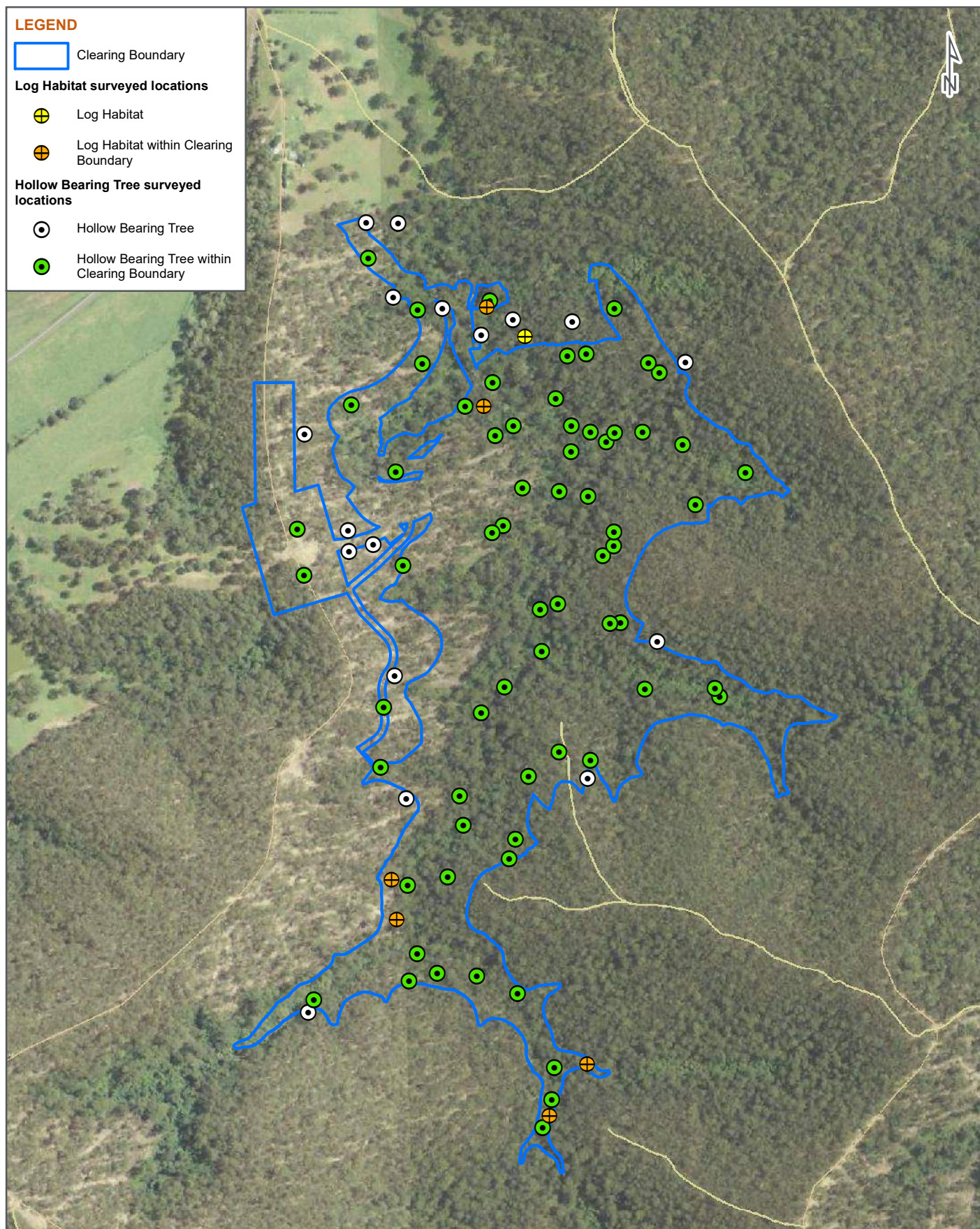
Table 3-2 Summary of potential impacts to terrestrial biodiversity

Potential Impact	Details	Extent/Scale
Loss and fragmentation of native vegetation	Clearing of wet sclerophyll forest, dry rainforest and forested wetland	43.58 ha of native vegetation 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, dry rainforest and forested wetland. Habitat features such as hollow-bearing trees and logs will also be lost.	43.58 ha of vegetation providing potential fauna habitat will be cleared. This includes 66 hollow-bearing trees and 6 logs.
Fauna habitat fragmentation	Vegetation clearing associated with the construction works will cause habitat fragmentation.	43.58 ha 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	Most likely during clearance activities.

Potential Impact	Details	Extent/Scale
	be created as a result of the 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

Sixty six hollow-bearing trees and six hollow logs occur within area of the clearing boundary (Figure 3-1). The 66 hollow-bearing trees supported 103 hollows (Appendix D). The recorded tree hollows varied from 'chimney-like' hollows at the tops of deceased trees (stags) (Figure 3-2 right), to 'fissure' hollows that run vertically along a tree's trunk or as 'cavity' hollows that could occur throughout a tree (Figure 3-2 left). The tree hollows provide habitat for a range of fauna such as large forest owls (e.g., the Sooty Owl), small and medium sized birds (e.g., the Gang Cockatoo and Rose Robin), arboreal mammals (e.g., the Yellow-bellied Glider), and microchiropteran bats. The hollow logs may provide habitat for ground-dwelling fauna such as the Spotted-tailed Quoll and the Echidna.



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COORDINATE SYSTEM
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FIG NO. 3-1

FIGURE TITLE Fauna habitat

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

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Figure 3-2 Hollow-bearing tree types. A cavity-type hollow (left) and a chimney-type hollow (right).

4 Mitigation and management measures

Mitigation and management measures to avoid or minimise impacts to flora and fauna during clearing within the clearing boundary include:

- hygiene control
- delineation of no-go zones
- weed control and management
- pre-clearing surveys
- relocation of fallen logs and bushrock
- nest box management plan
- River-Flat Eucalypt Forest management plan

4.1 Site set up

Hygiene control stations 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 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 of native vegetation outside the designated clearing boundary and full supply level as indicated in Figure 4-1. In total, 12 'no-go zones' have been delineated. A physical clearing boundary is to be identified prior to any clearing works with the 'no-go zones' being marked with high-visibility bunting. 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 native vegetation.

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 Erosion and sediment control

Specific erosion and sediment control measures are detailed within the SWMP, including timing of implementation prior/during the Partial Clearing works.

4.5 Pre-clearing surveys

Within a week prior to clearing of any vegetation, pre-clearing surveys and inspections for threatened and non-threatened fauna and their habitat (tree hollows, nests, rocky areas, hollow fallen logs) 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. If any new fauna habitat is identified, it is to be marked with high visibility flagging tape and spray paint with the letter "H". If previously marked habitat has become difficult to identify (flagging tape may have fallen off or bark with spray paint may have shed) then flagging tape and/or spray paint is to be reapplied. The pre-clearing survey will identify sensitive areas which will require on-site supervision by an ecologist during clearing of vegetation.

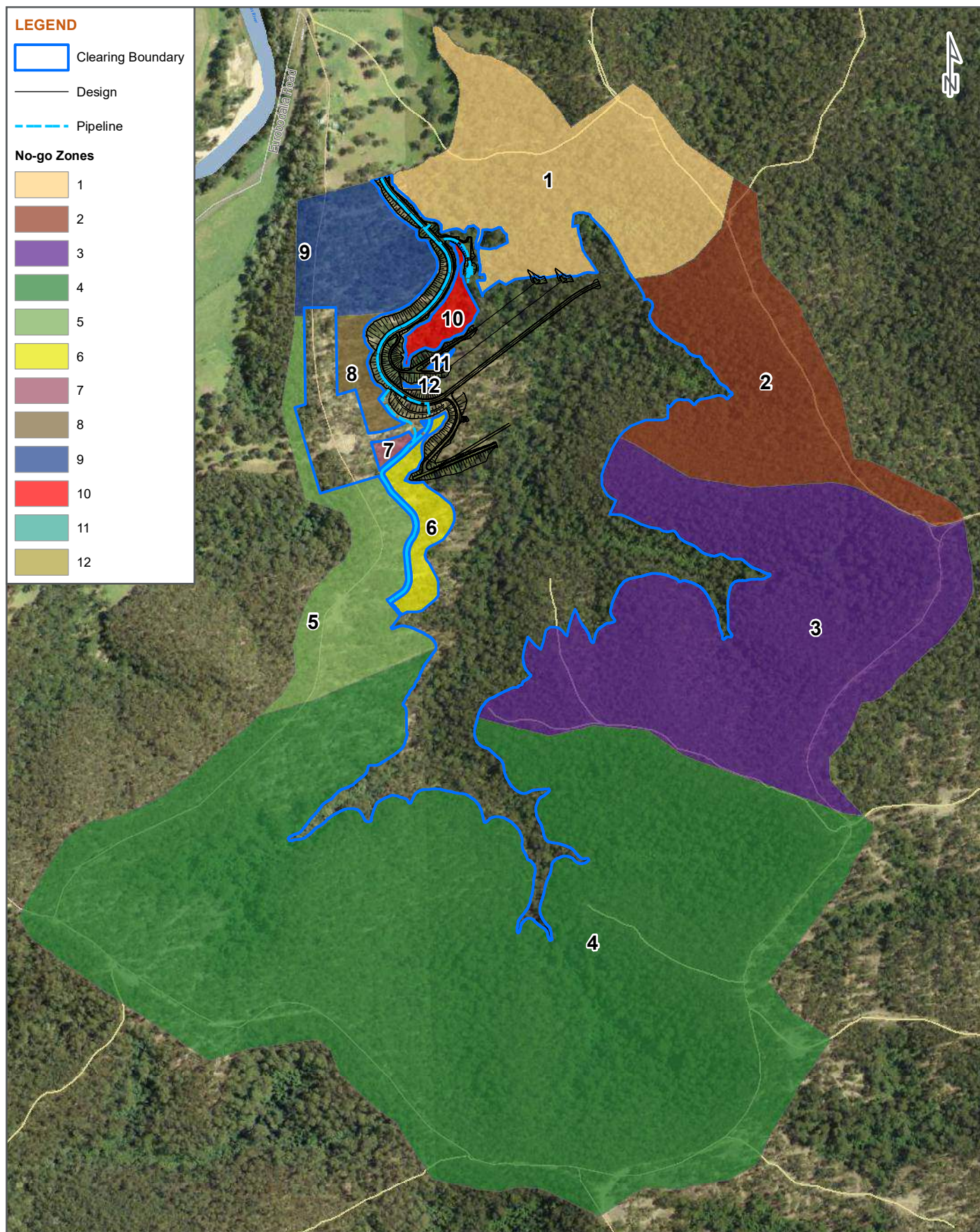
Pre-clearance surveys will also provide an opportunity to collect seeds of native species that may be ripe at the time of clearing. An assessment of collectable seed is to be conducted by a trained botanist/ecologist.

Where feasible, all mapped and additional hollows as identified in ecologist pre-clearing survey will be inspected for visual signs of recent use from the ground or by pole mounted camera. The information attained from ground or camera inspections will be used by an arborist to support the verification of hollow existence, assessment of potential for salvaging/repurposing, and identification of evidence of current/recent hollow use. It is noted that trial field inspections of hollows via camera in mid-January 2022 had varying success due to field constraints such as weather and technological constraints.

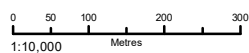
4.6 Reuse of logs and vegetation

Where practicable, the following should be employed for reuse of logs and vegetation:

- Cleared vegetation and woody material will be re-used in habitat supplementation and restoration
- The guidance of an ecologist should be sought to determine suitable capacity of fallen timber in the vegetation communities in accordance with NSW benchmarks. The aim is to use felled HBTs first before salvaging other logs.
- Identified fallen logs are to be put aside after felling for relocation into retained vegetation zones and revegetation areas. Opportunities to harvest sections of fallen hollow logs of a manageable size in order to repurpose as nest boxes will be explored and implemented where practical. Availability of fallen hollow log material for repurposing as nest boxes will be subject to guidance from an ecologist.
- Timber should only be moved into accessible retained vegetation areas where there are suitable routes in for machinery without causing significant damage
- Logs can be placed into vegetation zones from the edge of no-go zones or short incursion made into the no-go zone under guidance of an ecologist
- Management zones for the River Flat EEC (shown in appendix B) should not be breached
- Logs should be cut to a size practical for relocation without damaging hollow features where possible. 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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FIG NO. 4-1

FIGURE TITLE No-go Zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

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4.7 Vegetation clearing

4.7.1 Vegetation clearing strategy

The approach to clearing vegetation in the storage site is to be staged in order to meet the objectives of minimising impact to threatened species, prevent erosion and salvageable timber resources.

Forestry has an agreement to salvage all harvestable timber from the clearing site. Clearing by Forestry is to occur as the first stage of clearing (as detailed in Section 1), with subsequent clearing of smaller trees, and remaining shrubs and regrowth occurring in future stages of the Project (i.e. post Partial Clearing works outlined in this CFFMP) by the nominated construction contractor. This is in order to retain a reasonable level of vegetation cover to maintain soil stability over the site. Forestry's experience and procedures in creating suitable access tracks, including temporary creek crossings, to harvestable trees will be utilised and are detailed in the CSWMP to be implemented for the partial Clearing works

The independent arborist contractor will be undertaking clearing of HBTs concurrently with Forestry. Clearing undertaken by the independent arborist contractor comprising of felling HBTs by hand that have been identified by the ecologist in the pre-clearing survey, unless unsafe or impractical to do so.

Condition B4(e) of the conditions of consent require staged clearing and timing of clearing outside of breeding seasons, in order to minimise potential impact to threatened fauna species. All identified threatened fauna species on site can breed within hollow bearing trees, with the exception of the Varied Sittella which builds a nest in upper branches. In keeping with the recommendation in Section 8.3.1 of the EIS, removal of hollow bearing trees (HBTs) will be undertaken by Forestry and the independent arborist contractor between 1 February and the first two weeks of March, to minimise impacts on breeding of the hollow dependant threatened fauna. Nest boxes must be in place in accordance with the nest box management plan prior to clearing of these HBTs to provide additional potential habitat for displaced fauna (Appendix C).

The Varied Sittella builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. It is anticipated that many of the suitable trees with high canopies will be cleared within the February /March clearing works. The pre-clearing check list has been developed to detect any additional nesting fauna prior to vegetation clearing outside this clearing window. If a Varied Sittella nest is detected, DPIE Biodiversity and Conservation (BCD) will be contacted to decide the appropriate mitigation and clearing procedure.

The Eastern Pygmy Possum (*Cercartetus nanus*) was identified as being potentially present in the EIS. Although not found in survey, the survey results were considered inconclusive in being able to completely eliminate their potential presence on the Project site. Eastern Pygmy Possums undergo a period of winter torpor, a time during they would be most vulnerable to clearing and may not respond to the disturbance of encroaching clearance. They may shelter in a variety of locations including tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, (e.g. grass-tree skirts). The habitat tree clearance procedures will reduce risk to this species and clearing of other vegetation is expected to be completed before June avoiding mid-winter where torpor is more likely.

It is anticipated that HBTs will correspond with suitable trees for harvest. In cases where HBTs are not suitable for harvest Forestry will still be required to fell these trees in order to capitalize on the short timing window for clearing of habitat trees to minimise threatened fauna disturbance. Non-commercially useable trees felled by Forestry can be left on site for clean-up or relocation as habitat during later stages of the clearing process. Forestry will operate under their Timber Harvesting in Native Forest Practice Code, however with modifications to include the provisions relating to the felling of HBTs under this plan and the associated mitigation measures required. This includes the felling of HBTs first (from 1 February to the second week of March), then the remaining clearing can proceed at any time outside of the mid-winter period (July/August), including the salvaging of any remaining harvestable trees by Forestry, and the subsequent completion of clearing of the area within the clearing boundary by the construction contractor in future stages of the Project (i.e. post Partial Clearing works outlined in this CFFMP). Clearing of non-habitat harvestable timber and other vegetation outside the February/March period should be timed in such a manner as to reduce the potential for erosion and run-off.

4.7.2 Habitat tree clearing and timber harvesting by Forestry

Habitat or hollow-bearing trees will be cleared by Forestry if it is deemed unsafe or impractical to be cleared by hand by the independent arborist contractor. Habitat or hollow-bearing trees have been marked with an 'H' and/or flagged with flagging tape (example shown in Figure 4-2). If tape or paint has been removed it is to be re-applied during pre-

clearing works or prior to vegetation clearing machinery working through the site. Additionally, if other hollow-bearing trees are identified during pre-clearing works or prior to vegetation clearing machinery working through the site they are to be marked in the same manner and associated clearing procedures followed.

The following best-practice vegetation clearing methodology is to be applied to any HBTs within the clearing boundary being felled by Forestry:

- The pre-clearing checklist (found in Appendix E) is to be addressed and all completed pre-clearing checklists submitted to the proponent.
- Removal of all HBTs is to be undertaken between 1 February and the first two weeks of March to minimise impacts on breeding of threatened fauna.
- Removal of trees surrounding HBTs will occur at least 48 hours before HBTs are removed so that disturbance and reduction in surrounding habitat may encourage fauna sheltering in HBTs to self-relocate. "Surrounding" in this case is to include at clearing radius of at least 10m around the habitat tree, including the felling of smaller trees of non-commercial value. More extensive clearing around HBT is preferable including the harvesting of all other salvageable trees within a clearing zone or coupe, however due to the approach to clearing for the project (i.e. partial clearing for harvestable timber and habitat trees by Forestry first then at a later time post Partial Clearing works, additional clearing by the construction contractor) shrubs, roots and ground cover will be left in situ for erosion and sedimentation control.
- An ecologist will be present to during both stages of HBT clearing and will also be present to inspect existing hollow fallen logs and rocks before they are moved. If fauna is found utilising this habitat it is to be relocated to suitable habitat outside the clearing boundary.
- Hollow-bearing trees are to be felled using the following method:
 - HBT to be knocked or shaken with an excavator bucket or other machinery to encourage fauna to evacuate the tree during this time or immediately prior to felling
 - pause and wait five minutes to give fauna the opportunity to escape
 - repeat knocking or shaking HBT with excavator bucket
 - pause and wait five minutes to give fauna the opportunity to escape
 - using the excavator bucket, slowly lower the tree to the ground. Where feasible, HBT should be lowered in a direction or position such that damage to hollows are minimised
- Felled trees must be left for at least an hour on the ground to give any fauna trapped in the trees an opportunity to escape before further processing of the trees.
- An ecologist is to be present during the felling of all HBTs, and they must inspect the felled trees as soon as possible once it is deemed safe to inspect the area.
- Should fauna be observed either during the felling process or during the inspection by an ecologist and it can't be safely caught and relocated at the time, the tree should be retained in place for 24 hours to allow fauna the opportunity to move on during the night. The tree should be inspected again the next day to ensure the animal has vacated the tree. If the animal is still present and can't be caught the ecologist should work with a skilled chain saw operator to access the animal so it can be safely relocated.
- Felled HBTs to be assessed by ecologist and/or arborist for potential for salvaging for either repurposing as nest box or use as ground habitat outside the clearing area, and subsequently salvaged and repurposed as practical.
- Results and outcomes of fauna rescued and or relocated during the clearing works will be documented and provided to the proponent.

All persons working on the vegetation clearing will be briefed in inductions and/or toolbox talks about the possible fauna present at the time of construction, and what procedures should be undertaken in the event of an animal being injured or disturbed.



Figure 4-2 Hollow-bearing tree identification. Hollow-bearing tree trees were marked with an 'H' and with high-visibility flagging tape.

4.7.3 Hollow-bearing tree clearing by independent arborist contractor

The independent arborist contractor will clear all HBTs as identified in the pre-clearing survey where safe and practical to do so, using the following methodology:

- The pre-clearing checklist (found in Appendix E) is to be addressed and all completed pre-clearing checklists submitted to the proponent.
- Removal of all HBTs is to be undertaken between 1 February and the first two weeks of March to minimise impacts on breeding of threatened fauna.
- All HBTs with potential for repurposing hollows as nest boxes or with any potential sign of current/recent use will be physically inspected by arborist in presence of ecologist, with any inhabitant removed and manually relocated if necessary/possible prior to tree felling.
- Should fauna be observed during the inspection by the arborist or ecologist and it can't be safely caught and relocated at the time, the tree should be retained in place for 24 hours to allow fauna the opportunity to move on during the night. The tree should be inspected again the next day to ensure the animal has vacated the tree. If the animal is still present and can't be caught the ecologist should work with the arborist to access the animal so it can be safely relocated.
- The independent arborist contractor is to fell the HBT by hand/chainsaw. If it is deemed by the arborist to be unsafe or impractical to do so, Forestry will fell the tree in accordance with the methodology outlined in Section 4.7.2.
- Once it has been confirmed that felled hollows are not inhabited, hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.
- Repurposed hollow nest boxes to be reused on site in addition to nest boxes already installed on advice from ecologist.

- Results and outcomes of fauna rescued and or relocated during the clearing works will be documented and provided to the proponent.

4.7.4 Clearing of all other vegetation

For removal of all remaining vegetation including the understorey vegetation, non-hollow bearing trees, and trees not removed by Forestry, the following best-practice vegetation clearing methodology is to be applied:

- The pre-clearing checklist (found in Appendix E) should be addressed.
- A fauna handler or ecologist will be onsite during vegetation clearing within sensitive areas identified within the pre-clearing survey that require on-site surveillance by an ecologist (refer Section 4.5).
- The clearing process should be undertaken in a manner sensitive to the potential presence of fauna during the clearing process.
- 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.
- 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 pseudocapsicum* (Jerusalem Cherry) and *Sida rhombifolia*
- Trees near the clearing boundary should be felled in a manner to minimise damage to retained vegetation. Felling into the clearing area is preferable when there are no other safety constraints. When possible, trunks and roots are to be left in situ to minimise soil erosion. In Clearing Area 1, grubbed organic material (stumps, roots) are to be spread over the disturbed area to provide soil stability.
- Non-harvestable organic material to be spread over disturbed earth to avoid soil erosion.
- Hollow log habitat is to be relocated to a vegetation retention zone. The supervising ecologist 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 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 Site Supervisor / 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 is 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 the vegetation clearing works within the clearing boundary, 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 nearest prequalified veterinary clinic for treatment where, if assessed by a vet as unlikely to survive, it will be humanely euthanized.

The relevant fauna rescue services and local veterinary surgeries contact details are listed in Table 4-1.

Table 4-1 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 Site 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 a suitable release point by the qualified ecologist or wildlife rescuer
- release site is to contain similar habitat (the same vegetation community if possible) and occur as close to the original capture location as possible without placing the animal in danger from the continuing constructing works

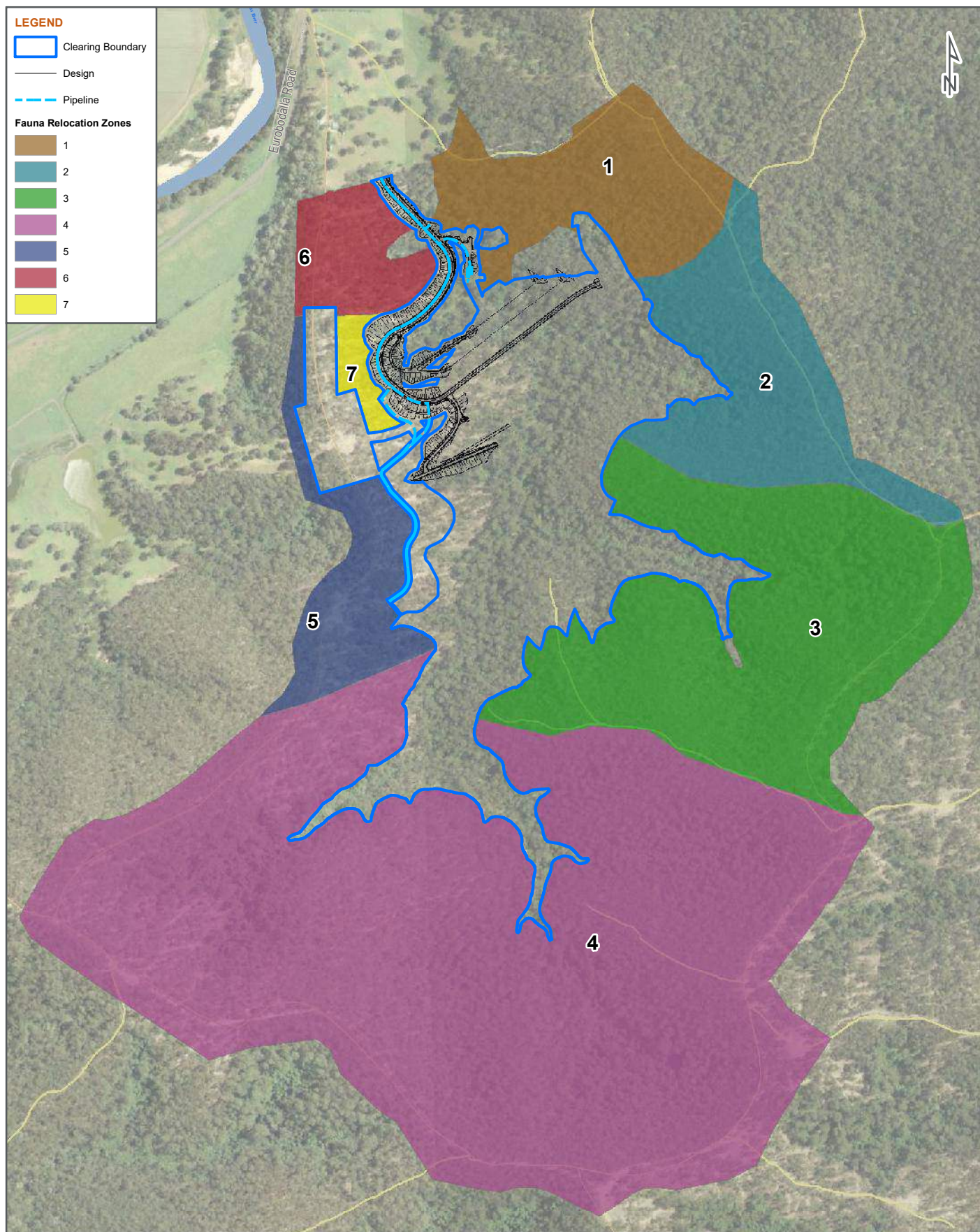
- if the species is nocturnal, release is to be carried out at dusk or after nightfall to minimise the risk of predation by diurnal predators.
- release would generally not be carried out during periods of heavy rainfall
- hollow-dependent species, particularly those with dependent young, shall be released into a temporary nest box.

The native vegetation adjacent to the clearing boundary on the eastern and western uphill slopes offers the best relocation sites for most species, as shown as the 'Fauna relocation zones' in Figure 4-3. These areas of native vegetation are contiguous with the native vegetation of Bodalla State Forest and should provide any relocated fauna with an opportunity to disperse away from danger. The south of the storage site also supports dry rainforest and rocky creek lines within the steeper gullies for fauna that may require such habitat.

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.



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FIG NO. 4-3

FIGURE TITLE Fauna Relocation Zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

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4.9 Unexpected threatened species finds

If any threatened species are observed within the 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 Forestry 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

Rehabilitation and re-vegetation will be detailed in subsequent management plans in future stages of the Project as the Partial Clearing works clearing covered under this CFFMP will be followed clearing of remaining vegetation, construction of the water storage facility and associated ancillary facilities for which separate CEMP and CFFMP documentation will be developed.

The goal of rehabilitation and re-vegetation will be 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. Post fire regeneration from the summer 2019/20 fires will however limit the availability of seed available for some species and provisions will need to be made to source additional stock with local provenance.

5.1 Retained vegetation

Vegetation retention zones (VRZs) have been delineated for the Storage Site construction footprint (Figure 5-1). Twelve VRZs have been delineated adjacent to the Storage Site construction footprint. The VRZs correspond to the no-go zones outlined in Section 4.2 and are to be appropriately managed as no-go zones for the duration of the partial clearing works for the project.

5.2 Vegetation management actions

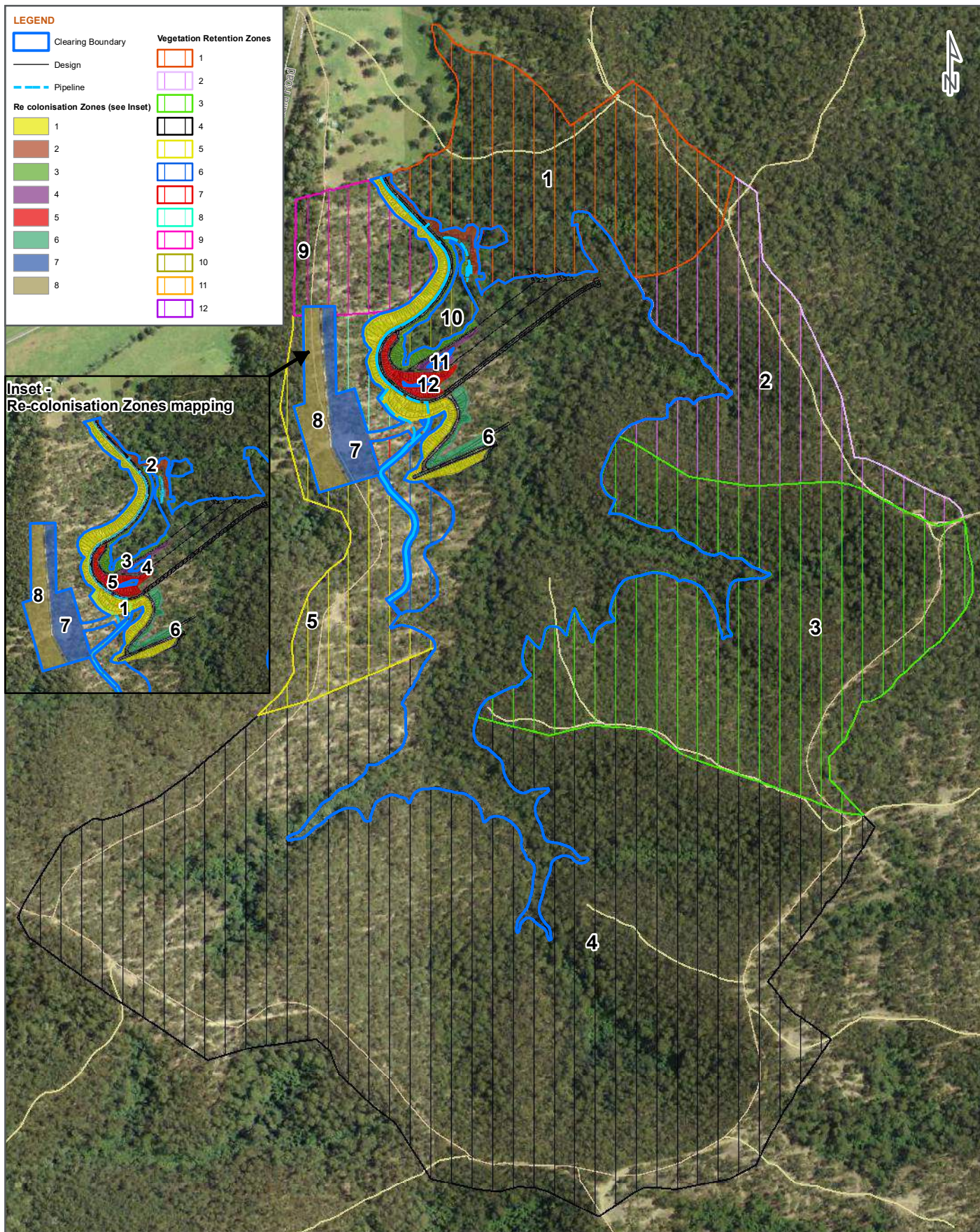
The following table (Table 5-1) outlines the purpose and timing of relevant vegetation management actions applied to the eight revegetation and re-colonisation areas and twelve VRZs. The main management objectives relevant to the partial clearing works and this CFFMP are with regard to prevention of weed and invasive species colonising these revegetation and recolonization zones due to the vegetation clearing works being undertaken within the clearing boundary.

Regeneration is expected to occur via soil bourn seeds and seed rain from neighbouring zones of retained vegetation. Management of weeds and invasive species reduces competition and displacement pressures in the revegetation and recolonization zones, thereby promoting the likelihood of successful recolonisation of local native flora species. If natural recolonisation is not successful as determined during monitoring, supplemental planting may be required (to be addressed in CEMPs/CFFMPs developed for future stages of the Project post Partial Clearing works).

Table 5-1 Management actions and objectives for each re-colonisation and vegetation retention zone

Management zone	Management objective	Action	Timing
Revegetation and 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
Revegetation and 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		

Management zone	Management objective	Action	Timing
	Increase the resilience of the disturbed area	Monitor regrowth and conduct weed control as required	Ongoing monitoring every six months for five years
Revegetation and Recolonisation Zone 3	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 zones 1 - 6	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.	As construction commences Ongoing monitoring every six months for five years
	Preserve the existing assemblage of native species and their condition	Monitor the vegetation retention zones for signs of weed invasion. Treat weeds as required	
	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 zones 7 - 12	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.	As construction commences Ongoing monitoring every six months for five years
	Preserve the existing assemblage of native species and their condition	Monitor the vegetation retention zones for signs of weed invasion. Treat weeds as required	
	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 Vegetation Retention Zones and Re colonisation Zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CFFMP

CREATED BY JT14432

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Appendix A Weeds and pathogens management sub-plan

Overview

Measures to manage the current weeds within the project area and to prevent the colonisation of weeds are to be addressed throughout the project from pre-construction through to operation. For the purposes of this CFFMP this includes the initial removal of existing weeds within the clearing boundary and undertaking measures to reduce the risk of introduction and spread of weeds throughout the period of partial clearing. Appropriate removal of priority weeds will occur prior to any vegetation clearing works occurring within the clearing boundary.

General hygiene measures are detailed and will be followed throughout the partial clearing period. Follow up weed treatment and monitoring are also outlined in this sub-plan as the timing for these actions may fall within both the initial Partial Clearing works and within the clearing undertaken by the construction contractor in future stages of the Project (i.e. post Partial Clearing works outlined in this CFFMP).

Hygiene measures and protocols

The following general weed management measures are to be adopted for the vegetation clearing works within the clearing boundary:

- 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.

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 project. 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).

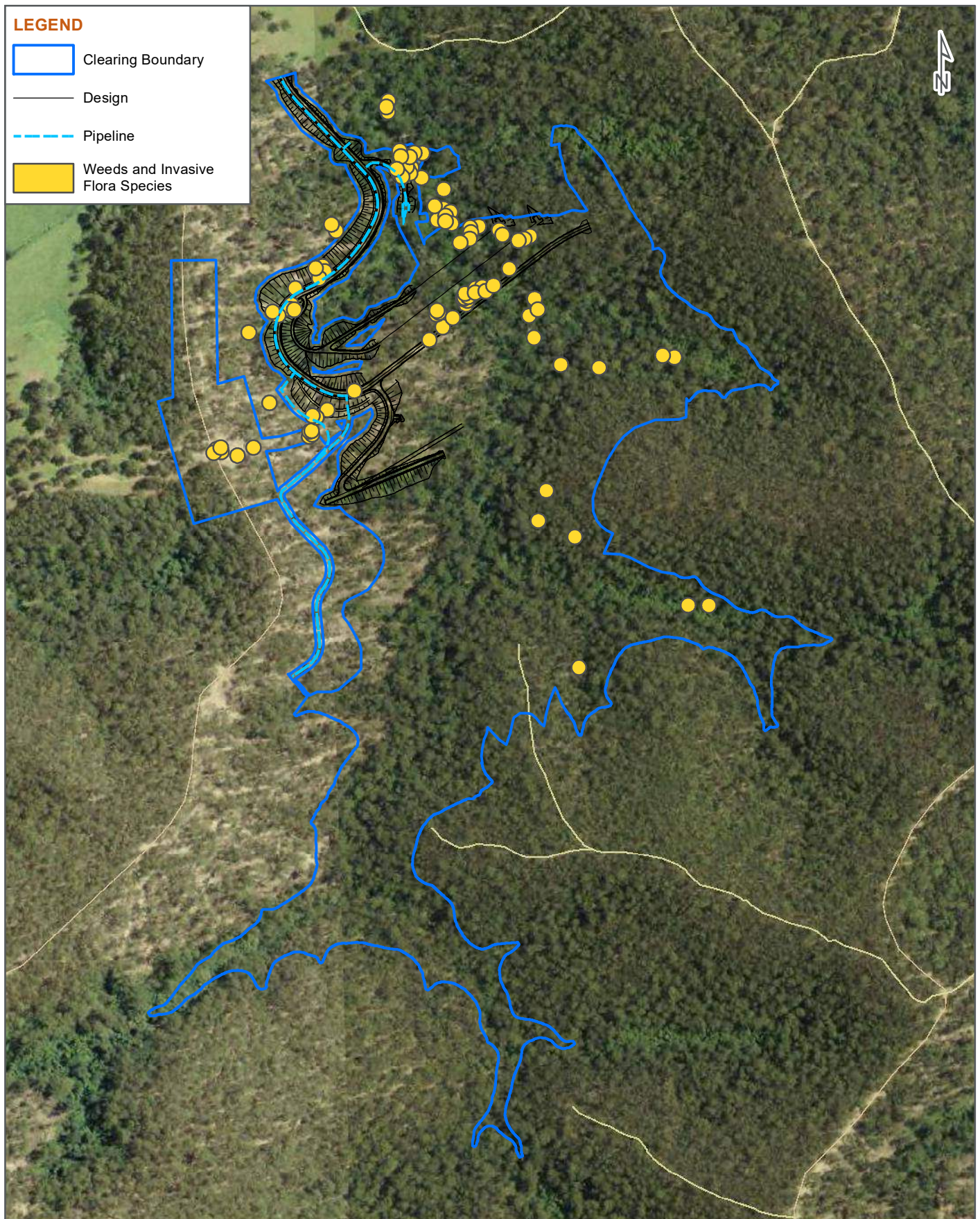
Secondary weeding will involve the targeted removal of priority weed regrowth and hand removal and spot spraying of exotic grasses, herbaceous weeds and seedlings of woody weeds.

Maintenance weeding

Maintenance weeding will occur after construction works. This will involve the removal and management of additional weeds throughout the project area where required, including the revegetation zones. The River Flat Eucalypt Forest that occurs adjacent to the Storage Site Clearing Boundary is also required to be monitored for weeds and invasive flora species throughout construction. It is recommended that this occurs monthly throughout this period and appropriate removal and management occur if required.

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 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.



LEGEND

- Clearing Boundary
- Design
- Pipeline
- Weeds and Invasive Flora Species

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. A-1

FIGURE TITLE Weeds and Invasive Flora Species

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works CFFMP

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Appendix B River Flat Eucalypt Forest Management Plan

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. This management plan aims to protect areas of River Flat Eucalypt Forest not occurring within the Storage Site clearing boundary and regenerate the areas that are only temporarily impacted by the construction works.

Management actions

This management plan describes management actions which are required to conserve and maintain the remnant stands of River-Flat Eucalypt Forest. Table B-1 outlines the purpose and outcomes of these management actions applied to the River Flat Eucalypt Forest within and immediately adjacent to the Storage Site Construction Footprint. These management actions are to be applied to the three management zones outlined in Figure A-2.

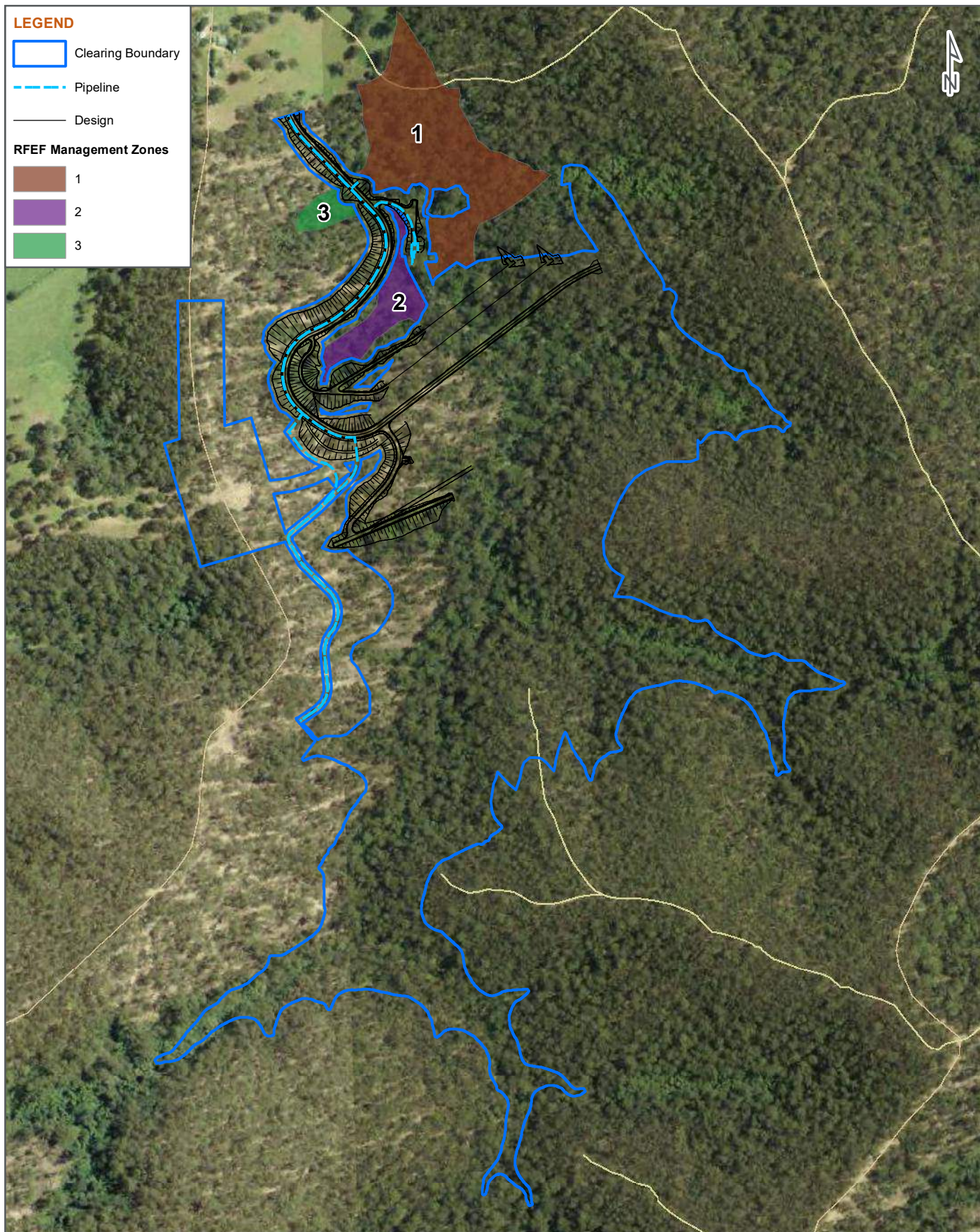
Table B-1. River Flat Eucalypt Forest management actions

Management action	Purpose	Timing
Sediment control measures (detailed in the SWMP)	To minimise sediment-laden run-off from the construction works entering 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 Storage Site Clearing Boundary. Areas are to be marked with high-vis flagging rope.	To prevent the accidental 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 <i>Appendix A: Weeds and pathogens management subplan</i>)	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 pre-construction and construction
	To prevent the spread of plant pathogens and disease via plant, machinery and personnel into the adjacent River Flat Eucalypt Forest.	

Management action	Purpose	Timing
	To prevent the spread of plant material, disease and pathogens away from the Storage Site Clearing Boundary and into areas of River Flat Eucalypt Forest outside the ESS Site.	
Weed control (see <i>Appendix A: Weeds and pathogens management subplan</i>)	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 spread of weed and invasive flora species into adjacent areas of River Flat Eucalypt Forest.	
<p>Monitoring: River Flat Eucalypt Forest occurring adjacent to Storage Site Clearing Boundary will be monitored for weeds and invasive flora species.</p> <p>Monitoring: The recovery of temporarily cleared River Flat Eucalypt Forest within the Access Road and Pipeline Construction Footprint will be monitored.</p>	To assess the presence of weeds and invasive species in River Flat Eucalypt Forest adjacent to the Storage Site Clearing Boundary.	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.	
Water quality monitoring	Monitoring water quality during construction will be conducted to determine potential impacts on the EEC. Corrective measures will be applied in consultation with council.	During construction
Stock exclusion from management zones.	Prevent trampling of creek banks and the introduction of weed seeds and pathogens from manure.	Construction and Ongoing.

Management Zones

This management plan has delineated three River Flat Eucalypt Forest management zones (Figure A-2). The management actions outlined in Table B-1 will be applied across these zones.



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FIG NO. A-2

FIGURE TITLE River-Flat Eucalypt Forest Management Zones

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
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Appendix C Nest box and connectivity management plan

The EIS for this project states that ‘equivalent nest boxes should be erected for each natural hollow that is removed during the construction phase. Replacement nest boxes should be suitable for the threatened and non-threatened fauna inhabiting the development site. Nest boxes are to be erected before removal of hollow bearing trees’ (refer to Section 8.3.2.12b). Additionally, Section 3.9 *Impact on native fauna and their habitat* of Appendix 2 of the Development Consent specifies that the CFFMP will ‘include a nest box strategy to be implemented prior to vegetation removal’. Vegetation removal for the project will commence by Forestry and the independent arborist contractor in February 2022 prior to the main construction period. Therefore this nest box management plan, including installation of nest boxes, will be implemented before this period.

The most recent guidelines for artificial hollows was released by the Biodiversity Conservation Trust (BCT), Guideline for Artificial Hollows (BCT 2020), on the use of artificial hollows for private land conservation agreements. The Guideline for Artificial Hollows outlines the following seven requirements for a nest box management plan:

- the number and type of artificial hollows required for each management zone
- the location of suitable trees for installation (closer proximity to water and food resources may increase occupation and subsequent breeding success)
- installation technique and who would install the artificial hollows
- measures to protect the artificial hollows from fire
- monitoring and reporting requirements for your site
- relevant triggers for the repair and replacement of artificial hollows, including managing unwanted occupants (refer to Stage 7)
- costs associated with management actions including construction, installation, monitoring and maintenance.

This nest box management plan will follow the seven requirements outlined in BCT’s Guideline for Artificial Hollows thereby satisfying the EIS recommendation and requirement for a management plan set out in Section 3.9 of the Conditions of Consent.

Connectivity

The Biodiversity Assessment Report (BAR) identifies that the Project will have impacts on connectivity along the Tuross River. Works along the Tuross river and its riparian buffers are not within the scope of the Partial Clearing works. Works along the Tuross River mainly comprise the Tuross River Intake Pump System (TRIPS) works which are outside the scope of the Partial Clearing works, for which separate environmental management plan documentations have been prepared. As such, fauna crossings have not been proposed as part of this CFFMP for the Partial Clearing works.

Connectivity impacts may be experienced by ground dwelling/small mammals and reptiles residing within the clearing boundary as the Partial Clearing works are undertaken. However, the Partial Clearing only encompasses clearing of harvestable timber and localised grubbing. The majority of non-harvestable organic matter will be left within the clearing boundary. Furthermore, as part of the Partial Clearing works, vegetation around the clearing boundary is retained as a continuous patch. Therefore, fragmentation and impacts to connectivity are considered minor and are mitigated by the management measures outlined in this CFFMP, in particularly the retention of non-harvestable organic matter.

Impacts to connectivity may become more pronounced during future stages of clearing (post Partial Clearing works) and construction for the Project. Management measures to mitigate impacts to connectivity for ground dwelling/small mammals/reptiles through management of the mid-storey will be addressed in revegetation and rehabilitation measures identified in subsequent environmental management plans prepared for these future phases and operation of the Project.

Hollow loss from the clearing of habitat trees has been identified as an impact to fauna. The installation of nest boxes as per this Nest Box and Connectivity Management Plan will be undertaken under the guidance of an ecologist to ensure appropriate location and spacing of nest boxes. A ratio of up to 1:5 hollows to nest boxes installed has been proposed and is detailed in the next section.

Number and type of nest box

Eurobodalla Shire Council propose to use the *Habitech modular nest box system* (“Habitech”) supplied by Habitat Innovation and Management. Further, as discussed in Section 4.6 and Section 4.7.2 of the CFFMP, opportunities to

salvage and repurpose logs and HBT hollows into nest boxes will be pursued. Repurposed hollow nest boxes will supplement the proposed artificial Habitech nest boxes outlined in this Nest Box management plan. All nest box works will be undertaken by a qualified ecologist ensure appropriate placement (i.e to determine the appropriate trees to support the nest boxes and the distance between these trees) and installation.

The EIS identified eight threatened species within the development site that utilise tree hollows as habitat. These eight species were then grouped according to the nest box type they could potentially occupy (Table C-1 and Table C-2). However, not all tree hollow-using species utilise artificial hollows or nest boxes. Appendix 1 of BCT's Guideline for Artificial Hollows summarises the evidence of artificial hollow usage for hollow-dependent species occurring in New South Wales (BCT 2020). This information was used to determine if nest boxes could be used as a conservation action for a particular tree hollow using species occurring on site (Table C-1).

Larger nest boxes often involve more complex installation configurations due to the size and weight. This could include the installation of heavy duty steel brackets and mounted steel posts. This configuration often leads to failure within a few short years as the dimensions and weight of the box fail to support themselves over time. This poses safety issues during installation and maintenance of the nest boxes. Therefore, due to the limited evidence in scientific literature of nest box uptake as well as the complexities associated with larger nest boxes, augmented carved hollows have been proposed to be used for these larger species. The use of the "Hollowhog" boring tool would be used to gouge hollows of suitable dimension through a small entrance hole, producing less damage to the tree's cambium compare to the more traditional chainsaw method of cutting a face plate.

To reduce hollow competition and to allow for individuals of a particular fauna group to occupy alternative hollows within their home range, it is usually recommended that more nest boxes be installed compared to the number of tree hollows that will be lost. The area to be cleared is surrounded by an extensive area of state forest and several national parks (Kooraban, Wadbilliga and Gulaga) that will provide habitat including hollows for displaced fauna. Initially, a nest box regime based on a 1:1 ratio of hollows removed to nest boxes installed was proposed. However, upon consultation with the BCD in January 2022, the adoption of a 1:5 ratio was considered more appropriate.

As per consultation with the BCD, the occupancy rates of hollows in these habitats is not known. It is noted loss of habitat and hollows from the extensive 2019/2020 summer bushfires would impact the occupancy rates of these surrounding habitats. Furthermore, hollows can take a long time to form, in some instances taking 100+ years to form. Therefore, it is considered that for this project a 1:5 ratio of hollows removed (103 hollows in total, refer Appendix D) to nest boxes installed will be sufficient to provide supplementary habitat for displaced fauna until natural hollows form in the current trees in the vegetation retention zones. This is also provided the nest boxes are maintained. It is noted however that the availability of trees able to accommodate larger hollows for the larger species (i.e. powerful owl & glossy black cockatoos) may not meet the 1:5 ratio of hollows removed to nest boxes. Therefore, a maximum possible ratio of up to 1:5 hollows removed to nest boxes installed will be pursued, with a minimum 1:1 ratio pursued in the first instance. This equates to potential maximum total of 515 nest boxes to be installed.

Table C-1 Hollow-dependent threatened species recorded within the development site and evidence of their use of artificial hollows. Information attained from Appendix 1 of the Guideline for Artificial Hollows (BCT 2020).

Species name	Common name	Nest box type / fauna group	Evidence of artificial hollow use
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Cockatoos	No
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Cockatoos	Yes
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Microbats	Yes
<i>Petaurus australis</i>	Yellow-bellied Glider	Possums and gliders	Yes
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Microbats	Yes
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Microbats	No
<i>Tyto novaehollandiae</i>	Masked Owl	Large forest owls	Yes

Species name	Common name	Nest box type / fauna group	Evidence of artificial hollow use
<i>Tyto tenebricosa</i>	Sooty Owl	Large forest owls	No. Note: Approved NSW Recovery Plan states “The potential for artificial hollows (nest-boxes) to fast-track habitat development for owls should be investigated.”

Based off the estimated size class of hollows to be removed, five different types of nest boxes and carved hollows will be required to mitigate the loss of tree hollow habitat (Table C-2). The number of each type is not directly correlated with the associated estimated size class of hollows to be removed. The recommended number of each type has been based on an understanding of the target species biology as well as an understanding of human error and bias when undertaking hollow tree assessments. For example, extremely large hollows (>210mm) are easier to detect and count than smaller hollows. Twenty-nine of this size class were recorded during the hollow tree assessment with the target species for this size nest box being forest owls. The installation of the possible maximum one-hundred & forty-five nest boxes for forest owls in the vegetation retention zone would most likely be overloading the area of this size nest box given the home range of forest owls. Therefore, some of the numbers of this size class have been allocated to smaller size class nest boxes that may have been underestimated. Furthermore, the seventeen hollows of size 160-200mm are not directly associated with the recorded hollow dependent threatened species (refer Table C-2). These seventeen hollow “allotments” have been separated and assigned to the 110mm-150mm and 210+mm size classes to ensure that they have been accounted for.

To prevent overcrowding within a population of target species, nest boxes targeting the same species should also be adequately spaced apart. Nest boxes should not be installed in trees that have existing hollows. The installation of nest boxes will be undertaken under the advice of an ecologist to ensure appropriate location and spacing.

It is proposed that the nest box numbers as per the 1:1 nest box replacement ratio outlined in Table C-2 (determined prior to consultation with the BCD) be installed prior to the felling of HBTs by Forestry and the independent arborist contractor. Further nest box installations will follow in order to meet the 1:5 ratio as outlined in Table C-2. Any hollows salvaged and repurposed as nest boxes will be installed in the first instance. Table C-2 provides the Habitech nest box and carved hollow specifications for each target species. The table also provides the framework for an ecologist to determine the appropriate allocation of salvaged repurposed hollows.

Table C-2. Nest box replacement specifications. The type and number of each nest box has been approximated from the size and number of hollows recorded in Appendix D.

Nest box type / fauna group	Target threatened species (if suitable)	Hollow entrance size (mm) class recorded in Appendix D (number observed)	Habitech nest box type	Number to be installed prior to HBT clearing (as per original 1:1 ratio)	Number to be installed after HBT clearing	Inner dimensions (mm)	Depth (mm)	Entrance width (mm)	Approximate height above ground for installation (m)	Additional requirements
Microbats	Eastern Freetail-bat	<50mm (5)	4 unit with top entrance through lid	15	25	225 (diameter)	400	90 (diameter)	5-8	Nest box must be a wedge-shape design to reduce build-up of guano. Entrance must include a slit at the base and be heavily grooved to promote grip.
	Yellow-bellied Sheath-tail-bat		4 unit with entrance located on side of box	15	25			20 x 30		
Small gliders	-		2 unit with 'branch stub' side entrance	15	25	225 (diameter)	450	45	3-5	Nest boxes should be a mixture of outward and inward entrance design. Nest box must include a ladder of wire mesh or have steps cut on the inside to allow young to climb out. Provide 5mm drainage holes in the base of nest box.
Owlet nightjar	-	60-100 (12)	1 unit with 'branch stub' side entrance	5	45	225 (diameter)	150	70	5	
Possums and large gliders	Yellow-bellied Glider		2 unit with short 'branch stub' side entrance	35	50	225 (diameter)	450	90	5-8	Nest box must include a ladder of wire mesh or have steps cut on the inside to allow young to climb out. To be provisioned with a bedding material of eucalypt fines to small chips in order to provide a suitable bedding substrate as well as to

Nest box type / fauna group	Target threatened species (if suitable)	Hollow entrance size (mm) class recorded in Appendix D (number observed)	Habitech nest box type	Number to be installed prior to HBT clearing (as per original 1:1 ratio)	Number to be installed after HBT clearing	Inner dimensions (mm)	Depth (mm)	Entrance width (mm)	Approximate height above ground for installation (m)	Additional requirements
										regulate humidity within the nest/den box. Provide 5mm drainage holes in the base of nest box.
Large forest owls	Masked Owl	110-150 (29)	Carved Hollow	15	Minimum 29 (up to 145 to meet 1:5 ratio where possible)	400 x 400	600	100-150	5-8	Short, horizontal spout entrance
Cockatoos	Glossy Black-Cockatoo	>210 (40)	Carved Hollow	33	Minimum 40 (up to 200 to meet 1:5 ratio where possible)	(300-500) x (250-300)	870-2,000	160-200	12-15	Entrance must include angled spout of 15-20 degrees. Provide 5mm drainage holes in the base of nest box.
Total number of nest boxes				118	239 (515 maximum if 1:5 ratio for carved hollows can be met)					

Location of nest boxes

A nest boxes should be installed in a similar management zone (vegetation community) to the tree hollow it will be replacing. For example, if a tree-hollow with an estimated opening width of 30 centimetres is lost in the wet sclerophyll forest community, a Large Forest Owl type hollow should be installed in an area of wet sclerophyll forest that will be retained. All nest boxes are to be installed in the vegetation retention zones identified in Section 5. If the number of hollows lost in a particular management zone cannot be replaced because the remaining extent of that management zone is too small or not present, another management zone with suitable habitat for the target species is to be determined by an ecologist.

Nest box installation

The following section outlined the installation techniques for each of the proposed nest box types to be implemented as part of this Nest Box Management Plan. Each nest box should be given a unique identification code with their GPS coordinates recorded. This will assist in accurate identification of each tree and box during the monitoring works.

When installing a nest box, it is important that it is orientated in a suitable direction to protect it – and its potential inhabitants – from prevailing weather and extreme temperatures. When determining the height at which a nest box will be fixed it is important to consider the movement patterns of the target species, monitoring requirements and placing it in a location that minimises the risk of predation. Recommended heights that different nest box types can be fixed is provided in Table C-2.

Habitech Nest Box

Habitech nest boxes are designed with a proprietary mounting system to enable the installation of the Habitech nest box to the host tree. The mounting system is purported to allow for the tree to grow over it and hold it in place in the long-term. The Habitech nest boxes will be installed by fully qualified ecologists to ensure appropriate placement and installation.

Hollowhog Carved Hollows

As an alternative way to mimic natural hollows, it is proposed that carved hollows will be created using the Hollowhog technology by Habitat Innovation & Management within existing trees. The Hollowhog approach involves creating large internal cavities through small entry holes in both living and dead timber and then progressively carving a larger hollow to the required dimensions. The location and installation of the carved hollows will be determined and undertaken by a qualified ecologist to meet spatial requirements for targeted species whilst minimising risk to the health or structural integrity of the tree.

Salvaged Repurposed Hollows

The technique used to install a nest box will depend on the nature of the repurposed hollow nest box, the site conditions and the location of the tree to which the nest box will be fixed. Location and installation of repurposed hollows will be undertaken under the advice of an ecologist. The repurposed nest box proposed to be installed can be done so using the *Habisure*TM system or a variation of this system (BCT 2020) (Figure C-1). The advantage of this system is that it allows for trunk growth and prevents the dislodgment of attachment screws as bark is shed. The installation of repurposed nest boxes may also be installed using the Habitech proprietary mounting system if considered feasible and appropriate by the supervising ecologist.

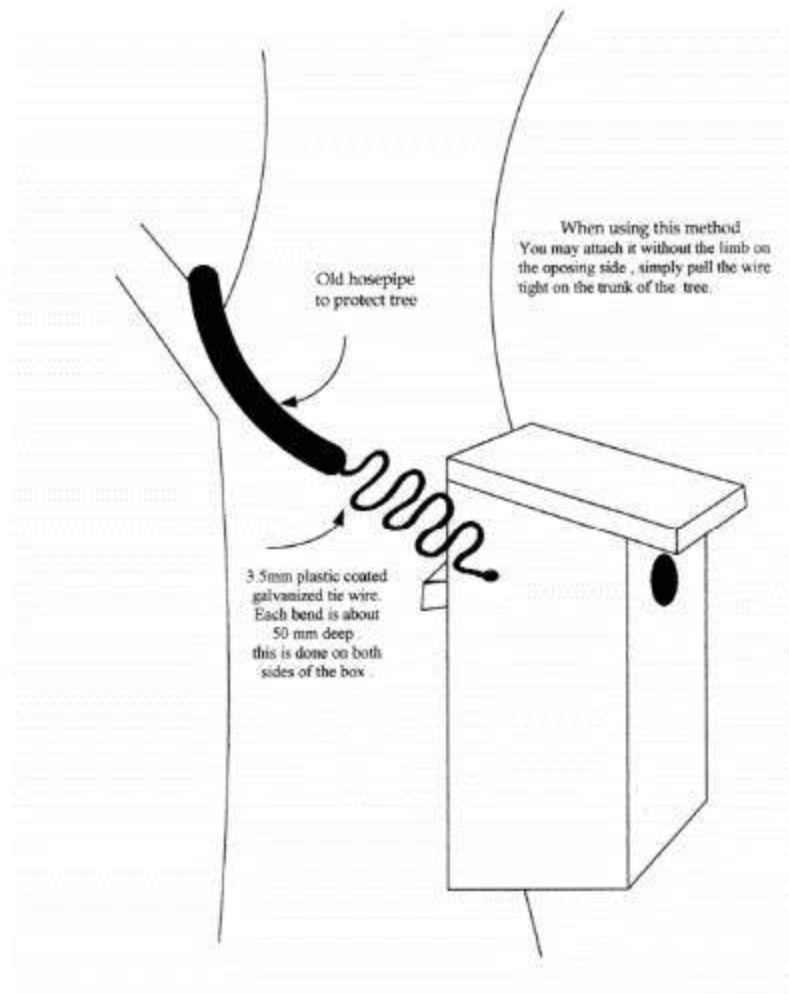


Figure C-1. Installation using the Habisure™ System.

Protection from fire

As the vegetation retention zones - in which the nest boxes will be installed - are contiguous with the native vegetation of Bodalla State Forest, protecting them from fire poses a difficult challenge. The native vegetation in the subject site was burnt in the bushfires of 2019/2020 indicating there is a risk of another fire during the lifecycle of the nest boxes. The nest boxes will be at risk of damage by fire, as would naturally occurring hollows.

The materials the nest boxes are made from should be as fire resistant as possible. Locations of nest boxes should be provided to organisations conducting hazard reduction burns so that they can be avoided.

Monitoring and reporting

A requirement of BCT's Artificial Hollow Guideline, as well as general best practice for development projects, is that artificial hollows (nest boxes) are monitored. Monitoring allows for the effectiveness of the mitigation measure to be gauged as well as the condition of the nest boxes to be observed and maintenance be undertaken if required.

The nest box monitoring program requires the following data be collected during each monitoring event:

- inspection dates
- target species (baseline data collection)
- location of the hollow (baseline data collection)
- installation dates (baselines data collection)
- species observations / internal nest box inspection for evidence of occupancy (regardless of the target species)
- photo (to provide proof of inspection and provide evidence of nest box condition)

- nest box condition (good/moderate/poor)
- tree health (including, signs of die-back or burning, formation of new hollow, interaction with Hollowhog/carved hollow system¹)
- details of maintenance and management action undertaken.

A sample monitoring form has been provided as Figure C-2.

Nest boxes are to be checked every 12 months for 5 years. As nest boxes will be located over five metres above the ground at minimum, checks are to be undertaken by a qualified ecologist with Working at Heights and Rope Access training. Nest box checks are to assess the external condition of each nest box to determine if they have been damaged and if they are damaging the supporting tree. Nest box condition description and their corresponding maintenance actions are described in Table C-3. The monitoring of nest boxes will be subject to further review within operational management plans.

The inside of each nest box should be checked to determine if it has been used and if so, by what species. It is important that any debris is not removed from a nest box. Debris may have been added by a native animal as part of a nest with its removal resulting in the occupant abandoning the nest box. If the nest box is occupied by an invasive animal, its presence should be documented and managed. Further action may include removing and relocating the nest box and/or participating in a pest management program run by Eurobodalla Shire Council.

Reporting of the nest box monitoring works is a requirement of this management program. A report on the data collected each year will be provided to Eurobodalla Shire Council, the BCD and if necessary, the BCT.

¹ The BCT (2020) states that “the installation of artificial hollows is considered an interim solution while natural hollows form, and landholders installing artificial hollows must make a long-term commitment to monitor their use and undertake maintenance as required”.

Table C-3. Nest box conditions and corresponding maintenance actions as recommended in BCT's Artificial Hollow Guideline (BCT 2020).

Condition	Description	Action
Good	No damage or minimal damage that does not affect the function of the hollow.	None
Moderate	Minor damage, but the hollow still provides suitable habitat for the target species. Examples: lid slightly loose, sides warping due to moisture	Undertake minor repairs if not occupied Continue to monitor
Poor	Major damage to artificial hollow making it no longer suitable for occupation by the target species Examples: Tree attachment failing, missing lid.	Repair or replace

Management plan costing

The costs associated with nest box construction/purchase, installation, monitoring and maintenance will need to be considered. Implementation of the scope of this plan during different stages of the project (including operational phases of the Project) and how these fit into different packages of the project along with a final costing schedule will need to be attained by Eurobodalla Shire Council.

Site:.....Observers:.....Inspection date.....

[illegible]

Figure C-2. An example of a monitoring form as provided by in the BCT Artificial Hollow Guideline (BCT 2020).

Appendix D Tree hollow data

Table D-1: Tree Hollows recorded including estimated entrance size within the clearing boundary.

Tree ID	DBH	Hollows (total number)	Hollow_1 entrance size (mm)	Hollow_2 entrance size (mm)	Hollow_3 entrance size (mm)	Hollow_4 entrance size (mm)
1	90	3	210+	160-200	160-200	
2	50	1	210+			
3	65	2	210+	60 -100		
4	40	2	210+	60 -100		
5	50	1	210+			
6	85	2	210+	160-200		
7	40	1	210+			
8	50	1	210+			
9	30	2	210+	210+		
10	70	1	210+			
11	80	1	210+			
12	80	2	210+	110-150		
13	50	1	210+			
14	60	1	210+			
15	50	1	210+			
16	80	1	210+			
17	150+	1	210+			
18	70	1	210+			
19	80	3	210+	210+	110-150	
20	70	1	210+			
21	60	2	210+	<50		
22	60	1	210+			
23	50	1	210+			
24	110	2	210+	110-150		
25	90	3	210+	160-200	160-200	
26	70	1	210+			

Tree ID	DBH	Hollows (total number)	Hollow_1 entrance size (mm)	Hollow_2 entrance size (mm)	Hollow_3 entrance size (mm)	Hollow_4 entrance size (mm)
27	150+	2	210+	110-150		
28	120	2	210+	60 -100		
29	80	1	210+			
30	90	2	210+	110-150		
31	110	4	210+	210+	60 -100	110-150
32	130	3	210+	210+	210+	
33	100	1	210+			
34	70	1	210+			
35	50	2	210+	<50		
36	70	2	160-200	110-150		
37	65	2	160-200	60 -100		
38	65	2	110-150	110-150		
39	70	1	110-150			
40	100	3	160-200	110-150	110-150	
41	40	1	110-150			
42	60	1	<50			
43	40	1	<50			
44	30	1	60 -100			
45	60	1	<50			
46	80	2	160-200	160-200		
47	70	2	110-150	160-200		
48	70	2	110-150	160-200		
49	20	1	60 -100			
50	20	1	160-200			
51	40	1	110-150			
52	40	1	60 -100			
53	80	4	110-150	110-150	110-150	110-150
54	60	1	160-200			

Tree ID	DBH	Hollows (total number)	Hollow_1 entrance size (mm)	Hollow_2 entrance size (mm)	Hollow_3 entrance size (mm)	Hollow_4 entrance size (mm)
55	50	2	110-150	60 -100		
56	50	1	60 -100			
57	70	2	160-200	110-150		
58	40	1	60 -100			
59	60	1	110-150			
60	70	1	110-150			
61	90	2	160-200	60 -100		
62	70	1	110-150			
63	80	2	160-200	110-150		
64	80	1	110-150			
65	20	1	110-150			
66	50	1	110-150			

Total Number of Hollows = 103

Total number of each size hollow:

<50mm= 5

60-100mm = 12

110-150mm = 29

160-200mm = 17

210+ = 40

Appendix E Pre-clearing checklist

Table E-1 Points to addressed prior to the commencement of any clearing by Forestry, independent arborist contractor or a construction contractor. Consult with the pre-clearance ecologist and project foreperson to confirm findings.

#	Control Measures	Y/N/NA	Comments/Corrective Actions
1	Has the extent of works been clearly delineated and is consistent with the approved limit?		
2	Have clearing boundary limits been established and clearly marked with demarcation rope or fenced off? Please comment on how the limit has been identified on the ground.		
3	Has the project ecologist completed the pre-clearing inspection?		
4	Do all habitat trees have clear visible marking with "H" or flagging tape?		
5	Were any native animals or active nests and habitat features other than the habitat trees observed and marked, or fauna relocated?		
6	Were any threatened flora species identified during pre-clearance survey? If yes, was this translocated (with appropriate approvals) from the clearing area or fenced off for protection prior to clearing?		
7	Have areas of weed infestation been identified and are measures in place for removal and appropriate disposal?		
8	Have sediment control measures been installed before clearing as required by the Soil and Water Management Plan?		
9	Have sensitive areas requiring on-site supervision by an ecologist/fauna catcher during clearing activities been identified?		
10	Is an ecologist/fauna catcher available to be onsite during clearing of identified sensitive areas?		
11	Has WIRES / local licenced wildlife carer or fauna handler been notified of the intention to commence clearing?		
12	Have the relevant personnel been briefed on the staged clearing process including that for habitat trees?		
13	Have all relevant staff and contractors been briefed during toolbox talks on the clearing limits, no go areas, clearing process, descriptions of fauna that may be present and fauna handling procedures?		

Appendix F Consultation correspondence

From: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Sent: Wednesday, 22 December 2021 11:39 AM
To: Harvey Lane
Subject: RE: Eurobodalla Southern Storage - Partial Clearing Works - Draft CFFMP

Hi Harvey,

DPI Fisheries has reviewed the 'Construction Flora and Fauna Management Plan – Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area (SME, Ref No, 30012835, 20 December 2021) and has no objections to or changes to make to this plan.

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: Harvey Lane <Harvey.Lane@esc.nsw.gov.au>
Sent: Wednesday, 22 December 2021 8:45 AM
To: Carla Ganassin <carla.ganassin@dpi.nsw.gov.au>
Cc: DPI Fisheries Info Mailbox <fisheries.info@dpi.nsw.gov.au>
Subject: Eurobodalla Southern Storage - Partial Clearing Works - Draft CFFMP

Dear Carla,

Further to the draft CSWMP already submitted, please find attached the draft CFFMP for the partial clearing of the Eurobodalla Southern Water Storage site.

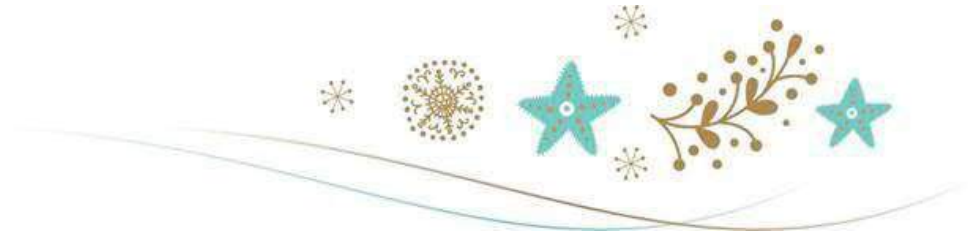
This is being submitted for your review and comment in accordance with condition B3 of the Development Conditions of Consent.

Please don't hesitate to call me to discuss any elements of this document at any stage.

Kind regards,

Harvey Lane
Water & Sewer Project Engineer

t 02 4474 1342



Season's greetings from everyone at Eurobodalla Shire Council

Council offices, depots and libraries will be closed for the Christmas holidays from 12.30pm Friday 24 December 2021, reopening 8.30am Tuesday 4 January 2022.
Our essential services continue during the closure, including household waste collection. Please call Council's after hours services on 1800 755 760 for urgent assistance.



vulcan street moruya nsw 2537 | po box 99 moruya nsw 2537
www.esc.nsw.gov.au

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From: Harvey Lane <Harvey.Lane@esc.nsw.gov.au>
Sent: Tuesday, 21 December 2021 4:20 PM
To: tim.baker@nrar.nsw.gov.au; rachel.daly@nrar.nsw.gov.au
Cc: nrar.servicedesk@dpie.nsw.gov.au
Subject: Eurobodalla Southern Storage - Partial Clearing Works - Draft CSWMP
Attachments: 30012835.009.06 - SWMP ESWSS Partial Clearing works_Rev_2_20122021.pdf

Dear Tim/Rachel,

Thank you sincerely for your time and input at the workshop of the 26th November at Eurobodalla Shire Council offices to discuss the proposed approach for staging of the clearing works of the Southern Water Supply storage. This approach is being taken to try and best balance the potentially competing interests of

Further to previous documents submitted for your review in relation to various construction stages of the Eurobodalla Southern Water Supply Storage, please find attached the draft Construction Soil and Water Management Plan for the partial clearing of the site of harvestable timber and hollow bearing trees. The scope of these works and this subsequent document has been discussed at length with the EPA and Biodiversity and Conservation Division with the intent of determining the best way to facilitate project progress whilst managing the potentially conflicting interests of managing soil and water runoff, threatened species and contractor interface/WHs.

This is being submitted for your review and comment in accordance with condition B13 of the Development Conditions of Consent.

Please don't hesitate to call me to discuss any elements of this document at any stage.

Kind regards,

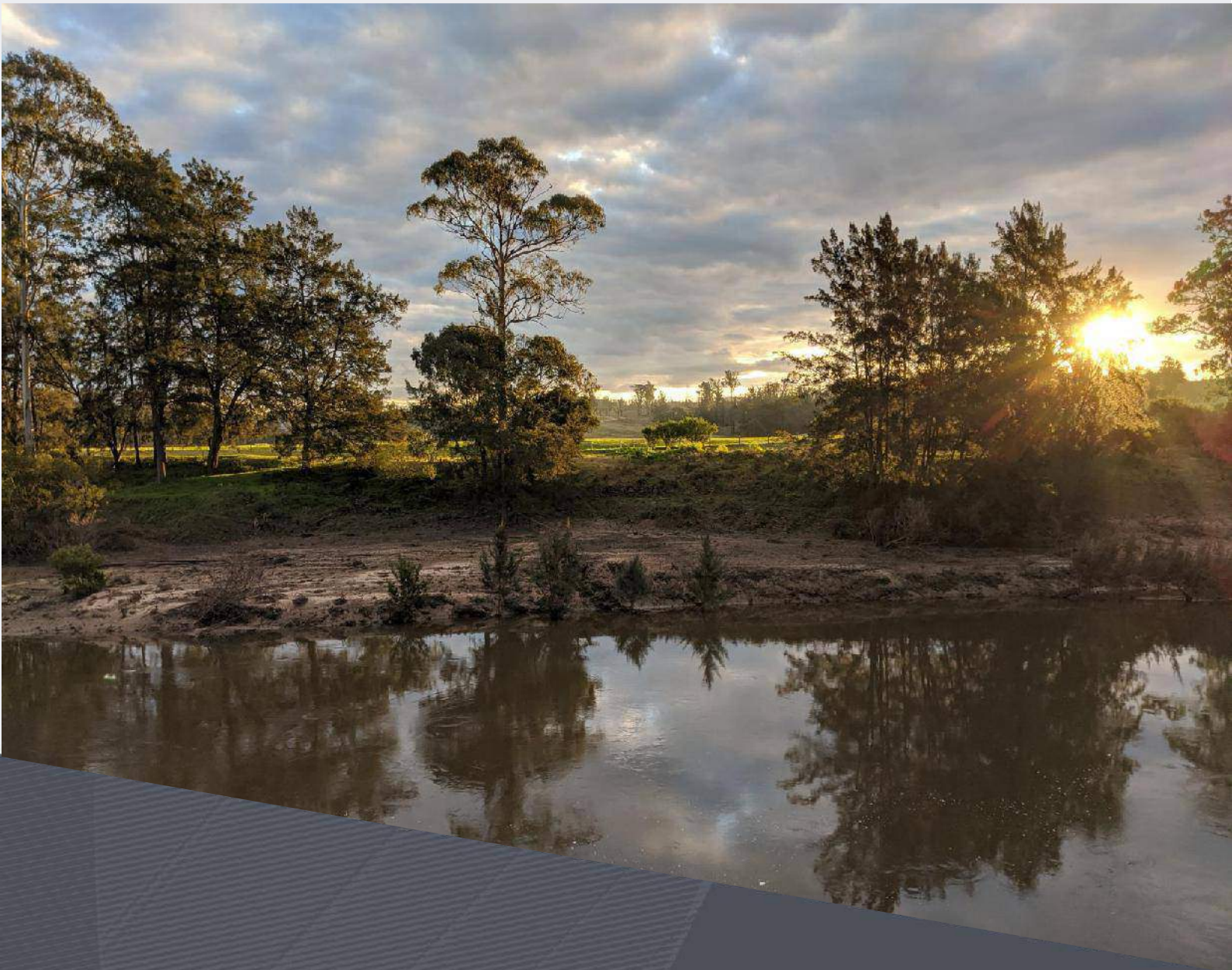
Harvey Lane
Water & Sewer Project Engineer

t 02 4474 1342

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Appendix D Construction Traffic Management Plan



Construction Traffic Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
28 January 2022

Document Control

Document:	Construction Traffic Management Plan
File Location:	
Project Name:	Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area
Project Number:	30012835
Revision Number:	2

Revision History

Revision No.	Date	Prepared by	Reviewed by	Approved for Issue by
1	2 December 2020	T Gibbons	M Davey	M Davey
2	28 January 2022	A Moll	J Miller	J Miller

Issue Register

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SMEC and Eurobodalla Shire Council

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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) and details the partial clearing of the design area, ancillary works and inundation areas (herein referred to as the “Partial Clearing Works”) and further for the Eurobodalla Southern Water Supply Storage Project (the Project). The extent of the Partial Clearing works area is herein referred to as the “clearing boundary” as shown in Figure 1-1.

Subject to approvals, the Partial Clearing works covered under this CFFMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area (further detailed in the CSWMP). Forestry and the arborist contractor will ensure that the area has been left with soil in a stable condition for the project construction contractor to complete the remainder of the site clearing in future stages of the Project.

1.1.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the Erosion and Sediment Control Plan (Section 6 CSWMP). Progressive erosion and sediment control would be installed during initial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of ‘no-go zones’ with the installation of high-visibility bunting to clearly mark these areas.
- implementation of the nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (CFFMP; Appendix B).

1.1.2 Partial clearing of the vegetation within the clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 1-2). The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP).

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 1-3):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

1.2 Objectives

This CTMP has been prepared to outline and describe how Eurobodalla Shire Council would be responsible for the clearing 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 CTMP specifically outlines how Eurobodalla Shire Council is to minimise traffic and access risks and achieve environmental outcomes for the Project by providing a structured approach to ensure appropriate mitigation measures and controls are implemented.

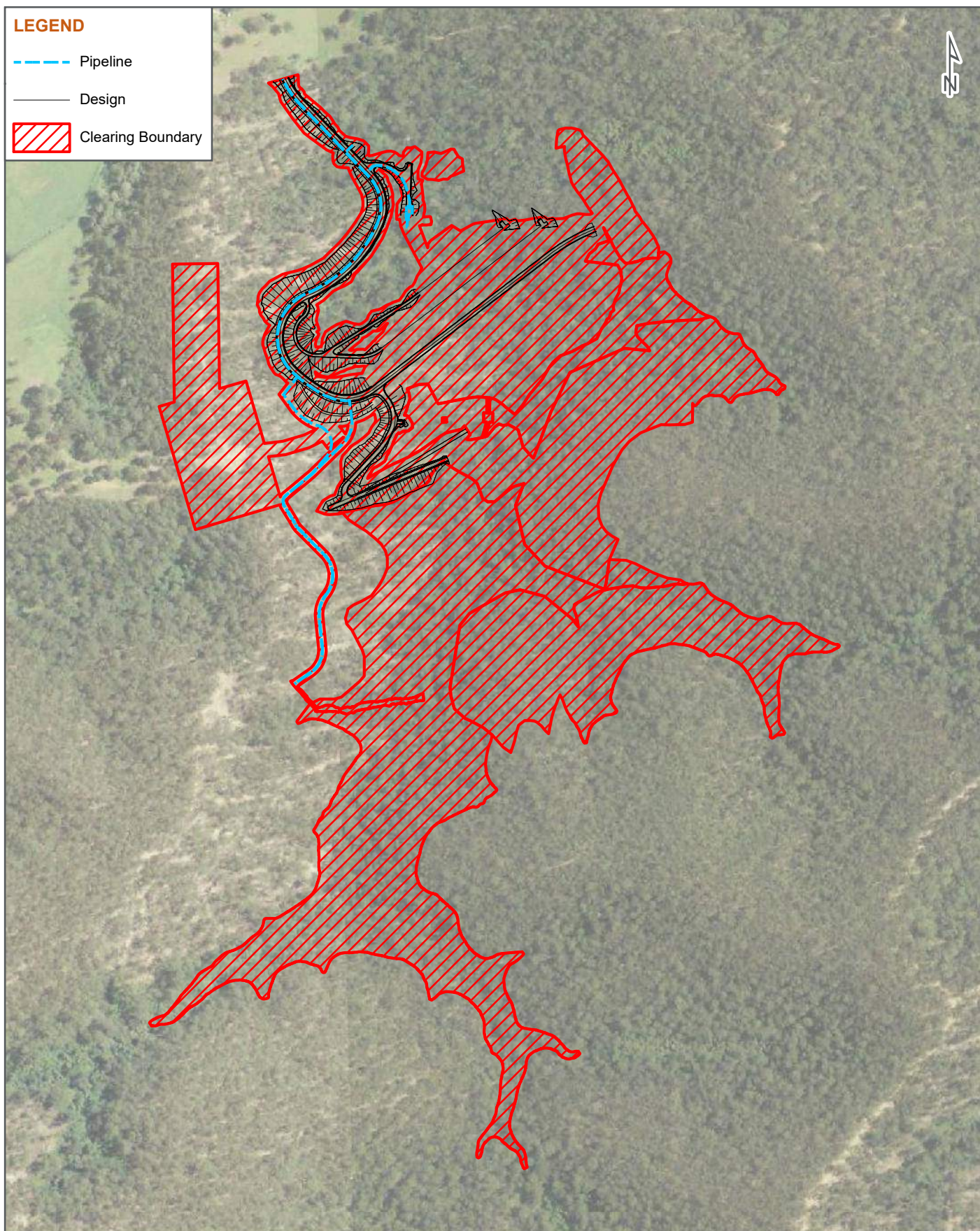
The objectives of this CTMP are to describe how clearing impacts on traffic and access will be minimised and managed. The conditions of the Development Consent (Specific Environmental Conditions – Traffic and Access: B28 – B29) outline that the development of the project is required to:

- be prepared by a suitably qualified and experienced person(s)
- include a Road Safety Audit for the Eurobodalla Road/Nerringundah Mountain Road intersection in accordance with the relevant AustRoads guidelines
- detail the measures that area to be implemented to ensure road safety during construction
- detail heavy vehicle routes, access and parking arrangements
- 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
- achieve full compliance with relevant legislative requirements and the conditions of consent
- 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.

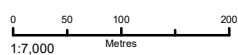
The purpose of this CTMP is to meet the requirements as stipulated in Condition B28 of Part B of the Development Consent (SSD-7089) for the Project. Further details of the requirements relating to consent conditions are contained in Section 1.4.

LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



DATE 13/12/2021



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Overview of construction works covered by this CTMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CTMP

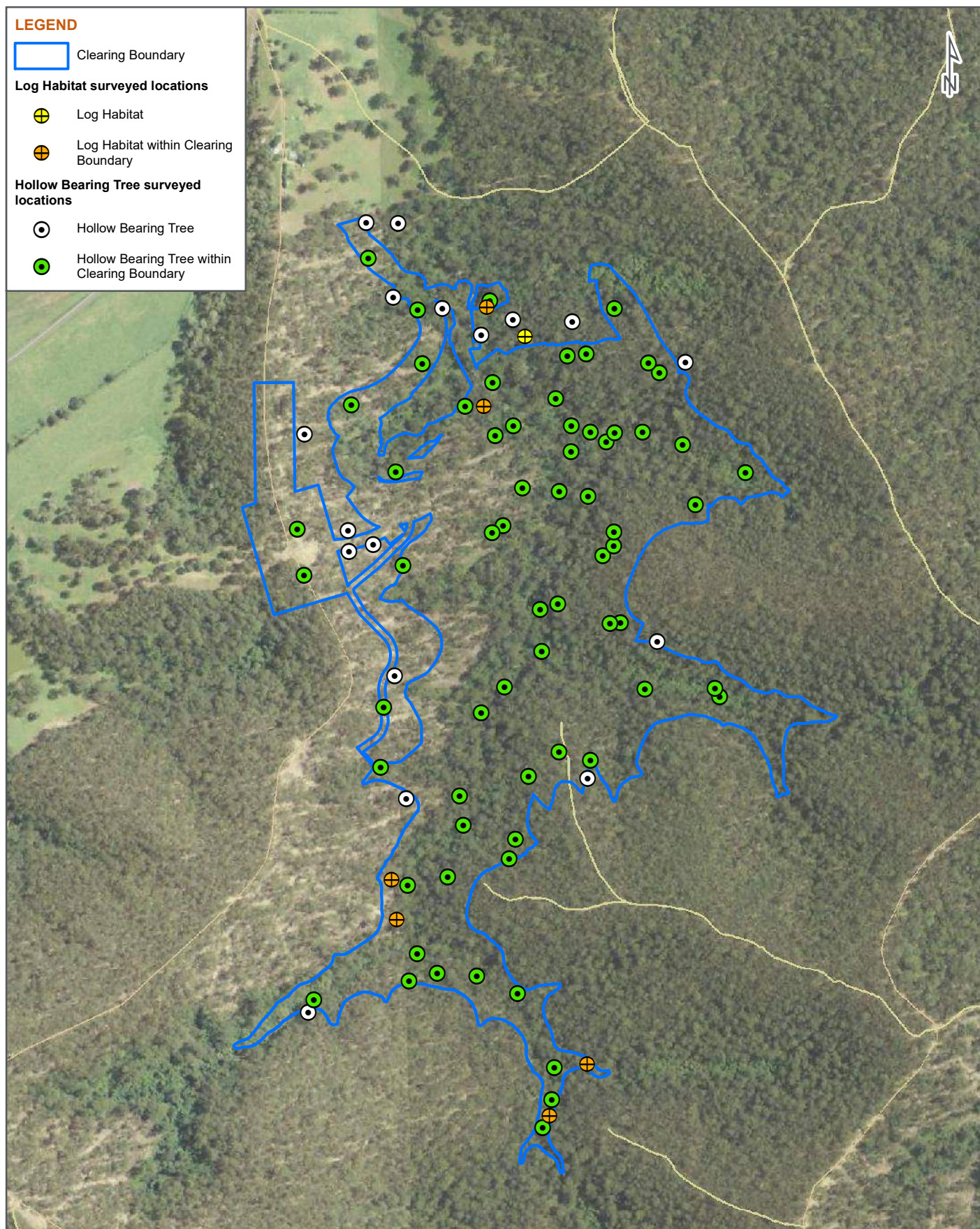
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DATE 13/12/2021

0 40 80 160 240
1:8,000 Metres

PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-2

FIGURE TITLE Hollow-bearing tree mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CTMP

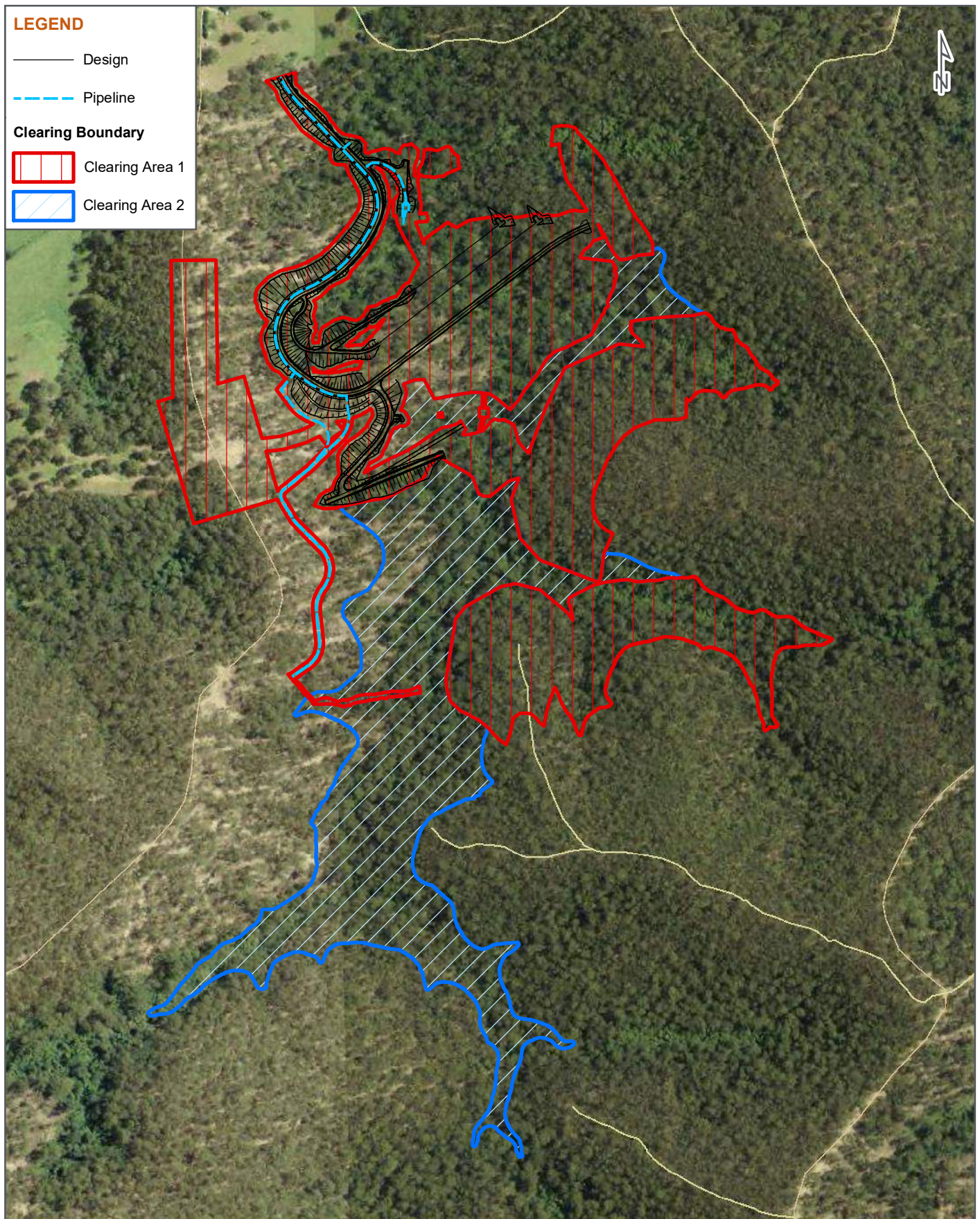
CREATED BY FA13847

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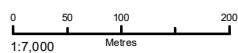


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DATE 23/11/2020



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-3

FIGURE TITLE Clearing Area Type Mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CTMP

CREATED BY JT14432

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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
	• describe the general approach and procedures to be adopted when producing specific traffic control plan	Section 5
	• 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
	<ul style="list-style-type: none"> 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) 	
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> where practicable, program deliveries of construction plant such as over-mass and over-dimension vehicles) outside peak traffic periods 	Section 4
	<ul style="list-style-type: none"> identify steps to minimise construction traffic, such as car-pooling by construction staff to site 	Section 5
	<ul style="list-style-type: none"> regularly review and modify the CTMP (such as at changes of construction stages), to ensure the CTMP remains valid and appropriate 	
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> ensuring all relevant requirements from emergency service providers are included, including from NSW Rural Fire Service, NSW Ambulance Service and NSW Police 	
	<ul style="list-style-type: none"> consultation with the respective road authorities including Roads and Maritime Services and Eurobodalla shire Council 	
	<ul style="list-style-type: none"> consultation with other relevant parties including school bus operators 	
	<ul style="list-style-type: none"> 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:	
	<ul style="list-style-type: none"> provision for emergency services passage through construction zones 	
	<ul style="list-style-type: none"> 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
	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.	Section 5

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 is unlikely to be required for the Partial Clearing works.

A Traffic Control Plan (TCP) will need to be developed by the Forestry.

2 Existing environment

2.1 Road network

The Partial Clearing works would be accessed from the Storage Access Road, via Eurobodalla Road and the Princes Highway. 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. This route is also expected to be used by the clearing 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 and access impacts that may result from the Partial Clearing works would mainly occur on Eurobodalla Road due to increase traffic volumes. Key traffic impacts and issues may include:

- traffic disruptions due to clearing vehicle, plant and equipment activities associated entering the site from Eurobodalla Road onto the Storage Access Road
- increased Forestry/contractor and heavy vehicle (e.g., for transporting felled timber offsite) 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 Site Access

Movement of clearing plant, equipment and vehicles to and from the Partial Clearing works would disrupt traffic flow along Eurobodalla Road. Impacts are likely to include:

- potential need for reduced speed limits for Eurobodalla Road/Storage Access Road intersection to reduce safety risk to Forestry, independent arborist and the public
- rough surfaces
- increased traffic volumes and vehicle movements associated with movement of Forestry and independent arborist plant, equipment and vehicles
- noise and dust impacts.

3.2 Increased construction traffic

Vehicles associated the Partial Clearing works would generally access the site from the Princes Highway, then Eurobodalla Road and onto the Storage Access Road. This would result in a temporary increase in vehicle movements and traffic volumes along these routes during clearing works. The biggest impacts would likely be during periods when felled timber is being removed from the sites.

Increased traffic movements would be associated with Forestry and independent arborist personnel access to site, and clearing plant, equipment and material delivery to site.

Access to the Partial Clearing works would only be through approved access points, specifically the Storage Access Road. This would be detailed in the TCP. Where Forestry and independent arborist 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 site would continue to operate. No changes to access arrangements on local roads, or most private properties would be required. Forestry vehicles would be parked within the Partial Clearing works clearing boundary in designated areas that would be determined by Forestry or Eurobodalla Shire Council. These areas would be detailed in the TCP.

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 clearing of the Partial Clearing works, 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 and access 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 access 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 clearing activities. Maintenance of roads associated with the clearing 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	<p>A Construction Traffic Management Plan (CTMP) would be prepared prior to construction and would be included in the CEMP.</p> <p>The CTMP would:</p> <ul style="list-style-type: none"> 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 	Eurobodalla Shire Council	<p>Detailed design</p> <p>Pre-construction</p> <p>During construction</p>

Impact	Environmental Safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> Identify a contact person (and phone number) for liaison and complaints, by project stakeholders and the community. <p>Consultation with various stakeholders will also be undertaken in the development and periodic review of the CTMP, including:</p> <ul style="list-style-type: none"> 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. <p>Detailed traffic control plans would be developed for each construction phase. These would include</p> <ul style="list-style-type: none"> Provision for emergency services passage through construction zones. <p>Only accredited traffic controllers would be permitted to prepare and implement traffic control plans.</p>		
Impacts to local roads during construction	<p>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.</p> <p>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.</p> <p>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.</p> <p>Construction personnel will also be encouraged to report road hazards and road damage</p>	Eurobodalla Shire 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 Forestry 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 Clearing Contractor and include the Project Manager, Site Supervisor, key subcontractors, as
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
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
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
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

5.2 Roles and responsibilities

The roles and responsibilities of project and Forestry staff relevant to the implementation of this CTMP are listed in the CEMP. Roles and responsibilities of project and Forestry personnel specific to this CTMP are outlined in Table 5-2.

Table 5-2 Project staff roles and responsibilities – specific to CTMP

Role	Responsibility
Forestry Site Supervisor	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> • 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 Forestry personnel and independent arborist will undertake 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 personnel, vehicles, 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 clearing works. Consultation would include provision of information about traffic and access 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 project, Forestry personnel and independent arborist must adhere to the requirements of the CTMP. It is the responsibility of Eurobodalla Shire Council to ensure that Forestry disseminates 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 personnel:
 - first offence – personnel receives a warning
 - second offence – personnel dismissed from duties on the project
- Forestry /supplier/independent arborist:
 - first offence - Forestry/supplier/independent arborist receives a warning letter
 - second offence - Forestry/supplier/independent arborist banned from providing services on the Project.

5.6 Complaints procedure

Eurobodalla Shire Council is committed to managing traffic and access 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 the Partial Clearing works:

- 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 Forestry, Eurobodalla Shire Council 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 personnel, 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 clearing activities for the Partial Clearing 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 CTMP:

- 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 project, Forestry personnel and independent arborist operating vehicles while undertaking activities for the Partial Clearing works or travelling to and from site must adhere to posted speed limits at all times. For the site and adjacent road network, this includes:

- the Princes Highway – Eurobodalla Shire Council personnel, Forestry and independent arborist 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 project, Forestry personnel and independent arborist 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 project, Forestry personnel and independent arborist operating vehicles for activities associated with clearing of the Partial Clearing works 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 Forestry will develop a TCP (or TCPs) for clearing activities. The TCP must include provisions for access 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 seek direction from relevant roads authorities for installation of any temporary signage, including restoring the existing speed limit on completion of the Project.

Prior to clearing commencing, Eurobodalla Shire Council is to determine the interaction of clearing vehicle movements with local school bus routes and timetables. This information is to be used to specify curfew times for vehicles associated with the Partial Clearing works to minimise interaction between project 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. Forestry and independent arborist personnel 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 heavy vehicle movements to and from site. These are 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 Forestry will liaise with 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 in the TCP.

6.5 Management of dirt tracked onto the public road network

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 clearing work. In addition, the Site Supervisor will carry out inspections and deploy where necessary a road sweeper on routes affected by clearing traffic and at access points prior to commencement of clearing 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 agencies 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 Shire Council will regularly monitor project, Forestry personnel and independent arborist traffic related 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 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.

Appendix A Road Safety Audit

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



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Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
1	10/12/2019	Thomas Meadows	Paul Golema	Mark Davey

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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.

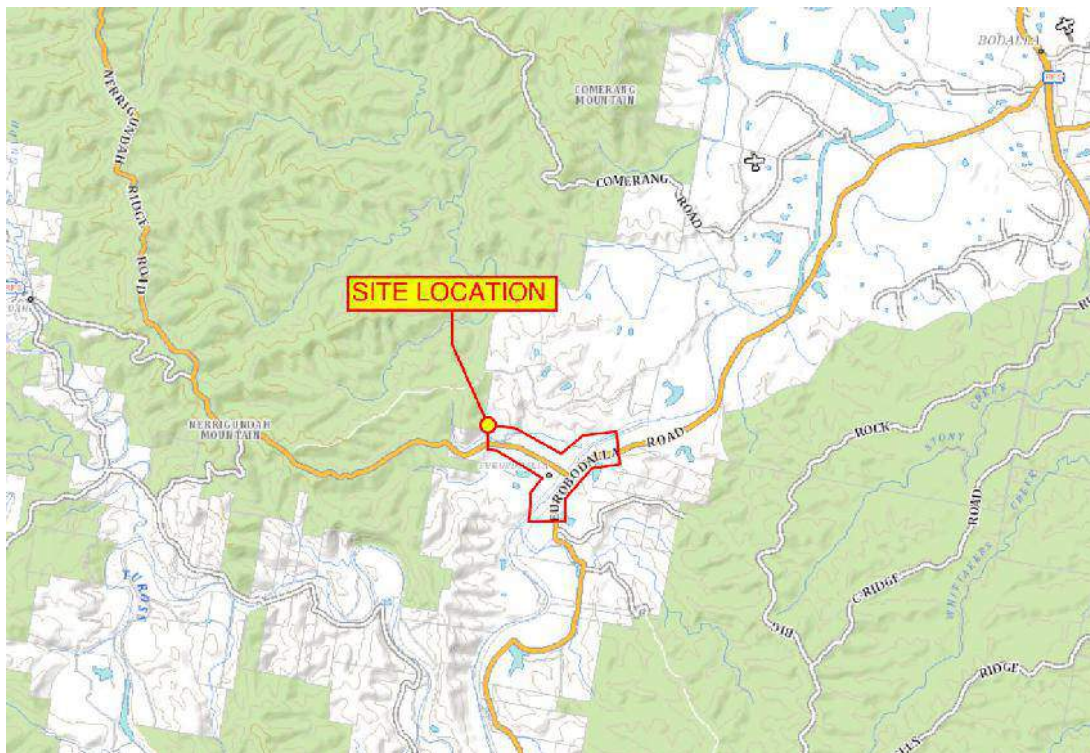


Figure 1-1: Project Locality Sketch

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 *Austrroads Guide to Road Safety, Part 6A: Implementing Road Safety Audits (2019)*. Austrroads 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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.

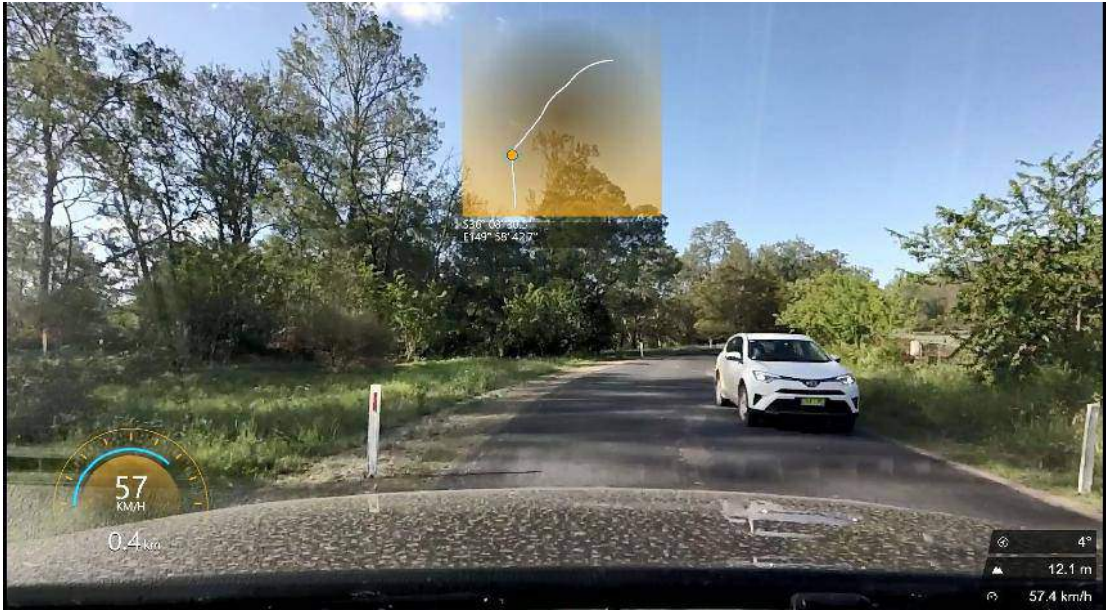
4. Road Safety Audit Findings


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	<div><p>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</p><div></div></div>	Occasional	Serious	High	Moderate	<div><ul style="list-style-type: none">- Delineation of road centreline- Widening of pavement on all roadways</div>


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	<p>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.</p> 	Occasional	Serious	High	Moderate	<ul style="list-style-type: none">- 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	<p>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</p> 	Occasional	Serious	High	Moderate	<ul style="list-style-type: none"> - 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	<p>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</p>	Occasional	Serious	High	Moderate	<ul style="list-style-type: none"> - 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	<p>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</p> 	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none">- 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	<p>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</p> 	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none">- 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	<p>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.</p> <div></div>	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none">- Move GIVE WAY signage to more appropriate location at the intersection- Provide linemarking to reinforce priority at the intersection
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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	<p>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.</p> 	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	<p>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.</p>	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none">- 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	<p>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</p> 	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none">- 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	<p>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</p> 	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none"> - 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	<p>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</p> 	Improbable	Serious	Medium	Moderate	<ul style="list-style-type: none"> - 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	<p>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.</p> <div></div>	Improbable	Serious	Medium	Moderate	<p>- Replace existing safety barrier with safety barrier that requires dynamic deflection to suit the available space</p> <p>- Widen carriageway and culvert to allow for dynamic deflection of the existing safety barrier</p>

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	<p>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.</p> 	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	<p>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</p> <div></div>	Occasional	Minor	Medium	Moderate	<p>- Improve delineation of the intersection by the provision of guide posts, linemarking, delineating the end terminals and RRPMS</p> <p>- Provide larger signage at the intersection</p>

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	<p>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.</p> 	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	<p>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</p> 	Improbable	Minor	Low	Highly	- Remove roadside vegetation

018	Nerrigundah Mountain Road	Nerrigundah Mountain Road	Roadside Hazards	Car/tree pole	>70	<p>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</p>  	Improbable	Minor	Low	Highly	<ul style="list-style-type: none">- Provide protection for these culverts in the form of safety barriers- Remove culverts from within the clear zone of the roadway
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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	<p>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.</p>  	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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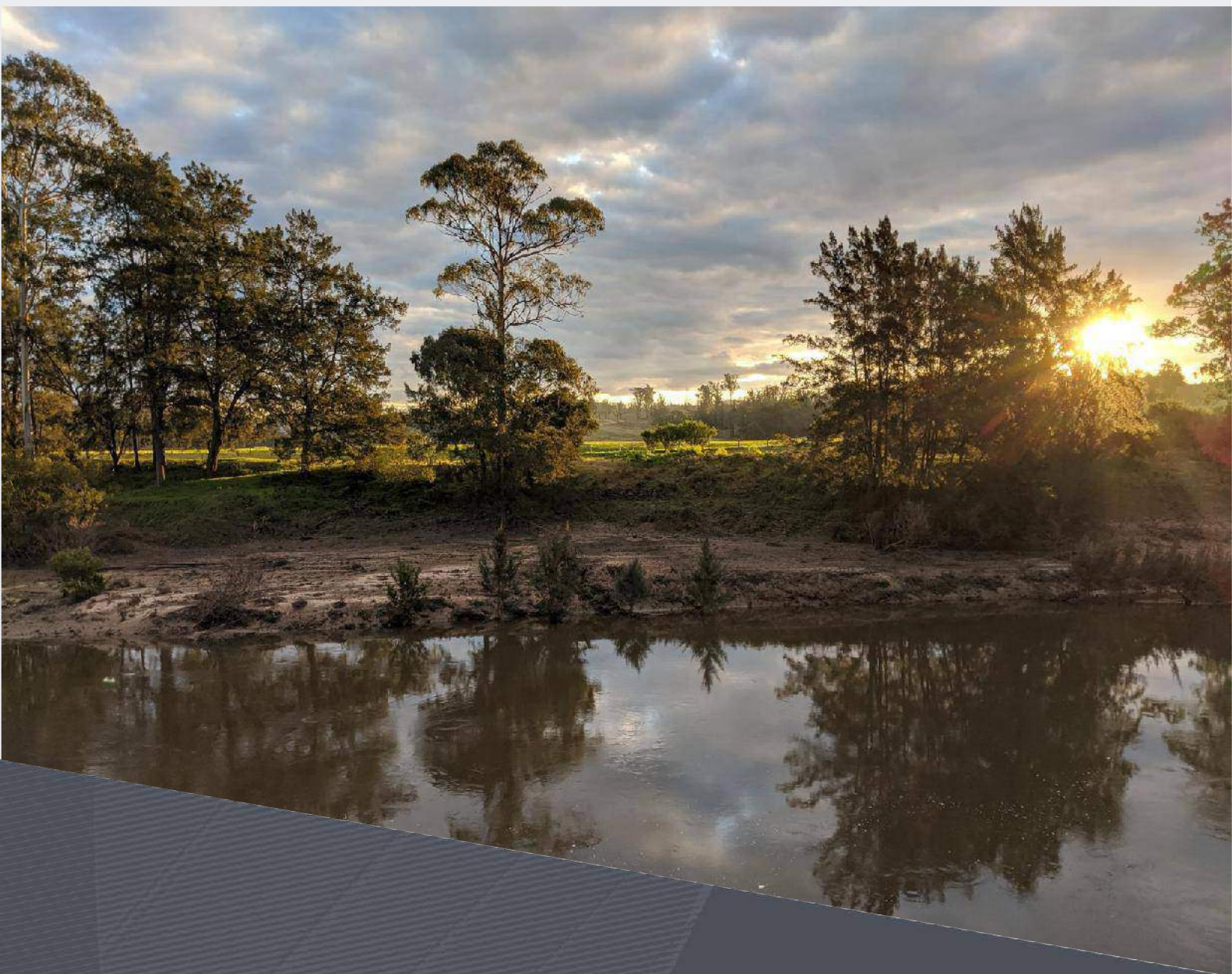
Appendix B Traffic Control Plan

To be provided by Eurobodalla Shire Council or their construction traffic contractor.

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Appendix E Construction Noise Management Plan



Construction Noise and Vibration Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
28 January 2022

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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 partial clearing of the design area, ancillary works and inundation areas (herein referred to as the “Partial Clearing Works”) for the Eurobodalla Southern Water Supply Storage Project (the Project). The extent of the Partial Clearing works area is herein referred to as the “clearing boundary” as shown in Figure 5-1. This CNVMP and associated CEMP relate only to the activities to be undertaken for the Partial Clearing works component of the Project outlined in Section 5.1.

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

This CNVMP describes how Eurobodalla Shire Council is to manage potential noise and vibration impacts to surrounding nearby sensitive receivers that may result during construction activities associated with the Partial Clearing works.

The purpose of this CNVMP is to meet the requirements as stipulated in Condition B34 of Part B and item 8 of Appendix 2 of the Development Consent (SSD 7089) for the Project. Further details of the requirements relating to consent conditions are contained in Section 1.3.

1.2 Project Description

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 in this document.

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:

- 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.

1.3 Development consent conditions relating to construction noise and vibration

Table 1-1 outlines the Development Consent conditions that are relevant to the management of noise impacts associated with the Partial Clearing works for the Project.

Table 1-1 Development Consent Conditions – Noise

Condition	Requirements										
B31	<p>The Applicant must comply with the hours in Table 3, unless otherwise agreed in writing by the Planning Secretary</p> <p>Table 3 <i>Hours of Work</i></p> <table><tr><th>Activity</th><th>Day</th><th>Time</th></tr><tr><td rowspan="3">Earthworks and construction (other than blasting)</td><td>Monday – Friday</td><td>7 am to 6 pm</td></tr><tr><td>Saturday</td><td>8 am to 1 pm</td></tr><tr><td>Not permitted on public holidays</td><td></td></tr></table>	Activity	Day	Time	Earthworks and construction (other than blasting)	Monday – Friday	7 am to 6 pm	Saturday	8 am to 1 pm	Not permitted on public holidays	
Activity	Day	Time									
Earthworks and construction (other than blasting)	Monday – Friday	7 am to 6 pm									
	Saturday	8 am to 1 pm									
	Not permitted on public holidays										
B32	<p>Work outside of the hours identified in Condition B31 may be undertaken in the following circumstances:</p> <ul style="list-style-type: none">(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.										
B33	<p>The development must be constructed to achieve the construction noise management levels detailed in the <i>Interim Construction Noise Guideline</i> (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.</p>										

Condition	Requirements
B34	<p>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:</p> <ul style="list-style-type: none"> (a) Be prepared by a suitable qualified and experienced noise expert; (b) Describe procedures for achieving the noise management levels in EPA's <i>Interim Construction Noise Guideline</i> (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	<p>The Applicant must:</p> <ul style="list-style-type: none"> (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.

1.4 Scope

This CNVMP is only applicable to the Partial Clearing works. There will be no blasting activities during this stage of works 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-compliances.

1.5 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 4.
- undertake active community consultation and maintain positive working relationships.

2 Legislative and Regulatory Requirements

Eurobodalla Shire Council have an obligation to ensure that construction activities associated with the Project comply with all relevant regulatory requirements and guidelines. All project and Forestry 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 ESWSS Project is declared to be a 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 a 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 policies, guidelines and standards:

- *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 of this document.

3 Existing environment

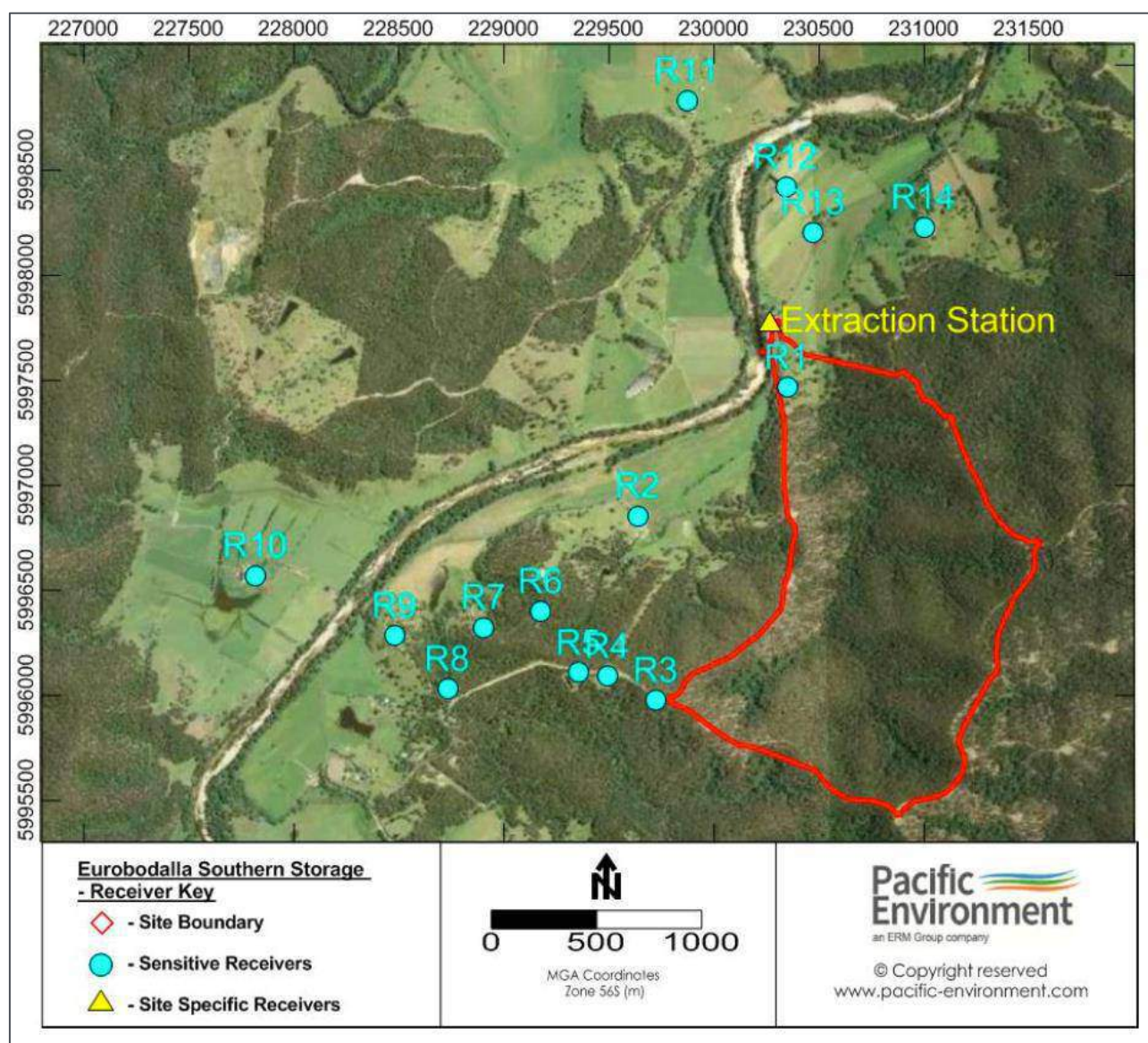
3.1 Sensitive receivers

The nearest sensitive receivers are located to the west and north of the Project. The closest residence is located approximately 440 metres to the west of the Project. The receivers are summarised in Table 3-1 and presented in Figure 3-1.

Table 3-1 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 ²	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 3-1 Sensitive receiver locations

3.2 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*.

4 Construction Noise and Vibration Criteria

4.1 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 the Project's construction noise assessment during the EIS phase.

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.

In the context of noise impact, the clearing activities covered under this CNVMP are considered construction noise.

4.1.1 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.

4.1.2 Residential land uses

The daytime standard work hours NMLs prescribed for residential land uses by the ICNG are presented in Table 4-1. The ICNG out of hours NMLs would not be applicable to the Partial Clearing works 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; or
- for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm; or
- where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works.

4.1.3 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 4-2 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 Partial Clearing works. These NMLs have been presented in this CNVMP for completeness.

Table 4-1 Noise management levels for residential land uses

Time of day	NML, $L_{Aeq, 15min}$	Application notes
<p>Recommended Standard Hours:</p> <ul style="list-style-type: none"> Monday to Friday 7am to 6pm Saturday, 8 am to 1 pm no work on Sundays or public holidays 	Noise affected: RBL + 10 dB	<p>May be some community reaction to noise.</p> <ul style="list-style-type: none"> 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	<p>May be strong community reaction to noise.</p> <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 above the affected noise level, the proponent should negotiate with the affected community.

Table 4-2 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

4.1.4 Project specific noise management levels

The Partial Clearing works shall be constructed with the aim of achieving the construction noise management levels detailed in Table 4-3 which summarises the NMLs applicable to sensitive land uses surrounding the Project during the Partial Clearing works phase of the construction. The NMLs are based on the assumed background noise levels as presented in the NIA.

Table 4-3 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)

4.2 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, potentially, Bullockys Hut Road, prior to accessing the Project site.

The Partial Clearing works shall be undertaken with the aim of achieving the construction road traffic noise goals as detailed in Table 4-4. Table 4-4 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 Partial Clearing works. Further assessment is typically conducted where existing noise levels are increased by more than 2 dB due to the construction related traffic.

Table 4-4 Road traffic noise criteria for residential land uses

Road category	Type of project/development	Noise criteria, dB	
		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.	$L_{Aeq,15 \text{ hour}}$ 60 (external)	$L_{Aeq,9 \text{ hour}}$ 55 (external)
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments.	$L_{Aeq,1 \text{ hour}}$ 55 (external)	$L_{Aeq,1 \text{ hour}}$ 50 (external)

4.3 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 Partial Clearing works shall be undertaken with the aim of achieving the construction vibration goals as detailed in Sections 4.3.1 and 4.3.2.

4.3.1 Cosmetic and structural damage

DIN 4150-3 summarises structural and cosmetic damage assessment criteria for different types of buildings, which are presented in Table 4-5, 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 4-5 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.

4.3.2 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 4-6 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 4-7.

Table 4-6 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 4-7 VDV management levels for intermittent vibration

Land use	VDV – intermittent vibration, m/s ^{1.75}	
	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.

4.3.3 Safe working distances

Safe working distances for typical vibration inducing equipment are listed in Table 4-8 below.

Table 4-8 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 – 12 to 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

5 Construction Methodology

This section provides an overview of the Partial Clearing works 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; and
- the proposed construction schedules.

5.1 Construction Activities covered under this CNVMP

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 5-1). The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP).

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 5-3):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area (further detailed in the CSWMP). Forestry will ensure that the area has been left with soil in a stable condition for the successful construction contractor to complete the remainder of the site clearing and construction in future stages of the Project.

The Partial Clearing works covered under this CNVMP are confined to vegetation clearing only. Minor earthworks may be required to facilitate access to the site and establish loading areas for the plant and equipment required to undertake the clearing.

5.1.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the Construction Soil and Water Management Plan (CSWMP). Progressive erosion and sediment control would be installed during initial partial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of 'no-go zones' with the installation of high-visibility bunting to clearly mark these areas.
- implementation of a nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (FFMP; Appendix B).

5.1.2 Clearing within Partial Clearing works clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs). Figure 5-2 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the CFFMP.

Within Clearing Area 1 (refer Figure 5-3), localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

As required, soil and erosion control works shall be completed progressively during clearing operations to minimise soil erosion. Soil and erosion control works shall be carried out in accordance with the conditions of the Development Consent, and the CSWMP.

The area within the clearing boundary, as shown in Figure 5-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

5.2 Construction plant and equipment

A list of likely plant and equipment for “site mobilisation and preparatory works” and “clearing within Partial Clearing works clearing boundary” is provided in Table 5-1. 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 5-1. These sound power levels have been extracted from the NIA.

Table 5-1 Construction plant and equipment maximum sound level

Plant and equipment item	Sound power level – dB(A)
Excavator	110
Roller	103

Plant and equipment item	Sound power level – dB(A)
Moxies	108
Watercart	107
Dozer	114
Light vehicle	98
Truck	104
Compressor	103
Generator	103
Crane	104
Grader	107

5.3 Construction program and period

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

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

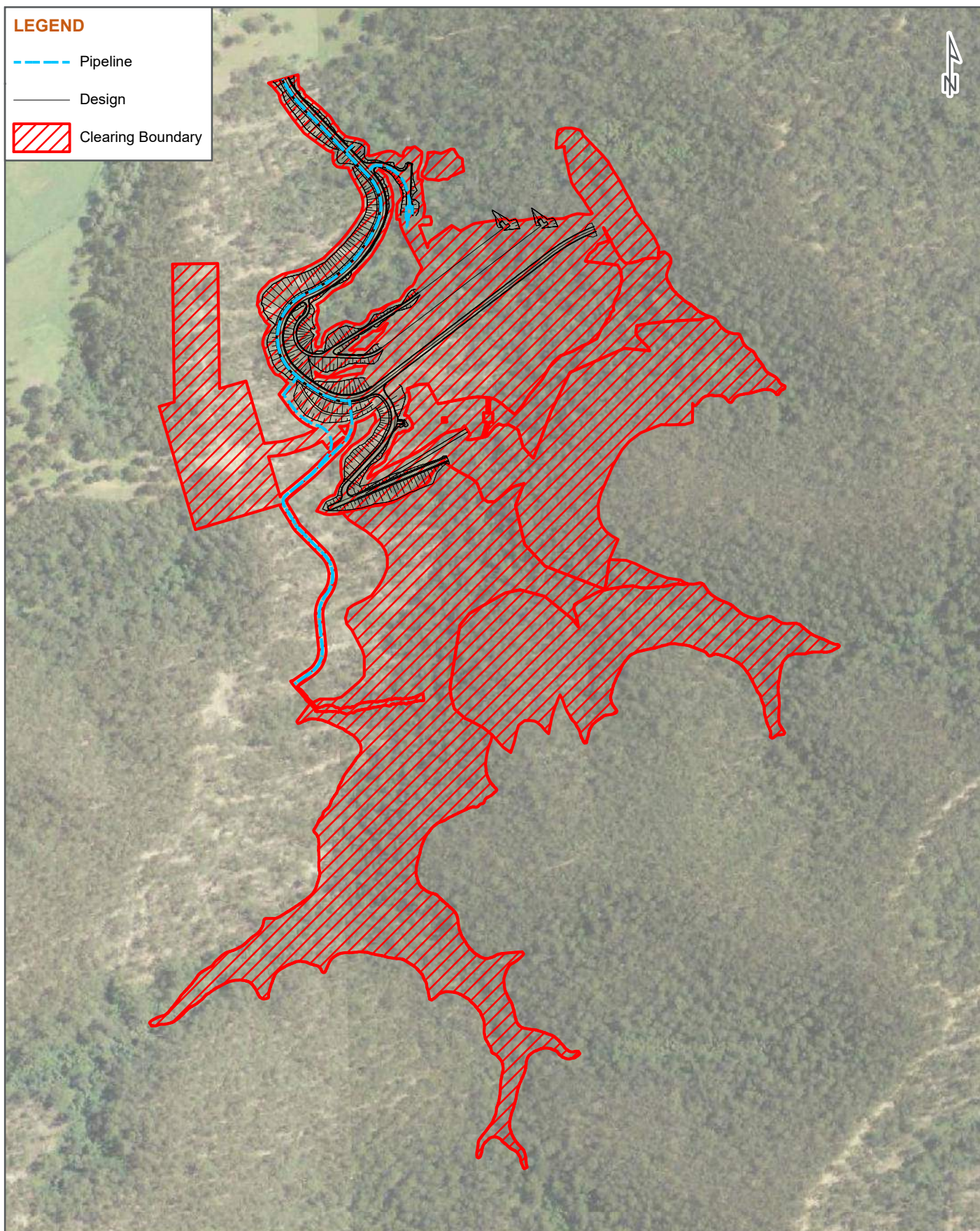
- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturdays
- at no time on Sundays and NSW public holidays.

Works outside the hours outlined above may be undertaken under the following circumstances:

- works that are inaudible at the nearest sensitive receivers
- for the delivery of materials outside these hours as required by the NSW Police Force or other authorities for safety reasons
- where it is required in an emergency to avoid the loss of life, 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.

LEGEND

- Pipeline
- Design
- Clearing Boundary



DATE 13/12/2021

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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 5-1

FIGURE TITLE Extent of Partial Clearing works covered under this CNVMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CNVMP

CREATED BY FA13847

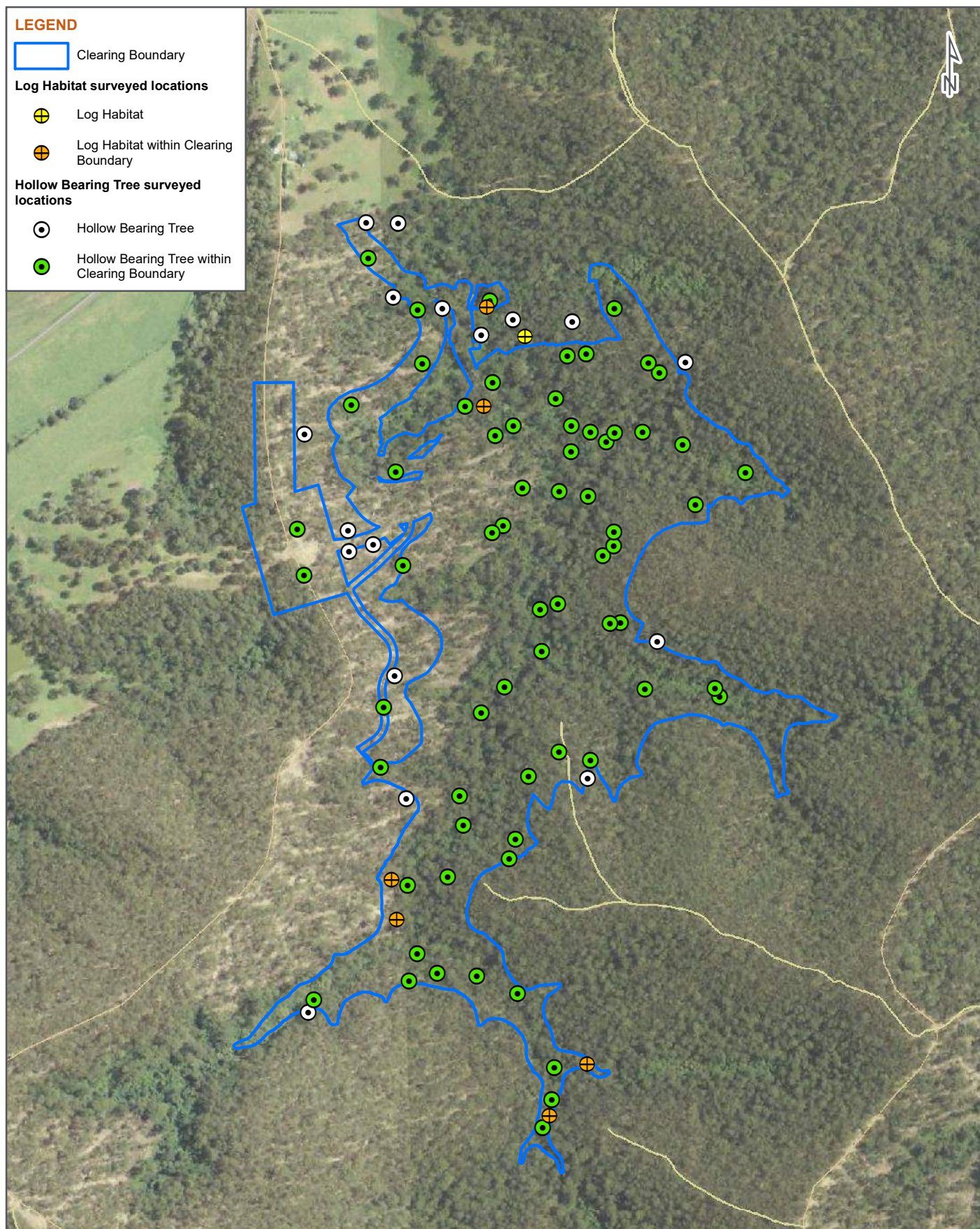
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DATE 13/12/2021

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COORDINATE SYSTEM
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FIG NO. 5-2

FIGURE TITLE Hollow-bearing tree mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works CNVMP

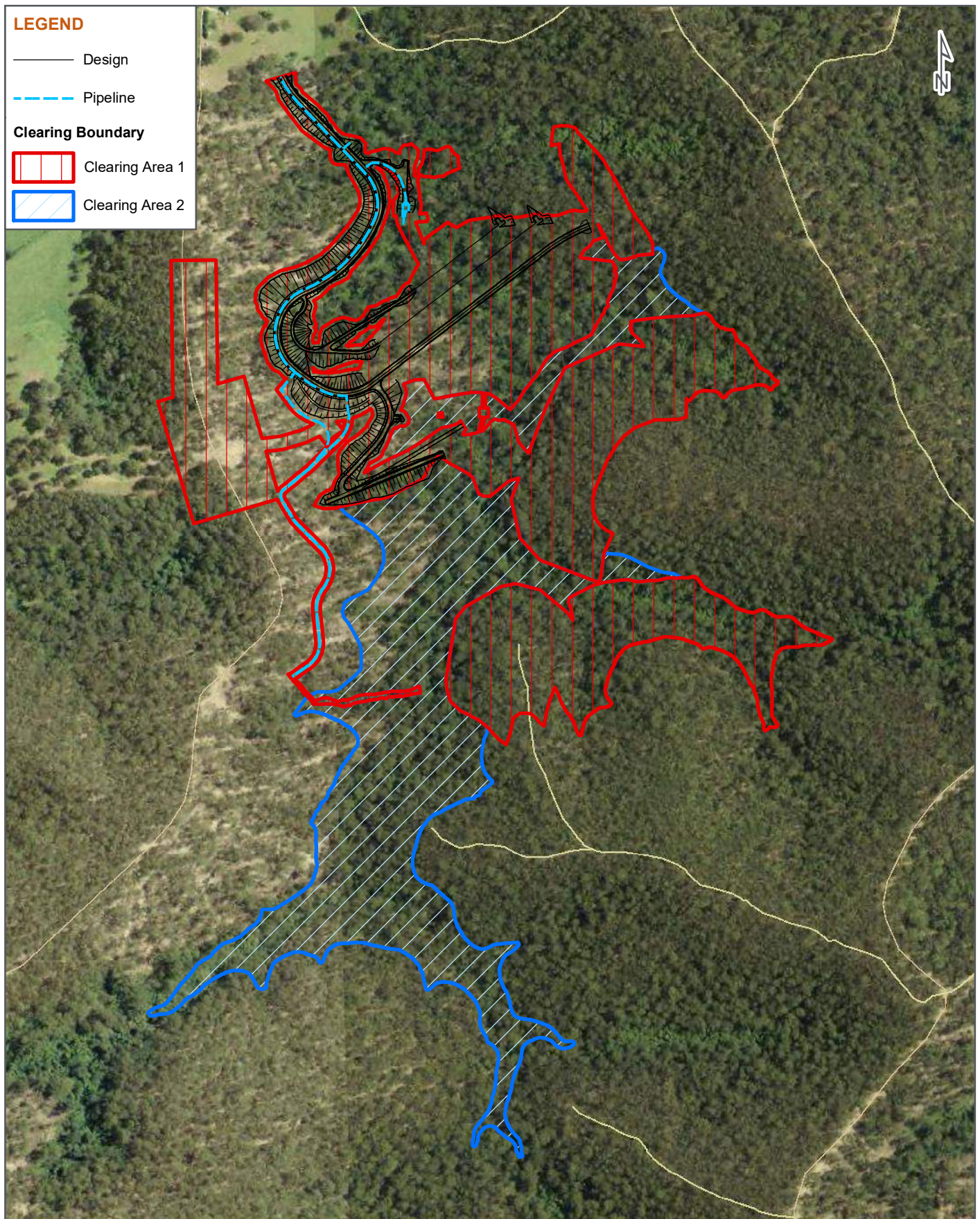
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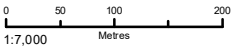

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DATE 23/11/2020		PAGE SIZE A4	COORDINATE SYSTEM GDA 1994 MGA Zone 56	
FIG NO. 5-3	FIGURE TITLE Clearing Area Type Mapping			
PROJECT NO. 30012835	PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works CNVMP			
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6 Construction Noise and Vibration Assessment

Construction noise and vibration impacts, as well as road traffic noise impacts associated with the site mobilisation and preparation works, and clearing within Partial Clearing works clearing boundary have been assessed in the NIA. The following sections provides a summary of the noise and vibration impact assessments presented in the NIA report.

6.1 Construction noise

Based on the construction noise levels predicted in the NIA, the following have been assessed:

- the site mobilisation and preparation works noise levels have been assessed to satisfy the recommended Standard Hours NML of 45 dB(A) at most receiver locations. The exception to this is residential receivers R1 and R2, where Standard Hours NML has been assessed to be exceed by 24 dB(A) and 1 dB(A) respectively. The 1 dB exceedance at R2 is considered to be acoustically insignificant as the difference in noise level of 1-2 dB is generally not perceptible by the average human hearing and is therefore considered to be ‘effectively compliant’¹.
- the clearing of the permanent works areas noise levels have been assessed to satisfy the recommended Standard Hours NML of 45 dB(A) at most receiver locations. The exception to this is residential receiver R1, where Standard Hours NML has been assessed to be exceed by 4 dB(A).

All Partial Clearing works activities, except for deliveries of oversized materials and equipment, would be carried out during ICNG standard hours. Therefore, construction noise impact assessment of site mobilisation and clearing works 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 7 of this plan.

6.2 Construction vibration

Based on the construction vibration assessment undertaken in the NIA, construction vibration impact is unlikely to occur throughout the Partial Clearing works as vibration intensive plant are not expected to be used nor would plant be operating within 100 m of any residential property.

Given the distances between the Partial Clearing works clearing boundary 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 Partial Clearing works. 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.

¹ Note that the term ‘effectively compliant’ is used in this report as meaning a noise level result not more than 2 dB in excess of the criterion. The basis of this is that noise levels within 1-2 dB of the required levels are considered not perceptible by an average listener. Reference is drawn to Section 2.4.2 of Engineering Noise Control by Bies and Hansen, 2009, which describes that a change in noise level of 3 dB is required before there is a “Just perceptible” change in the apparent loudness of a noise, and a change of 5 dB being classified as “Clearly noticeable”.

6.3 Road traffic noise during construction

Based on the road traffic noise assessment undertaken in the NIA, road traffic noise levels during Partial Clearing 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.

7 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.

7.1 Controls

The controls to be implemented during the Partial Clearing works are provided in Table 7-1. Appendix A provides further detail with respect to timing and responsibility for each control, as well as monitoring and reporting requirements.

Table 7-1 Environmental management controls

Control ref #	Environmental management controls
NV1	All potentially affected residences as identified in Figure 3-1 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 3-1 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 9.
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 Forestry Site Supervisor.
NV6	Works will be undertaken during the hours of: <ul style="list-style-type: none"> a) 7:00 am to 6:00 pm Mondays to Fridays; b) 8:00 am to 1:00 pm 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.
NV7	Activities resulting in impulsive or tonal noise emission (such as rock breaking, pile driving) shall only be undertaken: <ul style="list-style-type: none"> a) 7:00 am to 6:00 pm Mondays to Fridays;

Control ref #	Environmental management controls
	<ul style="list-style-type: none"> b) 8:00 am to 1:00 pm 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	<p>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:</p> <ul style="list-style-type: none"> 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 5-1.
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	<p>Wherever practicable, noisy equipment will be:</p> <ul style="list-style-type: none"> 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.

7.2 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 7-2 and are consistent with the overarching CEMP.

Table 7-2 Roles and responsibilities

Role	Responsibilities
ESC / Project Manager	<ul style="list-style-type: none"> • overall implementation of the Construction Noise and Vibration Management Plan • authorise and confirm the implementation of mitigation measures • undertake audits to ensure implementation of the CNVMP • communication with EPA, as required
Forestry Manager / Site Supervisor	<ul style="list-style-type: none"> • 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

7.3 Training and awareness

All project and Forestry personnel, independent arborist, subcontractors, consultants and visitors will receive inductions into the 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 Partial Clearing works induction
- visitor induction
- job specific environmental training.

Information specific to construction noise and vibration will be included in the general Partial Clearing works induction and will include:

- all relevant Partial Clearing works 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)
- environmental incident and complaint procedures.

All inductions will be recorded in the training register held by Forestry.

7.4 Community and stakeholder consultation

Prior to implementation of this CNVMP and commencement of clearing, this document will have been reviewed by the DPIE and approved by the Secretary or his nominee prior to commencement of clearing.

At least 14 days prior to clearing, all potentially affected residences will be informed by letterbox drop and/or email of the works including working hours to be adhered to, and the level and duration of noise to expect during works. They will also be informed if there are any changes to activities and timing, including out of hours work.

8 Monitoring and Reporting

8.1 Monitoring and reporting schedule

Monitoring will be undertaken through regular inspections and may be undertaken by a variety of personnel including Forestry, Eurobodalla Shire Council and third-party environmental inspectors. It is the responsibility of Eurobodalla Shire Council or Forestry for ensuring the scheduled monitoring is undertaken in accordance with this CNVMP. The inspectors will be required to report compliance to the CNVMP, in the form of checklists. These checklists are provided as an appendix to the overarching CEMP.

Forestry 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 contract. More information on the weekly reporting requirements for the Partial Clearing works 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.

8.1.1 Attended noise monitoring procedure

The measurements will be conducted in accordance with the procedures outlined 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}
- 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.

8.1.2 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 Forestry'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 5-1. If noise checks on any equipment result in a prediction of non-compliance, noise mitigation strategies to achieve compliance will be developed.

8.1.3 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.

8.1.4 Attended noise monitoring schedule for construction

Table 8-1 below provides a preliminary monitoring schedule for construction.

Table 8-1 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 8.1.5 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	

8.1.5 Reporting on attended noise monitoring

The following information must be included in the weekly reports where applicable:

- field calibration results (before and after measurements)
- measurement times and dates
- qualitative description of the noise environment during the measurements
- LA1, LAeq and LA90 levels
- meteorological conditions during the measurements
- estimation of or recorded noise contribution from other major noise sources.

Forestry shall establish and maintain a system of records which provides full documentation of all noise monitoring results, complaint handling and responses to non-compliances. Forestry shall establish and maintain procedures for the collection, indexing, filing, storage and maintenance of the records.

8.2 Auditing

Eurobodalla Shore Council will undertake monthly audits to ensure compliance to the CNVMP. This will involve checking that 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 4.

Any external auditing is to be undertaken in accordance with the Compliance Tracking Program.

8.3 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 Forestry. Corrective actions should be documented in the inspection checklist.

If a non-compliance has been identified during monthly audits that has not been corrected, Eurobodalla Shire Council will issue a request for corrective action to Forestry who will action the request as appropriate and provide updates on progress in addressing the issue at meetings or as requested by Eurobodalla Shire Council.

Forestry is responsible for the initial reporting of significant non-compliances with this CNVMP or relevant legislation to Eurobodalla Shire Council. Eurobodalla Shire Council will report such events to the relevant statutory authorities in accordance with legislative requirements.

9 Complaints Management

In the event of an environment-related complaint from the community regarding noise, Forestry or the independent arborist will notify Eurobodalla Shire Council. Eurobodalla Shire Council may issue a request for corrective action to Forestry or the independent arborist 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 clearing 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, details of the occurrence and actions taken will be recorded. 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 Partial Clearing works 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.

Eurobodalla Shire Council 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.

10 CNVMP Review

This CNVMP is a living document which should be revised and updated as necessary throughout the construction phase of the Partial Clearing works and in accordance with the Development Consent requirements.

At a minimum it shall be reviewed by Forestry 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
- 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. For each revision, the Quality Information table at the beginning of this document should be updated.

All personnel indicated in Table 7-2 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 3.1 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	Forestry
NV2	All potentially affected residences as identified in Section 3.1 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	Forestry
NV3	Any complaints received related to noise or vibration will be dealt with in accordance with Section 9.	Construction	Eurobodalla Shire Council's Project Manager	Record of complaints, investigations and responses in Environmental Incidents Reports and complaints register.	Weekly inspection	Weekly checklist	Forestry or independent arborist
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	Forestry	Records of inductions in training register.	Weekly inspection	Weekly checklist	Forestry
NV5	Equipment operators are to report any faulty equipment to Forestry.	Construction	Forestry and independent arborist	Records of faulty equipment in vehicle	Monthly inspection	Weekly checklist	Forestry and independent arborist

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) 7:00 am to 6:00 pm Mondays to Fridays b) 8:00 am to 1:00pm Saturdays 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	Forestry and independent arborist	No work is undertaken outside allowed hours.	Daily inspection	Daily checklist	Forestry
NV7	Activities resulting in impulsive or tonal noise emission (such as rock breaking, pile driving) shall only be undertaken: a) 7:00 am to 6:00 pm Mondays to Fridays b) 8:00 am to 1:00 pm Saturdays c) at no time on Sundays and public holidays 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	Forestry and independent arborist	No activities resulting in impulsive or tonal noise emission is undertaken outside allowed hours.	Daily inspection	Daily checklist	Forestry and independent arborist

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
NV8	<p>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:</p> <ul style="list-style-type: none"> 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. 	Prior to varied hours of construction	Forestry	Written approval from the Secretary is obtained.	Weekly inspection	Weekly checklist	Forestry
NV9	The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the levels in Table 5-1.	Construction	Forestry	Attended noise measurements as per Section 8.	As per noise monitoring schedule in Section 8.	Monthly report	Forestry
NV10	Vibration intensive activities should not be located closer to sensitive receptors than the safe working distances presented in Table 4-8.	Construction	Forestry	Vibration intensive activities are not located closer to sensitive receptors than	Daily inspection	Daily checklist	Forestry

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
				the safe working distances presented in Table 4-8.			
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	Forestry	Construction equipment fitted with noise and vibration control equipment where possible.	Monthly inspection	Monthly checklist	Forestry
NV12	Any equipment not in use for extended periods during construction work will be switched off.	Construction	Forestry	No equipment is left running without active use for more than 15 minutes.	Daily inspection	Daily checklist	Forestry
NV13	All vehicles and equipment will be regularly serviced, as per manufactures instructions and maintained in proper working order.	Construction	Forestry and independent arborist	Vehicles maintained in accordance with manufacturers requirements. Records of equipment maintenance logged in vehicle	Monthly inspection	Weekly checklist	Forestry and independent arborist

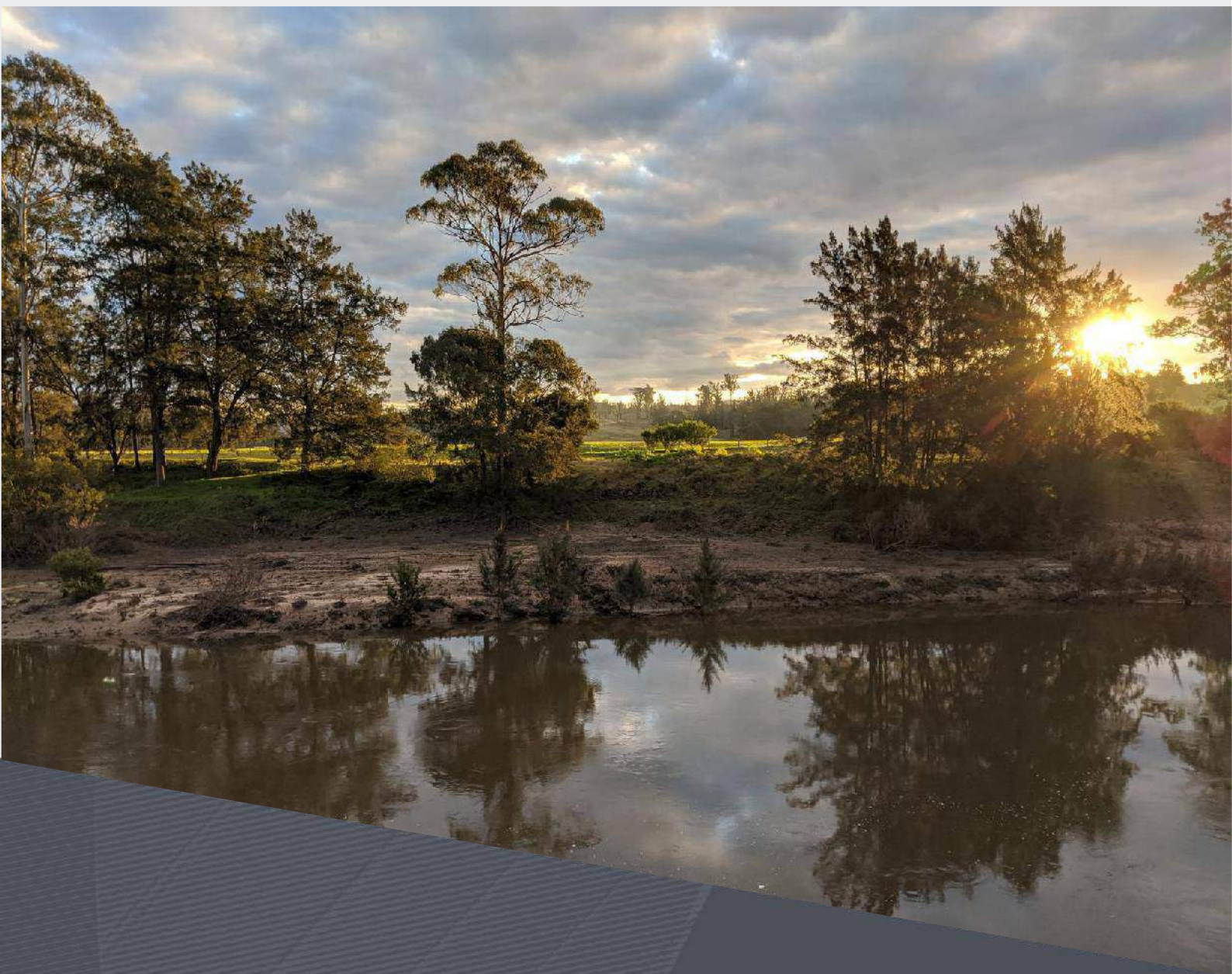
Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
				maintenance registers.			
NV14	Ensure deliveries are within the standard hours of works	Construction	Forestry and independent arborist	No deliveries occur outside standard hours of works.	Daily inspection	Daily checklist	Forestry and independent arborist
NV15	Simultaneous operation of noisy plant will be avoided wherever practicable.	Construction	Forestry	Attended noise measurements as per Section 8.	As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry
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	Forestry	Attended noise measurements as per Section 8 to confirm all measures to reduce noise emissions are effective and noise management levels are not exceeded.	As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry
NV17	"Quiet" practices will be employed wherever practicable when operating equipment.	Construction	Forestry		As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry
NV18	Any noise construction activities will be completed in the shortest time possible.	Construction	Forestry		As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry

Control Ref #	Environmental control	Implementation		Monitoring and reporting			
		Timing	Person responsible	Measurement criteria	Monitoring schedule	Reporting	Person responsible
NV19	There will be no swearing or unnecessary shouting or loud stereos/radios on site.	Construction	Forestry and independent arborist		As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry
NV20	There will be no dropping of materials from heights, throwing of metal items, or slamming of doors.	Construction	Forestry and independent arborist		As per noise monitoring schedule in Section 8.	Monthly in the weekly report as applicable.	Forestry

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Appendix F Air Quality Management Plan



Construction Air Quality Management Plan

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
28 January 2022

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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 clearing of the Permanent Works area (to the extent shown in Figure 1-1) for the Eurobodalla Southern Water Supply Storage (the Project). This AQMP and related CEMP relate only to the activities to be undertaken for the component of the project outlined in this document.

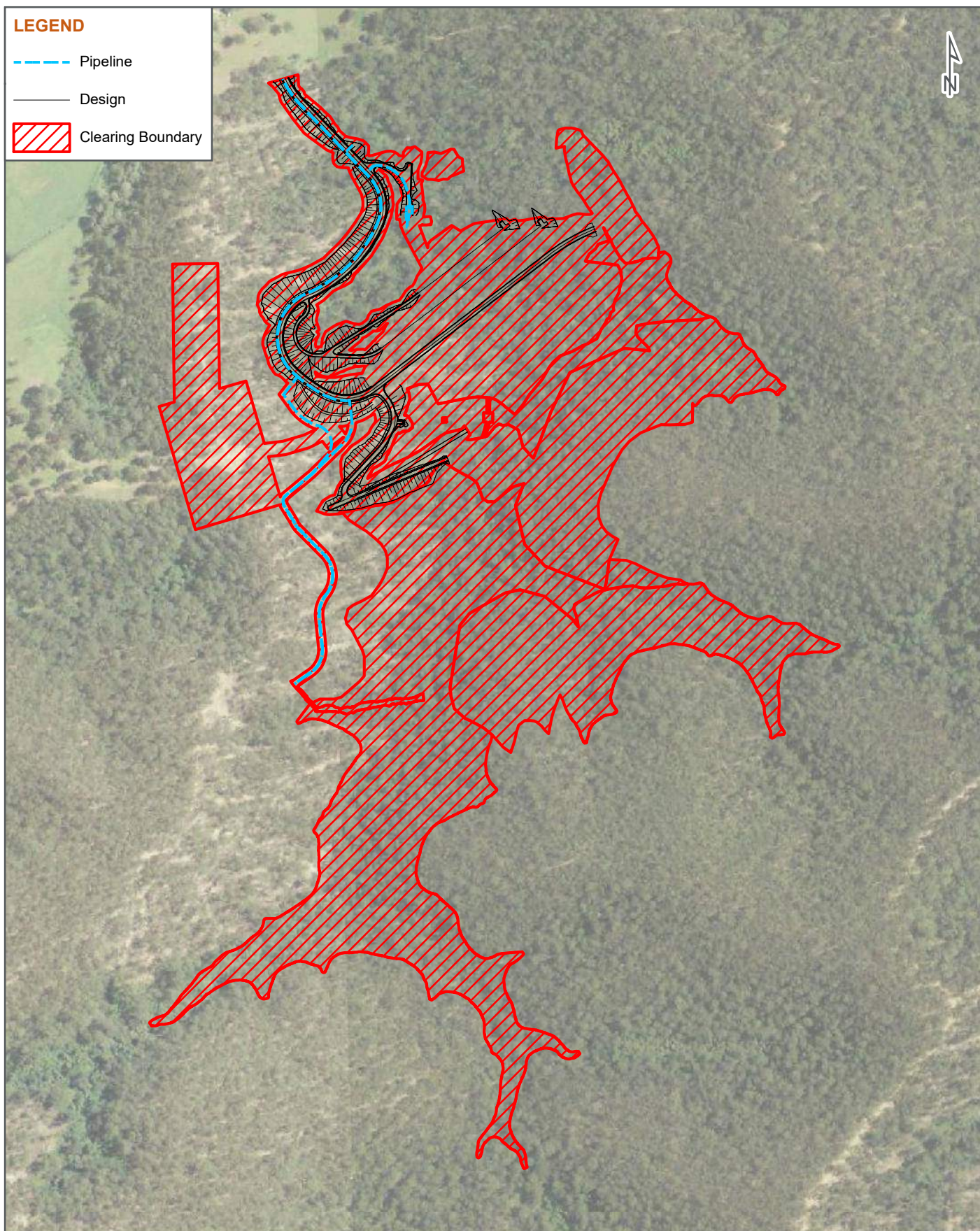
This Air Quality Management Sub Plan (AQMP) forms part of the Construction Environmental Management Plan (CEMP) for the partial clearing of the design area, ancillary works and inundation areas (herein referred to as the “Partial Clearing Works”) for the Eurobodalla Southern Water Supply Storage Project (the Project). The extent of the Partial Clearing works area is herein referred to as the “clearing boundary” as shown in Figure 1-1.

The purpose of this AQMP is to describe how Eurobodalla Shire Council is to manage potential impacts to air quality that may result during the Partial Clearing works.

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.

LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



DATE 13/12/2021

0 50 100 200
1:7,000 Metres

PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Extent of Partial Clearing works covered by this AQMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works AQMP

CREATED BY FA13847

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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 Partial Clearing works.

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: <ul style="list-style-type: none"> (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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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.
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 Partial Clearing works area 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 Partial Clearing works:

- 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 the Partial Clearing works area 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	Forestry 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	Forestry 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	Forestry Site Supervisor	Environmental inspection checklist Site supervisor's daily checklist
Spillage or track-out onto public roads	Any spillage or track-out on public roads to be cleaned immediately	At all times	Forestry 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); and
- *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); and,
- *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 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 Partial Clearing works site, the POEO (Clean Air) Regulation 2010 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 2010 – General standards of concentration

Air impurity	Activity	Standard of Concentration (Group C) ¹
Solid particles	Any activity or plant	100 mg·m ⁻³
Smoke	Any activity or plant in connection with which liquid or gaseous fuel is burnt	Ringlemann 1 or 20 % opacity mg·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 2010 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 Partial Clearing works site or to transport materials to and from the Partial Clearing works 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 Partial Clearing works. 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	µg·m ⁻³	50
	1 year	µg·m ⁻³	25
Particulates (as PM _{2.5})	24 hours	µg·m ⁻³	25
	1 year	µg·m ⁻³	8
Particulates (as TSP)	1 year	µg·m ⁻³	90
Particulates (as dust deposition)	1-year(a)	g·m ⁻² ·month ⁻¹	2
	1-year(b)	g·m ⁻² ·month ⁻¹	4

Notes: (a): Maximum increase in deposited dust level

(b): Maximum total deposited dust level

2 Project description

This AQMP relates only to the Partial Clearing works as shown in Figure 1-1. Separate CEMPs and associated management sub-plans would be prepared and submitted for approval for subsequent construction stages of the Project.

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary (Figure 2-1). The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP).

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 2-2):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area (further detailed in the CSWMP). Forestry will ensure that the area has been left with soil in a stable condition for the successful construction contractor to complete the remainder of the site clearing and construction in future stages of the Project.

The Partial Clearing works covered under this AQMP are confined to vegetation clearing only. Minor earthworks may be required to facilitate access to the site and establish loading areas for the plant and equipment required to undertake the clearing.

2.1 Site mobilisation and preparation works

Site mobilisation and preparatory works would generally commence prior to the bulk of clearing works; however, initial clearing to facilitate access to the site may be required. Site mobilisation and preparation of the works area would include:

- installation of erosion and sediment control as outlined in the Construction Soil and Water Management Plan (CSWMP). Progressive erosion and sediment control would be installed during initial partial clearing activities required to facilitate access to the site for clearing plant and equipment.
- delineation of 'no-go zones' with the installation of high-visibility bunting to clearly mark these areas.
- implementation of a nest box strategy and other threatened fauna pre-clearing strategies as outlined in the Flora and Fauna Management Plan (FFMP; Appendix B).

2.2 Clearing within Partial Clearing works clearing boundary

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs). Figure 2-1 provides mapping of the locations of HBTs. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the CFFMP.

Within Clearing Area 1 (refer Figure 2-2), localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

As required, soil and erosion control works shall be completed progressively during clearing operations to minimise soil erosion. Soil and erosion control works shall be carried out in accordance with the conditions of the Development Consent, and the CSWMP.

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

2.3 Construction program

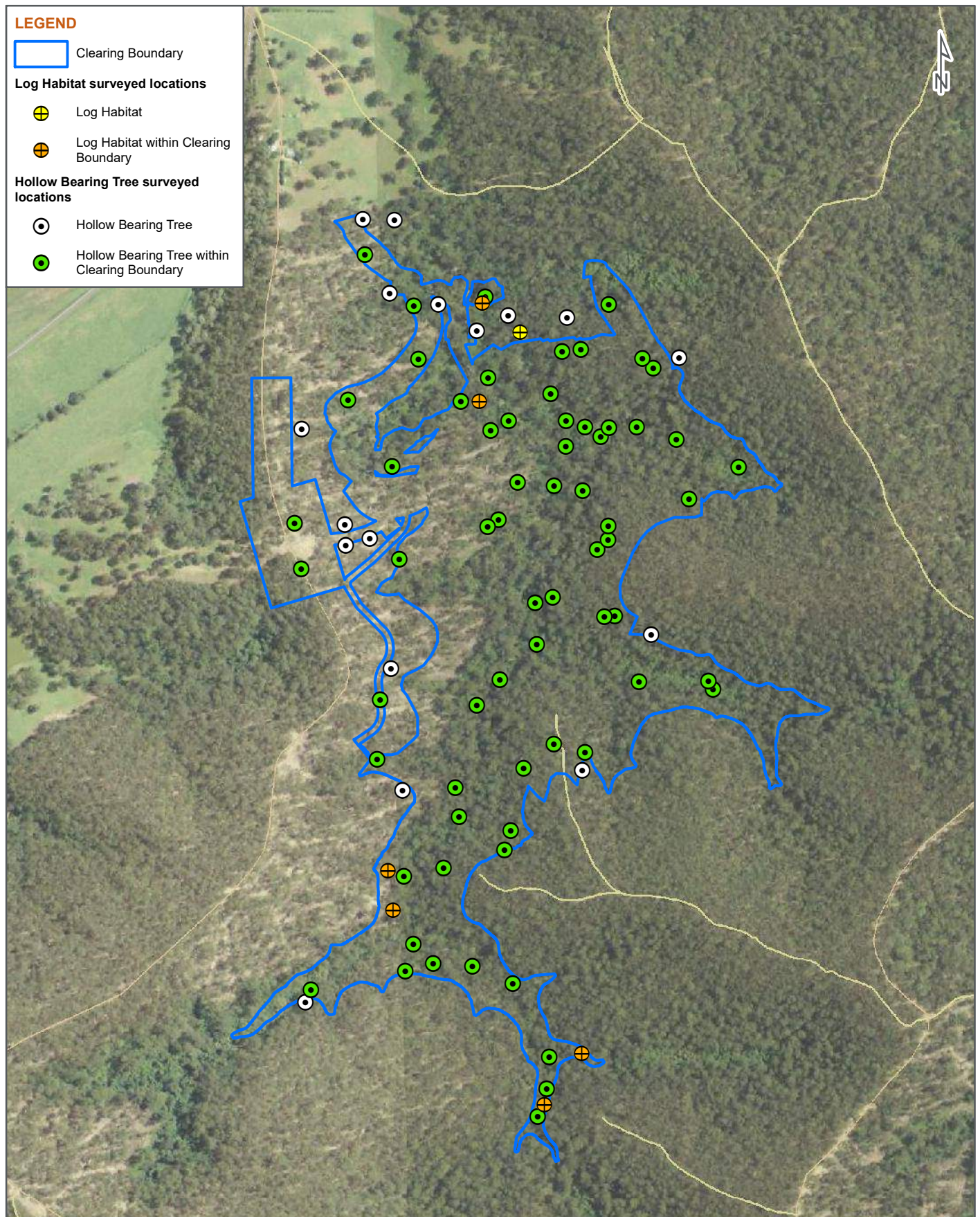
Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022, with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

Unless approval has been obtained from the Secretary, clearing 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.

Works outside the hours outlined above may be undertaken under the following circumstances:

- works that are inaudible at the nearest sensitive receivers
- for the delivery of materials outside these hours as required by the NSW Police Force or other authorities for safety reasons
- where it is required in an emergency to avoid the loss of life, 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.



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COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 2-1

FIGURE TITLE Hollow-bearing tree mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works AQMP

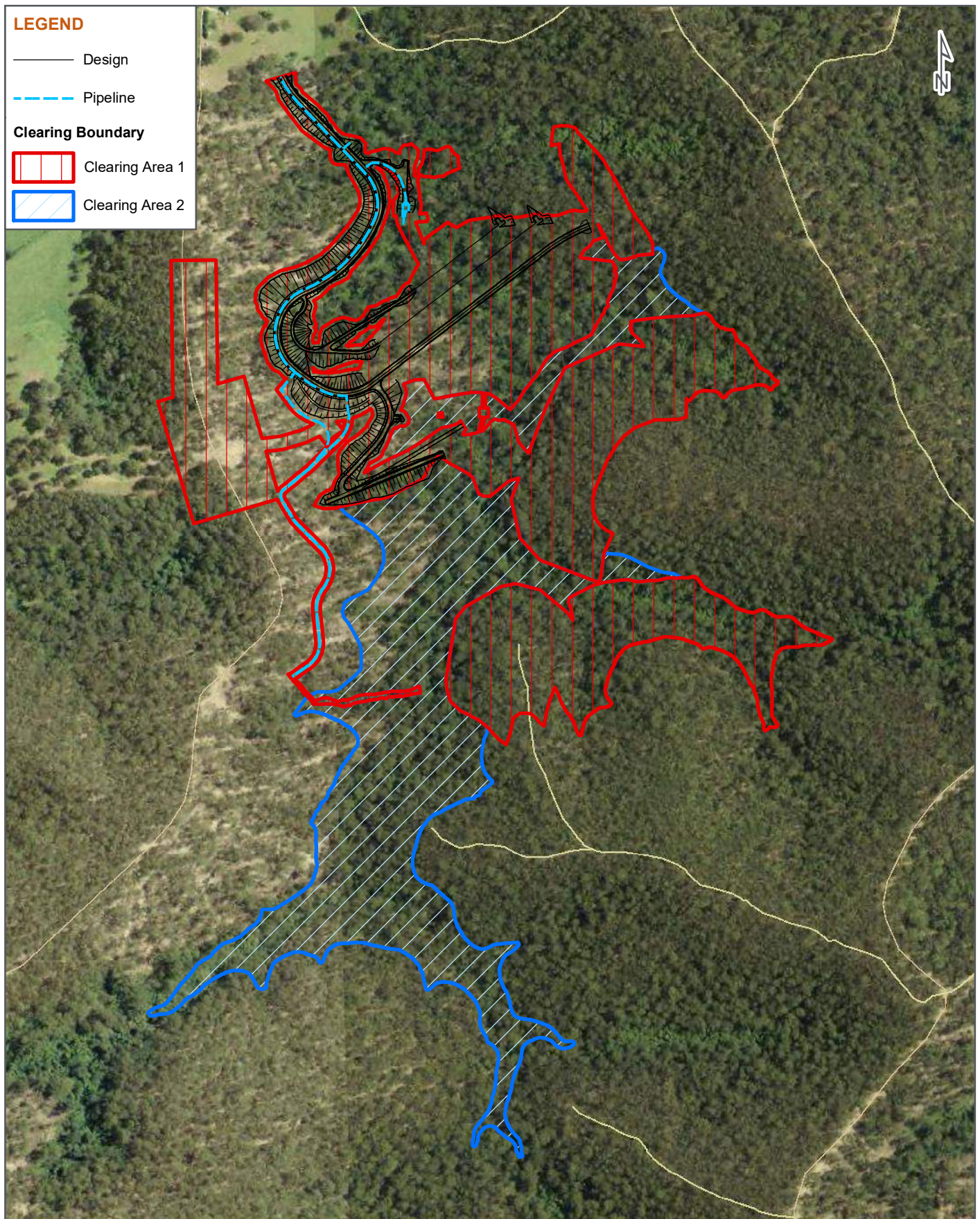
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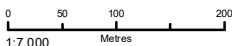

SOURCES : Roadnet MDS 2019, public_NSW_Imagery: © Department of Customer Service 2020



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DATE 23/11/2020		PAGE SIZE A4	COORDINATE SYSTEM GDA 1994 MGA Zone 56	 Member of the Surbana Jurong Group
FIG NO. 2-2	FIGURE TITLE Clearing Area Type Mapping			
PROJECT NO. 30012835	PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works AQMP			
CREATED BY JT14432	SOURCES : Roadnet MDS 2019, public_NSW_Imagery: © Department of Customer Service 2020			

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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 Partial Clearing works 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 (km²) 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.

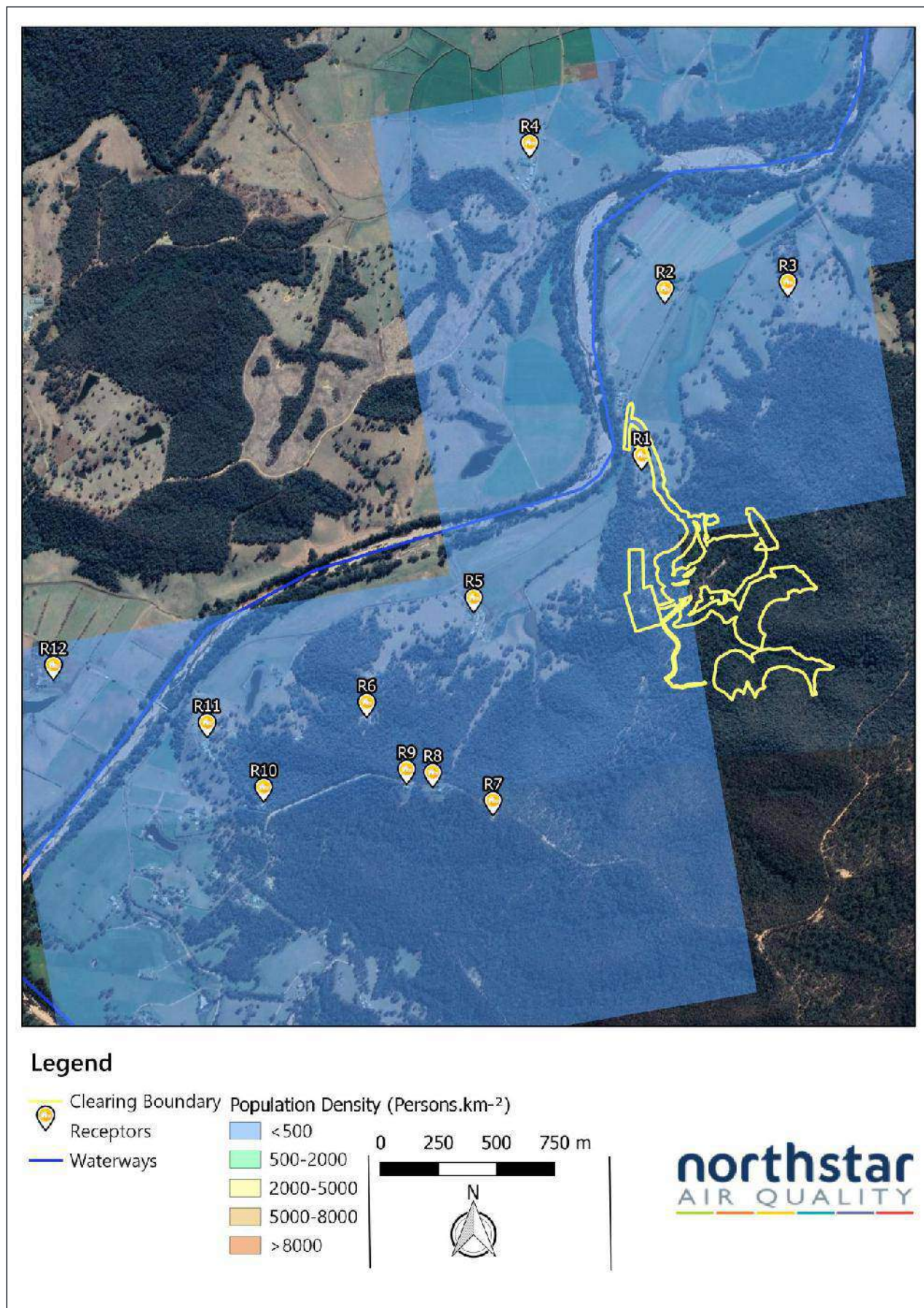
In accordance with the requirements of the NSW EPA, several receptors have been identified and the receptors adopted for use within this AQMP are presented in Table 3-1.

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 $<0.5 \text{ m}\cdot\text{s}^{-1}$ to $5.5 \text{ m}\cdot\text{s}^{-1}$ with the highest wind speeds (i.e., greater than $8 \text{ m}\cdot\text{s}^{-1}$) 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., $<0.5 \text{ m}\cdot\text{s}^{-1}$) 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 PM₁₀ 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 1.1.1). 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 Partial Clearing works associated with the Project which may have the potential to generate emissions to air include:

- earthworks including clearing
- movement of plant and equipment on the Partial Clearing works and heavy vehicles on unpaved areas.

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 Partial Clearing works 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 Partial Clearing works site.
- impacts on ecological receptors:
 - **high risk** of impacts on ecological receptors during earthworks and construction activities and associated with trackout from the Partial Clearing works site.

The air quality management and mitigation measures identified in the AQIA (Pacific Environment, 2018) of relevance to the Partial Clearing works, 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 Partial Clearing works 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 Partial Clearing works 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 Partial Clearing works. 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, Forestry, independent arborist 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.	Forestry Site Supervisor	Construction
AQ2 Proactive/reactive Prevent/minimise/control Note – this document	<p>A Dust Management Plan will be prepared and implemented as part of the CEMP. The DMP will include, but not be limited to:</p> <ul style="list-style-type: none"> • 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.	Forestry Site Supervisor	Construction
AQ4 Reactive Prevent/minimise/control	Make the complaints log available to the local authority.	Forestry 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.	Forestry Site Supervisor	Construction

Control Measure ID	Environmental Safeguards	Responsibility		Timing
Monitoring				
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.	Forestry Supervisor	Site	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 performed and during prolonged dry or windy conditions.	Forestry Supervisor	Site	Construction
AQ8 Proactive Prevent/minimise/control	Should ongoing complaints be received during construction works, agree PM ₁₀ monitoring locations with the local authority.	Forestry Supervisor	Site	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.	Forestry Supervisor	Site	Pre-construction
AQ10 Proactive/reactive Prevent	Avoid site runoff of water which may expose areas to wind erosion.	Forestry Supervisor	Site	Construction
AQ11 Proactive/reactive Prevent/minimise/control	Keep site fencing, barriers and scaffolding clean using wet methods.	Forestry Supervisor	Site	Construction
AQ12 Proactive/reactive	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).	Forestry Supervisor	Site	Construction

Control Measure ID	Environmental Safeguards	Responsibility	Timing
Prevent/minimise/control			
AQ13 Proactive Prevent	Cover, seed or fence stockpiles to prevent wind whipping.	Forestry Supervisor	Site 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.	Forestry Supervisor	Site Construction
AQ15 Proactive Minimise	Ensure all vehicles switch off engines when stationary to minimise engine idling emissions.	Forestry Supervisor	Site 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.	Forestry Supervisor	Site Construction
AQ17 Proactive/reactive Prevent/minimise/control	Impose and signpost a maximum-speed-limit of 40 km·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).	Forestry Supervisor	Site Construction
AQ18 Proactive Prevent/minimise	Install speed bumps on unsurfaced haul roads to ensure vehicles comply with speed limits.	Forestry Supervisor	Site Construction
AQ19 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.	Forestry Supervisor	Site Construction

Control Measure ID	Environmental Safeguards	Responsibility		Timing
AQ20 Proactive/reactive Prevent/minimise	Maintain the temporary road pavement to ensure minimisation of silt loading.	Forestry Supervisor	Site	Construction
AQ21 Proactive Minimise	Ensure larger vehicles are used where possible to reduce the number of trips required.	Forestry Supervisor	Site	Construction
AQ22 Proactive Prevent/minimise	If required, apply chemical suppressants to the road surface to reduce wheel generated dust emissions.	Forestry Supervisor	Site	Construction
AQ23 Proactive Prevent/minimise	All trucks entering or leaving the site with loads will have their loads covered.	Forestry Supervisor	Site	Construction
Operations				
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.	Forestry Supervisor	Site	Construction
AQ25 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.	Forestry Supervisor	Site	Construction
AQ26 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.	Forestry Supervisor	Site	Construction/post construction

Control Measure ID	Environmental Safeguards	Responsibility		Timing
AQ27 Proactive Minimise	Only remove the cover in small areas during work and not all at once.	Forestry Supervisor	Site	Construction
AQ28 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.	Forestry Supervisor	Site	Construction
AQ29 Proactive Prevent	Avoid dry sweeping of large areas.	Forestry Supervisor	Site	Construction
AQ30 Proactive Prevent/minimise	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Forestry Supervisor	Site	Construction
AQ31 Proactive/reactive Prevent/minimise	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Forestry Supervisor	Site	Construction
AQ32 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).	Forestry Supervisor	Site	Construction
AQ33 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.	Forestry Supervisor	Site	Construction
AQ34 Proactive	Access gates to be located at least 10 m from receptors where possible.	Forestry Supervisor	Site	Pre-construction

Control Measure ID	Environmental Safeguards	Responsibility		Timing
Prevent/minimise				
AQ35 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.	Forestry Supervisor	Site	Construction
AQ36 Proactive Minimise	Minimise stockpile heights to reduce wind velocity over surfaces and wind erosion.	Forestry Supervisor	Site	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 Forestry 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.

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:

- Forestry 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 Partial Clearing works 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; and,
- if necessary, update any relevant procedures to prevent any recurrence of problems and record any remedial action taken.

6.5 Record keeping

The Forestry 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

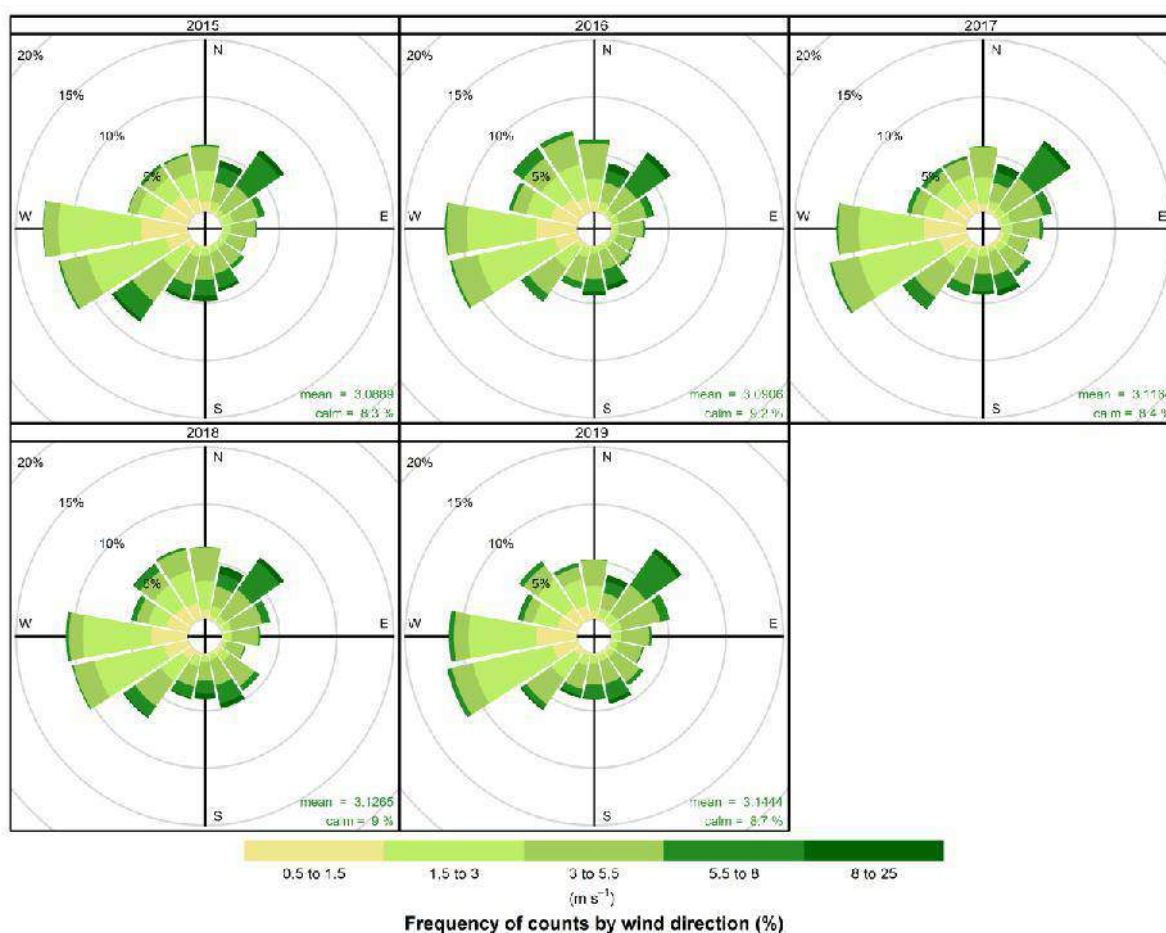
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Appendix A

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 $<0.5 \text{ m s}^{-1}$ to 5.5 m s^{-1} with the highest wind speeds (i.e., greater than 8 m 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., $<0.5 \text{ m s}^{-1}$) 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 for PM₁₀ and PM_{2.5} data are presented in Table B-2.

The measured values are compared to the NSW EPA criteria outlined in Section 3.3. Where there are measured exceedances of those criteria this is highlighted in red in Table B-2.

Table B-2 Summary of AQMS data

AQMS	Monash	
Years	2015-2019	
Pollutant	PM ₁₀	PM _{2.5}
Averaging period	24-hour	24-hour
Data Points (number)	1790	1786
Mean (µg·m ⁻³)	11.91	8.53
Standard Deviation (µg·m ⁻³)	13.61	12.65
Skew ¹	+8.26	+9.76
Kurtosis ²	+103.69	+142.77
Minimum (µg·m ⁻³)	0.29	<0.01
Percentiles (µg·m ⁻³)		
25	5.96	3.67
50	9.63	5.63
75	14.02	9.29

AQMS	Monash	
90	20.17	16.96
95	24.10	22.63
99	67.12	38.43
Maximum	260.92	264.63
Data Capture (%)	97.92%	97.70%

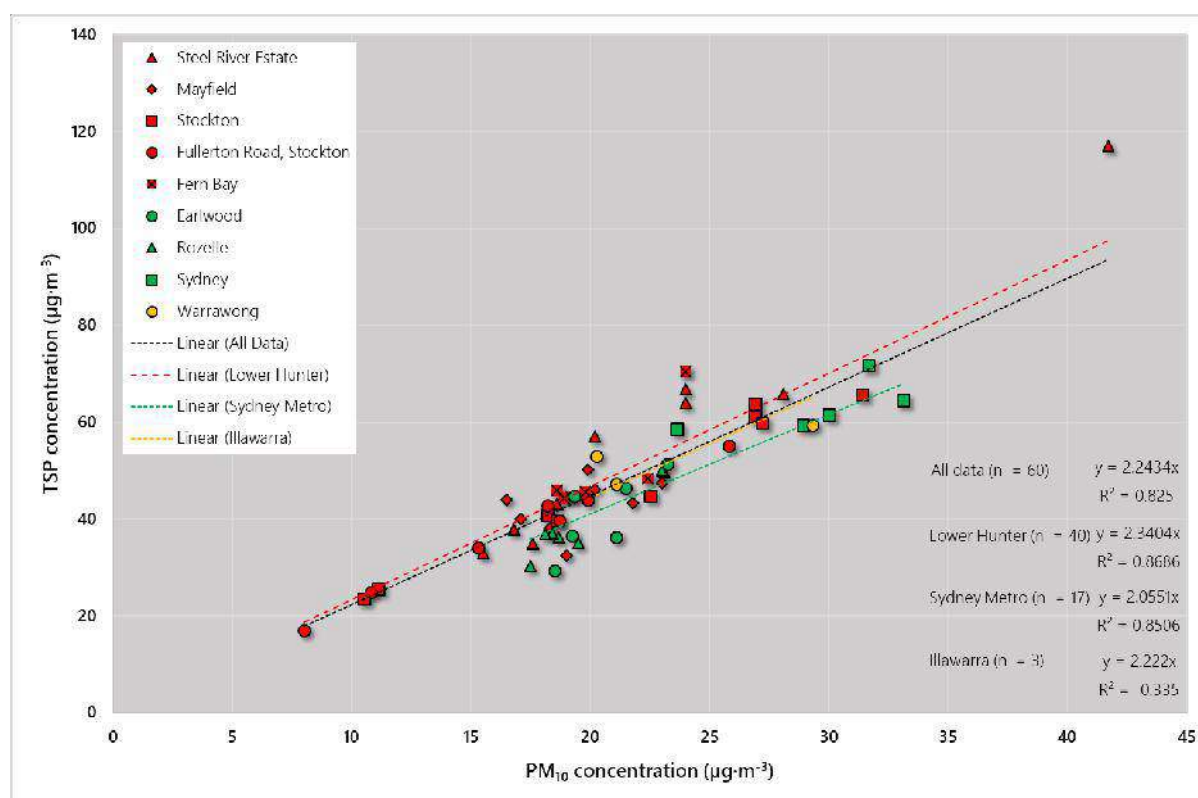
Notes: 1: Skew represents an expression of the distribution of measured values around the derived mean. Positive skew represents a distribution tending towards values higher than the mean, and negative skew represents a distribution tending towards values lower than the mean. Skew is dimensionless.

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 PM₁₀ 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:PM₁₀ ratio of 2.3404:1 (i.e., PM₁₀ 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 PM₁₀ measurements, Lower Hunter, Sydney Metro and Illawarra



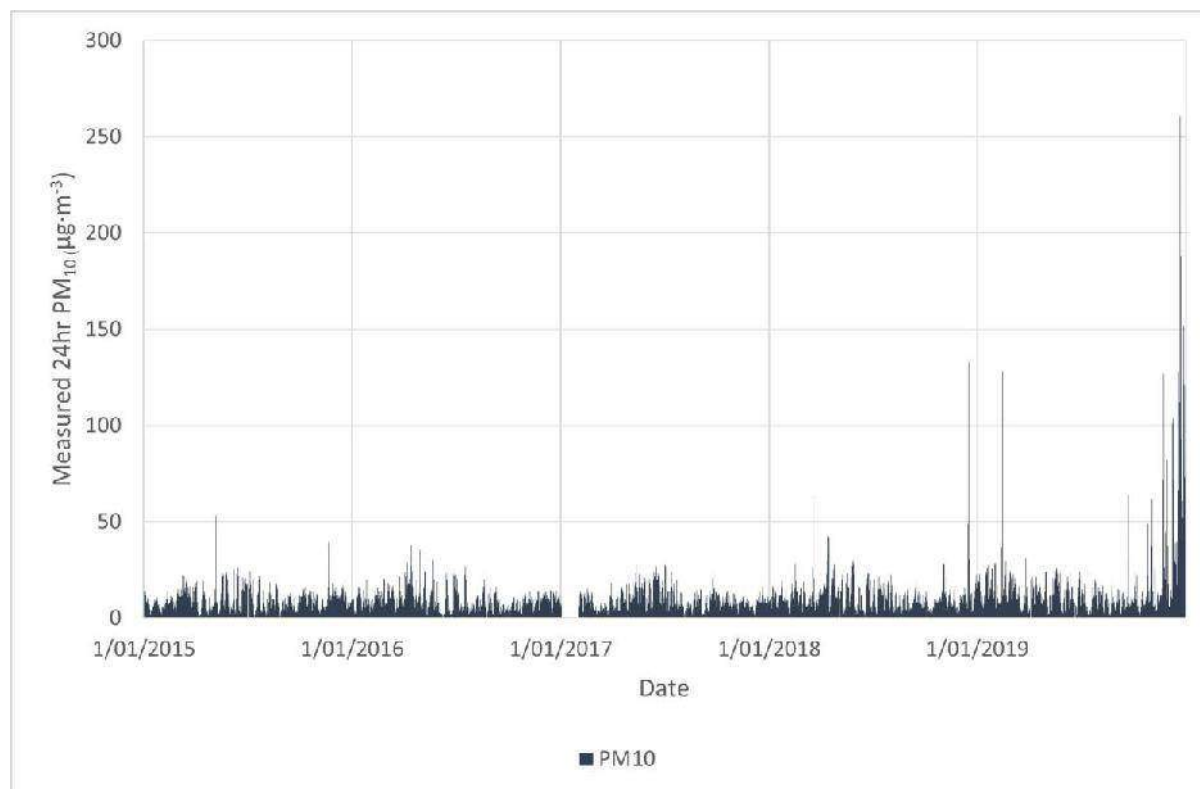
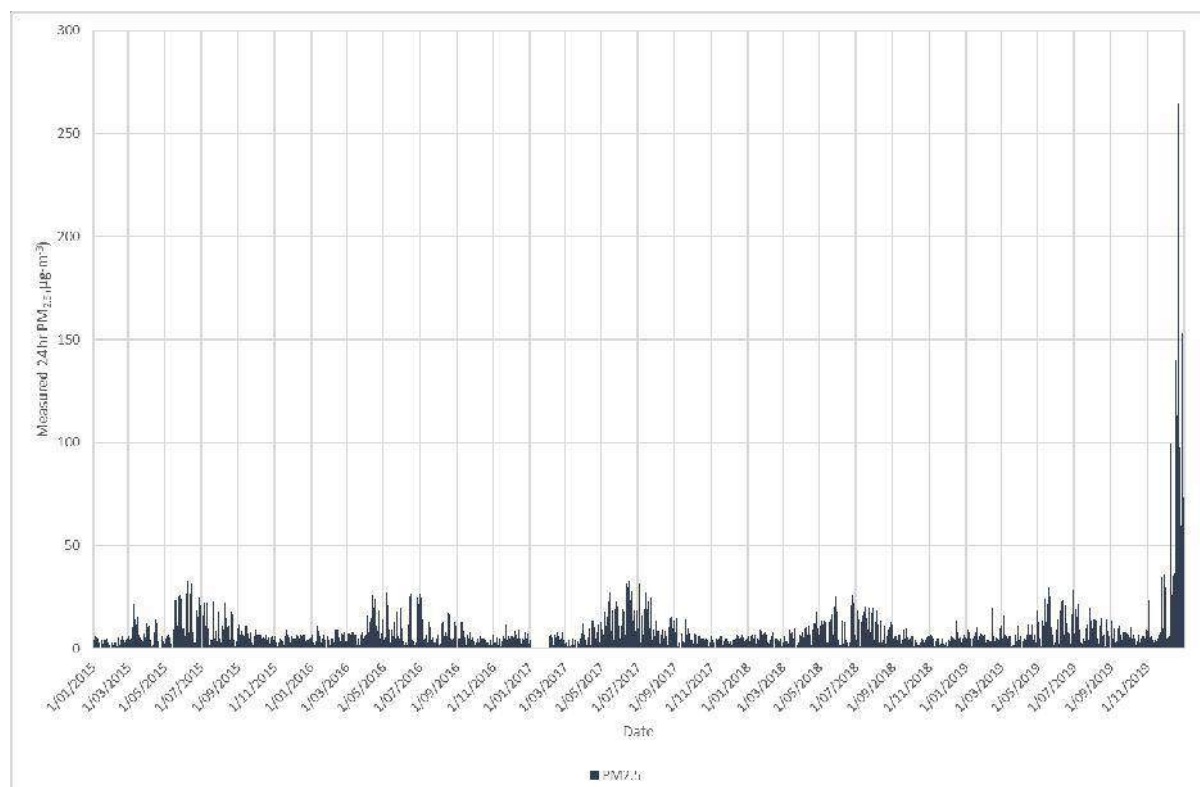
Similarly, no dust deposition data is available for the area surrounding the development site. The incremental impact criterion of 2 g·m⁻²·month⁻¹ as outlined within the Approved Methods has been adopted which effectively provides a background deposition level of 2 g·m⁻²·month⁻¹ (the total allowable deposition being 4 g·m⁻²·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 PM₁₀ 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)

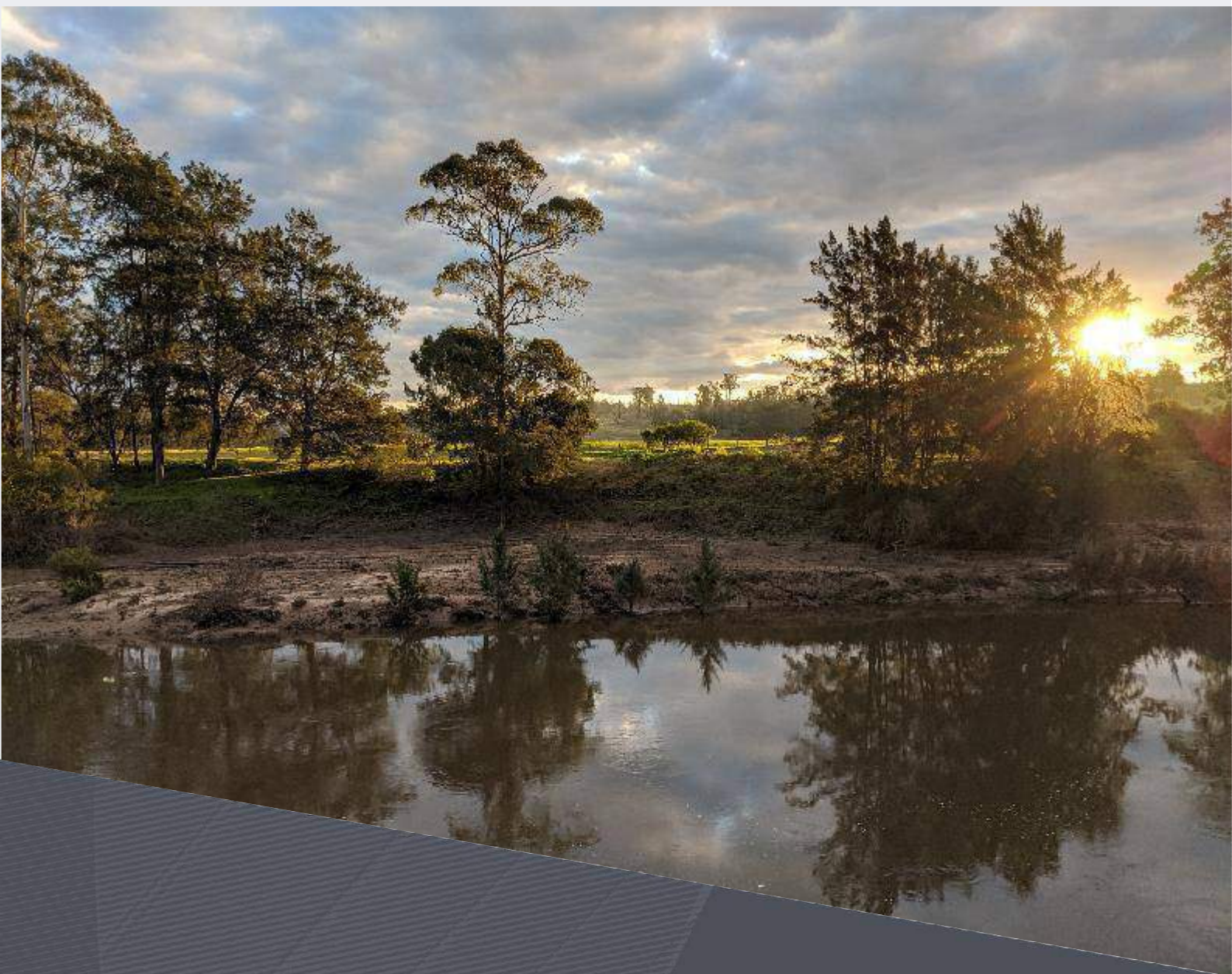
Pollutant	TSP	PM ₁₀	PM _{2.5}	NO ₂
Averaging period	Annual	24-hour	24-hour	1-Hour
Data Points (number)	1790	1 790	1786	41,726
Mean ($\mu\text{g}\cdot\text{m}^{-3}$)	27.9	11.91	8.53	0.00
Standard Deviation ($\mu\text{g}\cdot\text{m}^{-3}$)	-	13.61	12.65	0.01
Skew	-	+8.26	+9.76	+1.64
Kurtosis	-	+103.69	+142.77	+3.15
Minimum ($\mu\text{g}\cdot\text{m}^{-3}$)	27.9	0.29	<0.01	<0.01
Percentiles ($\mu\text{g}\cdot\text{m}^{-3}$)				
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 PM₁₀ measurements, Monash 2015-2019Figure B-3 PM_{2.5} measurements, Monash 2015-2019

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Appendix G Fire and Emergency Response Plan



Emergency Response Procedure

Eurobodalla Southern Water Supply Storage: Partial Clearing of the Permanent Works and Inundation Area

Reference No. 30012835
Prepared for Eurobodalla Shire Council
28 January 2022

Document Control

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Glossary and Abbreviations

Abbreviation	Detail
BLO	Bushfire Liaison Officer
CEMP	Construction Environmental Management Plan
CFFMP	Construction Flora and Fauna 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	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EPC	Emergency Planning Committee
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
Forestry	Forestry Corporation of NSW
HSE	Health Safety and Environment
POEO Act	Protection of the Environment Operations Act 1997
RFS	Rural Fire Service
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 Context

This Emergency Response Procedure (ERP) forms part of the Construction Environmental Management Plan (CEMP) and relates to the partial clearing of the permanent works design area, ancillary works and inundation areas, herein referred to as the “Partial Clearing works”, for the Eurobodalla Southern Water Supply Storage Project (the Project). The Partial Clearing works area is herein referred to as the “clearing boundary”.

The purpose of this ERP is to provide emergency response procedures relevant to the Partial Clearing works.

1.2 Objectives

The primary objective is for all environmental incidents to be resolved and reported appropriately and in a timely manner to:

- Ensure that all environmental incidents that occur are identified, reported, managed and investigated in a logical and consistent manner, and in compliance with applicable environmental legal requirements.
- Establish an adequate procedure that allows the establishment of environmental incident response actions to eliminate or minimise environmental incidents and to meet legislative requirements during the construction phase of the Tuross River Intake Pump Station (TRIPS) scope
- Identify the relevant authorities to be contacted in the event of an emergency.

All reported events need to be reviewed, and if necessary, further investigated to determine what actions can be taken to prevent further recurrence of the incident.

The procedure applies to all employees and subcontractors and their workers, contractors, consultants’ visitors and others who have a shared duty of care for environmental matters or who may be involved or affected by the Project’s activities.

1.3 Targets

The following targets have been established for the management of flood impacts during the construction of the Project:

- Ensure full compliance with the relevant legislative requirements, the development consent, the Environmental Impact Statement (EIS) and the Submissions Reports.
- Ensure all reasonable and practical measures are taken prior to a flood and bushfire to mitigate environmental damage, including minimising the potential damage by materials and equipment damaging other infrastructure or impacting the waters up and down-stream.

1.4 Background and project description

The Project is located approximately 30 kilometres south of Moruya, within the Eurobodalla Local Government Area . The Permanent Works area is within 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. Figure 1-1 provides an outline of the clearing boundary and scope of works.

Subject to approvals, the Partial Clearing works covered under this CEMP will be undertaken by the Forestry Corporation of NSW (herein referred to as Forestry) and an independent arborist contractor. The Partial Clearing works are proposed to be undertaken from February 2022 to end of June 2022 , with clearing of habitat trees occurring in February 2022 and the first 2 weeks of March 2022 to minimise disturbance to breeding of threatened fauna. Clearing of other non-habitat trees can be undertaken outside of this February-early March 2022 period (i.e. mid-March to end of June 2022).

The Partial Clearing works to be undertaken by Forestry would comprise clearing of harvestable timber for sawmill and pulpwood, through selective clearing of trees greater than 15cm in diameter, as well as all hollow-bearing Trees (HBTs) within the clearing boundary. The Partial Clearing works to be undertaken by the independent arborist contractor would comprise clearing of HBTs for the purpose of repurposing hollows into nest boxes for Project use as part of the Construction Flora and Fauna Management Plan (CFFMP).

Introduction

The Partial Clearing works within the clearing boundary will be comprised of the two following areas (depicted in Figure 1-2):

Clearing Area 1 - Localised grubbing of stumps, roots and organic material will be required around trees selected for clearing greater than 30cm in diameter. Grubbed stumps, roots and organic material will be spread over the disturbed area to provide soil and erosion stability. No grubbing will take place within gullies. This area largely comprises the permanent works design area.

Clearing Area 2 – Areas to be cleared for harvestable organic material only, with stumps to remain (trees remaining post Partial Clearing works, with saplings, undergrowth and groundcover to remain intact). This area largely comprises the inundation area.

Localised grubbing and clearing will be required for establishing loading areas to facilitate the clearing works. Loading areas would be strategically placed in flat areas to maximise efficiency of the partial clearing works and minimise the number and size of loading areas required.

The area within the clearing boundary, as shown in Figure 1-1, will be cleared by Forestry and the independent arborist contractor, with the remainder of clearing not undertaken as part of the Partial Clearing works to be completed by a construction contractor during future stages of the Project.

Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

It is the intent of the Principal to retain and use non-commercially viable timber, saplings, undergrowth and organic matter as much as is practicable to minimise erosion of the Partial Works area. Non-harvestable organic matter would be spread over disturbed areas to provide soil and erosion stability.

The site is intended to be left in a stable condition after Partial Clearing works, with the storage construction contractor to complete the remainder of the site clearing in future stages of the Project (i.e. post Partial Clearing works). This will be addressed in subsequent CEMP documents to be prepared by the successful construction contractor.

1.4.1 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 Project 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 predominantly 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.

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 1-3).

Introduction

1.4.2 Forestry Corporation of NSW

Subject to approvals, the Partial Clearing works covered under the CEMP will be undertaken by Forestry. Clearing activities to be undertaken by Forestry would include:

- harvestable trees will be cut down. Trunks and roots will be left in situ to minimise soil erosion. Where localised grubbing is required, grubbed organic material (trunks, roots) will be spread over the disturbed area to provide soil stability.
- clearing of HBTs with machinery in accordance with Section 4.7.2 of the CFFMP if it is unsafe or impractical to fell by the arborist by hand. Hollows will be set aside for the arborist and ecologist to assess their use for salvage and repurposing as nest boxes/ground habitat outside of the clearing area.
- harvestable timber will be removed from the site
- areas to be cleared and grubbed for loading areas will all occur within the clearing boundary and be constructed on flat areas. Sediment and erosion controls will be implemented as outlined within the CSWMP.

Forestry manages a significant estate of fire prone forests and plantations in NSW. Uncontrolled bushfires are a major and recurring threat to Forestry business objectives, to communities living in or near forested landscapes, and to people and businesses whose livelihoods rely on forest and plantation resources.

Forestry is responsible for sustainably managing native forest ecosystems that have evolved with fire and require a range of different fire regimes to maintain their health, diversity and vitality. In addition, Forestry has statutory obligations to manage fire. Accordingly, Forestry recognises the need for a risk-based approach to fire management which gives appropriate protection to the range of social, economic and environmental values.

Forestry's statutory obligations for fire management arise from the *Forestry Act 2012* and the *Rural Fires Act 1997*. These Acts place a responsibility on Forestry:

- Protect life and property from fire
- Minimize the spread of fire from State forests and other lands managed by Forestry
- Protect State forests from the damaging effects of fires.

The *Rural Fires Act 1997* recognises Forestry as one of four Fire Authorities, a member of the NSW Bush Fire Coordinating Committee, and subjects Forestry to the coordinated fire management provisions of the *Rural Fires Act 1997*.

Forestry operate under a Fire Management Policy (P 2020/05, refer Appendix A) and Fire Management Plan (D00271354, refer Appendix B) which describe the systems developed to implement Forestry's fire management policies and strategies on State forests and other lands managed by Forestry to meet its obligations and business imperatives.

1.4.3 Independent Arborist Contractor

Clearing activities to be undertaken by the independent arborist contractor would include:

- felling of HBTs as identified by an ecologist in the pre-clearing survey prior to Forestry works in the immediate area, unless unsafe or impractical to do so.
- hollows subsequently identified as being appropriate for salvaging and repurposing as nest boxes/ground habitat outside of the clearing area will be cut off by chainsaw and, where possible, removed prior to forestry works in the immediate vicinity, or clearly marked and identified for Forestry to move during harvesting of that area.

The independent arborist contractor shall liaise with Forestry's leadership for the site-based response to the emergency.

1.4.4 Applicant

The consenting authority for the development is the Minister for Planning. The ERP to which this document relates is prepared for Eurobodalla Shire Council. Eurobodalla Shire Council will be responsible for ensuring the Development Conditions stipulated in State Significant Development (SSD) 70890 have been met.

1.4.5 Stakeholder group

The main stakeholders in relation to this development and with regard to the ignition of bushfire are Eurobodalla Shire Council, Forestry 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.

Introduction




1.4.6 Emergency Management Committees

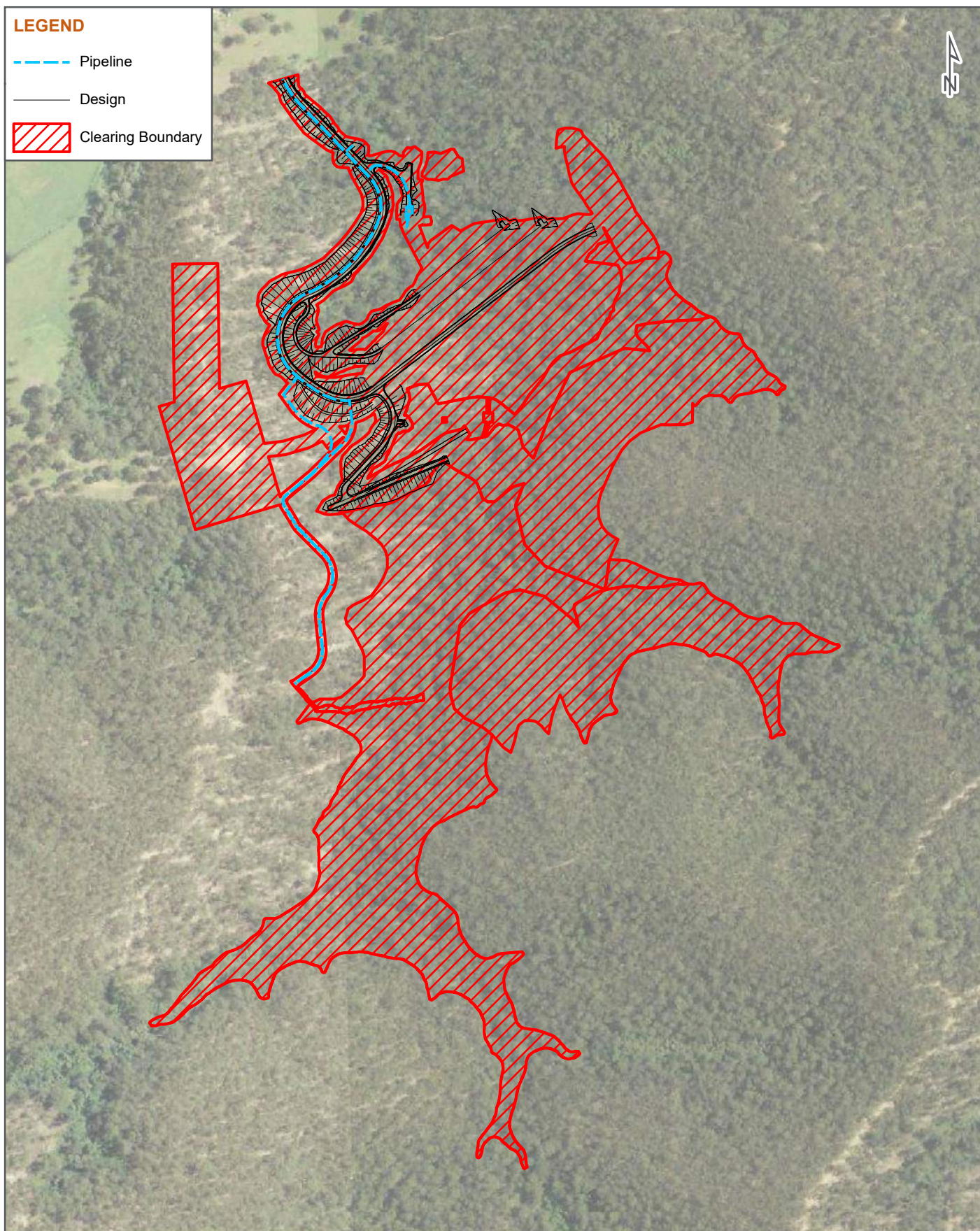
The following overarching committees are responsible for dealing with bush fire prevention, preparedness, response and recovery:

- State Emergency Management Committee
- Regional Emergency Management Committees
- Local Emergency Management Committees and.

When a bush fire occurs, an emergency may be declared by the NSW RFS. Once this occurs, a control centre will be established at the headquarters of the NSW RFS.

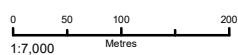
LEGEND

-  Pipeline
-  Design
-  Clearing Boundary



42

DATE 13/12/2021



PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-1

FIGURE TITLE Extent of Partial Clearing works covered by this CEMP

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works - Partial Clearing works ERP

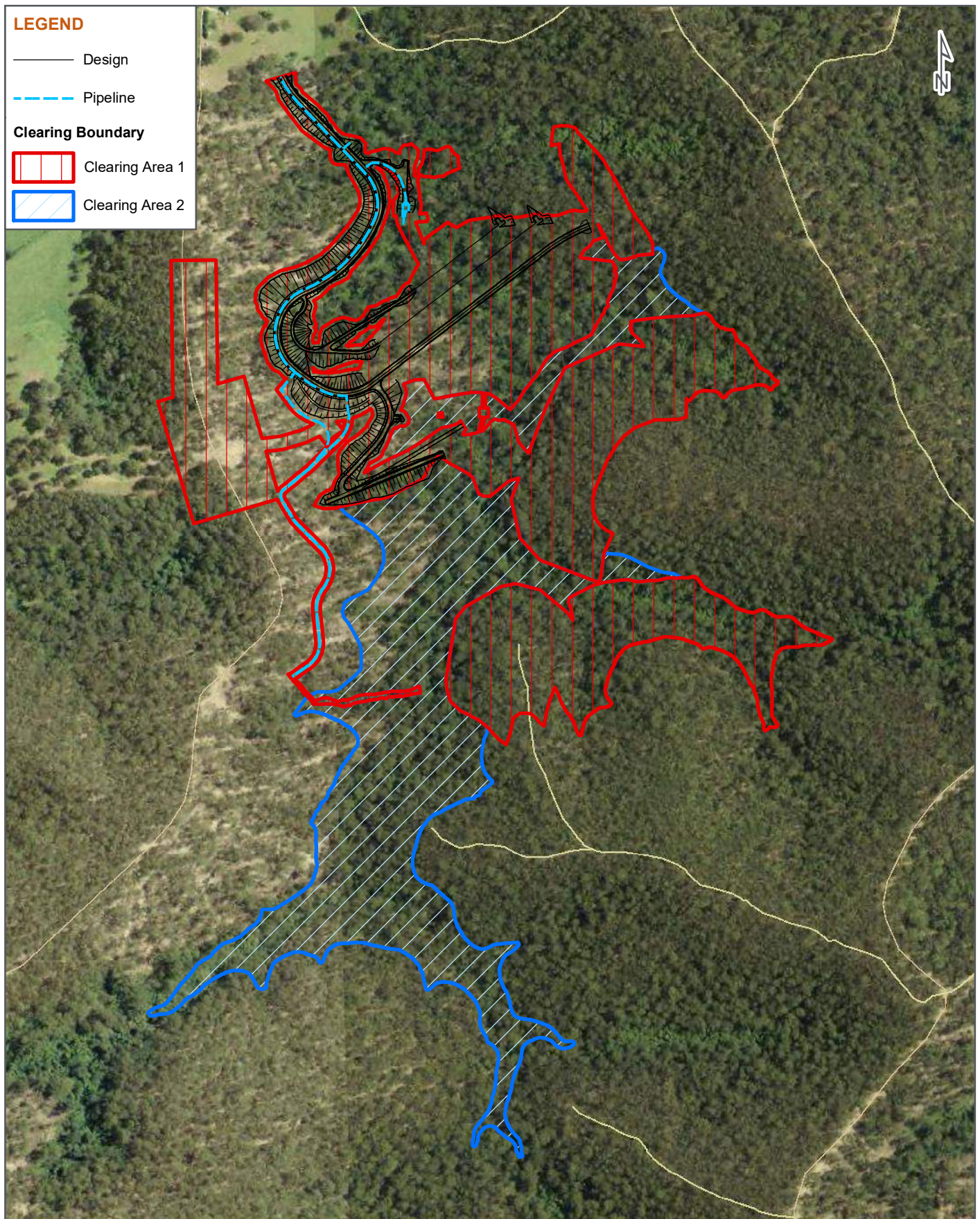
CREATED BY FA13847

SOURCES : Roadnet MDS 2019, public_NSW_Imagery: © Department of Customer Service 2020



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DATE 23/11/2020

0 50 100 200
1:7,000 Metres

PAGE SIZE A4

COORDINATE SYSTEM
GDA 1994 MGA Zone 56

FIG NO. 1-2

FIGURE TITLE Clearing Area Type Mapping

PROJECT NO. 30012835

PROJECT TITLE Eurobodalla Southern Water Supply Storage Early Works -
Partial Clearing works ERP

CREATED BY JT14432

SOURCES : Roadnet MDS 2019, public_NSW_Imagery: © Department of Customer Service 2020



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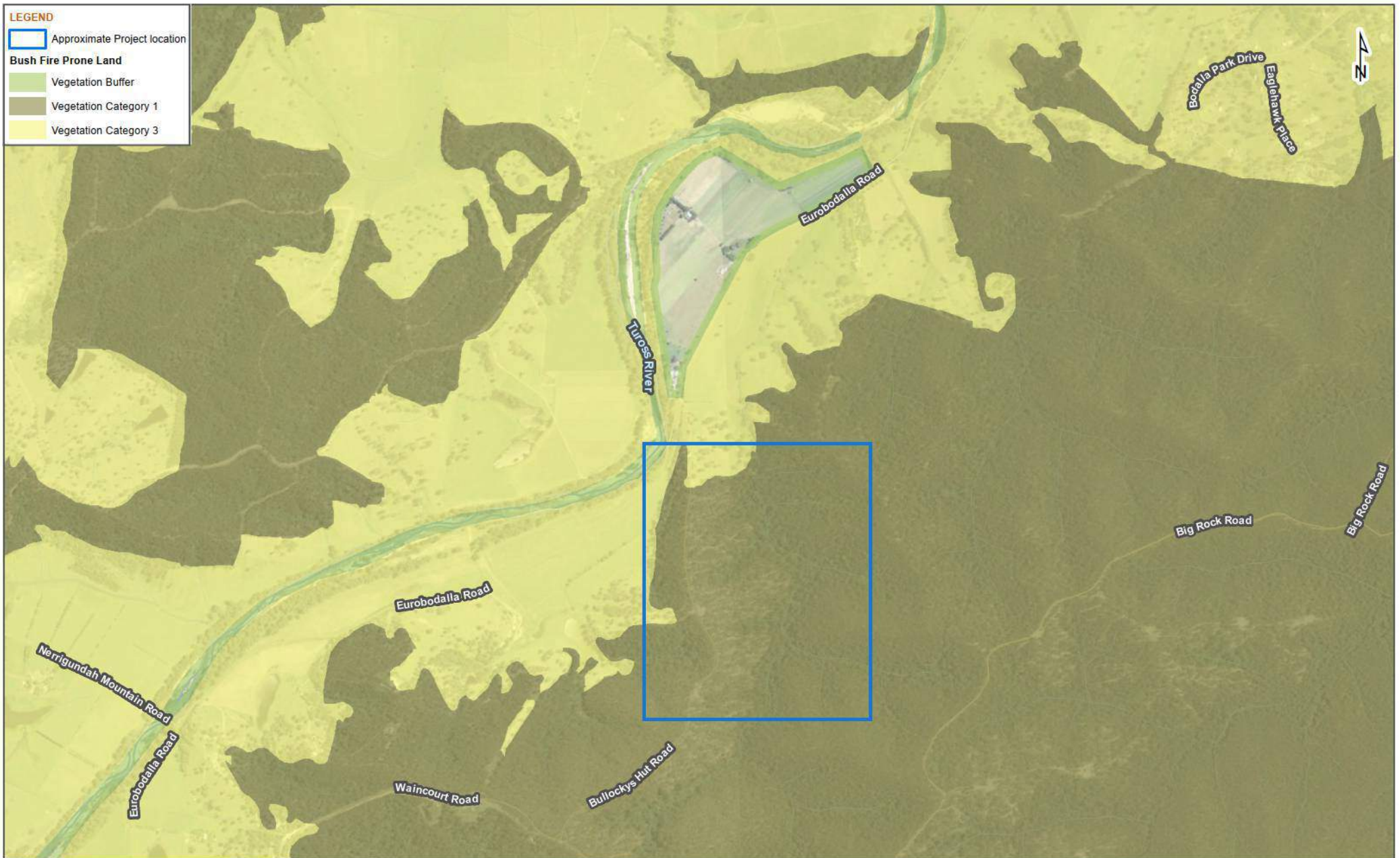


FIG NO. 1-3	FIGURE TITLE Bush Fire Prone Land	DATE 18/01/2022	0 100 200 400 600 1:20,000 Metres	PAGE SIZE A4	COORDINATE SYSTEM GDA 1994 MGA Zone 56	© SMEC Australia Pty Ltd 2022. All Rights Reserved
PROJECT NO. 30012835	PROJECT TITLE Eurobodalla Southern Storage Water Supply Project - Partial Clearing works ERP	CREATED BY FA13847	SOURCES Roadnet MDS 2020, Public NSW Imagery: © Department of Customer Service 2020, Bush Fire Prone Land © NSW Rural Fire Service 2021			

Location: V:\Projects\30012835 - Eurobodalla Southern Storage\Maps\CEMP 2021\1126\30012835_F00014_BushFireProneLand.mxd



Last updated by: FA13847 on 18/01/2022 at 18:53

2 Responsibilities

All site personnel upon becoming aware of a situation that is or has the potential of becoming an emergency situation, are responsible to:

- Take all reasonable steps to make the situation safe or to reduce the hazard to themselves or others
- Summon what assistance is required to treat the immediate effects of the emergency
- Report the details of the emergency to the Forestry Site Supervisor
- Provide assistance as required to the Forestry Site Supervisor or emergency response personnel.

2.1 Forestry Site Supervisor/Emergency Co-ordinator

The Forestry Site Supervisor is Forestry's representative permanently based on site and shall provide Forestry's leadership for the site-based response to the emergency. Specific responsibilities include, but are not limited to:

- Initial assessment of the severity of the incident and the necessity for notification and mobilisation of emergency services including police, fire brigade, ambulance and/or air/sea rescue
- Ensuring that emergency services have been mobilised
- Immediate notification of the Eurobodalla Shire Council Superintendent
- Assisting Eurobodalla Shire Council Superintendent in initial contacts with emergency services
- Providing safety advice for emergency response and work practices
- Implementing procedures outlined in this plan to minimise harm to all site personnel, including independent arborist contractor.

2.2 Independent Arborist Contractor

The independent arborist contractor will liaise with Forestry's leadership for the site-based response to the emergency. Specific responsibilities include, but are not limited to:

- Initial assessment of the severity of the incident and the necessity for notification and mobilisation of emergency services including police, fire brigade, ambulance and/or air/sea rescue
- Ensuring that emergency services have been mobilised
- Immediate notification of the Eurobodalla Shire Council Superintendent
- Assisting Eurobodalla Shire Council Superintendent in initial contacts with emergency services
- Providing safety advice for emergency response and work practices
- Implementing procedures outlined in this plan to minimise harm to all site personnel.

2.3 Emergency Planning Committee or Bushfire Liaison Officer

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 identified in the Forestry Fire Management Plan (Appendix B)
- Liaise with emergency services.

2.4 HSE Representative

The Health Safety and Environment (HSE) Representative is primarily responsible to represent workers on health, safety and environmental matters within the workplace. Specific responsibilities include, but are not limited to:

- Monitor the HSE measures taken by the project group ensuring compliance to relevant legislation and company policy
- Conduct regular audits and inspections at project locations
- Investigate or arrange for all accidents and near-misses be investigated and prepare a report of findings.

2.5 Eurobodalla Shire Council Project Manager

The Project Manager has overall responsibility for the Project site and activities and shall provide support to the Site Engineer in the response to the emergency. Specific responsibilities include, but are not limited to:

- Confirming the initial assessment of the severity of the incident by the Site Supervisor
- Assisting in the notification and mobilisation of emergency services
- Assisting in communications with Client Representatives
- Liaising with the Forestry Site Supervisor with regard to any emergency involving injury to personnel serious environmental impact or property loss
- Ensuring all required notifications are completed including WorkCover, the Regulator, Insurers, EPA, and Eurobodalla Shire Council
- Review of the emergency and recording of any actions arising from the emergency.

3 Risk Analysis

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 1-3).

The Partial Clearing works 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 Partial Clearing works 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.

External bushfires would be a risk to the Partial Clearing works. 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 the Partial Clearing works. Responders accessing an incident involving the Partial Clearing works 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 Partial Clearing works site.

The Partial Clearing works will involve clearing activities on gradients and valley slopes. Ground slip may be caused by extreme precipitation, clearing activities and a combination of both factors. Partial clearing activities such as localised clearing for haul routes, loading areas and localised grubbing in Clearing Area 1 may reduce ground stability. Extreme precipitation may also lead to localised flooding (particularly in the valley slopes and ephemeral creek) which may result in injury and safety risks.

The following Section 4 outlines a range of environmental management measures and emergency response actions would be implemented to address these risks.

4 Risk Management Measures

4.1 Emergency muster area

Forestry will nominate one or several, as necessary, emergency muster area for the Partial Clearing works. Each emergency muster area is to be clearly identified on the site layout plan. The muster area will consider:

- The location of the work area
- The availability of large enough open/protected area to accommodate all persons
- The topography of the site in relation to ease of travel to the muster area
- The location of emergency equipment such as first aid kits, fire-fighting equipment, ease of access etc.

4.2 Bushfire

4.2.1 Prior to commencement of work

Prior to works beginning on site, establish an EPC or 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 identified in the Forestry Fire Management Plan (Appendix B)
- Liaise with emergency services.

4.2.2 During Partial Clearing works

- A bushfire can occur at any time during the year. 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 the local Bodalla RFS unit that work is being carried out and provide them with the bushfire emergency management plan.

4.2.3 Bushfire Emergency Situation

Actions during bushfire emergency situation are outlined below:

- **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.
 - Person discovering (if the fire was not previously known):
 - Alert persons in the vicinity of the fire
 - Contact the Forestry Supervisor (if unable to quickly contact then ring 000)
 - Note details of emergency, exact location, situation and name of person advising

- Notify the Fire Brigade (call 000), if not already called
 - Ensure that persons are kept away from the bush fire area and Fire Brigade ingress route
- **Notify:**
 - Report incident to Forestry Site Supervisor 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 Forestry Site Supervisor 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
 - Forestry Site supervisor is to:
 - Confirm Fire Brigade informed and responding
 - Confirm that all persons are evacuated from potential danger area and move to the emergency muster area, and initiate broader evacuation if appropriate
 - Consult with emergency services personnel regarding site evacuation need
- **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** - The Forestry Site Supervisor will compile an incident report and provide a copy to the ESC Project Manager to keep on file. An investigation or serious incident review may be conducted. Staff may be required to assist external authorities with investigations.

4.3 Extreme precipitation and flooding

Mitigation and response actions during an extreme precipitation and/or flood emergency situation are outlined below.

- Weather and climatic data monitoring would include the following:
 - Weather would be monitored daily for construction planning purposes to identify any risk of high rainfall and subsequent flooding events
 - Flood watch and flood warning notifications
 - Ensure evacuation routes are kept clear during high risk periods
 - Storage of materials would be above the 1 in 20 years ARI modelled flood level
- If extreme precipitation and/or flooding is anticipated, ensure that any loose objects are secured or able to be removed
- If extreme precipitation and/or flooding is anticipated, stop works on steep valleys and gradients and locate plant away from steep gradients
- If a severe electrical storm is anticipated, review safety precautions concerning critical processes or outdoor work activity (staff and contractors) with applicable specialist personnel – caution persons concerning use of electrical equipment such as phones and computers. Monitor passage of storm cell/s and temporarily suspend outdoor movement if risk of lightning strike

- Extreme weather events will be monitored to assess what ever precautionary measures need to be implemented to secure project facilities and equipment
- Consult with emergency services personnel regarding site evacuation need
- Any temporary work will be inspected prior to recommencement of works after a severe weather event
- The areas of the Partial Clearing works affected by severe weather events will be inspected for damage, undermining, collapse etc. prior to reopening the site.

4.4 Ground Slip

The Partial Clearing works will involve clearing activities on gradients and valley slopes. Ground slip may be caused by extreme precipitation, clearing activities and a combination of both factors. Mitigation and response actions in potential or actual ground slip events are outlined below:

- If extreme precipitation and/or flooding is anticipated, stop works on steep valleys and gradients and locate plant away from steep gradients
- Daily risk assessment and inspection of site conditions and weather forecasts
- In the event of an emergency ground slip event, the following is to be implemented:
 - **Locate** – Locate the area of ground slip (Look for evidence e.g. tools, helmet), ask any other staff present - need to establish the number of individuals involved
 - **Raise the alarm** – two – way radio or mobile phone (Emergency Communication Protocol) advise of emergency notification
 - **Alarm** – In case of major ground slip resulting in injury and trapped workers, CALL TRIPLE ZERO (000) for emergency services (e.g. ambulance, FRNSW, SES) and provide details – patient/s, location, nature of incident
 - **Assess the danger** - Ensure you and others are not in immediate danger (further collapse, equipment or structures falling into excavation. Look for cracks in the ground, observe the site conditions). Depending on severity of failure, plant may have to be abandoned
 - **Evacuate** - If the situation is assessed to pose an immediate danger, then you must evacuate to a safe distance
 - **Prevent** - Do not allow anyone to enter the trench/excavation until it has been made safe.

4.5 Emergency Contacts

Emergency contact details relevant to the Partial Clearing works are provided in Table 4-1. Locations of the closest Medical Centre and Hospital are provided in Figure 4-1 and Figure 4-2.

Table 4-1 Emergency contact details relevant to the Access road and pipeline construction works

Organisation / Project Position	Responsible representative	Contact details
Forestry	Site Supervisor	TBA
Independent Arborist Contractor	Arborist	TBA
NSW Fire and Rescue	-	000
NSW Police	-	000
NSW Ambulance	-	000
Narooma Medical and Specialist Centre	-	185 Princes Hwy, Narooma, 2546 (02) 4476 5588
Moruya District Hospital	-	2 River St, Moruya, 2537 (02) 4474 2666
EPA pollution hotline	-	131 555
Southern NSW Local Health District	-	1300 066 055
SafeWork NSW	-	131 050
DPI - Fisheries	Carla Ganassin	Carla.ganassin@dpi.nsw.gov.au
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

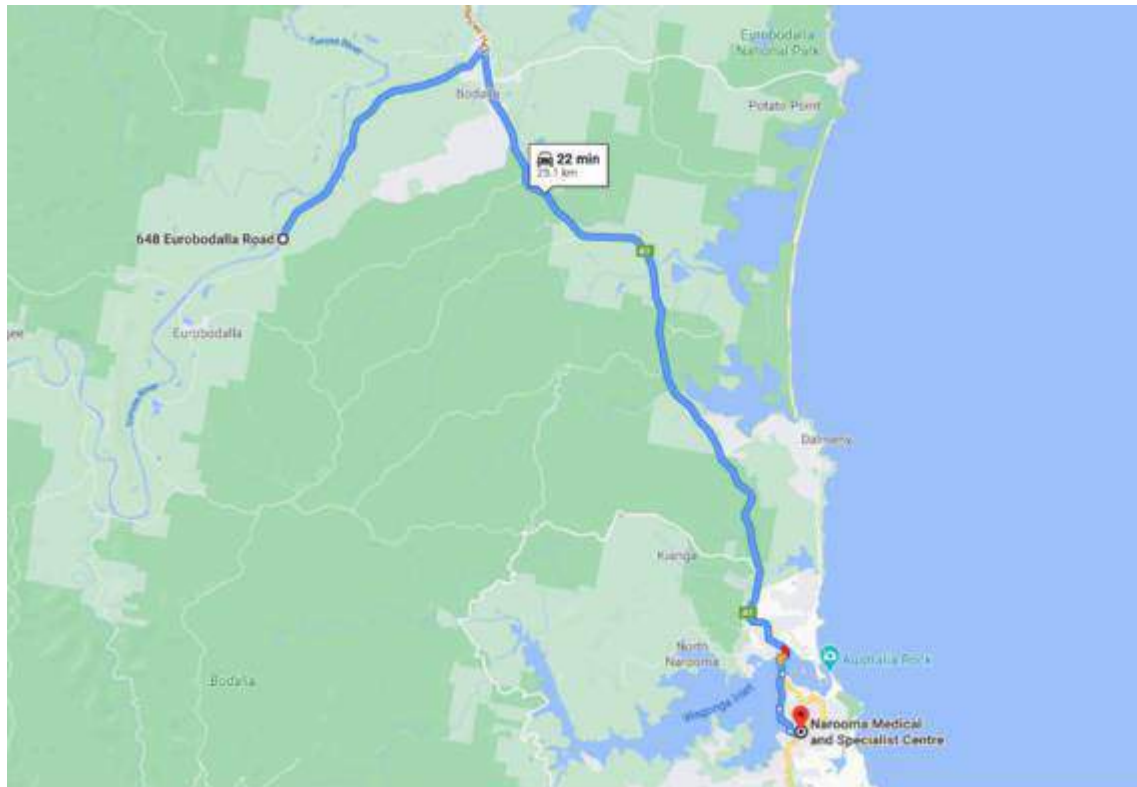


Figure 4-1 Location of closest medical centre (Narooma Medical and Specialist Centre)

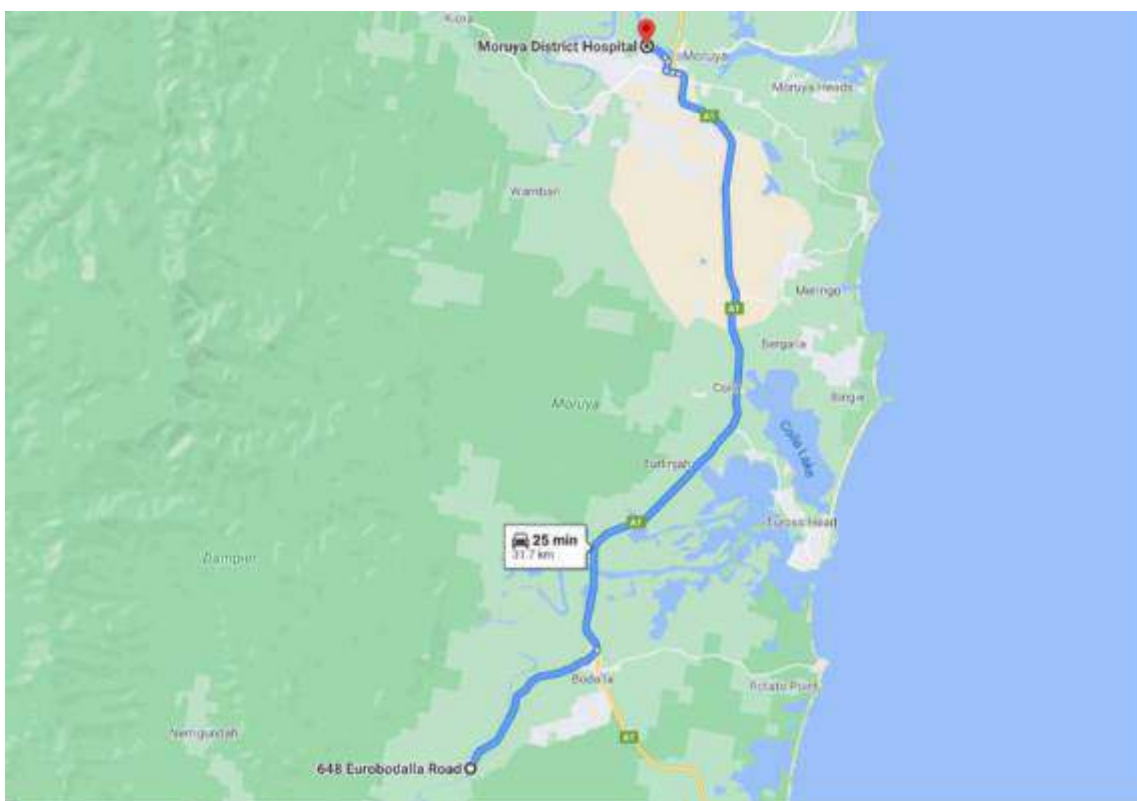


Figure 4-2 Location of closest hospital (Moruya Hospital)

Appendix A Forestry Fire Management Policy (P 2020/05)

Title	Fire Management	Version	3
Policy No.	P 2020/05	Effective date	12/05/2020

1. OVERVIEW

Forestry Corporation of NSW (FCNSW) manages a significant estate of fire prone forests and plantations in NSW. Uncontrolled bushfires are a major and recurring threat to FCNSW business objectives, to communities living in or near forested landscapes, and to people and businesses whose livelihoods rely on forest and plantation resources.

FCNSW is responsible for sustainably managing native forest ecosystems that have evolved with fire and require a range of different fire regimes to maintain their health, diversity and vitality. In addition, FCNSW has statutory obligations to manage fire. Accordingly, FCNSW recognises the need for a risk-based approach to fire management which gives appropriate protection to the range of social, economic and environmental values.

2. BACKGROUND

Forestry Corporation's statutory obligations for fire management arise from the *Forestry Act 2012* and the *Rural Fires Act 1997*. These Acts place a responsibility on FCNSW to

- » protect life and property from fire,
- » minimize the spread of fire from State forests and other lands managed by FCNSW, and
- » protect State forests from the damaging effects of fires.

The Rural Fires Act recognises FCNSW as one of four Fire Authorities, a member of the NSW Bush Fire Coordinating Committee, and subjects FCNSW to the coordinated fire management provisions of the *Rural Fires Act*.

3. SCOPE

This policy covers FCNSW' fire and fuel management activities.

4. POLICY

1. FCNSW' undertakes fire management planning at strategic, tactical and operational levels.
 - a. Pre-incident Plans establish preparedness, detection and response arrangements for wildfire.
 - b. Fuel management plans define the preventative measures taken by FCNSW to minimise the risk of wildfires.
 - c. Operational planning processes for each site identify a range of values, including areas of environmental and cultural significance.
2. FCNSW implements the Australian standard control and command structure for wildfire suppression, which follows the Australian Inter-Service Incident Management System (AIIMS).
3. FCNSW applies national competency standards in fire training for Incident Management roles and firefighting personnel
4. FCNSW collaborates with other landowners and land managers, fire authorities and the community to

Title: Fire Management Policy	Version: 3	Page: 1 of 2
Document ID: D00114145	Owner: State Fire Manager	Date effective: 12/5/20 Review date: 1/5/23

- a. develop bushfire risk management and operations plans
 - b. implement programs for bushfire prevention, mitigation, preparedness, response and recovery.
 - c. respond to bushfires to minimise the adverse impacts on human life, and on social, economic and environmental values.
5. FCNSW use fire as a tool to promote ecosystem health, diversity and resilience in native forests, and as a risk reduction strategy to minimise the adverse impacts of wildfire.
 6. FCNSW maintains appropriate levels of fire management capability to effectively discharge its responsibilities as a sustainable forest manager and statutory fire authority.

5. RELATED LEGISLATION

- » Forestry Act 2012
- » Rural Fires Act 1997
- » Environment Planning & Assessment Act 1979
- » National Parks & Wildlife Act 1974
- » Protection of the Environment Operations Act 1997
- » Plantations and Reafforestation Act 1999,
- » Biodiversity Conservation Act 2016
- » Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)

6. RELATED POLICIES

- » Forest Management policy
- » Health and Safety policy
- » Training and Development Policy
- » Fire Training Currency and Competency Policy

7. RELATED DELEGATIONS

- » Fire Fighting and Estate Management Arrangements between Divisions, including Fire Management Responsibility

8. RELATED DOCUMENTS

- » FCNSW Fire Management Plan
- » Pre-Incident Plans
- » SPD and HFD Fuel Management Plans
- » Fire Management Manual - directives, guidelines and procedures.

9. REVISION HISTORY

Version	Policy Number	Date
1	P2012/07	9/9/2012
2	P2016/01	20/5/2016
3	P2020/05	12/05/2020

10. CONTACT OFFICER

State Fire Manager

Approved



Acting Chief Executive Officer

Anshul Chaudhary

Title: Fire Management Policy	Version: 3	Page: 2 of 2
Document ID: D00114145	Owner: State Fire Manager	Date effective: 12/5/20 Review date: 1/5/23

Appendix B Forestry Corporation of NSW Fire Management Plan (D00271354)



Fire Management Plan

forestrycorporation.com.au

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1. Introduction

Forestry Corporation of NSW (FCNSW) manages 2.19 million ha of native forest and plantations in NSW, with most of the softwood plantation and some of the eucalypt plantation being highly susceptible to severe damage by low to moderate intensity fires for their entire crop life and mortality from high intensity fires. The forest industry is valued at more than \$2.4 billion within the State.

The main risk to these assets is fire. FCNSW statutory obligations for fire management arise from the *Forestry Act 2012* and the *Rural Fires Act 1997*. These Acts place a responsibility on FCNSW to

- » protect life and property from wildfire;
- » minimise the spread of wildfire from State forests and other lands managed by FCNSW, and
- » protect State forests from the damaging effects of wildfire.

In addition to these responsibilities, the Rural Fires Act establishes FCNSW as one of four Fire Authorities and a member of the NSW Bush Fire Coordinating Committee which enables a statewide Coordinated Fire management approach.

This Fire Management Plan describes the systems developed to implement FCNSW fire management policies and strategies on State forests and other lands managed by FCNSW to meet its obligations and business imperatives.

2. Scope of the plan

This Plan provides the framework for how Forestry Corporation intends to manage fire on State forests and other land owned or managed by Forestry Corporation of NSW. It is not intended to repeat existing plans, policies or procedures, but to provide overarching guidance to our fire management arrangements. Included are policies, strategies, and approaches we take to minimise the fire risks to our commercial assets, to our industry, and to neighbours and communities.

The broad range of forest types, fire history, climate, weather, unpredictability between years and seasons and forest values across the state mean that the risk posed by fire varies significantly making a risk-based approach prudent.

The term “fire management” includes both fire prevention and fire suppression activities.

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3. Context

FCNSW is the largest manager of commercial native and plantation forests in NSW, managing recreation, environmental sustainability and renewable timber production on more than two million hectares of NSW State forests and other land.

FCNSW is Australia's largest grower of plantation pine, producing enough timber to construct a quarter of the houses built in Australia each year. FCNSW also produces certified sustainable native hardwood timber. A State Owned Corporation with an independent Board of Directors, FCNSW' sustainability framework sets out our principles for managing both the forests and our business. Financial statements are available in the Annual Reports.

FCNSW' forest estate is geographically disperse. We manage native forests with a wide diversity in ecosystems, landscape features and land use patterns along the coast and tablelands of NSW from the QLD to the Victorian borders. This also includes large areas of native timber plantations. We have two extensive pine plantation areas around Tumut and Bathurst and three smaller areas near Walcha, Grafton and Bombala. We also manage large areas of native cypress forests in the west of the state, as well as smaller areas of red gum forest along the Murray River.

As such, we are a commercial organization with contractual obligations to supply timber to a range of customers. The sustainable supply of timber from both hardwood and plantation forests can be severely impacted by unmanaged fire and other natural events which have the potential to damage or destroy the resource.

NSW has rather unique cooperative fire and response arrangements established between its key fire authorities. These arrangements provide for the responsibility of land management agencies to manage fuel on their estate and to respond to and control wildfire. It also enables high levels of support and coordination between the agencies to ensure sufficient resources to respond to escalating fire situations which are beyond the capability of any one agency. It provides for a shared responsibility and ability to operate within an inter-agency coordinated system.

3.1 COMPLIANCE FRAMEWORK

This Plan meets legal and other best practice standards and requirements for fire management¹. Refer to Table 1.

¹ For greater detail, please refer to Forestry Corporation's Compliance Register.

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TABLE 1 FORESTRY CORPORATION'S LEGAL REQUIREMENTS AND OTHER COMPLIANCE OBLIGATIONS AS THEY RELATE TO FIRE MANAGEMENT

	Legislation	Plans/ Regulatory Instruments	Committees	Strategy/ policy
Commonwealth	Environmental Protection and Biodiversity Conservation Act 1999		Australasian Fire & Emergency Service Authorities Council (AFAC) Forest Fire Management Group (FFMG)	National Bushfire Management Policy Statement for Forests and Rangelands
	Forestry Act 2012 No 96	Integrated Forestry Operations Approvals (IFOAs)		
State (NSW)	Rural Fires Act 1997 No 65	Bushfire Environmental Assessment Code Bushfire risk management plans	Bush Fire Coordinating Committee (BFCC) Bushfire Management Committees (BFMCs)	Bush Fire Coordinating Committee Policies
	Plantations and Reafforestation Act 1999	P&R (Code) Regulation (fire roads)		
	Environmental Planning and Assessment Act 1979 No 203	EIA process		
	National Parks and Wildlife Act 1974 No 80	FCNSW Cultural Heritage Guidelines		
FCNSW		Fire Management Plan		Forest management policy Fire management policy

3.1.1 FCNSW – A Recognised Fire Authority

FCNSW is a recognised Fire Authority under the Rural Fires Act, giving FCNSW the authority to manage fires on its estate. In addition to this:

- » The RFS Commissioner may delegate a function to FCNSW staff (Sect 33D)
- » FCNSW staff should be advised when there is an unauthorized fire (Sect 64)
- » FCNSW staff are authorised to light a fire for the purposes of back burning (Sect 86)
- » FCNSW staff may enter adjoining property - up to 8 km from FCNSW estate – and undertake actions necessary to suppress fires (Sect 133).

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- » FCNSW can issue Hazard Reduction Certificates for hazard reduction burns in State forests (Sec 100G)

3.1.2 Bush Fire Coordinating Committee (BFCC)

The Bush Fire Coordinating Committee (BFCC) is established under the provisions of Section 46 of the *Rural Fires Act 1997*.

The Committee is chaired by the NSW RFS Commissioner and comprises nominees from the following:

- » Fire and Rescue NSW
- » Department of Industry – Resources and Energy and Crown Lands Divisions
- » Office of Environment and Heritage
- » Local Government and Shires Association of NSW
- » NSW Police Force
- » Minister for the Environment
- » Nature Conservation Council of NSW
- » NSW Farmers Association
- » Ministry for Police and Emergency Services
- » Forestry Corporation of NSW

The BFCC reports to the Minister for Emergency Services and is responsible for planning in relation to fire prevention and coordinated bush firefighting and advises the Commissioner on bush fire prevention, mitigation and coordinated bush fire suppression. The Committee has other functions imposed upon it by or under the *Rural Fires Act 1997* and other legislation.

The Chief Forester is FCNSW' representative on this Committee.

3.1.3 Bush Fire Management Committees

The BFCC constitutes Bush Fire Management Committees (BFMCs) for all rural fire districts, areas with a significant risk of bush fire and approves the draft plans of operations and bush fire risk management plans that are prepared by the BFMCs.

FCNSW sits on these committees where there is a forest resource within the Committee's area of responsibility (Section 6.2, Table 4)

Under the Rural Fires Act, the Rural Fire Service have responsibility for coordinating the development of District Bushfire Risk Management Plans. This is done through each District Bush Fire Management Committee which comprises FCNSW, other Public Land Managers and other representative landholders or interest groups.

Bush Fire Risk Management Plans are strategic documents that identify community assets at risk and outline five-year multi-agency programs designed to reduce the risk of bush fire to those assets. Treatments may include hazard reduction burning, grazing, community education, fire trail maintenance and establishing community fireguard groups.

These plans specifically:

- » Identify the level of bush fire risk across the BFMC area.

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- » Develop treatment strategies for risks identified by the BFMC, including the location of Bush Fire Management Zones.
- » Identify the agencies responsible for implementing the treatment strategies.
- » Define a process for prioritising treatments as well as monitoring implementation progress over the life of the Plan.

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4. Fire management in FCNSW

4.1 OBJECTIVES

FCNSW is a commercial business and the protection of its timber assets are crucial to its sustainability, viability and profitability. Any substantial loss of timber resources has long term supply implications. In order to deliver fire protection to the greatest extent possible, FCNSW recognises that it needs to:

- i. work collaboratively with other NSW fire authorities to develop bushfire risk management and operations plans, and will implement programs for bushfire prevention, mitigation, preparedness, response and recovery.
- ii. work cooperatively with other NSW fire authorities to respond to bushfires to minimise the adverse impacts on human life, on social, economic and environmental values.
- iii. use fire under appropriate conditions to promote ecosystem health, diversity and resilience in native forests, and as a risk reduction strategy.
- iv. maintain appropriate levels of fire management capability to effectively discharge its responsibilities as a sustainable forest manager and statutory fire authority (recognising that bushfire risk management is a shared responsibility (involving other NSW fire authorities, state and local government, communities and individuals).

4.2 POLICIES

FCNSW has a [Fire management policy](#). Other relevant policies include:

- » [Health and Safety Policy](#) and associated safety management system
- » [Alcohol and Other Drugs Policy](#)
- » [Forest Management Policy](#)
- » [Fire Training Currency and Competency](#)

In addition, SPD and HFD are both certified to ISO 14001: Environmental Management System and the Australian Standard for Sustainable Forest Management (AS 4708).

Environmental care

The [Forest Management Policy](#) outlines FCNSW's intent for management of the environment. FCNSW adopt principles of environmental care when planning and conducting fire management activities in line with the following:

- » Maintain the vigour and diversity in NSW's indigenous flora and fauna species populations and communities through use of appropriate fire regimes and fire management activities
- » Protect water quality and quantity by implementing measures designed to minimise the impact of fire on swampy ground and bodies of standing water, and their physical, chemical, and biological qualities
- » Protect soil to maintain its physical and chemical properties and promote stabilisation of bare or disturbed earth

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- » Consider landscape values, geomorphologic features, and cultural and historical sites when planning operations
- » Protect indigenous flora and fauna following wildfire suppression by measures which promote the re-establishment of the ecological processes existing prior to the wildfire
- » Avoid the possible introduction and spread of pest plants and animals, plant diseases, and insect pests
- » Address air quality by measures which diminish the impacts of smoke generated by prescribed burning.

4.3 MEDIA

The [Media Policy](#) outlines how FCNSW interacts with the media. Media will be pro-actively managed according to the sensitivity of issues for all fire management activities. If staff are contacted by the media regarding information about a fire, they should transfer the call to senior staff in the Forest Protection Area. In the absence of those staff, refer the caller to the Communications & Media Manager or the State Fire Manager. FCNSW will also:

- » Facilitate the provision of information to media outlets that informs the public of our fire management operations in accordance with internal media policy.
- » Provide information to the publicly available RFS website on fire management operations
- » Utilise electronic media outlets established by the RFS, including the internet, to provide public alerts concerning wildfire incidents and smoke accumulation events.

4.4 RISK MANAGEMENT

FCNSW adopts a risk management approach throughout its fire operations, consistent with its Risk Management Framework. The main risk categories for fire management are described below.

4.4.1 People

Fire presents risks to the health, safety and welfare of staff, contractors and forest visitors. Fire and associated smoke can also impact communities and our neighbours. FCNSW is also committed to forming partnerships with traditional aboriginal custodians to insure the maintenance and protection of their culture and values.

4.4.2 Resources

FCNSW maintains fire management resources according to that defined in Pre-Incident Plans and preparedness guidelines (which are formulated around daily Fire Danger Ratings (FDR). Forestry Corporation is committed to using resources cost effectively and ensuring financial accountability in its fire management activities.

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4.4.3 Impact on the environment

The environmental impact of a fire depends, of course, on the size and intensity of the fire. Fire can have the following impacts on the environment we are trying to protect and maintain;

Air quality

Fire can have a significant impact on air quality causing detrimental impacts on major population centers, airports, major roads, neighbours and other sensitive areas.

Planning and risk analysis are undertaken for each prescribed burn to determine the comparative risk of smoke impacts from burns on communities and air quality with the risks to public safety and natural assets from potential wildfire. Information on weather, fire behaviour, smoke trajectory predictions, burn location, size and strategic importance in determining the most suitable burn prescription and ignition application to achieve an effective burn outcome with low smoke impacts.

Water quality

Our state forests provide for important and significant water catchments for communities across the state. Planning and operations are assessed by risk to minimise the impact on water quality, and reduce risks associated with increased chance of sedimentation.

Habitat modification

Habitat modification includes destruction of ground cover and subsequent accelerated erosion (land degradation), changes in ground cover species composition (perennial grasses to annual weeds), physical modification of stream profiles and water quality and physical destruction of individual plants.

Soil quality

Fire can lead to increased erosion through the removal of ground cover.

Prescribed burn planning considers the impacts of fire on soils and aims to deliver mosaic burn patterns that maintain soil cover while at the same time reducing fuel loads. Forestry operations and earthworks are undertaken in accordance with strict “best practice guidelines” to insure soil quality is not degraded. Post fire recovery operations are also undertaken to insure soil stability.

4.4.4 Commercial imperatives

Forestry Corporation is a commercially-focused business, returning a dividend to the State of New South Wales.

Timber needs to be supplied to customers to meet long term Wood Supply Agreements. One of the greatest risks to this is the impact of unplanned fire. The loss of significant areas of plantation or native forest regrowth ultimately impacts our ability to meet these wood supply commitments.

Plantation estate within Softwoods is susceptible to fire, although *P. ellioti* var. *elliottii* shows a tolerance to mild fire once established. When not killed outright, fire can damage plantation timber or greatly reduce growth rates. Whilst it may still be possible to harvest and recover plantation products, it will be at a much-reduced value.

The hardwood estate comprises a range of forest types and timbers and provides for a diverse range of other community values such as recreation, water, biodiversity and cultural assets. In terms of timber production, we manage large areas of high value timber resources, including hardwood plantations. These include fast growing regeneration forests along the NSW coast through to cypress and redgum

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forests in the central western regions of the state. Cypress forests are susceptible to fire as are young regeneration forests on the coast. As with plantations there is a significant loss of resource and time to re-establish these forests if they are impacted by wildfire.

It is not only the loss or damage to the timber resource by fire that impacts the industry and the community. There is a flow on effect right across the industry. Our industry employs a significant number of people in communities across the state including contractors engaged in silviculture, harvesting and haulage to supply timber to large mills and paper manufacturers. Large fire events will ultimately have a significant impact on regional economies.

These potential impacts are well recognized by FCNSW and the other fire authorities in NSW, and the coordinated approach to interagency fire fighting and support recognizes and reflects the impacts that large uncontrolled fires will have on the forests, on the industry and on the communities. Commercial forests are defined and recognized in Bushfire Risk Management plans as high risk, high value assets and coordinated operational planning and mitigation activities are highly prioritized for their protection.

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5. Safety

Safety is a key driver in FCNSW. We have defined a list of critical risks to our people and have implemented a range of actions and utilized technology to reduce these risks. Keeping our people safe and ensuring that they get home safely to their families at the end of each day is our “catchcry”.

FCNSW

- » Ensure the safety of all firefighting and support personnel is given the highest priority in the planning and application of all fire management operations.
- » Review and apply standards for the medical and physical fitness requirements of all fire management personnel in accordance with best practice information and experience as set out in the Fire Fitness Guidelines for Managing the Fire Fitness Program.
- » Make available critical incident stress debriefing to personnel subjected to traumatic events or circumstances
- » Give firefighters sufficient time to rest to relieve fatigue and stress arising from their involvement in fire suppression operations as far as is reasonably practical.

Random drug and alcohol testing can be undertake at any time and at any part of the work place, including on the fire ground, as per the FCNSW [Alcohol and Other Drugs Policy](#).

The following initiatives and procedures are maintained by FCNSW to further enhance and promote the safety of all firefighters working for the organization.

5.1 FITNESS FOR FIREFIGHTING

FCNSW firefighters undertake an annual fitness assessment to ensure they are fit for task. There are various levels of fitness prescribed for roles undertaken by staff. These are detailed in the Task Based Assessment Document (available on the Fire and Radio intranet).

FCNSW staff are required to undertake a medical test prior to employment, including a test for drugs and alcohol. Firefighting staff are required to undertake further medical checks annually or every three years, the regularity of which are determined by age, general fitness and doctor’s assessment.

5.1.1 Personal protective equipment (PPE)/Personal Protective Clothing (PPC)

All FCNSW fire fighters are supplied with, and expected to wear or carry, standard firefighting PPE/ PPC. PPE/ PPC meets Australian Standards and it is the responsibility of the wearer to ensure it is maintained and worn or carried in accordance with [SOP 19/o8 PPC & PPE for fire operations](#).

5.2 STANDARD OPERATING PROCEDURES AND GUIDELINES

Fire related Standard Operating Procedures and Guidelines are developed and updated as required. They can be found on the Fire and Radio Intranet.

All firefighting staff are expected to be aware of and abide by these SOPs and Guidelines.

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5.3 VERY HIGH TREE HAZARD AREAS

The safety of firefighters is always paramount in firefighting operations, and dangerous trees have been identified as one of the organisation's Critical Risks.

FCNSW has a policy and decision-making tool to determine the procedures to be adopted in Areas of Very High Tree Hazard ([SOP 18-53 Very High Tree Hazard Areas and Firefighter Safety](#)).

5.4 FATIGUE MANAGEMENT

Fatigue management guidelines apply within FCNSW and incident management teams schedule rosters and crew changeovers accordingly. FCNSW has a procedure for managing firefighter fatigue ([Fire SOP 19-16 Managing fatigue - work hours](#)).

It is the responsibility of every fire fighter as well as Duty Officers and Incident Management Teams to be aware of and abide by these procedures.

5.5 VEHICLES AND DRIVING

The extent of the forest estate and operations means that many staff are required to drive long distances as part of their workday. Driving is considered one of the organisation's highest critical risks. This is exacerbated in fire management because of the work environment, which can include night time operations and extended periods of work. FCNSW strive to limit this risk by enforcing fatigue management guidelines, monitoring vehicle movements and safe driving practice. Staff are constantly reminded of the risks and controls to minimize accidents and incidents associated with driving.

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6. Organisation of fire management

6.1 FORESTRY CORPORATION

6.1.1 Fire Management Branch

State-wide coordination of fire management activities is facilitated by Fire Management Branch within Corporate Services Division. Fire Management Branch:

- » provides for the delivery of fire training
- » develop and maintain fire related standards and procedures
- » collate state-wide fire reporting requirements
- » negotiate, co-ordinate and manage out of area deployments to wildfires
- » undertake the state liaison role with RFS and the other fire authorities and
- » support Forest Protection Areas (FPAs) within HFD and SPD.

Two (2) operating divisions - Hardwood Forests and Softwood Plantations – are responsible for fire preparedness and response in defined Forest Protection Areas (refer Figure 1).

6.1.2 Hardwood Forests Division

For the purposes of fire management, HFD is organised into Forest Protection Areas which are geographically based (refer Table 2 Hardwood Forest Division's Forest Protection areas).

TABLE 2 HARDWOOD FOREST DIVISION'S FOREST PROTECTION AREAS

Location	Forest Protection Area
Coastal	Far North Coast
	North Coast
	Mid North Coast
	Hunter
	South Coast
Western	Northern Cypress
	Southern Cypress
	Riverina

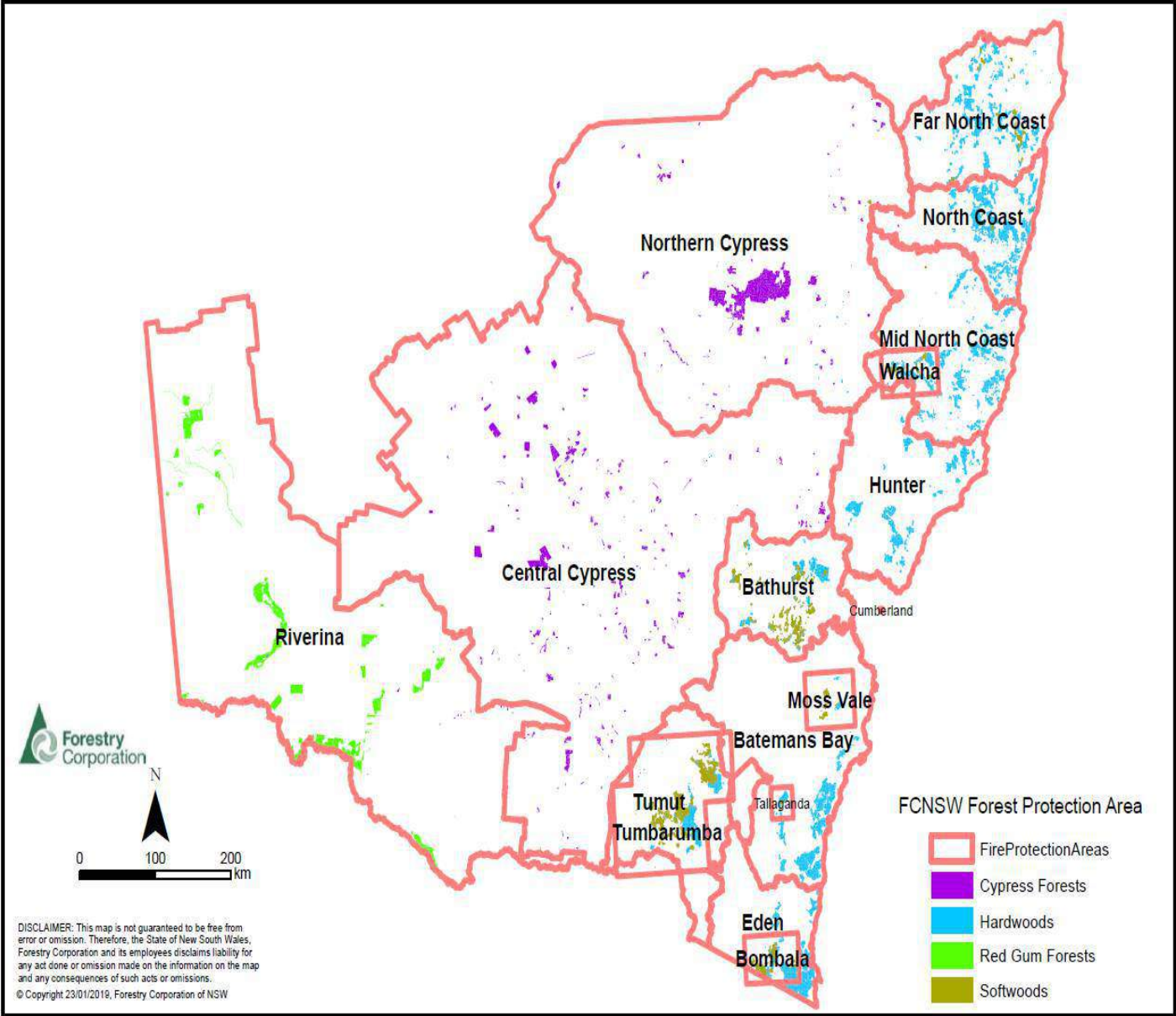
6.1.3 Softwood Plantations Division

In Softwood Plantations Division, the Management Area boundaries are used for fire management. For the sake of consistency in this document, the term Forest Protection Areas is used. These are detailed in Table 3 Regions and associated Management Areas in SPD.

TABLE 3 REGIONS AND ASSOCIATED MANAGEMENT AREAS IN SPD

Region	Management Area/ Forest Protection Areas
Snowy	Bombala
	Tumut (includes Moss Vale and Tallaganda Plantations)
Northern Softwood	Bathurst
	Grafton
	Walcha

FIGURE 1 FCNSW FOREST PROTECTION AREAS



6.2 NSW coordinated fire management structure

FCNSW works closely with other government agencies, including NSW Rural Fire Service, National Parks and Wildlife Service and Fire and Rescue NSW. This is generally coordinated through local Bush Fire Management Committees.

A Statewide map and District Overview map of RFS Districts and LGAs can be found at:

<https://www.rfs.nsw.gov.au/resources/publications/statewide-map>

Where both hardwood and softwood divisions have estate within the one Bush Fire Management Committee area, refer to the "Fire management responsibility for Forestry Corporation Assets and Fire management arrangements between SPD and HFD" document.

TABLE 4: FOREST PROTECTION AREA X BUSHFIRE MANAGEMENT COMMITTEE X LOCAL GOVERNMENT AREA

FCNSW office	FCNSW Forest Protection Area	Bush Fire Management Committee
Casino	Far North Coast	» Northern Tablelands
Grafton²		» Clarence Valley » Northern Rivers
Coffs Harbour	North Coast	» Mid North Coast » Lower North Coast » Clarence Valley
Wauchope	Mid North Coast	» Lower North Coast » Mid Coast » New England » Tamworth » Liverpool Range
Maitland	Hunter	» Mid Coast » Lower Hunter » Hunter Valley » Central Coast » Hawkesbury

² Grafton Management Area (SPD) is part of the Far North Coast Forest Protection Area

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Eden/ Batemans Bay	South Coast	» Bega Valley
		» Snowy-Monaro
		» Shoalhaven
		» Lake George
		» Eurobodalla
Tumbarumba		» Riverina Highlands
Baradine/Inverell/ Narrabri	Northern Cypress	» North Tablelands
		» Gwydir Namoi Tamworth
		» Liverpool Range
		» Castlereagh
		» North West
Dubbo/ Forbes	Southern Cypress	» Orana
		» Cudgegong
		» Far West
		» Mid-Lachlan Valley
		» Bland-Temora Zone
		» Riveri
		» MIA Mid-West
Deniliquin/Barham/ Balranald	Riverina	» Mid Murray
		» Lower Western
Snowy	Bombala	» Snowy Monaro
		» Bega Valley
	Tumut	» Snowy Valleys
		» Greater Hume
		» Southern Border
		» Southern Highlands
		» South West Slopes
		» Lake George
Northern Softwoods	Bathurst	» Chifley
		» <u>Canobolas</u>
	Walcha	» New England
		» Tamworth

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6.3 Capability

Each Forest Protection Area maintains:

- » A defined “initial attack” capability for wildfire response which has been defined and established in accordance with a risk-based approach. This model incorporates a daily readiness and preparedness guideline which is informed by the fire danger rating and levels of fire activity on any given day.
- » A Pre-Incident Plan, revised annually, which holds this guideline along with resources and procedures for daily activities and requirements for fire preparedness and response.
- » A Fuel Management Plan, revised annually, with scheduled mitigation activities that reduce the risk of fire or support operational activities in terms of detection and response.

6.3.1 Staff

The “initial attack” capability requirements for each FPA defines the number of firefighters and support staff that are necessary to fill rosters and provide initial attack to multiple fires at different locations at any given time. Most FPA staff that are fit and able are expected to be fire trained and available to respond, if not to support the firefighting effort in other ways.

Seasonal staff are also employed in HFD and SPD to supplement firefighting capacity to meet the “initial attack” numbers.

Staff are trained and experienced in a range of competencies to enable FPAs to resource fires with roles ranging from on ground fire fighters and commanders through to specialist Incident Management roles. Once fires go beyond this initial attack capability, more staff can be deployed from other FPA's to support. At this stage we would also be relying on the cooperative firefighting arrangements with other agencies and for them to also supply people to assist with the firefighting effort.

6.3.2 Training

Fire training and accreditation is an essential component of safe, efficient and effective fire management operations.

FCNSW

- » Apply national standards as the basis of competency definition, or where these do not exist, accepted industry standards.
- » Define competency requirements for all Incident Management roles and firefighting personnel to meet the requirements of Forest Protection Area Pre-Incident Plans.

³ Grafton Management Area (SPD) is part of the Far North Coast Forest Protection Area

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- » Review the competencies of our firefighting personnel according to established currency requirements.
- » Provide and/or facilitate training programs and competency assessments for skills acquisition, maintenance and personal and professional development to ensure personnel have the required competencies.
- » Maintain systems to record training and competency for all fire management activities.

Training requirements and review/expiry dates are tracked and monitored through PeopleStreme for all FCNSW firefighting staff.

FCNSW fire training is managed and delivered through Fire Management Branch. FMB is responsible for:

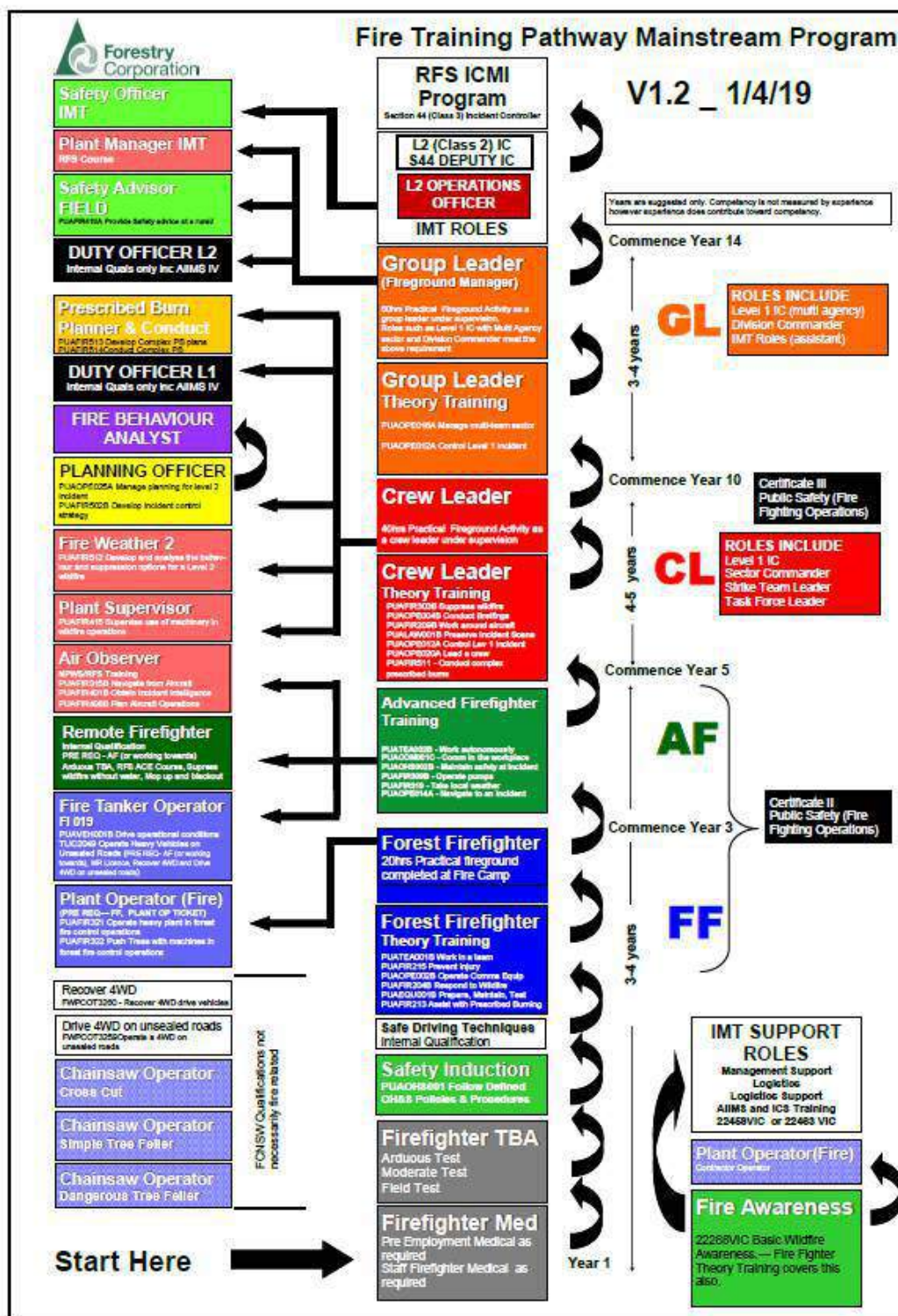
- » Managing the fire training program including fire training camps and pre-season fire days.
- » Leading and implementing fire training to ensure FCNSW staff are accredited with and have the necessary firefighting qualifications and experience to perform roles expected of them.
- » Delivering operational fire management support to the FPA's as required during fire operations.

Figure 2 Pathways available to FCNSW Staff describes the fire roles that may be undertaken and levels of experience they need to acquire to progress to more senior leadership or specialist roles.

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FIGURE 2 PATHWAYS AVAILABLE TO FCNSW STAFF



6.3.3 Facilities and equipment

Fire appliances

FCNSW maintains a fleet of around 50 heavy fire tankers (Cat 1), which are strategically located around the FPA's. Staff utilize dedicated light attack fire appliances (Cat 9), for daily duties and are usually very mobile in being able to leave normal duties to attend to fires. These resources can be deployed out of area to provide support when needed.

Heavy plant

Each FPA has access to, owns, or contracts heavy machinery that can be used in firefighting. Heavy plant may be specifically stood-up and ready for deployment, particularly during periods of high fire danger.

FCNSW uses heavy plant that is Roll Over Protection (ROP's), Falling Object Protection (FOP's) and (OPG) Operator Protection Guarding compliant (refer to Section 8.6 Using heavy plant).

FCNSW has many staff that are trained and highly experienced in operating and supervising heavy plant. To the greatest extent possible, FCNSW should always provide a heavy Plant Supervisor to direct and work with heavy plant on the fire ground to ensure communications with the plant operator and to also provide fire protection for plant working on fire lines.

Fire towers and detection

FCNSW maintains a network of fire towers and vantage points across the state which can detect and locate fires on most State forests when they occur. Fire towers are manned according to daily readiness guidelines contained within Pre-incident Plans. We rely also on fire reports from the public or other agencies.

FCNSW have installed and have access to remote cameras on unmanned towers providing 360-degree views across both forest and parks tenure. These real time video feeds are fed back to fire rooms in the relevant FPA.

FCNSW has also developed a Remote Piloted Aircraft (RPA) capability to assist us in detecting fires and providing specific GPS coordinates.

Radio communications and technology

FCNSW maintains its own radio network which is used extensively in fire control and daily operational requirements. Radio Services specialists, located in Tumut and Coffs Harbour, service the south and north of FCNSW' radio network respectively. FCNSW has also developed a range of measures to ensure that we can communicate with other agencies to ensure inter-operability.

Refer to the Fire and Radio Services intranet page for procedures relating to radio installation, upkeep and maintenance.

FCNSW has developed its own tablet-based mapping application which provides most staff with detailed and accurate mapping capability, and the ability to map fire details and share this near real time information with all other users.

Aircraft

FCNSW contracts at least 2 light helicopters, based at Bathurst and Tumut, during the fire season to enable reconnaissance, water bombing and air observation. Additional aircraft may be contracted or

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sourced from the State Air desk as and when required. Refer to Section 8.7 for additional information on aircraft use.

Fire trails and access

FCNSW maintains an extensive network of roads and fire trails throughout the forests which provide both access and fire management options from which to fight and control fires. Road, track and access networks necessary for fire management purposes and other essential activities on our estate are identified. Within plantation areas, Fire Roads, suitable for Cat 1 fire tankers, may be identified and maintained in accordance with standards of the Plantations and Afforestation Code.

FCNSW maintains GIS database maps which indicates the standard classification of each road, track and access route. Management Areas use an annual Road Schedule to develop priorities for the construction and maintenance of fire trails, roads, and bridges and implement those plans as far as is practicable.

Water points

FCNSW adopts defined RFS criteria and standards for the establishment and maintenance of permanent or mobile water points for supply of water for ground and/ or aerial firefighting on land it manages. The location of permanent water points is signposted on the ground and recorded in FPA Pre-Incident Plans/ corporate GIS.

Fire coordination

Each FPA maintains a “Fire Duty Room” and a Duty Officer throughout the fire season. This enables us to provide “Area Control” and communications for both detection and response. The Duty Officer provides for initial coordination and resourcing of fires until or if an Incident Management team is established or required. When fires become too big for a single agency response, FCNSW moves to RFS Fire Control Centers and provides staff for Incident management roles to support the coordinated firefighting effort.

6.3.4 Weather forecasts and fire danger

FCNSW monitors seasonal and daily fire danger across the State and monitors indices indicative of seasonal and daily fire danger.

Each FPA monitors its own local weather and fire danger and sets its state of readiness against the established guidelines in their pre-incident plans. Where there is overlap between the divisions such as Bombala, Walcha and Grafton, details for preparedness are spelt out in “Fire management responsibility for Forestry Corporation Assets and Fire Management Arrangements between SPD and HFD”. Where appropriate they will also liaise with the Bureau of Meteorology and the NSW Rural Fire Service regarding current and future trends in fire danger.

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7. Fire management program delivery

Forestry Corporation use the “Prevention, Preparedness, Response, Recovery model” as an organising framework for delivery of its Fire management planning and programs.

7.1 FIRE PREVENTION

FCNSW undertakes, participates in, and supports programs aimed at improving the effectiveness of fire prevention activities through cooperation and collaboration with other NSW Fire and Emergency Services Authorities and other stakeholders. FCNSW works cooperatively with National Parks & Wildlife Service, Fire and Rescue NSW, Rural Fire Service, local government authorities and other stakeholders on programs to prevent the occurrence of unplanned fires.

Additional measures for fire prevention are determined and implemented at a Management Area/ Forest Protection Area level. Measures commonly applied are:

- » Compliance with the [Forestry Regulation 2012](#) to prevent ignition by machinery and enforce fire use restrictions/ forest closures in forests and camping areas to reduce accidental/careless/deliberate ignition by others.
- » Systems for ceasing forest operations during severe fire weather to reduce accidental ignitions.
- » Surveillance of selected camping/recreation areas during adverse conditions.
- » Undertaking strategic prescribed burning programs.

7.2 PLANNING AND PREPAREDNESS

7.2.1 Fire planning

FCNSW aims to undertake fire prevention and preparedness activities in a planned and integrated manner, delivering the best possible level of fire protection, as required by legislation, while simultaneously maximising ecological and other land management outcomes.

Fire management planning is undertaken in conjunction with local government, communities and other stakeholders through local Bushfire Management Committees (BFMC). For further information on BFMCs refer to Section 13.1.3. FCNSW has input – along with others - into the BFMC coordinated risk management and Operational Planning process.

FCNSW also develops and implements

- » Annual **Fire Pre-Incident plans** detailing fire suppression strategies and priorities, and
- » Annual **Fuel Management plans** to mitigate the risk of bushfires on its managed estate.

This provides for a consistent and integrated approach for both suppression and fuel management activities. These must:

- » Include an assessment of risk to life and property, economic risk to commercial assets, and risks to rare and threatened species and communities.
- » Describe the priorities for fire protection works for a five-year period.

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7.2.2 Pre-Incident plans

Prior to fire season commencement each year, pre-incident planning is undertaken, and a plan developed to ensure rapid and effective response to wildfires can occur.

Plans are developed for each FPA, and contain the following information:

- » Fire preparedness guidelines and fire readiness guide
- » First response arrangements
- » Local infrastructure for example, fire towers
- » Links to resourcing documents.

Levels of preparedness and defined numbers of personnel and equipment required for initial attack are determined in accordance to predicted fire danger. FCNSW ensure, as far as is practicable, that the total number and distribution of competent personnel meets the initial attack requirements as determined and approved by management for each FPA.

These arrangements are defined in each FPA Pre-incident Fire Plan.

FCNSW strategically locates personnel and resources to ensure rapid and effective response to wildfires, and to respond to changes in fire danger. Staff are available to deploy to other FCNSW areas to bolster resources or relieve fire fighters.

In line with established agreements, FCNSW may deploy personnel to assist with fires not only on other NSW estate, but also interstate and internationally.

Daily preparedness processes and systems are outlined in each Pre-Incident Plan.

7.2.3 Responsibilities

Development of Pre-incident Plans is the responsibility of:

TABLE 5 PRE-INCIDENT PLANS

Division	FPA	Prepared by	Approved by
HFD	Coastal	Forest Protection Supervisor	Senior Manager Forest Stewardship
	Western	District Managers	Senior Manager Western
SPD	All	Fire & Stewardship Manager (Snowy and Bathurst)/ District Manager (Grafton and Walcha)	Regional Manager

Note: HFD and SPD develop one Pre-incident Plan for Far North Coast comprising Grafton Plantation and Casino Harwood Management Areas. Walcha develops a Pre-Incident Plan for Plantations and Mid North Coast provides the planning for Hardwood forests in the area. There are defined and coordinated initial attack arrangements in place in these areas between divisions.

Review

Pre-incident Plans are reviewed annually, prior to the commencement of the fire season.

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Amendments to approved Fire Management Plans follow FCNSW Document Control Procedures.

7.2.4 Fuel management plans

Both Softwood Plantation and Hardwood Forests Divisions have a Fuel Management Plan, incorporating details and schedules for each Management Area/ Forest Protection Area.

The Fuel Management Plan considers the range of fire protection strategies and practices available and adopts those which best meet both fire protection objectives and the principles of environmental management. These may include use of fire

- » at a landscape scale (including exclusion of fire)
- » as a tool to achieve ecological outcomes by altering habitat structure and composition of flora and fauna species;
- » as a silvicultural management tool for forest regeneration following timber harvesting operations (HFD);
- » to protect or enhance water catchment, archaeological, historical, Indigenous and other cultural values.

Developing the Divisional Fuel Management Plan requires

- » involvement of specialists in flora, fauna, reserve management, historic and Indigenous heritage, soil and water protection and fire management;
- » support by best available scientific research;
- » following the principles and procedures in NSW IFOAs or the Bushfire Environmental Assessment Code for ecological burning and management of native flora and fauna; and
- » accommodating fire protection objectives outlined in [BFMC Risk Management Plans](#).

Each plan identifies 3-5 year rolling targets for prescribed burning on State forests/ areas managed by Forestry Corporation. Overall targets must meet or exceed targets for the organisation as defined by the RFS.

The Fuel Management Plan includes the following components:

GIS

GIS allows FCNSW to analyse spatial information such as the planning area, fire history, built, natural and cultural assets and values.

Layers are periodically reviewed and updated to incorporate new data and fire history as required. Map layers are stored in the Corporate GIS database.

Each Forest Protection Area has a series of **Risk Based Maps** which identify the following:

Assets at risk

This map identifies fire-vulnerable asset distribution.

- a. Settlements/townships adjoining State forest
- b. Plantations and high value young regrowth agglomerations

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- c. Land tenure boundaries (State forest; land owned by Forestry Corporation, National Park (NP); Crown; Private)
- d. Credible high-intensity fire paths to fire-vulnerable assets via State forest

Hazard reduction constraints

This map identifies areas that are hazard reduction treatable and non-treatable land/ vegetation type map

Non-burnable area categories:

- a. FCNSW land excluded from prescribed burning by environmental regulations.
- b. Plantations and high value young regrowth agglomerations
- c. Fire sensitive forest types in which grazing is preferred to burning as a fuel management treatment (*Note: Grazing and burning may also be a suitable option*).
- d. Forest health category 3 areas – being FCNSW land NOT currently feasible to treat with low intensity prescribed fire without Forest Health Restoration treatment first being applied.
- e. FCNSW land NOT tenable for hazard reduction burning due to operational constraints (neighbour fencing/assets not feasible to protect, no reliable burn boundaries, access issues etc.).

Burnable area categories:

- a. Forest Health Category 1 : forests currently in a healthy condition.
- b. Forest Health Category 2 : forests in a late transition state which require burning as a matter of priority to prevent transition to Category 3.
- c. Forest health Category 3. forests in significant to terminal decline, restoration treatments required to restore ecosystem process including the use of prescribed burning.

Hazard reduction fuel management zones

- a. Asset Protection Zones (may be too small to depict on FPA scale maps).
- b. Strategic Fire Advantage Zones
- c. Forest Health Category 2 Zones requiring near-term treatment
- d. Forest Health Category 1 Zones requiring treatment within nominal fire interval timeframes.

The above burn zones are additional to other fuel reduction treatments including Silvicultural burning, grazing and mechanical treatments.

7.2.5 Site specific burn plans

All prescribed burns will have an approved operational plan prior to burning. FCNSW uses standard Burn Plan templates for planning prescribed burns.

Safety and environmental considerations and potential impacts on other stakeholders are assessed as part of the planning process (due diligence). Operational plans include:

- » burn objectives and prescriptions
- » an operational map
- » environmental approvals
- » burn area details
- » resources required
- » standards to be met
- » checks and notifications to be undertaken

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- » authorisations to be obtained and
- » post burn appraisals to be conducted.

Operational Plans for prescribed burning remain current for 5 years where planned under the RFS Bushfire Environmental Assessment Code. Operational Plans under IFOA must be completed within 2 years of harvesting.

Authorising a site-specific burn plan under the appropriate environmental legislation

FCNSW conducts prescribed burning under one of four environmental approval pathways. These are:

i. Burning for site preparation

FCNSW plantations are authorised under the [Plantation and Reafforestation Act 1999 No 97](#).

The specifications for windrow and debris heaps produced as part of plantation operations are described in the [Plantations and Reafforestation \(Code\) Regulation 2001](#).

The burning of these windrows and debris heaps is permitted under a Bushfire Hazard Reduction Certificate (BFHRC) issued pursuant to the Rural Fires Act.

ii. Burning under the Bushfire Environmental Assessment Code (BFEAC)

Burning conducted in accordance with a Hazard Reduction Certificate (HRC) which FCNSW issue for land under which it manages. FCNSW may also issue HRCs for other lands with the consent of the owners/managers for multi-tenure burns. Changes to the regulatory environment enable bush fire hazard reduction burns to be carried out under the provisions of the Rural Fires Act in areas covered by an IFOA.

Fire Permits are not required for burns conducted under a HRC issued by FCNSW on land it manages, and it is envisaged under the Rural Fires Act, that FCNSW will remain the responsible entity, whether undertaking the burn or not.

HRCs can be issued for burning and other bush fire hazard reduction work which meet the relevant provisions of the Bush Fire Environmental Assessment Code (BFEAC).

<https://www.rfs.nsw.gov.au/resources/publications/hazard-reduction/bush-fire-environmental-assessment-code>

HRCs can only be issued in areas covered by a Bushfire Risk Management Plan prepared by the relevant Bushfire Management Committee.

iii. Burning under an IFOA

a. Coastal IFOA

Coastal IFOA Conditions and Protocols are available on the EPA's website:

<https://www.epa.nsw.gov.au/your-environment/native-forestry/integrated-forestry-operations-approvals/coastal-ifo>

The Coastal IFOA (2018) allows burning to be conducted pre-harvest, within 1 year prior to commencement, and post-harvest, within 2 years after completion of harvesting.

The conditions of the Coastal IFOA specify limits to the timing of burns and maximum Forest Fire Danger Index (FFDI) for when burning can be conducted. IFOA burns aims to minimise burning in exclusion zones to enable them to act as refuge habitat around the time of harvesting operations. These exclusion zones may be burnt during regular prescribed burning operations conducted under the BFEAC.

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HFD are not obligated to burn under the IFOA in these periods and can revert to burning under the BushFire Environmental Assessment Code (refer Section (ii) above). This may be appropriate where harvest areas interface with community protection requirements and it is not safe, practical or desirable to exclude fire from all exclusion zones.

b. Western IFOAs

Under the three (3) Western FPA areas, burning activities can be conducted under the provisions of a Burning Operations Management Plan as defined in the IFOAs (Brigalow-Nandewar, South West Cypress and Riverina Red Gum).

Where burning operations are conducted under an IFOA, fire must not be lit within a drainage feature protection zone or environmentally significant area as defined in the IFOA. Fire lit outside the zone or area may subsequently enter that zone or area without being a breach of the IFOA conditions. For such operations, the operational plan must specify the relevant features and associated exclusion zones that fire must not be lit within.

For those forests not covered by an IFOA, burning operations are conducted under the BushFire Environmental Assessment Code.

iv. Burning under an Environmental Impact Assessment

Burning conducted by FCNSW outside of the provisions of the three (3) previous categories must be assessed under Part 5 of the [Environmental Planning and Assessment Act 1979 No 203](#) (EP&A Act). Burning in this category could include high intensity or frequent burning for specific habitat or forest health restoration purposes etc.

A key requirement of Part 5 of the EP&A Act is the preparation of an Environmental Impact Assessment (EIA) and assessment of the significance of the impact. If the impact is significant an Environmental Impact Statement / Species Impact Statement is required, and a Section 193 licence needs to be issued by the Office of Environment and Heritage (OEH).

It is envisaged that this category of burning will occur only in circumstances where the EIA identifies no significant impacts and that an EIS is not required. This may need to be considered for specific types of burning for silvicultural, forest health, or ecological reasons that are not considered to be hazard reduction specifically for fuel management.

Ecological burning or burning to maintain forest health or development needs to be planned according to existing templates and approved under the appropriated or necessary regulations or legislation.

7.2.6 Approving burn plans

All site specific burn plans must be approved by a designated officer, or their delegate, and all burns must be authorized prior to commencement of burning

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Division	Area	Designated officer
HFD	Coastal	Senior Manager Forest Stewardship
	Western	Senior Manager Western
SPD	Snowy	Fire and Stewardship Manager
	Northern Softwoods - Bathurst	Fire and Stewardship Manager
	Northern Softwoods - Grafton	District Manager
	Northern Softwoods - Walcha	District Manager

TABLE 6 FCNSW OFFICERS AUTHORISED TO APPROVE A SITE-SPECIFIC BURN PLAN

8. Response

As discussed in Section 4.4 Risk management, the risk profile for bushfires varies across the landscape. Because of this, FCNSW applies a system to enable us to prioritise our response accordingly.

FCNSW mapped bushfire risk at a landscape level. This process identified:

- » Interface areas of life, property and forest which pose a high risk. Under the right conditions, fire that have started in State forest, both native and plantation, could impact on these interface areas within a 24-hour timeframe.
- » High value wood supply areas of high importance to wood supply obligations.
- » Partially cleared and fragmented landscape areas where forests and agricultural production are intermixed, with low population density (and generally dispersed)
- » Upland and mountain forest areas with near-contiguous forest cover, sparse population in remote/isolated properties/settlements, and a low probability of fires which start in the area spreading to population centres.

The outputs of this mapping process were used to inform the development of Regional Fire Response Priority maps (RFRP maps). The approach in developing these maps is shown in Sections 8.1 and 8.2.

In addition to risk-based response planning, FCNSW considers the following key priorities in response to wildfire:

- » Firefighter and public safety over all other fire suppression considerations.
- » Control of wildfires threatening life, property, other community and environmental values at risk on or near our managed lands will be given priority , subject to consideration of overall needs.
- » The asset or environmental values at risk
- » Forecast weather
- » Resource availability
- » Supplementing or supporting local resources

Response will be in accordance with FCNSW operating procedures and guidelines and the NSW system of coordinated firefighting.

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8.1 SOFTWOOD PLANTATION DIVISION

Priority level	Criteria
Very high	Major plantation areas/ groups where potentially high maximum probable loss scenarios are credible
High	All remaining plantation areas (not classified as Very High) and situated in positions at the outer end of response times from key plantation fire response staging areas
Standard	Off-estate timbered country in landscape areas around plantations, from where uncontained fires could become a threat to plantations in adverse weather and therefore a potential concern to FCNSW

TABLE 7 PRIORITISATION LEVELS FOR FIRE RESPONSE PRIORITY MAPS - SOFTWOOD PLANTATION DIVISION

8.2 HARDWOOD FORESTS DIVISION

8.2.1 Coastal

Priority level	Criteria
High	A combination of the significant human life and property exposure areas and high-value wood supply areas as mapped in the risk landscapes mapping process
Intermediate	The partially cleared and fragmented landscape areas where forests and commercial agricultural production are intermixed, with low population density
Standard	The upland and mountain forest areas in more remote parts of the FCNSW FPA

TABLE 8 PRIORITISATION LEVELS FOR FIRE RESPONSE MAPS FOR COASTAL HARDWOOD FORESTS, HFD

8.2.2 Western

Priority level	Criteria
High	The Pilliga Cypress and Koondrook red gum forest areas where potentially large-scale impacts to wood supply could arise from fires in those areas
Intermediate	Lands adjacent to the Pilliga and Koondrook from where fires could spread into the high priority forest areas
Standard	All other forest areas

TABLE 9 PRIORITISATION LEVELS FOR FIRE RESPONSE MAPS FOR WESTERN REGION, HFD

8.3 FIRE ORGANISATION AND COORDINATION

FCNSW implements the Australian standard control and command structure for wildfire suppression, which follows the Australian Inter-Service Incident Management System (AIIMS). AIIMS provides a common management framework to assist with the effective and efficient control of incidents. The

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framework applies to a range of incidents from small to large and provides the basis for an expanded response as the incident grows in size and complexity.

The management of wildfires involving other agencies and organisations conforms to the structures described in BPMC Coordinated Bushfire Operations Plans or as determined by RFS Regional/ District Incident Coordination Centers.

Each wildfire with resources deployed is allocated an incident level from 1 (lowest) to 3 (highest), which is determined by incident size and complexity. This incident level is reviewed as the size, complexity and impact of the incident changes over time.

Fire Class	Definition
1	A fire under the control of the responsible fire-fighting authority, whether or not incidental. Low level assistance is provided by other agencies. The Incident Controller is the OIC of the first suppression unit (from any fire-fighting authority) at the fire. Arrangements may be made to transfer control to the first available & suitably qualified FCNSW or RFS person on the scene.
2	A fire, which by necessity, involves or is expected to involve, more than one agency, and where the BPMC has appointed a person to take charge of fire-fighting operations across all land tenures.
3	A major fire where the appointment of an Incident Controller has been made or is imminent under the provisions of Section 44 <i>Rural Fires Act 1997</i>

TABLE 10 FIRE CLASSES

An Incident Action Plan is developed for the control of each wildfire identified as either Class 2 or Class 3 using the NSW RFS ICON application.

The content of the incident action plan is determined by the incident level and nature.

8.4 FIRST RESPONSE ARRANGEMENTS

In NSW, any fire-fighting authority may respond to any reported fire on any land. If FCNSW is the first response authority to a fire burning on any land in NSW, including State forest, FCNSW must:

- » Notify the RFS of this initial response as soon as practicable.
- » As soon as practicable, a situation report (SITREP) must be forwarded to the RFS (via ICON) detailing fire location, size, behaviour, resources in attendance, local weather, alert level, proposed containment strategy and any injuries or property damage.
- » The RFS must be provided with regular updated SITREPs and discuss any significant proposed changes to strategy prior to their implementation with the local RFS duty officer.

The authority making the first response to a fire on FCNSW lands assumes control of that fire. The local RFS duty officer may direct that control of the fire be handed to the RFS or FCNSW. That person will then assume the role of Incident Controller (IC).

The RFS has the power to appoint the IC to a fire, regardless of tenure or the objectives of other agencies, however it is expected that this takes place in a consultative manner.

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8.5 FIRE SUPPRESSION ON NATIONAL PARK

FCNSW may undertake initial attack on fires on adjoining National Park lands which have the potential to impact onto State forest land **and** where National Parks & Wildlife Service (NPWS) cannot respond in a timely manner.

FCNSW will contact the relevant NPWS office prior to commencement of initial attack and seek advice regarding the use of heavy plant, possible work, health and safety hazards and environmental or culturally sensitive areas. If prior contact with the local National Parks office is not possible, advise the regional NPWS office of the commencement of work as soon as it is practicable to do so.

8.6 USING HEAVY PLANT

FCNSW has a responsibility to ensure that all heavy plant used within FCNSW workplaces meets minimum standards for operator protection. Plant must be fitted with ROPS, FOPS and OPS which meets the relevant Australian or International Standard (refer to WHS Procedure 4.16 Protective Structures on Heavy Plant).

During an emergency firefighting situation, powered mobile plant that does not comply to Australian or International Standards may need to be used as a last resort. This may include situations where the risk of fire has increased rapidly and there is insufficient time to source compliant powered mobile plant. This non-compliant powered mobile plant may be used during these circumstances after completing a risk assessment. The assessment should consider the risk of exposure to the element not controlled by ROPs FOPs or OPG's e.g. slope and risk of roll over (ROPs), risk of falling trees and or branches (FOP's) risk of long woody material entering the cabin (OPG's).

If a fire on State forest is under the control of a RFS Incident Controller, they may choose to use heavy plant that is not compliant. Similarly, they should conduct a risk assessment around its use, and are responsible for any issues arising from non-compliance.

FCNSW Plant supervisors may use their discretion to re-task non-compliant mobile plant to less riskier situations or refuse to manage such equipment if they have concerns.

Heavy plant and plant transport contacts are contained within local Pre-incident Plans. Plant may also be registered in FCNSW Plant Hire Data Base and can be procured with a Purchase Order.

Where a hire agreement does not exist, request a copy of the company's Certificate of Currenty for their worker's compensation and public liability insurance (plus vehicle registration certificate if applicable). **A hire agreement can be drawn up later if one does not already exist.**

8.7 AIRCRAFT

Initial Attack

Requests for aircraft assistance on initial attack are made by the Duty Officer through the local RFS District office (refer to Fire and Radio Intranet for documentation) If the RFS duty officer agrees that an aircraft is required/ available, they will request an aircraft through the RFS State Air desk. It is likely that FCNSW will pay for all costs associated with requested aircraft. If the RFS duty officer says that an aircraft is not required/ available, contact FCNSW Fire and Radio Branch Duty Officer to request further assistance.

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For much of the fire season, the RFS have aircraft based along the coast and tablelands. Remote Area Fire Teams (RAFT) may be available for deployment on State forest fires where required to fight fires in remote areas with limited access. Contact the local RFS duty officer to discuss RAFT deployment.

FCNSW may, of its own accord, pre-emptively locate aircraft for standby response. SPD contract aircraft during the fire season – located in Tumut and Bathurst Management Areas. Other reasons would include:

- » existing fires in the area, or
- » there has been or is lightning forecast across the area.

These arrangements are discussed and approved by relevant managers.

FPA's should advise Fire Management Branch of any aircraft requirements, as they will assist with procurement and advice around suitability.

Any engagement of aircraft should be arranged in consultation with the State Air Desk.

When working with aircraft at a fire, ensure that there is communication with the aircraft and that the pilot is asked to inform ground staff before commencing water bombing.

Ongoing fires

Past day one, FCNSW is expected to pay for aircraft costs on Class 1 or 2 fires (refer Table 10 Fire classes).

If a fire becomes a class 3 fire, stand all aircraft down, if it is safe to do so, and have them re-engaged by the Incident Controller, otherwise FCNSW will continue to pay for any aircraft which continues to work on the fire and was engaged prior to the class 3 declaration.

Surveillance aircraft

Where and when aerial surveillance flights are commissioned, communication and flight coordination should occur between FCNSW, National Parks & Wildlife Service (NPWS), and Rural Fire Service prior to engagement. This ensures that any areas of concern for each agency are planned into the flight path. Surveillance aircraft requested through the RFS State Air desk by the RFS duty officer will be paid for by the RFS.

8.8 REMOTE AREA FIRE FIGHTING

FCNSW staff do not generally undertake remote area fire-fighting where access is only via helicopter, nor do we supply crew members for remote area fire-fighting via helicopter. If remote area firefighting is required and we can or need to access by foot, then all firefighters should be at arduous level fitness, and have the necessary skills and training to perform the tasks required. Refer to section 5.3.2 Training for further information.

8.9 OPERATIONAL GUIDELINES

FCNSW Fire Management Branch maintain a series of operational guidelines and standard operating procedures for fire management, reporting, firefighter safety, briefings, incident management, communications, aircraft use, equipment, media, finance and training. These are available on the [Fire and Radio Intranet](#).

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8.10 COMMUNICATIONS AND REPORTING

There are various levels of communication and reporting involved in fire management activities that are defined by systems and processes established through coordinated firefighting arrangements between the NSW Fire Authorities. These include systems, such as BRIMS for fuel management operations, and ICON for fire reporting at the state level.

Internally, FCNSW follow defined reporting and communications procedures.

8.11 CLASS 1 FIRES

FPA handle locally, update/ manage ICON and report incidents to Regional/Functional Fire Management Staff for situational awareness across the business.

8.12 CLASS 2 FIRES

FPA handle locally in collaboration with required agencies determining and activating Incident Control and Incident Management Team structure, update ICON and report as soon as practicable to Regional/functional Fire Management Staff for:

- » support,
- » situational awareness across the business and
- » reporting up to SMT

8.13 CLASS 3 FIRES

Once declared, FPA assist as per coordinated firefighting arrangements with Rural Fire Service https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0010/9586/Policy-2-2006-Management-of-Bush-Fire-Operations.pdf and report to Regional/functional Fire Management Staff and Fire Management Branch for:

- » support
- » direct access to Rural Fire Service head office to assist/ update/ direct
- » situational awareness across the business and
- » reporting up to Senior Management Team

8.14 ENFORCEMENT, PATROLS AND TOTAL FIRE BANS

Where there is sufficient evidence to suggest that a person (or persons) was responsible for deliberately lighting or negligently causing a fire on land FCNSW manages, or a fire that subsequently enters onto our managed lands, action may be taken to recover the costs of suppression and/or damage caused by the fire. Prosecution will be considered.

FCNSW will, as appropriate, report the incident to the RFS and police and assist where possible.

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FCNSW undertakes patrols in areas where barbecues and campfires are commonly used, where necessary, to ensure compliance with fire legislation and to provide advice and assistance regarding the wise and proper use of fire.

FCNSW may close forests to public access when there is elevated fire danger (e.g. Total Fire Bans) and risk of ignition, or when wildfires in forest estate pose a risk to the public. Closures will be in line with [SOP 18-52: Forest Closures](#).

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9. Recovery

All recovery operations and actions post fire should be carried out in accordance with the Incident Action Plan for the fire. This will be in accordance with “Make Safe Provisions” as defined by the RFS or in accordance with FCNSW internal provisions which generally utilize standards applied to other forestry operations.

Further significant recovery operations for FCNSW may include salvage operations for commercially recoverable timber and replanting of plantations or silvicultural operations to facilitate regeneration.

9.1 WILDFIRE RECOVERY

FCNSW undertake or assist other agencies to undertake recovery activities, including supporting wildfire affected communities in reconstruction of the physical infrastructure and restoration of social and economic wellbeing.

Other wildfire recovery actions may include operations to salvage, repair, rehabilitate or replace fire damaged assets and sites disturbed by fire control operations. Where the fire is under the control of RFS, these activities are planned and agreed to as part of the recovery strategy before the fire is set to “out”.

9.2 REHABILITATION

FCNSW undertake rehabilitation of disturbance resulting from firefighting operations as soon as practical after the wildfire is contained. Where substantial rehabilitation works are or will be required, a rehabilitation plan is prepared and implemented (refer to due diligence planning in line with the activity).

In some circumstances, the fire may be declared a natural disaster and funding for rehabilitation and recovery works may be available under the Natural Disasters Recovery Fund.

Where possible, rehabilitation activities such as erosion control measures should be undertaken in conjunction with control activities.

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10. Data capture, monitoring and reporting

10.1 ICON

10.1.1 Wildfire

Details for each individual wildfire including situation reports, intelligence, mapping, photos, video, documents, predictions, and Incident Action Plans (IAP) will be developed or uploaded into the RFS' reporting system (ICON). This system is the one "point of truth" for all wildfire operations in NSW.

FCNSW does not maintain a separate fire recording or reporting system, other than working details and planning that may take place in FCNSW fire duty rooms. All detail including logs, maps and planning should be captured and stored in case it needs to be produced later, and where appropriate, uploaded into ICON against the relevant fire.

Individual fire reporting requirements can be developed from ICON and annual data capture and reporting will be rolled up through ICON reports.

10.1.2 Prescribed burning

All prescribed burns are uploaded and managed through ICON prior and during operational burning to ensure that the RFS and the public are informed of prescribed burns being undertaken.

10.2 BRIMS

There is a planned migration of BRIMS to a new system, known as "Guardian".

- » FCNSW Prescribed Burn plans under the BFEAC, IFOA and EP&A Act are entered into the RFS BRIMS system.
- » Plantation re-establishment burn plans are not required to be entered in BRIMS.

10.2.1 Prescribed burning

FCNSW maintains an annual Operational Prescribed burn spreadsheet to capture all FCNSW prescribed burning activity and extent, however annual reporting is through BRIMS.

10.2.2 Cultural burning

Cultural burning operations should be planned according to the Bush Fire Environmental Assessment Code and managed in the same way as other prescribed burning.

10.3 CURRENCY AND COMPETENCY

Staff who participate in fire related operational activities including both wildfire and prescribed burning should log the details of their hours and operational roles in TREES. This enables capture of activity for maintenance of currency and competency against fire qualifications.

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10.4 POST INCIDENT AND END-OF-SEASON DEBRIEFS AND REPORTS

Major fire suppression events undertaken by FCNSW staff may be subject to a post incident debrief. End of season debriefs are also undertaken and actions or “lessons learnt” identified and addressed in training, procedure review and/or development or communicated out to all firefighting staff. The format and scope of the post incident debrief depends on the incident level and the nature of events during the incident. The style of debriefing can range from an informal discussion between firefighting personnel on a small incident, to a formal debriefing on a complex incident.

10.5 MONITORING AND RECORDING

RFS systems, such as ICON and BRIMS (soon to be replaced by Guardian), are the “source of truth” for most records regarding fire in NSW. FCNSW sources data, such as fire histories on a regular basis to update GIS layers and to inform annual planning and reporting. Requirements for additional records or reporting, such as a fire investigation, planning developments, training and Quality Assurance Audits/Operational Inspection Reports will be maintained in a format that complies with FCNSW’ Records Management Policy. Refer below.

What	FCNSW system
Training records	PeopleStreme
Time and role	TREES
Safety, environment or social hazards and incidents	RiskWare
Fleet related repairs and costs	Fleetnet
Expenses and costs	Finance One

TABLE 11 FIRE RELATED MONITORING AND RECORDING IN FCNSW

**local people
global experience**

SMEC is recognised for providing technical excellence and consultancy expertise in urban, infrastructure and management advisory. From concept to completion, our core service offering covers the life-cycle of a project and maximises value to our clients and communities. We align global expertise with local knowledge and state-of-the-art processes and systems to deliver innovative solutions to a range of industry sectors.

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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global experience

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