

HASLIN

Surface Water Quality Monitoring and Sampling Plan

Eurobodalla Southern Water Supply Storage Project



Construction
Consultative
Committee

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1. Introduction

1.1 Context

This Surface Water Quality Monitoring and Sampling Plan forms part of the Soil and Water Management Plan for the Eurobodalla Southern Water Supply Storage (the Project).

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.

This Plan has been prepared to address the requirements of the Minister's Development Consent, the environmental management measures listed in the Eurobodalla Southern Water Supply Storage Environmental Impact Statement (EIS) and all applicable legislation.

1.2 Background and project description

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

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.

- 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, and
- 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.

1.3 Scope of this plan

With the approval of the Secretary of Planning, construction of the project is being staged as follows:

- Stage 1: Tuross River Intake Pump Station clearing.
- Stage 2: Tuross River Intake Pump Station construction.
- Stage 3: Vegetation clearing and topsoil stripping of the access road, construction of the access road to the forestry boundary and construction of the inlet pipeline to the forestry boundary.
- Stage 4: Partial clearing of the entire storage site.
- Stage 5: All other works.

Works in Stage 1, Stage 2 and Stage 4 are complete. Stage 3 works are partially complete and will continue to be delivered under the applicable CEMP. This Plan only applies to Stage 5 of the approved project, being the construction of all remaining works on site including the removal of the remaining vegetation within clearing boundary, construction of the embankment wall, spillway, permanent erosion control measures and all remaining works on site to enable the project to become operational. The scope of works is detailed in Figure 1-1.

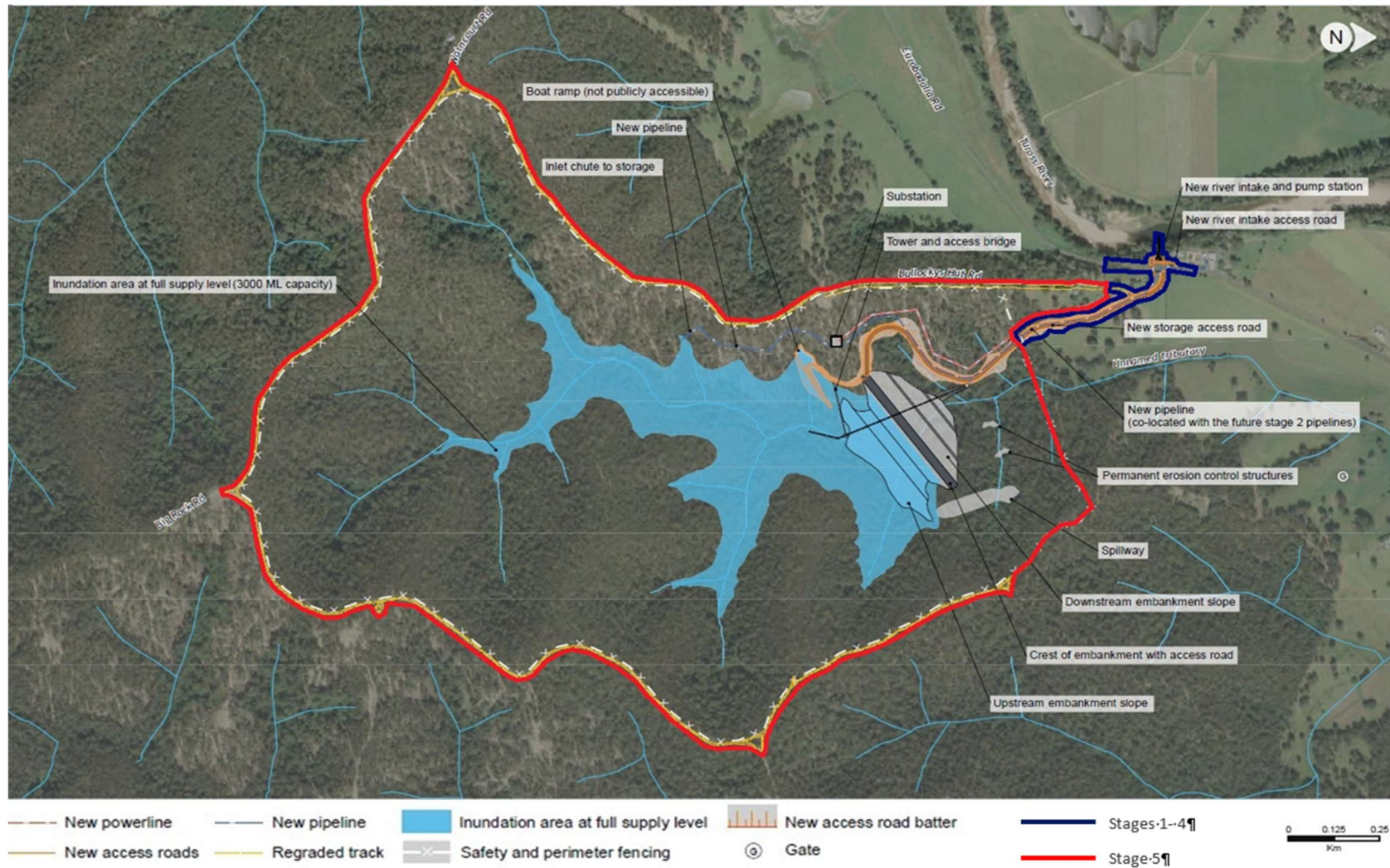


Figure 1-1 Project overview and scope of works covered by this plan (Stage 5)

2. Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how water quality will be monitored during construction of the Project in order to meet the water objectives and targets.

2.2 Objectives

The key soil and water objectives of the project is to ensure all conditions of the Development Consent, environmental management measures and licence/permit requirements relevant to water quality are described, scheduled and assigned responsibility as outlined in:

- The Environmental Impact Assessment (EIA) prepared for Eurobodalla Southern Water Supply Storage (the Project).
- Submission Report for the Eurobodalla Southern Water Supply Storage Project.
- Addendum Submissions Report for the Eurobodalla Southern Water Supply Storage Project.
- Revised Secretary's Environmental Assessment Requirements (SEARs).
- Revised Management and Mitigation Measures.
- Development Consent SSD 7089 (the Project) granted on 17 October 2019.

2.3 Targets

Section 2.3 of the Soil and Water Management Plan identified five targets in relation to soil and water. This plan supports Haslin Constructions in addressing the following two targets:

- Ensure full compliance with the relevant legislative requirements, EIS and conditions of the Development Consent.
- Manage downstream water quality impacts attributable to the project (ie 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).

3. Existing Environment

3.1 Baseline Surface Water Quality Monitoring

A baseline water quality monitoring program was undertaken by SMEC on behalf of Eurobodalla Shire Council between October 2017 and September 2018. The location of the monitoring is shown in Figure 4-1 below.

The baseline water quality monitoring included monthly sampling and event based (e.g., immediately after rainfall) sampling carried out within several locations along a 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.

The baseline water quality data was assessed against the adopted Investigation Levels that were derived from the following:

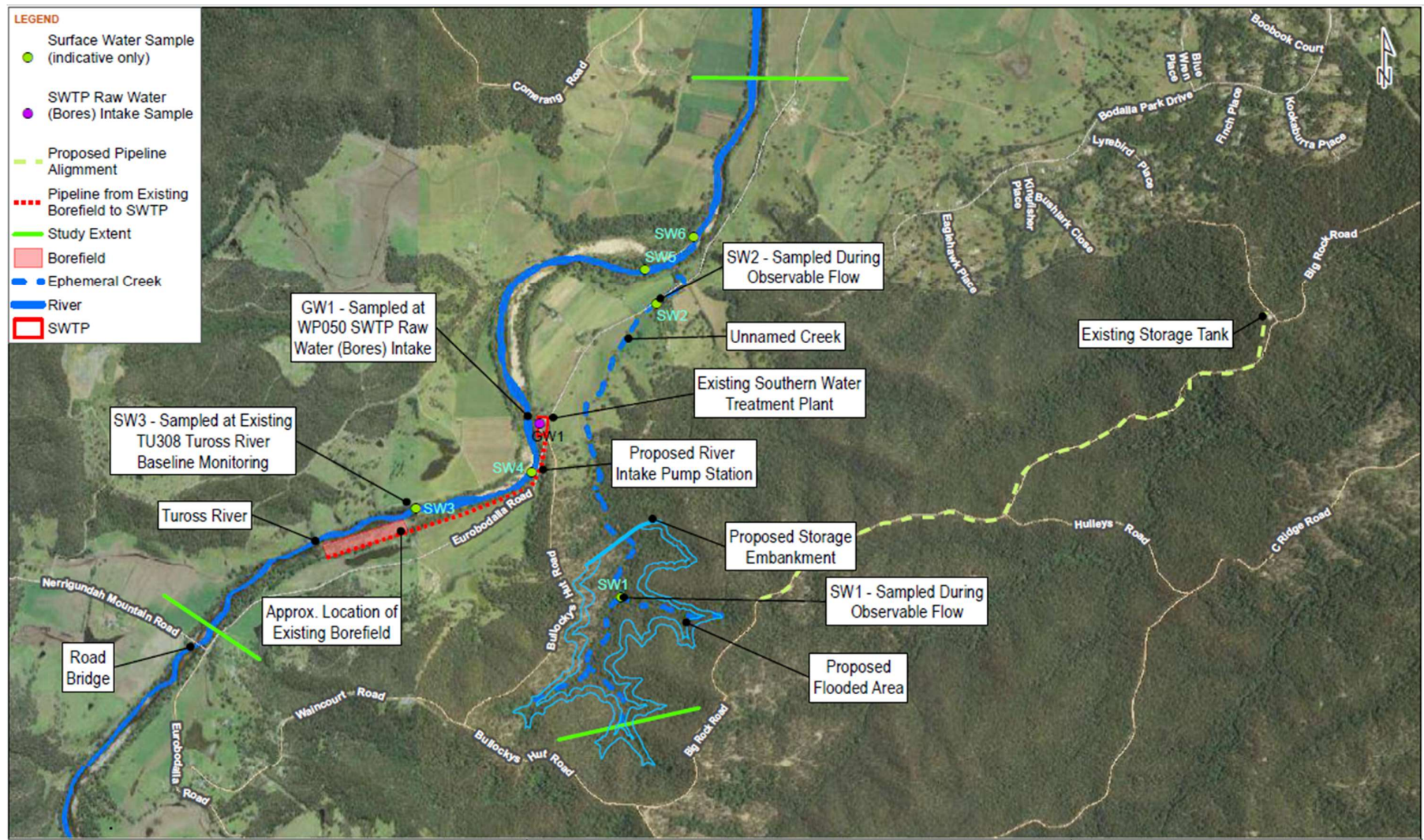
- ANZG (2020) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments;
- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality for 95% species protection;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

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.

Water quality monitoring of the un-named ephemeral drainage line that dissects the project area was also undertaken when flows were observable, although the monitoring report noted that SW1 (upstream of the project site) is regularly dry and limited results were available.

The monitoring showed that water quality in the drainage line was quite variable with exceedances of pH, electrical conductivity and dissolved oxygen observed over the monitoring period.



4. Construction Water Quality Monitoring

The construction water quality and sampling plan has been developed to align with the methodology used for establishing the baseline water quality of the Tuross River.

4.1 Monitoring location

Where possible, construction water quality monitoring locations have been chosen to align with those used for the baseline surface water quality monitoring program. The two locations in the Tuross River (CSW4 and CSW5) replicate those monitored by Council as part of the baseline water quality monitoring program. The five surface water quality monitoring sites and rationale for their selection are identified in Table 4.1. These sites may be further adjusted during construction in response to changing access or as a result of the shifting construction footprint (in the case of control sites). Where changes are required, they would be captured in an update to this plan.

Table 4.1 Monitoring network location and summary

Location ID	Easting (MGA94)	Northing (MGA94)	Type (Catchment)	Location description & rationale	Control / impact
CSW1	230208	5996017	Unnamed Creek	Upstream of construction site	Control
CSW2	230545	5997706	Unnamed Creek	Site boundary at unnamed creekline	Impact
CSW3	231083	5998635	Unnamed Creek	Downstream of construction site immediately before entering Tuross River	Impact
CSW4	230086	5998136	Tuross River	Upstream of construction site	Control
CSW5	231446	5998780	Tuross River	Approx 100m downstream of Tuross River and Unnamed Creek confluence	Impact

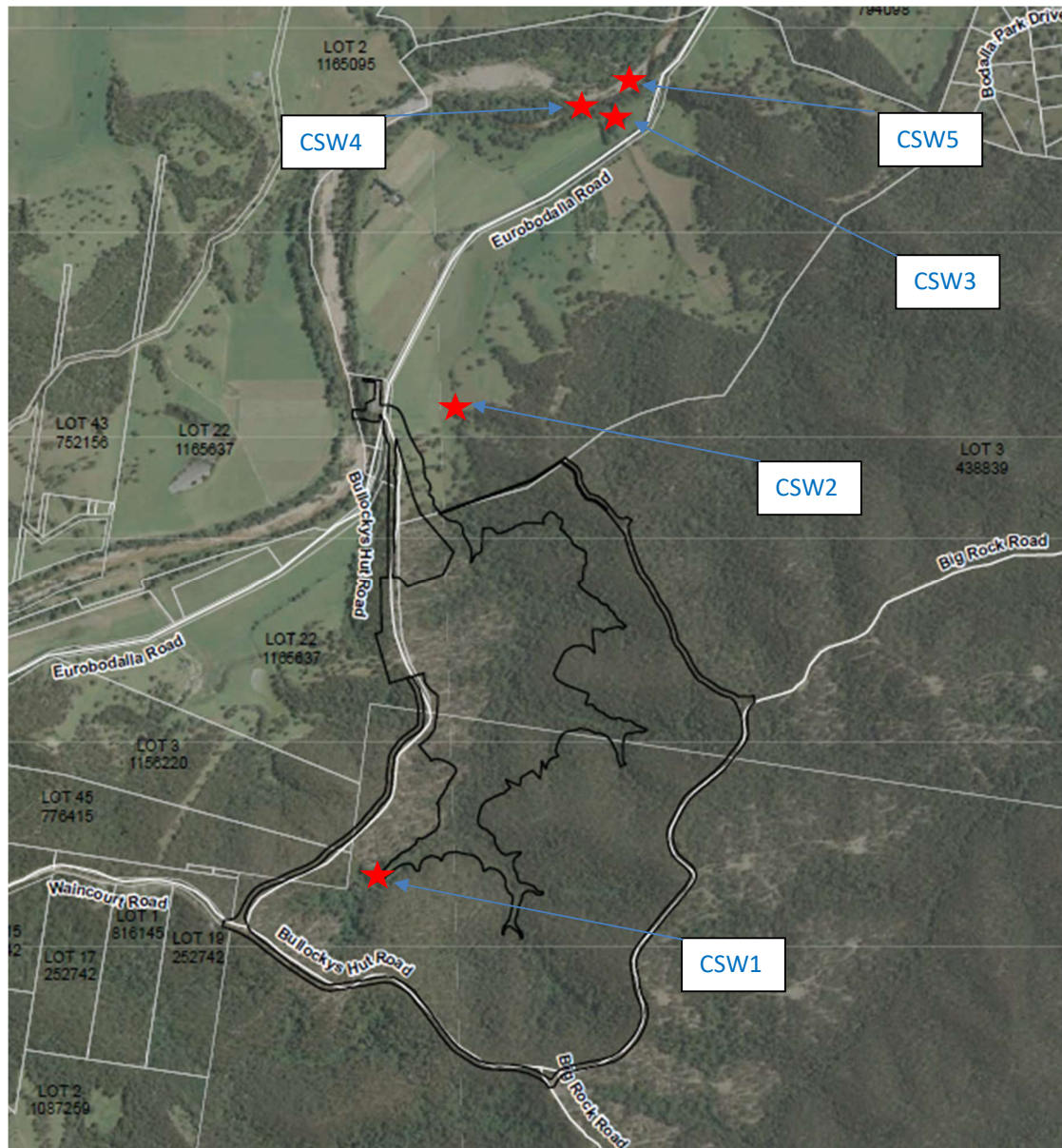


Figure 4-1 Construction surface water quality monitoring locations

4.2 Monitoring parameters and frequency

At each of the five surface water monitoring locations the following monitoring parameters would be tested quarterly.

The quarterly frequency has been selected as it aligns with the recommended frequency in Section 6.7 of the Baseline Water Quality Monitoring Report (SMEC May 2020). This frequency is considered appropriate to identify project impacts to water quality in the Tuross River. It is worth noting that in addition to the scheduled quarterly monitoring events, wet weather monitoring would be triggered when flows are leaving the site boundary at the unnamed creekline.

Monitoring will also include records of daily flows at the Eurobodalla gauging station relevant to sampling days.

Parameter	Field or laboratory method	Frequency / event
pH	Field	Quarterly / when flows leave site at unnamed creekline
Electrical conductivity	Field	Quarterly / when flows leave site at unnamed creekline
Turbidity	Field	Quarterly / when flows leave site at unnamed creekline
Dissolved oxygen	Field	Quarterly / when flows leave site at unnamed creekline
Temperature	Field	Quarterly / when flows leave site at unnamed creekline
Salinity	Field	Quarterly / when flows leave site at unnamed creekline
Biochemical oxygen demand	Laboratory	Quarterly
Nitrogen (as N) including Nitrate NO ₃ Ammonia NH ₃ , Ammonium NH ₄ Total Kjeldahl Nitrogen and Total Nitrogen	Laboratory	Quarterly
Phosphorus (as P) including total phosphorus, and plant-available phosphate (PO ₄)	Laboratory	Quarterly
Chlorophyll	Laboratory	Quarterly
Total dissolved solids (TDS)	Laboratory	Quarterly
Total suspended solids (TSS)	Laboratory	Quarterly
Major anions (Cl, F, SO ₄ , total alkalinity)	Laboratory	Quarterly
Major Cations (Ca, K, Mg, Na, Hardness)	Laboratory	Quarterly
True colour	Laboratory	Quarterly
Total organic carbon	Laboratory	Quarterly
Dissolved organic carbon	Laboratory	Quarterly

Parameter	Field or laboratory method	Frequency / event
Total Metals (Al, As, B, Cd, Co, Cr, Cu, Fe, Pb, Mn, Mo, Hg, Ni, Se, Zn)	Laboratory	Quarterly

4.3 Monitoring methodology

The construction water quality sampling program would involve in-situ field monitoring and collection of samples for laboratory analysis.

4.3.1 In situ water quality monitoring

Physio-chemical measurements are taken using a fully calibrated multi-parameter water quality meter for:

- Temperature (°C)
- pH (pH units)
- Electrical Conductivity (µS/cm)
- Dissolved Oxygen (mg/L and % saturation) and
- Turbidity (NTU).

Relevant site descriptions and notes are taken for each site and visual observations made of:

- Visual oil and grease
- Occurrence of algal scum
- Streamflow
- Water clarity
- Water colour, odour and any other notable observations.
- Photos are taken to record the visual appearance of each water quality sample site at the time of sampling. Where appropriate, photos of the stream bank are also taken to provide a record of bank stability, geomorphology and riparian vegetation condition.

4.3.2 Surface water sampling

In 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 HNO₃ 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.
- Water quality samples are transported in ice in an esky to a National Association of Testing Authorities (NATA) accredited laboratory, under Chain of Custody (CoC) requirements.

5. Response and mitigation actions for construction

During construction the water quality monitoring results would be reviewed against the Investigation Levels (IL) identified in Appendix A. These investigation levels were recommended by SMEC in their second year baseline water quality monitoring exercise.

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.

Appendix A Investigation levels

Analyte group	Analyte	Units	Value / Range		Reference
In-Situ	pH Surface Water	pH units	<6.5 >8.0		ANZECC (2000)
	pH Groundwater	pH units	<6.0 >8.0		Site Specific (20 th Percentile) ANZECC (2000)
	Electrical conductivity	µS/m	Level 1:	>300	Site Specific (1STV on the 95 th percentile)
	Turbidity	NTU	Level 2:	>2200	ANZECC (2000)
			Level 1:	>5	Drinking Water Guidelines (Aesthetic)
			Level 2:	>50	ANZECC (2000)
	Dissolved Oxygen	% Sat	<80% Sat		ANZECC (2000)
Microbial parameters	Temperature	°C	No Criteria		
	Salinity	%	No Criteria		
	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)
	Ammonium (as NH ₄ ⁺)	µg/L	Level 2:	900	ANZECC (2000)
			220		Site Specific (95 th Percentile)
	Nitrate (as N)	µg/L	Level 1:	90	ANZG (2018)
	Nitrite (as N)	µg/L	Level 2:	50,000	Drinking Water Guidelines (Health)
			Level 1:	9	ANZECC (2000)
	Total Kjeldahl Nitrogen	µg/L	Level 2:	3,000	Drinking Water Guidelines (Health)
			No Criteria		

Analyte group	Analyte	Units	Value / Range		Reference
Inorganics, Anions and Cations	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)
	Chloride	mg/L	175		ANZECC (2000)
	Fluoride	mg/L	1.5		Drinking Water Guidelines (Health)
	Sulphate (as SO ₄)	mg/L	250 1000		Drinking Water Guidelines (Aesthetic) 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	
	Total Suspended Solids	mg/L	No Criteria		ANZECC (2000)
	Total organic carbon	mg/L	No Criteria		
	Dissolved organic carbon	mg/L	No Criteria		
Metals	Biochemical oxygen demand	mg/L	No Criteria		
	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
	Mercury	µg/L	Level 2: 1	200	ANZECC (2000) Drinking Water Guidelines (Health)
	Molybdenum	µg/L	Level 1: 1	34	ANZG (2018)
			Level 2: 1	50	Drinking Water Guidelines (Health)
	Nickel	µg/L	Level1: 1	11	ANZECC (2000)
			Level2: 1	20	Drinking Water Guidelines (Health)
	Selenium	µg/L	Level 1: 1	5	ANZECC (2000)
			Level 2: 1	10	Drinking Water Guidelines (Health)
Total Recoverable Hydrocarbons (TRH)	Zinc	µg/L	Level 1: 1	8	ANZG (2018)
			Level 2: 1	3,000	Drinking Water Guidelines (Aesthetic)
	TPH C6 - C10 less BTEX (F1)	mg/L		20	Limit of Reporting
	TRH C6 - C10	mg/L		20	Limit of Reporting
	TRH >C10 - C16 less Naphthalene (F2)	mg/L		100	Limit of Reporting
	TRH >C10-C16	mg/L		100	Limit of Reporting
	TRH >C16-C34	mg/L		100	Limit of Reporting
	TRH >C34-C40	mg/L		100	Limit of Reporting
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	Benzene	µg/L	1		Drinking Water Guidelines (Health)
			950		ANZECC (2000)
	Ethylbenzene	µg/L	3		Drinking Water Guidelines (Aesthetic)
			80		ANZG (2018)
	Toluene	µg/L	800		Drinking Water Guidelines (Aesthetic)
			180		ANZG (2018)
	o-xylene	µg/L	350		ANZECC (2000)
	m and p-xylene	µg/L	75		ANZECC (2000)
	Xylene (Total)	µg/L	20		Drinking Water Guidelines (Aesthetic)
	Naphthalene	µg/L	16		ANZECC (2000)
Polycyclic Aromatic Hydrocarbons (PAHs)	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)