Water Quality Monitoring Program

Epping to Thornleigh Third Track Alliance

ETT ALLIANCE

Water Quality Monitoring Program

Document Control

Title Water Quality Monitoring Program (WQMP)

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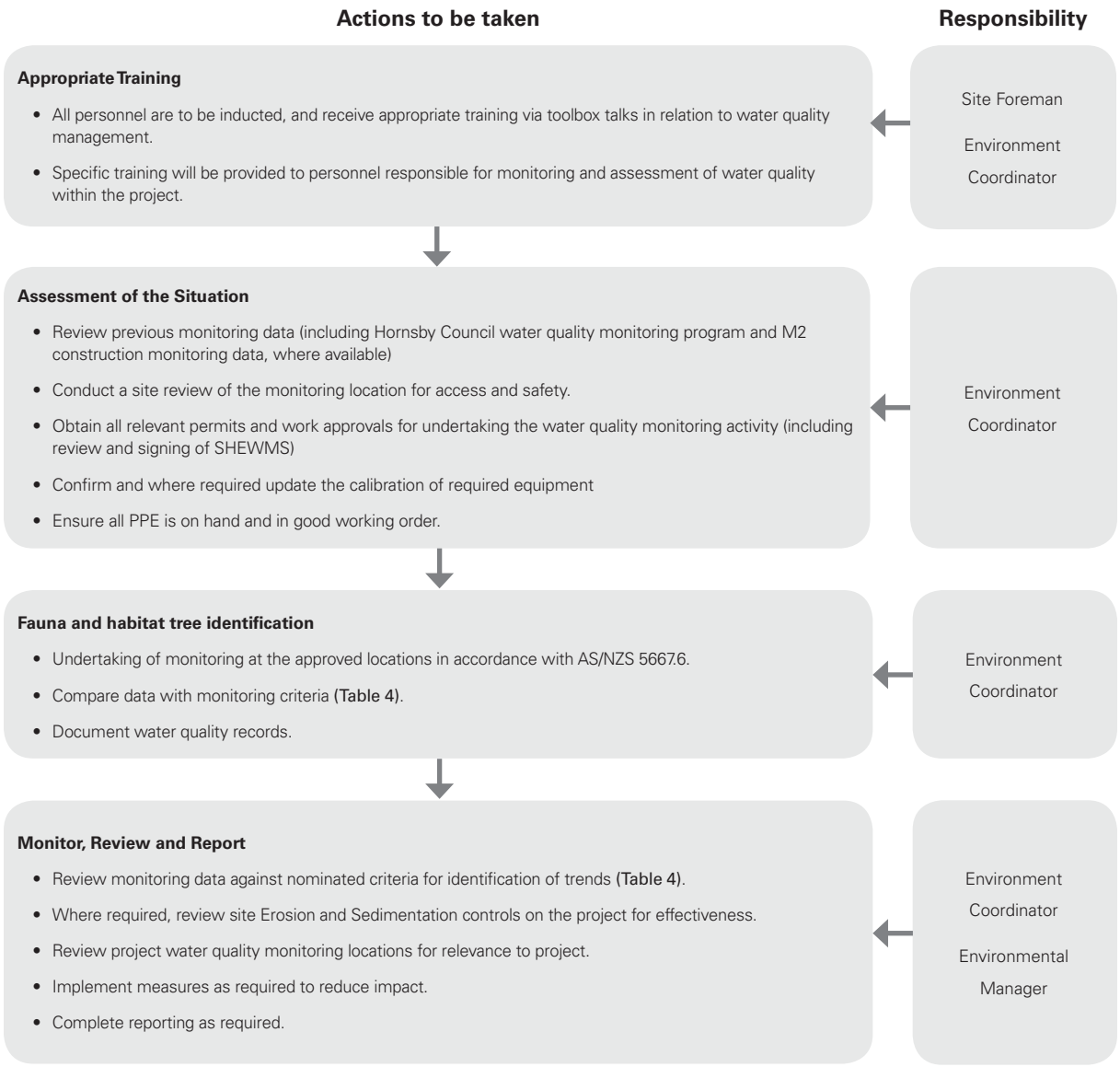
Details of Revisions

Rev	Date	Description
0	27/06/2013	Initial document for TPD / ER review
1	09/07/2013	Updated as per TPD / ER review
2	11/07/2013	Revised following comments close out meeting
3	23/07/2013	Updated to reflect project determination
4	19/08/2013	Updated following Agency and Council Comments
5	28/08/2013	Compiled for DP&I review and approval
6	18/10/2013	Initial for Construction
7	24/02/2014	Removal of procedures to central location
8	15/03/2015	Annual review, updated for Organisation Chart and as appropriate department name change DP+E . Incorporate document design changes in-line with Web Content Accessibility Guidelines (WCAG)
9	03/03/2016	Annual review, updated for Organisation Chart. Document design changes finalised in-line with Web Content Accessibility Guidelines (WCAG)

Contents

Figure 1 – Water Quality Monitoring Process



1 Objectives

- To comply with **Condition of Approval (CoA) C17 - Water Quality Monitoring Program** and **TfNSW Standard Requirements TSR E1 – Environmental Management** as applicable to the ETTT project.
- To provide a methodology for the measurement and assessment of water quality parameters that may be impacted by the ETTT Project and to monitor the effectiveness of Environmental Controls on ETTT.
- Development of the Water Quality Monitoring Program will be in consultation with the NSW Department of Primary Industries.

2 Legislation, Licences, Standards, Planning Instruments and Guidelines Applicable to the Project

- Table 1 below details the legislation, licences, standards, planning instruments and guidelines considered during development of this Plan.

Table 1: Legislation, Licences, Standards, Planning Instruments and Guidelines Applicable to the Project

Legislation / Licences	Standards & Guidelines	Planning Instrument
• NSW *Protection of the Environment Operations Act, 1997*	• TfNSW Standard Requirements TSR E1 – Environmental *Management*	• Project Planning Approval Dated: 17 July 2013
	• Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ ARMCANZ 2000)	• Epping to Thornleigh Environmental Impact Statement
	• Soils and Construction – Volume 1, 4th Edition (Landcom) March 2004	• Epping to Thornleigh Submission Report and Revised Environmental Mitigation Measures (REMMs)

- Water quality monitoring program compliance tracking sheet is provided in **Annexure A**.

3 Supporting Procedures, Forms, Checklists and Registers

- Tools that are used to support the implementation of this Program are detailed within **Table 2** below.

Table 2: Supporting Procedures, Forms, Checklists and Registers Applicable to the Project

Procedure	Form	Checklist	Register
	Water Quality Monitoring Record Form		

- The supporting documents applicable to the management of vibration are provided separately on the TfNSW Website and on the Alliance's "Our Way" management system.

4 Background Review

4.1. Surface Water

- The management of potential water quality risks during construction from fuels, oils and chemicals will be managed through the process detailed in the Soil and Water Management Plan for the project.
- In accordance with the ANZECC guidelines for determining the level of protection that should be applied to each waterway in the project area, the following disturbance classifications can be applied
  - Devlins Creek – Highly disturbed ephemeral creek line; and
  - Byles Creek – Slightly to moderately disturbed ephemeral creek line.
- Background data from the Hornsby Council 2011/2012 Water Quality Monitoring Program and the M2 Upgrade water quality monitoring program has been collated to provide information on stream health and water quality results along Devlins Creek.
- No data is available for Byles Creek water quality.

4.2. Groundwater and Bores

4.2.1. Ground Water

- The ETTT project involves works mostly within the existing rail corridor and involves widening existing cuttings.
- Deepening or creating new cuttings are not proposed.
- There are eight (8) registered groundwater bores within one (1) kilometre of the ETTT project including five (5) monitoring bores, two (2) domestic and one (1) recreational bore.
- The three closest bores occurring to the project are:
  - Thornleigh (near Stevens Street) – Domestic Livestock use;
  - Beecroft (near Mary Street) – Monitoring;
  - Cheltenham (near The Boulevard) – Recreation (Irrigation).
- All bores exist outside of the project construction area.
- The Environmental Impact Assessment (EIS) for the project considered the potential for groundwater impacts as a result of the project and concluded:
  - » *No additional groundwater interception is expected to occur;*
  - » *Due to the distance of the nearest registered bores and the density of development, the likelihood of impacts is considered to be very low;*
  - » *The proposal would likely result in some compaction of land, however overall the likelihood of impacts to groundwater systems is considered low; and*
  - » *Accidental spills and sedimentation have the potential to impact the quality of groundwater. This could potentially result in impacts on groundwater users and the creeks to which the groundwater discharges. Potential impacts would be reduced by implementation of the mitigation measures as detailed within the Soil and Water Quality Management Plan.*
- Due to the nature of the project (widening of existing cuts only) it is expected that construction activities will not impact upon existing bores, user rights or creek in flows. Negligible interaction with groundwater is expected.
- The Phase 2 Environmental Site Assessment (Golder, 2011) revealed that of the 10 groundwater wells sampled that:

- Concentrations of various heavy metals exceeded the ANZECC 2000 freshwater trigger values for 95% protection of aquatic ecosystems to some degree in each of the 10 wells;
- A toluene exceedance was detected in one well.

- Further the Phase 2 Environmental Site Assessment (Golder, 2011) detailed that:
  - The source of the heavy metals and toluene detected in the groundwater is not known, as the corresponding soil samples for the wells did not reveal a linkage between soil contamination and that of the groundwater;
  - Observation on site did not indicate that there is a significant contamination source on the site.
- Given the above, groundwater contamination appears to be as a result of offsite sources of contamination.
- Given that groundwater is not anticipated to be effected by the proposed works, further groundwater monitoring is not proposed with the exception of where groundwater may be intercepted during construction (i.e during piling).
- Where groundwater is intercepted it will be treated as being contaminated, collected, tested and classified in accordance with OEH's *Waste Classification Guidelines*.
- The ground water would then be disposed of in accordance with its waste classification.
- Given that groundwater is not anticipated to be affected by the proposed works; further groundwater monitoring in connect of this plan is not proposed.

5 Management

- **Figure 2** provides an overview of site activities and their general locations, waterway locations in proximity to the project and surface water quality monitoring locations.
- The construction activities that could impact on water quality are listed in **Table 3**.
- All construction personnel working on the project will be provided with an induction and where relevant ongoing training into water management measures and procedures to be implemented for the project.

Table 3 Construction activities and potential impacts on water quality

Construction Phase	Activity	Risk	Management
Site Establishment*	• Site set out • Installation of environmental controls and fencing • Compound site and ancillary sites (stockpile and storage sites) • Clearing of vegetation	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills are detailed in the Soil and Water Management Plan. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
		Flooding	The flood risk for the project is considered low due to the site being located along a ridge line, however, management of potential risks is detailed in the Soil and Water Management Plan.
Relocation of Services	• Services location, identification and consultation with service provider; • Relocation works.	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.

Construction Phase	Activity	Risk	Management
Earthworks	• Cut to fill operations • Sandstone batter excavation • Spoil transport and processing • Fill embankments • Batter treatments • Drainage • Stabilisation and rehabilitation	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
		Acids and chemicals (e.g. concrete) from washing processes	Water quality risk management associated with acids and chemicals is detailed in the Soil and Water Management Plan.
		Discharge of captured water with pH or suspended solids outside relevant criteria	Waste water risk management is detailed in the Soil and Water Management Plan and further detailed within the Construction Water Flocculation and Discharge Procedure.
		Flooding	The flood risk for the project is considered low due to the site being located along a ridge line, however, management of potential risks is detailed in the Soil and Water Management Plan.
		Disturbance of saline soils	Soil and water quality risk management associated with disturbance of saline soils is considered low, however, management of potential risks is detailed in the Soil and Water Management Plan.
		Disturbance of contaminated soils	Disturbance of contaminated soils and subsequent management is detailed within the Unexpected Discovery of Contamination Procedure.

Construction Phase	Activity	Risk	Management
Structures	• Piling • Bridge over M2 • Structures and bridge adjustments	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan.. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
		Groundwater drawdown	Some negligible (in relation to duration and extent) groundwater draw down may occur during piling operations. Given the limited impacts no additional specific management measures are required.
Station Adjustments	• Works at Stations • Car park adjustments	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan.. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
Track Work	• Installation of track	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan.. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.

Construction Phase	Activity	Risk	Management
Signalling and Communications	• Installation of signalling and communications	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan.. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
Overhead Wire	• Installation of wire • Adjustment of wire	Erosion and sedimentation	Erosion and sedimentation risk management is detailed in the Soil and Water Management Plan.
		Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.
Commissioning	• Testing and Commissioning	Hydrocarbon and other chemical spills from plant operation and maintenance	Water quality risk management associated with hydrocarbon and other chemical spills is detailed in the Soil and Water Management Plan. The Refuelling Procedure and Spill Response Procedure provide subsequent management to reduce potential for water quality impacts.

6 Goals and Limits

6.1. ANZECC Triggers

- ANZECC provides a framework for the assessment of water quality in fresh water environments that identifies criteria that can be used as a yardstick to determine possible risk to the environment.
- The ANZECC criteria can be used to initiate further investigations into surface water quality impacts from a specific site.
- In the absence of site specific data the ANZECC default values can be used as a guide until sufficient data is available.
- ANZECC assumes a "steady state" condition of creek lines which is problematic when applied to ephemeral creek lines due to the high variability of water flows and conditions which can lead to changes in the physical and chemical properties of the water compared to perennial streams.

6.2. Adopted Criteria

- In regard to Devlins Creek, a good body of existing baseline monitoring data is available from published Hornsby Council reporting and monitoring data captured during the from M2 Upgrade construction.
- It is noted that the monitored levels from the above data sources are generally within the ANZECC criteria.
- No water quality baseline data could be identified for Byles Creek; therefore the ETTT project will complete pre-construction water quality sampling to establish some baseline levels.
- To ensure consistency with the objectives of the ANZECC guidelines, background water quality monitoring upstream and downstream at the identified waterways in proximity to the site will be undertaken prior to commencement of construction to ensure nominated criteria within Table 4 are indicative of the receiving environments.
- At least two wet weather and two dry weather sampling sessions are to be completed prior to construction.
- Wet weather monitoring will be conducted following rain that results in water flowing within Byles Creek (an ephemeral creek). The rain fall for previous 3 days will be recorded.
- Dry weather monitoring event is considered to be 5 days of proceeding dry weather (<2mm).
- The measured baseline levels will be compared with the ANZECC criteria. If the measured levels are found to be outside of the ANZECC criteria, then the measured levels will be adopted in the monitoring program.
- It is noted that the ANZECC criteria are not ideal given the ephemeral nature of the creek lines and consideration shall be given to this when analysing water quality monitoring data. However ANZECC default criteria will be noted in the review of all captured monitoring data.

Table 4 Construction wastewater discharge criteria and sampling program

Parameter	Typical EPL Criteria	Hornsby Council baseline data for Devlins Creek[3]	Monitoring Data for Devlins Creek (from M2 Construction)	ANZECC Default Criteria[1]	Sampling Frequency	Method
pH (units)	6.5 – 8.5	7.1-7.8 **(7.6)**[4]	6.0 – 8.7 **(7.2)**[5]	6.5 – 8.5	Monthly	Probe
Total Suspended Solids (TSS – mg/L)	<50	-		<50[2]	Monthly	Grab sample for lab analysis
Conductivity (EC-µS/cm)	-	240 – 702 **(324)**[4]	219 – 2260 **(719.6)**[5]	125-2200	Monthly	Probe
Temperature (°C)	-	10.5 – 20.4 **(19.8)**[4]	15.4 – 23.0 **(20.1)**[5]	-	Monthly	Probe
Dissolved Oxygen (mg/L)	-	9.0 – 11.4 **(11.1)**[4]	1.8 – 11.6 **(7.1)**[5]	60-120	Monthly	Probe
Oil and Grease	No visible oil or odour	-		-	Monthly	Visual and olfactory observation
Turbidity (NTU)	TBC following confirmation of correlation with TSS	1.0 – 29.8 **(19.2)**[4]	0.5 – 39.6 **(12.4)**[5]	TBC following confirmation of correlation with TSS	Monthly	Probe

[1] Interim criteria based on ANZECC (2000) default values for lowland rivers in NSW. Site specific criteria will be developed as monitoring data becomes available.

[2] Interim criteria based on Volume 1 of Managing Urban Stormwater: Soils and Construction (Landcom, 2004)

[3] Hornsby Council data obtained from 2011/2012 Water Quality monitoring Program Annual Report

[4] Hornsby Council 80% data value obtained from 2011/2012 Water Quality monitoring Program Annual Report

[5] Water quality data from M2 upgrade 2011-2013

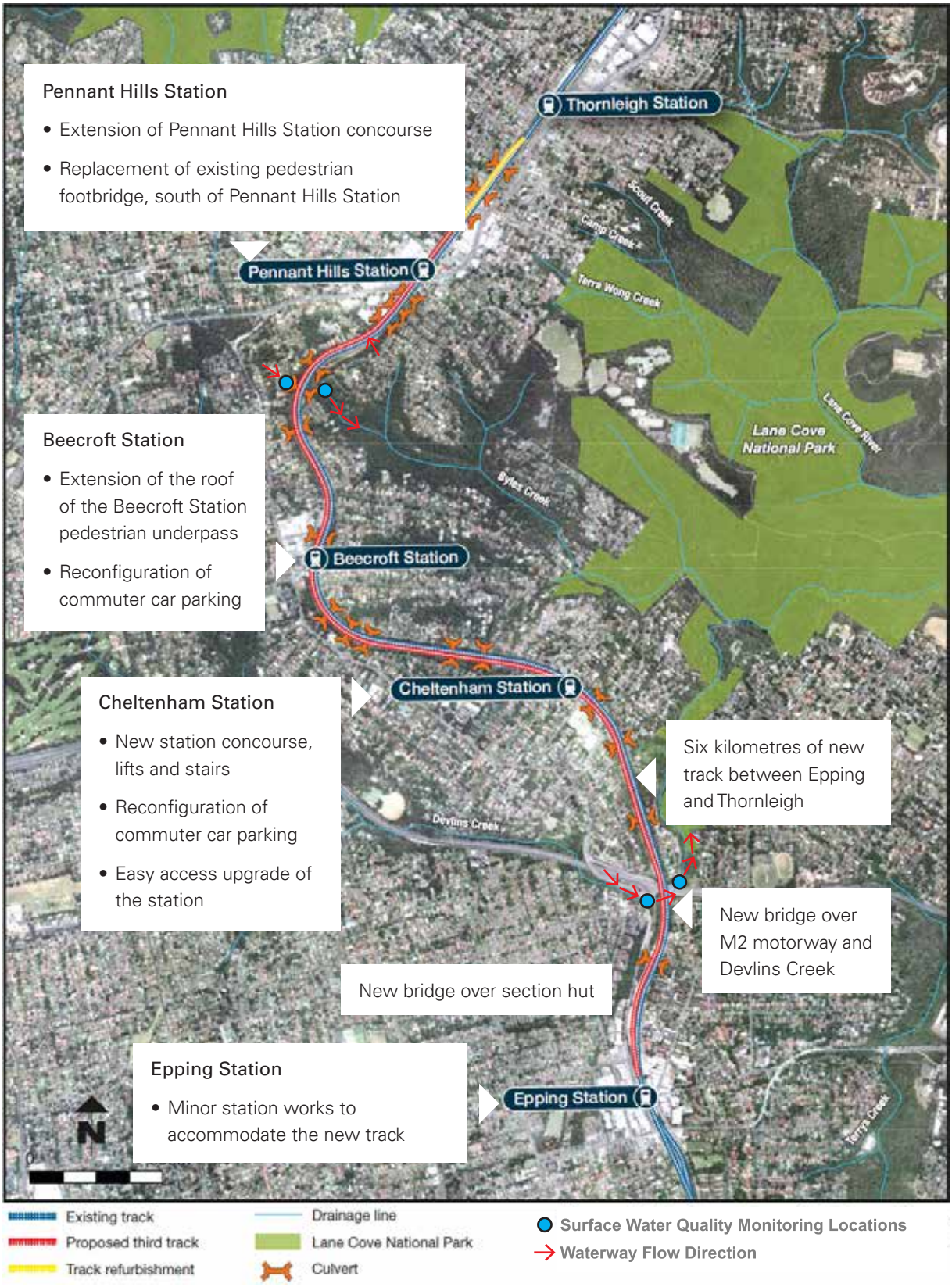
7 Monitoring

- Monitoring would be undertaken at the four locations identified in **Figure 2** in accordance with AS/NZS 5667.6.
- Prior to commencement of construction, monitoring would be undertaken for wet and dry events (where possible) at both identified locations, for upstream and downstream readings.
- Water quality monitoring will be undertaken each month during construction and the data reviewed determine trends and to identify if any remedial measures are required.
- In the event that adverse impacts to water quality are identified as a result of ETTT activities then the ETTT Alliance will take advice from the Soil Conservationist and/or appropriately qualified technical specialist on how to ameliorate the detected impact.
- If affected by the ETTT project, water monitoring will continue at the identified locations for a period of twelve (12) months following completion of construction or until affected waterways are certified by an independent expert as being rehabilitated to an acceptable condition (i.e. pre construction)

8 Reporting

- All waterway sampling will be recorded on the Water Quality Monitoring Record Form.
- A summary of the water quality monitoring results will be reported to DP+E with the 6 monthly compliance reports.

Figure 2 – Overview of work locations, waterways and proposed surface water monitoring locations



9 Incidents and Non-Conformances

- Environmental non-conformances for the project will be managed as per the process detailed within Section 8.2 and Table 16 of the CEMP.
- Incidents will be managed as outlined within Section 9 of the CEMP.

10 Review

- A management review of the WQMP will be undertaken to ensure its continuing suitability, adequacy and effectiveness. Reviews will include assessing opportunities for improvement and the need for changes to the system, including the environmental policy and environmental objectives and targets. The management reviews will occur:
  - ☐ On an annual basis to ensure its continuing effectiveness
  - ☐ Within 1 month following a major (Class 1) incident
  - ☐ Where an audit recommends a review
  - ☐ Where there are repeat non conformances and these are not closed out within the agreed timeframe
  - ☐ As otherwise determined by the Environmental Manager.

Annexure A – Water Quality Monitoring Program Compliance Tracking Sheet

CoA

Area	No.	Sub	Requirement	Where Addressed?
Groundwater	C16		The SSI shall be designed to avoid impacts on existing bores and user rights, to the greatest extent practicable. Where impacts can not be avoided, impacts shall be minimised and monitored as part of the Water Quality Monitoring Program (condition C17).	
Water Quality Monitoring Program	C17		A Water Quality Monitoring Program shall be prepared and implemented to monitor impacts on surface and groundwater quality resources during construction and operation. The Program shall be developed in consultation with the DPI and shall include but not necessarily be limited to:	
		(a)	identification of surface and groundwater quality monitoring locations which are representative of the potential extent of impacts from the SSI;	
		(b)	identification of works and activities during construction and operation of the SSI, including emergencies and spill events, that have the potential to impact on surface water quality of potentially affected waterways;	
		(c)	presentation of parameters and standards against which any changes to water quality will be assessed, having regard to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (Australian and New Zealand Environment Conservation Council, 2000);	
		(d)	representative background monitoring of surface and groundwater quality parameters prior to the commencement of construction, to establish baseline water conditions, unless otherwise agreed by the Director General;	
		(e)	a minimum monitoring period of 12 months following the completion of construction or until the affected waterways and/ or groundwater resources are certified by an independent expert as being rehabilitated to an acceptable condition. The monitoring shall also confirm the establishment of operational water control measures (such as sedimentation basins and vegetation swales);	
		(f)	contingency and ameliorative measures in the event that adverse impacts to water quality are identified; and	
		(g)	reporting of the monitoring results to the Department and DPI.	
			The Program shall be submitted to the Director General prior to the commencement of construction of the SSI, or as otherwise agreed by the Director General. A copy of the Program shall also be submitted to the DPI prior to its implementation.	