Fulton Hogan

Foxground and Berry Bypass

Final Construction Compliance Status Report

Report 10
1 April 2019 – 30 September 2019

Contents

Appendices

Details of Revision and Amendment:

Document Control

The most current version of this report will be available on the Fulton Hogan database for all project personnel. Distribution of this report will be made through the Foxground and Berry Bypass project document control system 'iTwo'.

The environmental management team will maintain, review and update this report on a six monthly basis.

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5	DP&E endorsed Environmental Representative (ER)	25/10/2019	Toby Hobbs
6	Department of Planning & Environment	25/10/2019	Katrina O'Reilly

Plan Approved By:

Tim Williams

Project Director

James Diamond

Environmental Manager

Amendment

Each new revision to the report will be distributed to all registered copyholders with an instruction that the superseded copy be destroyed or marked as superseded.

The revision number is included at the end of the document number, which is noted on each page. When amendments occur, the document or relevant section will be reissued with the revision number updated accordingly.

The Project Manager or Environmental Manager will approve amendments by initial in the Approval column below.

The following provides a record of amendments made to this document:

Revision	Date	Description	Page	Prepared by	Approved
0	15/08/2019	Draft submitted to RMS & ER	All	James Diamond	James Diamond
1	25/10/2019	Updated comments	All	James Diamond	James Diamond

Abbreviations

CEMP	Construction Environmental Management Plan
CPESC	Certified professional in erosion and sediment control
CTP	Compliance Tracking Program
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence
ER	Environmental Representative
DPIE	Department of Planning, Industry and Enviornment
NBN	National Broadband Network
NSW	New South Wales
POEO Act	Protection of the Environment Operations Act 1997
OoW	Office of Water
PPR	Preferred Project Report
SEPP	State Environmental Planning Policy
SoC	Statement of Commitments
SWTC	Scope of Work and Technical Criteria
TMP	Traffic Management Plan
RBL	Rating Background Level
ROL	Road Occupancy Licence
NCR	Non-conformance report

1 Introduction

The Foxground and Berry bypass has provided a four-lane divided highway (two lanes in each direction) with median separation for 11.6 kilometres of the Princes Highway between Toolijooa Road near Foxground and Schofields Lane south of Berry. The project crosses both Kiama and Shoalhaven local government areas.

Key design features include:

- Approximately 12.4 kilometres of new highway, including bypasses of the Foxground bends and the Berry township
- Interchanges at Toolijooa Road, Austral Park Road, Tindalls Lane and the northern and southern interchanges for Berry
- Junction arrangements at Schofields Lane and Gembrook Lane which enable both northbound and southbound access to the highway
- A cutting about 25 metres deep at Toolijooa Ridge, bypassing the Foxground bends
- Six lanes through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres, providing two lanes and a climbing lane in each direction
- Three bridge crossings at Broughton Creek and a bridge at Berry
- An upgrade and extension of Austral Park Road
- A new roundabout at the junction of Woodhill Mountain Road and the existing Princes Highway
- A diversion of Town Creek into Bundewallah Creek
- Local road closure at North Street
- A two-way connection between Queen and Victoria streets and a southbound on-ramp south of Victoria Street
- New property accesses and access roads (left-in/left-out only for direct property access to the upgraded highway) and
- Wildlife crossings (rope bridges and underpasses) to maintain existing wildlife corridors.

Benefits associated with the Project include:

- Improving road safety on the Princes Highway and local road network
- Reducing total crashes on the Princes Highway in the project area by an estimated 64 per cent
- Improving road safety through less interaction between traffic and pedestrians in the town of Berry
- Improving the efficiency of the Princes Highway between Toolijooa Road and Schofields Lane
- Reducing travel time by an estimated seven (7) minutes
- Supporting regional and local economic development
- Improving flood immunity and

- Improving wildlife crossings.

The project was delivered through a 'design and construct' contract process. Fulton Hogan was appointed by Roads and Maritime on 11 July 2014 to deliver the project.

Further details on the project background can be sourced from the project website at (http://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html)

1.1 Project environmental assessment and approval

The Foxground and Berry bypass, Princes Highway upgrade was approved by the NSW Minister for Planning and Infrastructure on 22 July 2013. The project has been assessed as a transitional project under Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Minister's conditions of approval have been provided to Roads and Maritime Services to guide the detailed design, construction and operation of the project.

To facilitate the assessment and determination of the Project, an Environmental Assessment was developed and issued in November 2012. This assessment (and associated specialist studies) detailed the key environmental aspects of the project and recommended management and mitigation measures to mitigate environmental risks during construction and operation of the infrastructure. The Foxground and Berry bypass environmental assessment was exhibited for 34 days from Wednesday 14 November 2012 to Monday 17 December 2012 and a total of 254 submissions were received during the exhibition period.

A Submissions and Preferred Project Report (PPR) was developed and placed on public exhibition in response to the submissions received during the Environmental Assessment consultation period. This report responded to the main issues raised during the consultation period, described amendments made to the project design since the exhibition of the Environmental Assessment, and provided additional assessment of relevant environmental issues raised in the submissions and amendments made in the public consultation phase.

Both the Environmental Assessment and Submissions and Preferred Project Report were assessed by the NSW Department of Planning and Infrastructure.

In addition to the above approval, Fulton Hogan have also acquired an Environment Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) to facilitate construction activities. The EPL was issued 29 August 2014.

The Project Construction Environmental Management Plan (CEMP) and sub-plans were approved by the Department of Planning and Environment on 19 September 2014.

The Department of Planning and Environment approved the following project documents on 27 October: the Biodiversity Offset Strategy; the Ecological Monitoring Program; the Water Quality Monitoring Program; the Urban Design and Landscape Plan; and the Community Consultation Strategy.

Following the above approvals, Roads and Maritime formally advised the Department of Planning and Environment that construction would commence on 28 October 2014 and the CEMP has been implemented since this date.

On 28 January 2015, the Department of Planning and Environment approved the modification of Condition C13. This modification removed the section which prohibited an increase to blasting limits application where a non-aboriginal heritage item existed.

On 9 March 2015, the Department of Planning and Environment approved increased blasting limits for the Toolijooa ridge earthworks cuts. A further approval to increase blasting limits at cut 3 and cut 4 on the FBB project was also approved.

Condition C4(e) of the project approval was modified by DP&E on 31 July 2015 to enable out-of-hours work as approved through the project Environmental Protection Licence . This modification was requested to streamline the out-of-hours works approval process without reducing the level of consideration required for out-of-hours work. Further, Condition C6 which previously detailed the Out of Hours work request process was removed as it was no longer required due to the modification to C4(e). The change was supported by NSW EPA, Kiama Municipal Council and Shoalhaven City Council.

One major consistency assessment has been completed on the project to date where the abutment B at Broughton Creek crossing 3 was designed to sit 34 metres closer to the creek in comparison to the concept design. This increase in construction footprint and scope also includes re-routing of an emphemeral drainage line into Broughton Creek. This consistency assessment was approved by Roads and Maritime and the Project ER on 14 Decemeber 2015.

Condition C15 of the project approval was modified by DP&E on the 3 July 2017 to enable works within specified heritage sites after seeking written approval from the Secretary. In light of this approval from the Secretary was given on 3 July 2017 to work within heritage site G2B H25 to construct a residents driveway.

On 29 September 2017, the Department of Planning and Environment approved a modification to conditions C15 and C16 to align with the original project approval.

1.2 Purpose of this report

The purpose of this report is to provide a summary of the outcomes and actions obtained through the implementation of the project Compliance Tracking Program required under the Minister's Condition of Approval (MCoA) B29.

This compliance tracking report provides a review of compliance for the six month period between 1 April 2019 and 30 September 2019. A pre-operational compliance review was completed one month prior to operation of the project as required by Minister's Condition of Approval B29(c). Foxground and Berry Bypass Construction Compliance Report 6 (1 May 2017 – September 2017) fulfiled that requirement with commencement of the operational highway occurring on 31 October 2017. The report will be the final compliance status report as remaining works were complete as 31 August 2019.

Minister's Condition of Approval (MCoA) B29 states:

"The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall be submitted to the Director General for approval prior to the commencement of construction and shall be applied during construction and for a minimum of one year following commencement of operation. The program shall include, but not necessarily be limited to:

(a) provisions for the notification of the Director General of the commencement of works prior to the commencement of construction and prior to the commencement of operation of the project (including prior to each stage, where works are being staged);

(b) provisions for periodic review of project compliance with the requirements of this approval and the documents listed under Condition A1, including the Statement of Commitments;

(c) provisions for periodic reporting of compliance status against the requirements of this approval and the documents listed under Condition A1, including the Statement of Commitments, to the Director General including at least one month prior to the commencement of construction and operation of the project and at other intervals during the construction and operation, as identified in the Program;

(d) a program for independent environmental auditing in accordance with /SO 19011:2003 - Guidelines for Quality and/ or Environmental Management Systems Auditing;

(e) mechanisms for reporting and recording incidents and actions taken in response to those incidents;

(f) provisions for reporting environmental incidents to the Director General during construction and operation; and

(g) procedures for rectifying any non-compliance identified."

During the reporting period the Foxground and Berry Bypass has been compliant to the conditions of approval. Appendix A of this report contains detailed information on the status and compliance of each specific condition for the Foxground and Berry Bypass.

2 Construction activities during reporting period

Project works are proceeding in accordance with the construction program. During the reporting period about 10% of the days were wet days. The total rainfall received on the project was significantly lower than the long term average. During this period production was complete with a high environmental focus on closing out temporary construction facilities with permanent landscaping and maintanence of the permanent landscaping.

As of the 31st August 2019 construction was deemed to be complete with only minor on-going maitenanace tasks occurring from 01 September 2019. The alignment in its final configuration commenced operation on 31 October 2017.

2.1 Demolition and property adjustment

Demolition works are complete.

Property adjustments works have been completed and any unresolved matters have been taken up by Roads and Maritime.

2.2 Utilities adjustments & diversions

FBB utilities and service adjustments are complete across the project.

2.3 Fencing

Boundary fencing is complete on the project.

2.4 Traffic

On 31 October 2017 the project saw the alignment in its full configuration and with an operational speed of 100km/h. The operational set-up ensured that major traffic was kept out of Berry which has made the township a safer place for visitors.

2.5 Drainage

All Drainage works have now been completed on the project.

2.6 Structures

The project includes the construction of 12 new bridges which cross creeks, floodplains, local roads and side roads. All 12 bridges have been completed.

There are six structural culverts on the project which provide connectivity for vehicles and wildlife under the new highway. All culverts have been completed.

Figure 2-1: Combined fauna underpass and drainage culvert complete with fauna furniture

2.7 Roadworks

Works are complete on design earthworks and roadworks.

Figure 2-2: Woodhill Mountain Road Compound decommissioned

2.8 Landscaping

The project made good progress on landscaping works in the reporting period specifically the rehabilitation of the two remaining ancillary facilities. With dry and windy conditions for the majority of the reporting period, focus on consistent watering of landscaped areas has helped the high survival rates through these tough conditions.

The key focus now that all permanent landscaping works have been completed is to ensure that the landscaping thrives via weed removal and general maintenance along the project.

Figure 2-3: Permanent landscaping of Cut 5

Figure 2-4: Permanent landscaping of Cut 2

2.9 Sediment basins

The number of sediment basins on the project reflects construction progress. The risk footprint is continually decreasing as the works progress and areas are stabilised.

At the start of the reporting period there was 1 sediment basin in a disturbed catchment. At the end of the reporting period there were no sediment basins on the project as all disturbed catchments had been stablised.

Since the start of construction until the end of this reporting period there has been an 100% reduction in the number sediment basins. This generally means that about 100% of the overall disturbed footprint of the project has now been rehabilitated.

With regard to sediment basin management, the project continued to work diligently at treating and discharging stored site water back into the environment as efficiently as possible. The table below illustrates the timeframe that sediment basins have been discharged.

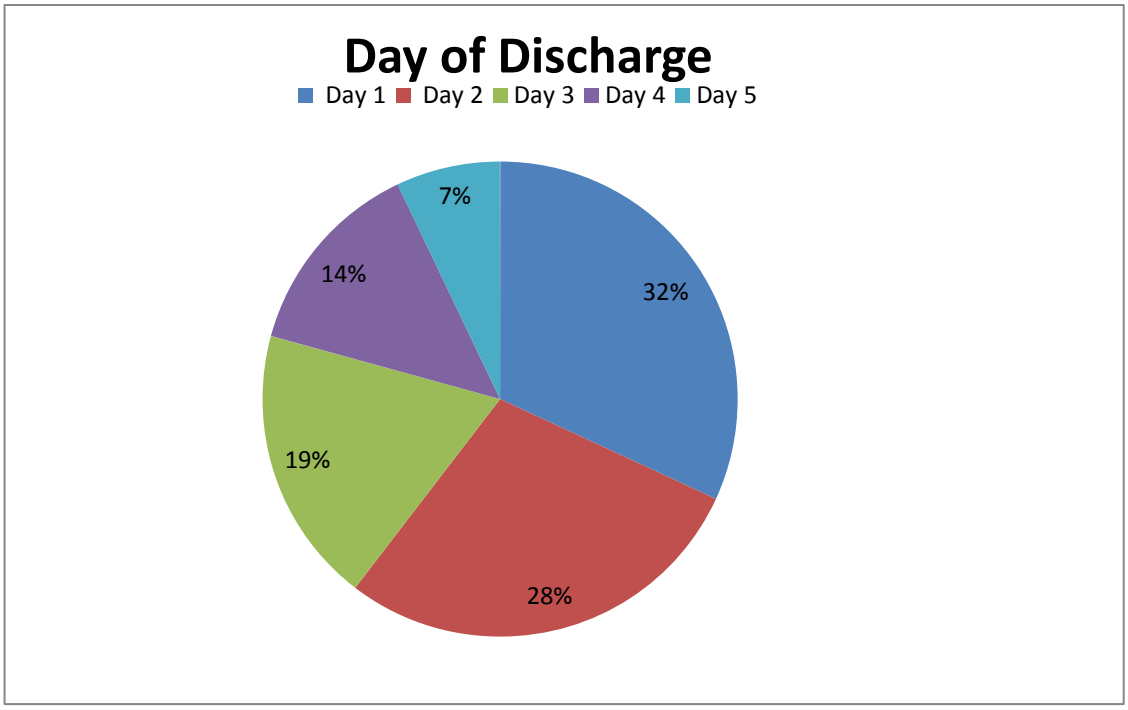

Figure 2-5: Sediment basin discharges in the five day period after rainfall

2.10 Noise mound construction

Construction of the Berry noise mound (North Street) was prioritised in the construction program. The early construction of the noise mound reduces the potential acoustic and visual impacts of construction on both the residents of North Street and the wider community.

There are three earth mounds in the project design which provide visual screening and noise attenuation. All three noise mounds have been completed and landscaped as per the approved designed.

2.11 Temporary works

The project requires temporary works to allow for safe and efficient construction of the Foxground and Berry bypass.

During the reporting period, the project rehabilitated the remaining two ancillary sites left on the project at Woodhill Mountain Road and Austral Park crushing area. The two remaining compounds were the last of the construction footprint to be rehabilitated.

Figure 2-6: Rehabilitation of Woodhill Mountain Road ancillary facility

Figure 2-7: Rehabilitation of Austral Park ancillary facility

3 Environmental management system overview

3.1 Environmental Management System certification

The overall Environmental Management System (EMS) for the Project is described within the Construction Environmental Management Plan (CEMP) and relevant sub plans. The EMS for the Project has been prepared to comply with the requirements of AS/NZS ISO 14001 Environmental Management Systems.

The Fulton Hogan EMS is periodically audited by external auditors to ensure compliance with ISO 14001. The Fulton Hogan EMS was audited in March 2019 by an external auditor which resulted in the recertification of the system.

3.2 Environmental management framework

The framework of the environmental management documents has been designed to comply with the requirements of ISO 14001 and to be consistent with the Guidelines for the Preparation of an EMP (DP&I 2004).

The CEMP comprises relevant sections from Fulton Hogan's Corporate Management System as well as a number of supporting documents (i.e. issue specific environmental sub plans) providing more detailed environmental management specifications.

3.3 Construction Environmental Management Plan

The CEMP is the key management tool in relation to environmental performance during the design and construction phases. The CEMP outlines Fulton Hogan's approach to minimising and managing environmental risks associated with the construction phase of the project. The CEMP is a dynamic document that is reviewed and amended to incorporate additional requirements as required, including changes to the project team, organisational structure and responsibilities or as improvements to procedures and methodologies develop.

The CEMP has been prepared in accordance with a number of guidelines including:

- Guideline for the Preparation of Environmental Management Plans (DP&I, 2004);
- RMS Specification G36 – Environmental Protection (Management Systems);
- ISO 14001:2004 – Environmental Managements Systems; and
- ISO 19011:2003 – Guidelines for Quality and/or Environmental Management Systems Auditing.
- NSW Minister for Planning Conditions of Approval (MCoA);
- EA and PPR Statement of Commitments; and
- Environment Protection License (EPL) requirements.

The CEMP was approved by the Department of Planning and Environment in accordance with MCoA B35 on 6 June 2014.

Detailed environmental management sub plans have been prepared on key environmental elements identified for the Project through the environmental assessment and approval process. They document the aspects, impacts, safeguards and monitoring requirements for each key environmental element, nominate who is responsible for implementing controls and note the frequency/timing of implementation.

The CEMP and sub-plans were reviewed and endorsed by the Project ER in 2017, dates of revision for the plans are detailed in table 3-1. The last review and ensorsement of the CEMP was conducted in October 2018 and no further review and/or amendments are proposed.

Plan Name	DP&E Approval Date	Consistent with MCOA	Latest revision date
Construction Environmental Management Plan	06 June 2014	Yes	Rev I October 2018
Flora and Fauna Management Sub Plan	27 May 2014	Yes	Rev H October 2018
Heritage Management Sub Plan	13 May 2014	Yes	Rev G October 2018
Noise and Vibration Management Sub Plan	06 June 2014	Yes	Rev H October 2018
Soil and Water Quality Management Sub Plan	06 June 2014	Yes	Rev G October 2018
Air Quality Management Sub Plan	26 April 2014	Yes	Rev H October 2018
Construction Waste and Energy Management Sub Plan	29 April 2014	Yes	Rev I October 2018

Table 3-1: CEMP and sub plans consistency with MCoA and ER review dates

3.4 Compliance auditing

Regular auditing of the management system is completed during construction. Auditing includes:

- Internal compliance audits undertaken by Fulton Hogan
- External compliance audits undertaken by the Environmental Representative and Roads and Maritime appointed auditors.

The intent of these audits is to identify opportunities for improvement and any system non-conformances during the course of construction so appropriate corrective actions can be implemented in a timely manner.

No regular audits have been undertaken during the reporting period as only very limited works were in progress that were associated with landscape maintenance and ancillary site decommissioning. EPL requirements and CEMP commitments were reviewed as part of onsite environmental inspections ensuring all works were conducted were compliant.

4 Environmental Performance

The project continued to implement and maintain a high standard of environmental controls during the reporting period. Controls were planned and executed to industry best practice standards.

The project's environmental performance is reviewed and measured by Roads and Maritime, FBB ER, NSW EPA, NSW Department of Primary Industries - Fisheries and NSW Office of Water.

Regional Roads and Maritime environment staff reviewed the project 3 times in the reporting period. Those inspections gave the project numerious 'green' and no 'amber or red' ratings. According to the Roads and Maritime assessment standards the green rating indicates the 'site demonstrates good environmental management with no action required to avoid environmental harm'.

EPA and DPIE visited site on 11th June 2019 to review the rehabilitation works of the and discussed surrendering the project EPL. No issues were raised during the inspection and all were happy with the way the site was progressing in decommissioning former ancillary facilities. The project EPL surrender application was submitted to the EPA and was approved on the 20th June 2019.

Fulton Hogan held the last of the six monthly environmental review group meeting (ERG) on in September 2017.

No significant environmental issues or concerns were raised by any agencies during the reporting period and all works were conducted in accordance with EPL requirements and CEMP commitments.

4.1 Effectiveness of environmental controls

Effectiveness of environmental controls is evaluated by industry trained environmental engineers and scientists. Controls are planned prior to ground disturbance and installed before works start.

Environmental controls have been designed and installed in accordance with industry best environmental practice. External specialist consultants are engaged periodically to provide specialist reviews and audit the effectiveness of installed controls. In addition to this, all controls are inspected weekly as a minimum, during and after rainfall events.

Site controls are reviewed and reinforced in advance of predicted heavy rainfall events. Prior to long weekends and shutdown periods extra controls are installed to make sure they are suitable for the time that workers are offsite.

Maintenance of controls occurs regularly during construction. Maintenance ensures controls are functioning properly and are fit for purpose.

In the reporting period, all erosion and sediment controls performed well during adverse weather. This minimised potential impacts on receiving catchments and adjacent sensitive receivers.

4.2 Environmental initiatives

The Foxground and Berry bypass construction team has adopted a 'Beyond Compliance' approach to the project. The aspirational goal for the project team is to leave a community legacy built on 360 degrees of excellence. This philosophy promotes a positive culture of excellence whereby the project aims to exceed the contract and legal requirements to create a legacy that all associated with the project will be proud of.

The ‘Beyond Compliance’ strategy has led to the development of goals for each construction zone to achieve during the project.

5 Environmental monitoring

The Foxground and Berry bypass project is undertaking a range of environmental monitoring to review the environmental effects of the project. The results of these monitoring activities are used to establish trends and drive improvements.

These results of the monitoring programs are described in this section.

5.1 Water quality

In accordance with approval condition B16 the project has developed a Water Quality Monitoring Program has been developed and was approved 27 October 2014.

The approved *'Water Quality Monitoring. Surface Water Monitoring Plan'* (June 2014) sets out the requirements for surface water quality monitoring. As the project became operational at the end of October 2017 surface water quality monitoring moved into the operational phase of monitoring except for two monitoring sites which would monitor any potential impacts from the Woodhill Mountain Road Compound. This process was agreed to by Fulton Hogan, Roads and Maritime and the project ER. As the remaining two ancillary facilities were rehabilitated and stabilised the requirement to measure the effects from construction on surface water was removed and as such the final surface water quality event was in June 2019.

In the reporting period Fulton Hogan undertook the following surface water monitoring events:

- 5 April 2019 (event 38)
- 5 June 2019 (event 39)

The reports for these events are contained in Appendix B of this report.

In the reporting period Roads and Maritime undertook the following post construction surface water monitoring events:

- 05 June 2019 (event 11)
- 02-03 September 2019 (event 12)

The reports for events 10 and 11 are contained in Appendix B of this report.

5.2 Flora and fauna

In accordance with approval condition B9 the project has developed an Ecological Monitoring Program (EcMP) approved on 27 October 2014.

Operational ecological monitoring is being undertaken by Roads and Maritime and monitoring events within this reporting period are as follows:

- Nest Box Monitoring – The nest box monitoring for 2019 will occur during late October to early November 2019.
- Aquatic monitoring – The aquatic monitoing for 2019 will occur during early and late October 2019.
- Camera automated motion detection monitoring - The camera monitoring for 2019 will occur during late October to early November 2019.
- Transect monitoring – The next transect monitoring will occur during late February 2020.

Fauna underpasses, aerial fauna crossings for arboreal mammals, and fauna fencing along the alignment is complete.

Figure 5-1: Fauna underpass complete

5.3 Heritage

There were no unexpected heritage finds on the project in the reporting period

5.4 Air quality

Ambient air quality monitoring for the project was undertaken in accordance with the Construction Air Quality Management Sub-plan. The highway is operational and as such air quality monitoring ceased in February 2018 with the consultation between EPA, ER, Roads and Maritime and Fulton Hogan.

5.5 Noise and vibration

Due to the low noise nature of work carried out during the reporting period, Fulton Hogan deemed that noise monitoring would only result in readings of external influences and operational noise from the highway. Monthly noise monitoring ceased in December 2017 with the consultation between EPA, ER, Roads and Maritime and Fulton Hogan.

6 Community complaints

In accordance with MCoA B31, a complaint management system has been established on the project to document community consultation including enquiries or complaints during construction. The project information line, email address, postal address and website are now being monitored and managed by Roads and Maritime.

The telephone number, postal address and email address was published in newspapers circulating the local area before construction started and at project completion. The details are included on all project material published to the community and they are also available on the project website in accordance with MCoA B31.

Figure 5.1 - Advert from South Coast Register – Friday 10 November 2017

The project will continue to respond to and manage complaints made by stakeholders in accordance with AS-ISO 10002-2006 Complaints Handling. This system will be in place until eight weeks after the date of construction completion.

6.1 Number and types of complaints

During the reporting period no complaints were received to the project information number. Roads and Maritime has received complaints and enquiries regarding noise from the operation of the Foxground and Berry Bypass including complaints received through the office of the Member for Kiama. A summary of those complaints and enquiries is documented and provided to DPIE on 31 May 2019 as an addendum to the previously submitted Operational Noise Report as required by Condition of Approval E1(d) .

6.2 Community engagement initiatives

Consultation with nearby residents about the remaining construction activities occurred between occurred during the reporting period.

7 Other compliance matters

7.1 Compliance Management

During the reporting period there were:

- No environmental non-conformances
- No overpressure non-conformances
- No overall non-conformances for the project against the conditions of approval and statement of commitments.

7.2 Internal and external environmental inspections

The project completes many inspections to assess environmental performance and identify improvements.

Those inspections have resulted in environmental management improvements across the project. The improvements included new erosion and sediment control installations, improved site mitigations and general site improvements.

Table 6-2 summarises the inspections completed on the project. The inspections completed are consistent with the requirements of the project documents.

Inspection type	Attendees	Number of inspections
Weekly	Fulton Hogan environmental manager	14
Wet weather	Fulton Hogan environmental manager	2
Environmental Representative	Toby Hobbs Fulton Hogan environmental manager	3
Roads and Maritime	Michelle Toms/Kamlesh Prajapati Roads and Maritime project staff Toby Hobbs Fulton Hogan staff; environmental manager	3
NSW EPA	Michael Heinze Fulton Hogan environmental manager	1
NSW DPIE	Jennifer Rowe	1

Table 6-2: Inspections

Appendix A Project Approval Compliance Table

FBB Compliance Tracking Table – 30 September 2019

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
PART A - ADMINISTRATIVE CONDITIONS						
Terms of Approval						
A1	The Proponent shall carry out the project generally in accordance with the: (a) Major Project Application MP10_0240; (b) Princes Highway upgrade – Foxground and Berry bypass - Environmental Assessment (Volumes 1-2), prepared by AECOM Australia Pty Ltd for Roads and Maritime Services and dated November 2012; (c) Princes Highway upgrade – Foxground and Berry bypass – Submissions Report, prepared by AECOM Australia Pty Ltd for Roads and Maritime Services and dated May 2013, including the revised Statement of Commitments contained therein; and (d) conditions of this approval.	Pre-construction, construction, and operation	RMS	Compliant	Construction Environmental Management Plan (Rev G), September 2017 Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A2	In the event of an inconsistency between: (a) the conditions of this approval and any document listed from condition A1(a) to A1(c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and (b) any document listed from condition A1(a) to A1(c) inclusive, and any other document listed from condition A1(a) to A1(c) inclusive, the most recent document shall prevail to the extent of the inconsistency.	Pre-construction, construction, and operation	RMS	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A3	The Proponent shall comply with any reasonable requirement(s) of the Secretary of the NSW Department of Planning & Environment (DP&E) arising from the Department's assessment of: (a) any reports, plans or correspondence that are submitted in accordance with this approval; and (b) the implementation of any actions or measures contained within these reports, plans or correspondence.	Pre-construction, construction, and operation	RMS	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 Tracked and reported bi-annually in the Compliance Tracking Reports.	Ongoing
A4	Subject to confidentiality, the Proponent shall make all documents required under this approval available for public inspection on request.	Pre-construction, construction, and operation	RMS	Compliant	Community Consultation Strategy, January 2017 The project is now in operational phase.	Ongoing
A5	The Proponent shall notify the Secretary of the NSW Department of Planning & Environment (DP&E) and other relevant government agencies of any incident with actual or potential significant off-site environmental impacts on people or the biophysical environment as soon as practicable and within 24 hours after the occurrence of the incident. The Proponent shall provide full written details of the incident to the Secretary of the NSW Department of Planning & Environment (DP&E) within seven days of the date on which the incident occurred. Note: Where an incident also requires reporting to the OEH and/or EPA the incident report prepared for the purposes of notifying the OEH and/or EPA would meet this requirement	Pre-construction, construction, and operation	RMS	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 The project is now in operational phase.	Ongoing
A6	The Proponent shall meet the requirements of the Secretary of the NSW Department of Planning & Environment (DP&E) or relevant government agency (as determined by the Secretary of the NSW Department of Planning & Environment (DP&E)) to address the cause or impact of any incident, as it relates to this approval, reported in accordance with condition A5, within such period as the Secretary of the NSW Department of Planning & Environment (DP&E) may require.	Pre-construction, construction, and operation	RMS	Compliant	Construction Environmental Management Plan (Rev G), September 2017. Section 1.2 The project is now in operational phase.	Ongoing
Limits of Approval						
A7	This approval shall lapse ten years after the date on which it is granted, unless construction works the subject of this project approval are physically commenced on or before that date.	Pre-construction, construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), Section 1.2 The project is now in operational phase.	Complete
Statutory Requirements						
A8	The Proponent shall ensure that all necessary licences, permits and approvals required for the development of the project are obtained and maintained as required throughout the life of the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such necessary licences, permits or approvals except as provided under section 75U of the Act. This shall include relevant certification requirements in accordance with section 109R of the Act.	Pre-construction, construction, and operation	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev G), Section 1.2 The project is now in operational phase.	Complete
Staging						

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
A9	The Proponent may elect to construct and/ or operate the project in stages. Where staging is proposed, the Proponent shall submit a Staging Report to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of the first proposed stage. The Staging Report shall provide details of: (a) how the project would be staged including general details of work activities associated with each stage and the general timing of when each stage would commence; and (b) details of the relevant conditions of approval, which would apply to each stage and how these shall be complied with across and between the stages of the project. (c) Where staging of the project is proposed, these conditions of approval are only required to be complied with at the relevant time and to the extent that they are relevant to the specific stage(s). The Proponent shall ensure that an updated Staging Report (or advice that no changes to staging are proposed) is submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of each stage, identifying any changes to the proposed staging or applicable conditions. The Proponent shall ensure that all plans, sub-plans and other management documents required by the conditions of this approval and relevant to each stage (as identified in the Staging Report) are submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) no later than one month prior to the commencement of the relevant stages, unless an alternative timeframe is agreed to by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction, construction	RMS/Fulton Hogan	Compliant	NA. No changes to staging are proposed from that already approved by DP&E as part of the *Toolijooa Road Fill Works Stage of the Foxground and Berry bypass Project.*	Complete
PART B - PRIOR TO CONSTRUCTION						
Design						
B1	The proponent shall, in consultation with the relevant council/s, investigate the need for: (a) potential future on and off ramps at Woodhill Mountain Road; and (b) a potential future left turn lane onto the new highway from Toolijooa Road. The investigation shall be undertaken to the satisfaction of Secretary of the NSW Department of Planning & Environment (DP&E), and include consideration of the relevant environmental impacts (noise, flooding, heritage, biodiversity, traffic etc.) and consider any alternative options.	Pre-construction	RMS	Compliant	RMS consulted with both Kiama Municipal Council and Shoalhaven City Council regarding the future off ramps and left turn lane. A letter regarding B1 was sent to DP&E on 30th September 2014. DP&E advised of their satisfaction in addressing B1 in a letter dated 27th October 2014.	Complete
B2	The bridge piers at the Connollys Creek / Bundewallah Creek / Broughton Mill Creek crossing shall be located and designed in such a way to minimise visual impacts to Berry and the bridge piers at Broughton Creek crossing 3 are located and designed in such a way to minimise visual impacts to RMB 353 Princes Highway, Broughton Village. Evidence of how visual impacts have been minimised shall be provided to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of works that would influence the design of the bridge in this location.	Pre-construction	RMS/Fulton Hogan	Compliant	Compliance has been met through the development of the detailed Urban Design and Landscaping Plan 12 September 2014 Evidence of how visual impacts have been minimised was provided to DP&E on 30th September 2014.	Complete
Biodiversity - Mitigation Measures - Fauna and Waterways						
B3	The Proponent shall design (and implement) the fauna crossings identified in Table 5.1 of Volume 2 Appendix F of the document listed under condition A1(b), at the locations and in accordance with the minimum design principles identified in Table 5.1, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E)	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015 As at March 2018, all fauna crossing have been completed generally in accordance with the Fauna Crossing Report	Complete
B4	Investigations into the design of fauna crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b) during detailed design shall be undertaken with the input of a suitably qualified and experienced ecologist and in consultation with OEH and DPI (Fishing and Aquaculture).	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015	Complete
B5	The Proponent shall prepare a report on the final design of fauna and/or waterway crossings identified in Table 5.1 of Appendix F of the document listed under condition A1(b), where the location of the crossing has changed and/or the crossing does not meet the minimum design principles identified in Table 5.1. The report shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E)prior to the commencement of construction of the relevant crossing, and shall demonstrate how the new location and/ or design would result in acceptable biodiversity outcomes. The report shall clearly identify how the fauna and/or waterway crossing will work in conjunction with complementary fauna exclusion fencing measures to be implemented for the project. The report shall be accompanied by evidence of consultation with OEH and DPI (Fishing and Aquaculture) in relation to the suitability of any changes to the location and/or crossing design.	Pre-construction	RMS/Fulton Hogan	Compliant	Princes Highway Foxground and Berry Bypass Fauna Crossings Report 20 November 2015	Complete
B6	The Proponent shall, in consultation with OEH and DPI (Fishing and Aquaculture), ensure that all waterway crossings are designed and constructed consistent with the principles of the Guidelines for Controlled Activities Watercourse Crossings (Department of Water and Energy, February 2008), Policy and Guidelines for Fish Friendly Waterway Crossings (NSW Fisheries, February 2004) and Policy and Guidelines for Design and Construction of Bridges, Roads, Causeways, Culverts and Similar Structures (NSW Fisheries 1999). Where multiple cell culverts are proposed for creek crossings, at least one cell shall be provided for fish passage, with an invert or bed level that mimics creek flows.	Pre-construction	RMS/Fulton Hogan	Compliant	Flora and Fauna Management Sub Plan (Rev G) The project used three temporary bridges and one temporary culvert to provide access across the three 'Class 1' waterways on the project. All temporary creek crossings have now been removed and embankments have been rehabilitated.	Complete
Biodiversity Offsets						
B7	The Proponent shall, in consultation with the OEH and DPI (Fishing and Aquaculture), develop a Biodiversity Offset Strategy that identifies the available options for offsetting the biodiversity impacts of the project in perpetuity, with consideration to the	Pre-construction	RMS	Compliant	Biodiversity Offset Strategy approved by DP&E 27 October 2014	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	Principles for the use of biodiversity offsets in NSW (OEH website http://www.environment.nsw.gov.au/biocertification/offsets.htm dated 17 June 2011). Unless otherwise agreed to by the OEH and DPI (Fishing and Aquaculture), offsets shall be provided on a like-for-like basis and at a minimum ratio of 4:1 for areas of high conservation value (including EEC, salt marsh, and poorly conserved vegetation communities identified as being more than 75% cleared in the catchment management area) and 2:1 for the remainder of native vegetation areas (including threatened species habitat, mangroves, seagrass, and non-EEC riparian vegetation). The Strategy shall include, but not necessarily be limited to: (a) the aims and objectives of the biodiversity offset strategy; (b) confirmation of the vegetation type/ habitat (in hectares) to be cleared and their condition, and the size of offsets required (in hectares); (c) details of the type of available offset measures that have been identified to compensate for the loss of threatened species and vulnerable and endangered ecological communities and/ or their habitats, and native vegetation (including mangroves, seagrasses, salt marsh and riparian vegetation). The measures shall achieve a neutral or net beneficial outcome for all the biodiversity values likely to be impacted directly or indirectly during both the construction and operation of the project; (d) the decision-making framework that would be used to select the final suite of offset measures to achieve the aims and objectives of the Strategy, including the ranking of offset measures; (e) a process for addressing and incorporating offset measures arising from changes in biodiversity impacts (where these changes are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1), including: (i) changes to the footprint due to detailed design; (ii) (changes to predicted impacts as a result of changes to mitigation measures; (iii) the identification of additional species/ habitat through pre-clearance surveys and construction; (iv) addressing outcomes of the ecological monitoring program; and (v) additional impacts associated with the establishment of ancillary facilities; and (f) options for the securing and management of biodiversity offsets in perpetuity. The Biodiversity Offset Strategy shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).					
B8	Within two years of the date of approval of the Biodiversity Offset Strategy, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall prepare and submit a **Biodiversity Offset Package** for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E). The Package shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture), and shall include, but not necessarily be limited to: (a) details of the final suite of the biodiversity offset measures to be implemented for the project demonstrating how it achieves the requirements of the Biodiversity Offset Strategy (including specified offset ratios); (b) the final selected means of securing the biodiversity values of the Package in perpetuity, including ongoing management, maintenance and monitoring requirements; and (c) timing and responsibilities for the implementation of the provisions of the Package over time. The requirements of the Package shall be implemented by the responsible parties according to the timeframes set out in the Package, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Construction and operation	RMS	Compliant	The Biodiversity Offset Package was approved by DPIE on the 3rd May 2017. All four agreements were lodged with OEH in the previous reporting period. BioBanking credits were issued by OEH during October 2018. All BioBanking credits now retired to offset the impact on biodiversity values.	Complete
Ecological Monitoring						
B9	The Proponent shall develop an **Ecological Monitoring Program** to monitor the effectiveness of the biodiversity mitigation measures implemented as part of the project. The program shall be developed by a suitably qualified and experienced ecologist in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include but not necessarily be limited to: (a) an adaptive monitoring program to assess the effectiveness of the mitigation measures identified in conditions B3 and B36(b) and allow amendment to the measures if necessary. The monitoring program shall nominate performance parameters and criteria against which effectiveness will be measured and include operational road kill surveys to assess the effectiveness of fauna crossings and exclusion fencing implemented as part of the project; (b) mechanisms for developing additional monitoring protocols to assess the effectiveness of any additional mitigation measures implemented to address additional impacts in the case of design amendments or unexpected threatened species finds during construction (where these additional impacts are generally consistent with the biodiversity impacts identified for the project in the documents listed under condition A1); (c) monitoring shall be undertaken during construction (for construction-related impacts) and from opening of the project to traffic (for operation/ ongoing impacts) until such time as the effectiveness of mitigation measures can be demonstrated to have been achieved over a minimum of three successive monitoring periods after opening of the project to traffic, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The monitoring period may be reduced with the agreement of the Secretary of the NSW Department of Planning & Environment	Pre-construction	RMS	Compliant	Ecological Monitoring Program approved 27 October 2014 Ecological monitoring is ongoing. Monitoring dates within the previous reporting period were: - Nest Box Monitoring - 30 October - 1 November 2018 - Aquatic monitoring - 20-22 November 2018 - Camera automated motion detection monitoring - October 2018. The camera monitoring for 2019 will occur later this year in the summer. - Transect monitoring – 18 February 2019 – 1 March 2019 Monitoring reports has been submitted to DP&E on 8 July 2019.	Ongoing

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	(DP&E) in consultation with the OEH and DPI (Fishing and Aquaculture), depending on the outcomes of the monitoring; (d) provision for the assessment of the data to identify changes to habitat usage and whether this can be directly attributed to the project; (e) details of contingency measures that would be implemented in the event of changes to habitat usage patterns directly attributable to the construction or operation of the project; and (f) provision for annual reporting of monitoring results to the Secretary of the NSW Department of Planning & Environment (DP&E) and the OEH and DPI (Fishing and Aquaculture), or as otherwise agreed by those agencies. The Program shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval no later than 6 weeks prior to the commencement of construction that would result in the disturbance of native vegetation (unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E)).					
Hydrology and Flooding						
B10	The Proponent shall ensure, where feasible and reasonable, that the project is designed to not exceed the afflux and other flooding criteria within the vicinity of the project as identified or predicted in the documents listed under condition A1. New or duplicated drainage structures shall be designed to minimise changes to afflux and flooding to waterways that traverse the project alignment to the greatest extent practicable.	Pre-construction	RMS/Fulton Hogan	Compliant	Detailed Design - Flooding Report	Complete
B11	The Proponent shall develop a Hydrological Mitigation Report for properties in the Broughton Creek, Town Creek, Bundewallah Creek and Shoalhaven floodplain areas where flood impacts are predicted to increase as a result of the project. The Report shall be based on detailed floor level survey and associated assessment of potentially flood affected properties in those areas. The Report shall: (a) identify properties in those areas likely to have an increased flooding impact and detail the predicted increased flooding impact; (b) identify mitigation measures to be implemented where increased flooding is predicted to adversely affect access, property or infrastructure; (c) identify measures to be implemented to minimise scour and dissipate energy at locations where flood velocities are predicted to increase as a result of the project and cause localised soil erosion and/or pasture damage; (d) be developed in consultation with the relevant council, NSW State Emergency Service and directly-affected property owners; and (e) identify operational and maintenance responsibilities for items (a) to (c) inclusive. The Proponent shall not commence construction of the project on or within those areas likely to alter flood conditions until such time as works identified in the hydrological mitigation report have been completed, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction	RMS/Fulton Hogan	Compliant	Hydrological Mitigation Report Detailed Design - Flooding Report Repeated attempts to gain agreement with the landowner have not been successful to date. Roads and Maritime are continuing efforts to resolve this issue.	Ongoing
B12	Based on the mitigation measures identified in condition B11, the Proponent shall prepare a final schedule of feasible and reasonable flood mitigation measures proposed at each directly-affected property in consultation with the property owner. The schedule shall be provided to the relevant property owner(s) prior to the implementation/ construction of the mitigation works, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). A copy of each schedule of flood mitigation measures shall be provided to the Department and the relevant council prior to the implementation/ construction of the mitigation measures on the property.	Pre-construction	RMS/Fulton Hogan	Compliant	Hydrological Mitigation Report (by RMS)	Complete
B13	In the event that the Proponent and the relevant property owner cannot agree on feasible and reasonable flood mitigation measures to be applied to a property within one month of the first consultation on the measures (as required under condition B10), the Proponent shall employ a suitably qualified and experienced independent hydrological engineer, who has been approved by the Secretary of the NSW Department of Planning & Environment (DP&E), for the purposes of this condition prior to the commencement of construction in the Broughton Creek, Town Creek, Bundewallah Creek and Shoalhaven floodplain areas affected by increased afflux from the project to advise and assist affected property owners in negotiating feasible and reasonable mitigation measures.	Pre-construction	RMS	Compliant	Mark Babister from WMA Engineers appointed and approved by DP&E	Complete
B14	The Proponent shall provide assistance to the relevant council and/ or NSW State Emergency Service, to assist in the preparation of any new or necessary update(s) to the relevant plans and documents in relation to flooding, to reflect changes in flooding levels, flows and characteristics as a result of the project.	Pre-construction	RMS/Fulton Hogan	Compliant	RMS have consulted local council and they have advised that no assistance is required	Complete
Sedimentation, Erosion and Water						
B15	Prior to the commencement of construction, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall in consultation with the EPA and NOW, undertake groundwater modelling on the concept design for the project, subject to the modelling being revised should the detailed design have a significantly different impact on groundwater than the concept design. The modelling shall be undertaken by a suitably qualified and experienced groundwater expert and assess the construction and operational impacts of the proposal on the groundwater resources, groundwater quality, groundwater hydrology and groundwater dependent ecosystems and provide details of contingency and management measures in the groundwater management strategy required under condition B36(d).	Pre-construction	RMS/Fulton Hogan	Compliant	Detailed Design - Geotechnical Design & Interpretative Report RMS undertook groundwater modelling on the RMS Concept Design for the project. Since the detailed design will not have a significantly different impact on groundwater than the RMS Concept Design, no further groundwater modelling is required.	Complete

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B16	The Proponent shall prepare and implement a Water Quality Monitoring Program to monitor the impacts of the project on surface and groundwater quality and resources and wetlands, during construction and operation. The Program shall be developed in consultation with the OEH, EPA, DPI (Fishing and Aquaculture) and NOW and shall include but not necessarily be limited to: (a) identification of surface and groundwater quality monitoring locations (including watercourses, water bodies and SEPP14 wetlands) which are representative of the potential extent of impacts from the project; (b) the results of the groundwater modelling undertaken under condition B15; (c) identification of works and activities during construction and operation of the project, including emergencies and spill events, that have the potential to impact on surface water quality of potentially affected waterways; (d) development and 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); (e) representative background monitoring of surface and groundwater quality parameters for a minimum of twelve months (considering seasonality) prior to the commencement of construction, to establish baseline water conditions, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E); (f) a minimum monitoring period of three years 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); (g) contingency and ameliorative measures in the event that adverse impacts to water quality are identified; and (h) reporting of the monitoring results to the Department, OEH, EPA and NOW. The Program shall be submitted to the Director-General for approval 6 months prior to the commencement of construction of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). A copy of the Program shall be submitted to the OEH, EPA, DPI (Fishing and Aquaculture) and NOW prior to its implementation.	Pre-construction	RMS/Fulton Hogan	Compliant	Construction Soil and Water Quality Management Plan (Rev E) Appendix B - Water Quality Monitoring Program As the project became operational at the end of October 2017 surface water quality monitoring moved into the operational phase of monitoring except for 2 monitoring sites which would monitor any potential impacts from the Woodhill Mountain Road Compound. Monitoring at the remaining 2 sites ceased in June 2019 as no impacts to water quality was noted during monitoring and the Ancillary Facility rehabilitation was completed. Fulton Hogan, Roads and Maritime and the project ER agreed to this process. Fulton Hogan undertook Surface water quality monitoring at the two sites related to WHMR compound on the following dates: - 5 April 2019 – Minor - 5 June 2019 – Minor RMS undertook surface water quality monitoring on the following dates: - 05 June 2019 - 02-03 September 2019 Water quality monitoring results are provided in Appendix B of this report.	Ongoing
Heritage Impacts - Built and Landscape Heritage						
B17	Prior to pre-construction and construction impacts affecting 'Glen Devon' Federation Cottage (H11) and skid mounted work-site shed (H60), the Proponent shall carry out further historical research and investigate the options for relocation of these heritage items, in consultation with the department and the Heritage Council of NSW, to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Additionally, for H11, the proponent shall: (a) undertake archaeological investigations in accordance with condition B20; and (b) provide for the preparation and implementation of a heritage interpretation plan.	Prior to Pre-construction	RMS	Compliant	Glen Devon Cultural Heritage Assessment was submitted to DP&E on 16th July 2014 and was approved by DP&E in a letter dated 10th September 2014. DP&E was advised of the relocation outcome of Glen Devon in a letter dated 9th July 2015. The Glen Devon Heritage Interpretation Plan was submitted to DP&E on 9th July 2015.	Complete
B18	Prior to the commencement of preconstruction and construction works in proximity to the following items G2B H11, H13, H15, H16, H17, H19, H21, H22, H23, H30, H45, H47, H53, H54, H55, H56, H62, H63, and the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape (SICPH CL), and G2B A13, A14, A39, TRACL and MFT12 the Proponent shall complete all archival recordings, including photographic recording. In addition detailed historical research shall be undertaken for the following items G2B H60 H61, H63, the SICPH CL and G2B A39. This work shall be undertaken by an experienced heritage consultant, in accordance with the guidelines issued by the Heritage Council of NSW. The areas containing these items shall be clearly identified and/or fenced until the completion of the archival recordings. Within 6 months of completing the above work, the Proponent shall submit a report containing the archival recordings and the historical research, where required, to the Secretary of the NSW Department of Planning & Environment (DP&E), the Heritage Council of NSW, the local Council and the local Historical Society.	Prior to Pre-construction	RMS	Compliant	Archival recording and detailed historic research complete. Reports were sent to the DP&E independently of this Compliance Tracking Report. Reports relating to Non-Aboriginal heritage were submitted to DP&E on 10th July 2015 Reports relating to Aboriginal heritage were submitted to DP&E on 22nd October 2015 Reports were sent to the Heritage Council of NSW, the local Councils, and the local Historical Society during this reporting period.	Complete
B19	Prior to pre-construction and construction impacts affecting G2B H15, H19, H21, H22, H23, H30 and H55 the Proponent shall carry out further historical and physical archaeological investigations in relation to these road alignments , in consultation with the department and the Heritage Council of NSW, to the satisfaction of the Director-General. These investigations must: (a) undertake archaeological investigations in accordance with condition B22; (b) provide for the detailed analysis of any heritage items discovered during the investigations; (c) include management options for these heritage items (including options for relocation and display); and (d) if the findings of the investigations are significant, provide for the preparation and implementation of a heritage interpretation plan.	Prior to Pre-construction	RMS	Compliant	Historic and physical archaeological investigations complete. Report submitted to the DP&E on 10th July 2015.	Complete
Archaeology (Aboriginal and non-Aboriginal)						
B20	Prior to the commencement of pre-construction and construction activities affecting Aboriginal site G2B PAD 1 the Proponent shall: (a) undertake archaeological investigation of this site using a methodology generally consistent with testing undertaken for	Prior to Pre-construction	RMS	Compliant	Archaeological investigations complete. Report submitted to the DP&E on 22nd October 2015.	Complete

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	the Environmental Assessment, and prepared in consultation with the OEH (Aboriginal heritage) and the Aboriginal stakeholders; and (b) report on the results of the archaeological investigation, including recommendations (such as for further archaeological work), in consultation with the OEH and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E), and shall include, but not necessarily be limited to: (i) consideration of measures to avoid or minimise disturbance to Aboriginal objects where objects of moderate to high significance are found to be present; (ii) where impacts cannot be avoided, recommendations for any further investigations under condition B21; and (iii) management and mitigation measures to ensure there are no additional impacts due to pre-construction and construction activities.					
B21	Prior to the commencement of pre-construction and construction activities affecting sites G2B A16, A18, A24, A29, A30, A31, A32, A33, A36, and G2B PAD1 the proponent shall: (a) develop a detailed salvage strategy, prepared in consultation with the OEH (Aboriginal heritage) and the Aboriginal stakeholders. The investigation program shall be prepared to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E); and (b) undertake any further archaeological excavation works recommended by the results of the Aboriginal archaeological investigation program. Within twelve months of completing the above work, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall submit a report containing the findings of the excavations, including artefact analysis and Aboriginal Site Impacts Recording Forms (ASIR), and the identification of final storage location for all Aboriginal objects recovered (testing and salvage), prepared in consultation with the Aboriginal stakeholders, the OEH (Aboriginal heritage) and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Note: where archaeological testing has occurred as part of the Environmental Assessment and the results are included in the documents listed in condition A1(b) the sites tested must still form part of the final report prepared under condition B21(b).	Prior to Pre-construction	RMS	Compliant	Archaeological salvage works have been completed on behalf of RMS by the nominated project archaeologist Kelleher Nightingale Consulting, in accordance with the approved methodology. The salvage report was finalised and sent to DP&E on 29th February 2016.	Complete
B22	Prior to the commencement of pre-construction and construction activities affecting non-Aboriginal sites H11, H14, H19, H23, H28, H30, H48, H49, H53, and H55, the Proponent shall: (a) Undertake an Historic archaeological investigation program in accordance with the Heritage Council's Archaeological Assessments Guideline (1996) using a methodology prepared, in consultation with the OEH (Heritage Branch), and to the satisfaction of the Director-General. This work should be undertaken by an archaeological heritage consultant approved by the Director-General. The nomination for the Excavation Director shall demonstrate ability to comply with the Heritage Council's Criteria for the Assessment of Excavation Directors (July 2011). (b) Report on the results of the non-Aboriginal archaeological investigation program, including recommendations (such as for further archaeological work), in consultation with the Heritage Branch, OEH and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E), and shall include, but not necessarily be limited to: (i) consideration of measures to avoid or minimise disturbance to archaeology, where archaeology of non-Aboriginal archaeological significance is found to be present; (ii) where impacts cannot be avoided, recommendations for any further investigations for archaeology of historical archaeological significance; and (iii) management and mitigation measures to ensure there are no additional impacts due to pre-construction and construction activities. (c) Undertake any further archaeological excavation works recommended by the results of the non-Aboriginal archaeological investigation program. Within 12 months of completing the above work, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall submit a report containing the findings of the excavations, including artefact analysis, and the identification of a final repository for finds, prepared in consultation with the OEH (Heritage branch) and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E). Note: where archaeological testing has occurred as part of the environmental assessment and the results are included in the documents listed in condition A1(b) the sites tested must still form part of the methodology and final report prepared for the non-Aboriginal archaeological investigation program.	Prior to Pre-construction	RMS	Compliant	Investigation and reporting is complete. Report submitted to the DP&E on 10th July 2015.	Complete
Urban Design and Landscaping						
B23	The Proponent shall prepare and implement an Urban Design and Landscape Plan for the project. The Plan shall be prepared in consultation with the relevant council and shall present an integrated urban design for the project. The Plan shall include, but not necessarily be limited to: (a) a principal goal of achieving the urban design objectives outlined in Section 2.2 Volume 2 Appendix I of the document referred to in Condition A1(b); (b) location of existing vegetation and proposed landscaping (including use of indigenous and endemic species where possible) and design features;	Pre-construction	RMS	Compliant	Urban Design and Landscape Plan approved by DP&E 27 October 2017. Works to rehabilitate the project footprint in accordance with the UDLP are complete.	Complete

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	(c) graphics such as sections, perspective views and sketches for key elements of the project (including, but not limited to built elements such as retaining walls, cuttings, embankments, bridges, and noise barriers); (d) a description of locations along the project corridor directly or indirectly impacted by the construction of the project (e.g. temporary ancillary facilities, access tracks, watercourse crossings, etc.) and details of the strategies to progressively rehabilitate regenerate and/ or revegetate the locations with the objective of promoting biodiversity outcomes and visual integration. Details of species to be replanted/ revegetated shall be provided, including their appropriateness to the area and considering existing vegetation and habitat for threatened species; (e) an assessment of the visual screening effects of existing vegetation and the proposed landscaping. Where residences and businesses have been identified as likely to experience high visual impact as a result of the project and high residual impacts are likely to remain, the Proponent shall in consultation with affected receptors, identify opportunities for providing at-receptor landscaping to further screen views of the project. Where agreed to with the landowner, these measures shall be implemented during the construction of the project; (f) take into account appropriate roadside plantings and landscaping in the vicinity of heritage items and ensure no additional heritage impacts; (g) specific details on the landscape treatments for the North Street corridor, Town Creek diversion and Town Park. (h) strategies for progressive landscaping of other environmental controls such as erosion and sedimentation controls, drainage and noise mitigation; (i) location and design treatments for any associated footpaths and cyclist elements, and other features such as seating, lighting (in accordance with AS 4282-1997 Control of the Obtrusive Effect of Outdoor Lighting), fencing, and signs; (j) evidence of consultation with the relevant council and community on the proposed urban design and landscape measures prior to its finalisation; and (k) monitoring and maintenance procedures for the vegetated built elements, rehabilitated vegetation and landscaping (including weed control) including performance indicators, responsibilities, timing and duration and contingencies where rehabilitation of vegetation and landscaping measures fail. The Plan shall be submitted for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The Plan may be submitted in stages to suit the staged construction program of the project.					
Signage Policy						
B24	The Proponent shall prepare a signage policy which addresses the bypassed towns of Foxground and Berry, in consultation with the relevant council.	Operation	RMS/Fulton Hogan	Compliant	Foxground and Berry Bypass Signage Policy dated 20th September 2013	Complete
B25	The signage policy shall be consistent with the Guide: Signposting (RTA July 2007), Tourist Signposting guide (RMS and Destination NSW 2012) and provide information on the range of services available within Berry including advice on any parks that could be used as a rest area (and directional signage to these parks) and that that the route through the towns may be taken as an alternative to the highway.	Operation	RMS/Fulton Hogan	Compliant	Foxground and Berry Bypass Signage Policy dated 20th September 2013	Complete
Property and Landuse						
B26	The Proponent shall ensure that the project is designed to minimise land take impacts to surrounding properties (including agricultural properties) as far as feasible and reasonable, in consultation with the affected landowners. Where the viability of existing agricultural operations are identified to be impacted by the land requirements of the project, the Proponent shall as part of detailed design employ a suitably qualified and experienced independent agricultural specialist (that is approved by the Secretary of the NSW Department of Planning & Environment (DP&E) for the purpose of this condition), to assist in identifying alternative farming opportunities for the relevant properties.	Pre-construction	RMS	Compliant	During the project development no impacts were identified to the viability of existing agricultural operations. As such, engaging an independent agricultural specialist was not required.	Complete
B27	The proponent shall discuss Crown Land transfer options with DPI (Crown Lands) and Shoalhaven Council, for Crown land located along the length of the project between Tannery Road and the northern interchange, with a view to reaching a mutually acceptable outcome for all parties. Evidence of consultation shall be provided to the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, with an agreed outcome to be reached, and submitted to the Secretary of the NSW Department of Planning & Environment (DP&E), prior to the operation of the upgraded highway. In the event that a mutually acceptable agreement cannot be reached, the Secretary of the NSW Department of Planning & Environment (DP&E) must be advised in writing, to determine whether mediation may be required.	Pre-construction and construction		Compliant	Evidence of consultation was sent to DP&E on 26th September 2014. An outcome was provided to DP&E on 18th October 2017.	Complete
B28	The proponent shall, in consultation with Shoalhaven City Council, prepare a strategy for the use of the Council land adjacent the project at North Street (presently occupied by the Berry Riding Club) investigating options to minimise impacts on the riding club both during construction and operation of the project. The final option(s) shall be determined by the proponent prior to the commencement of construction of works in the vicinity of the riding club, in consultation with Shoalhaven City Council and to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction		Compliant	The strategy for the land between North Street and the Berry bypass has been progressed by Roads and Maritime and Shoalhaven City Council to the point where Council has exhibited a draft Berry District Park Masterplan. The Shoalhaven City Council sought community comment on the draft masterplan. Roads and Maritime, in consultation with Shoalhaven City Council, has ensured that the Foxground and Berry Bypass Project has allowed sufficient land opportunity between North Street and the Berry Bypass to meet the needs identified in the masterplan. Roads and	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
					Maritime propose no further involvement in the masterplan development and a copy of the Council draft plan is available at the following link: http://shoalhaven.nsw.gov.au/My-Council/Current-Projects/Berry-District-Park Roads and Maritime received confirmation from DPIE on 29th November 2017 that the requirements of Condition B28 have been met.	
Compliance Tracking						
B29	The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall be submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) for approval prior to the commencement of construction and relate to both the construction and operational phases of the project, and include, but not necessarily be limited to: (a) provisions for the notification of the Secretary of the NSW Department of Planning & Environment (DP&E) of the commencement of works prior to the commencement of construction and prior to the commencement of operation of the project (including prior to each stage, where works are being staged); (b) provisions for periodic review of project compliance with the requirements of this approval and the documents listed under condition A1, including the Statement of Commitments; (c) provisions for periodic reporting of compliance status against the requirements of this approval and the documents listed under condition A1, including the Statement of Commitments, to the Secretary of the NSW Department of Planning & Environment (DP&E) including at least one month prior to the commencement of construction and operation of the project and at other intervals during the construction and operation, as identified in the Program; (d) a program for independent environmental auditing in accordance with ISO 19011:2003 - Guidelines for Quality and/ or Environmental Management Systems Auditing; (e) mechanisms for reporting and recording incidents and actions taken in response to those incidents; (f) provisions for reporting environmental incidents to the Secretary of the NSW Department of Planning & Environment (DP&E) during construction and operation; and (g) procedures for rectifying any non-compliance identified during environmental auditing, review of compliance or incident management.	Pre-construction, Construction, Operation	RMS	Compliant	Compliance Tracking Program , Revision B 5 September 2014 Construction Environmental Management Plan (Rev I), Section 8.3 Notification prior to the commencement of operation was sent to the Secretary on 3rd October 2017. This report is the final Compliance Tracking report for Construction as the project is now in operational phase	Ongoing
Community Information and Involvement - Provision of Electronic Information						
B30	Prior to the commencement of construction, the Proponent shall establish and maintain a new website, or dedicated pages within an existing website, for the provision of electronic information associated with the project. The Proponent shall, subject to confidentiality, publish and maintain up-to-date information on the website or dedicated pages including, but not necessarily limited to: (a) information on the current implementation status of the project; (b) a copy of the documents referred to under condition A1 of this approval, and any documentation supporting modifications to this approval that may be granted from time to time; (c) a copy of this approval and any future modification to this approval; (d) a copy of each relevant environmental approval, licence or permit required and obtained in relation to the project; (e) a copy of each current strategy, plan, program or other document required under this approval; and (f) the outcomes of compliance tracking in accordance with the requirements of condition B29.	Pre-construction	RMS	Compliant	Community Communication Strategy, (Rev 3) Section 7.2 Website:http://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html Periodic revisions and amendments of relevant documentation will be made as required.	Ongoing
Complaints and Enquiries Procedure						
B31	Prior to the commencement of construction, the Proponent shall ensure that the following are available for community complaints and enquiries during the construction period: (a) a telephone number on which complaints and enquiries about construction and operation activities may be registered; (b) a postal address to which written complaints and enquiries may be sent; and (c) an email address to which electronic complaints and enquiries may be transmitted. The telephone number, the postal address and the email address shall be published in a newspaper circulating in the local area prior to the commencement of construction and prior to the commencement of project operation. The above details shall also be provided on the website (or dedicated pages) required by this approval.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy, (Rev 3) sections 7.2 and 8.2 The project is now in operational phase.	Complete
B32	The Proponent shall prepare and implement a Construction Complaints Management System consistent with AS 4269 Complaints Handling prior to the commencement of construction activities and must maintain the System for the duration of construction activities. Information on all complaints received, including the means by which they were addressed and whether resolution was reached and whether mediation was required or used, shall be maintained by the Proponent and included in a complaints register. The information contained within the System shall be made available to the Secretary of the NSW Department of Planning &	Pre-construction, Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy, (Rev 3) Sections 8.1 and 8.2 The project is now in operational phase.	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	Environment (DP&E) on request.					
Community Involvement						
B33	The Proponent shall prepare and implement a Community Communication Strategy for the project. This Strategy shall be designed to provide mechanisms to facilitate communication between the Proponent, the Contractor, the Environmental Representative, the relevant council and the local community (broader and local stakeholders) on the construction and environmental management of the project. The Strategy shall include, but not necessarily be limited to: (a) identification of stakeholders to be consulted as part of the Strategy, including affected and adjoining landowners; (b) procedures and mechanisms for the regular distribution of information to stakeholders on the progress of the project and matters associated with environmental management; (c) procedures and mechanisms through which stakeholders can discuss or provide feedback to the Proponent and/ or Environmental Representative in relation to the environmental management and delivery of the project; (d) procedures and mechanisms through which the Proponent can respond to enquiries or feedback from stakeholders in relation to the environmental management and delivery of the project; and (e) procedures and mechanisms that would be implemented to resolve issues/ disputes that may arise between parties on the matters relating to environmental management and the delivery of the project. This may include the use of an appropriately qualified and experienced independent mediator. Key issues that should be addressed in the Community Communication Strategy should include (but not necessarily be limited to): (i) traffic management (including property access, pedestrian access); (ii) landscaping/urban design matters; (iii) construction activities; and (iv) noise and vibration mitigation and management. The Proponent shall maintain and implement the Strategy throughout construction of the project. The Strategy shall be approved by the Secretary of the NSW Department of Planning & Environment (DP&E) prior to the commencement of construction, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).	Pre-construction	RMS/Fulton Hogan	Compliant	a) Community Communication Strategy, 27 October 2015 Section 5.2 b) Community Communication Strategy, 27 October 2015 Section 7.2 and Appendix E c) Community Communication Strategy, 27 October 2015 Section 8.2 d) Community Communication Strategy, 27 October 2015 Section 8.2 e) Community Communication Strategy, 27 October 2015 Sections 4.1 and 8.2. Community Communication Strategy Appendix C i) Community Communication Strategy, 27 October 2015 Sections 4.1, 7.2 and 13. ii) Community Communication Strategy Sections 3.4, 7.2 and 7.5. iii) Community Communication Strategy Sections 3.4, 7.2 and 7.5. iv) Community Communication Strategy Sections 3.4, 7.2 and 7.5. The project is now in operational phase.	Complete
Environmental Management - Environmental Representative						
B34	Prior to the commencement of construction of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall nominate for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) a suitably qualified and experienced Environment Representative(s) that is independent of the design (including preparation of documentation referred to in condition A1), and construction personnel. The Proponent shall employ the Environmental Representative(s) for the duration of construction, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). The Environment Representative(s) shall: (a) be the principal point of advice in relation to the environmental performance of the project; (b) be consulted in responding to the community concerning the environmental performance of the project where the resolution of points of conflict between the Proponent and the community is required; (c) monitor the implementation of environmental management plans and monitoring programs required under this approval; (d) monitor the outcome of environmental management plans and advise the Proponent upon the achievement of project environmental outcomes; (e) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval, and other licences and approvals related to the environmental performance and impacts of the project; (f) ensure that environmental auditing is undertaken in accordance with the requirements of condition B29 and the project's Environmental Management System(s); (g) be given the authority to approve/ reject minor amendments to the Construction Environment Management Plan. What constitutes a "minor" amendment shall be clearly explained in the Construction Environment Management Plan required under condition B35; and (h) be given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur.	Pre-construction, construction	RMS/Fulton Hogan	Compliant	Vantage Environmental (Toby Hobbs) has been appointed by RMS as the Environmental Representative on the Foxground and Berry Bypass.	Complete
Construction Environmental Management Plan						
B35	The Proponent shall prepare and (following approval) implement a Construction Environmental Management Plan for the project. The Plan shall outline the environmental management practices and procedures that are to be followed during construction, and shall be prepared in consultation with the relevant agencies and in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004). The Plan shall include, but not necessarily be limited to: (a) a description of activities to be undertaken during construction of the project or stages of construction, as relevant; (b) statutory and other obligations that the Proponent is required to fulfil during construction including approvals,	Preconstruction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I) A periodic review was undertaken of the CEMP and sub plans in October 2018 and endorsed by the ER on 25th October 2018. The project is now in operational phase.	Complete

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Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	consultations and agreements required from agencies and key legislation and policies. Evidence of consultation with relevant agencies shall be included identifying how issues raised by these agencies have been addressed in the Plan; (c) a description of the roles and responsibilities for relevant employees involved in the construction of the project including relevant training and induction provisions for ensuring that employees, including contractors and sub-contractors are aware of their environmental and compliance obligations under these conditions of approval; (d) identification of ancillary facility site locations, including an assessment against the location criteria outlined in condition C32; (e) an environmental risk analysis to identify the key environmental performance issues associated with the construction phase and details of how environmental performance would be monitored and managed to meet acceptable outcomes including what actions will be taken to address identified potential adverse environmental impacts (including any impacts arising from the staging of the construction of the project and/ or concurrent construction works with adjacent Princes Highway Upgrade projects, as relevant). In particular, the following environmental performance issues shall be addressed in the Plan: (i) measures to monitor and manage dust emissions including dust from stockpiles, blasting, traffic on unsealed public roads and materials tracking from construction sites onto public roads; (ii) measures to minimise hydrology impacts, including measures to stabilise bed and bank structures as required, (iii) measures to monitor and manage impacts associated with the construction and operation of ancillary facilities, (iv) measures for the handling, treatment and management of contaminated materials, (v) measures to monitor and manage waste generated during construction including but not necessarily limited to: general procedures for waste classification, handling, reuse, and disposal; use of secondary waste material in construction wherever feasible and reasonable; procedures for dealing with green waste including timber and mulch from clearing activities; and measures for reducing demand on water resources (including the potential for reuse of treated water from sediment control basins); (vi) measures to monitor and manage spoil, fill and materials stockpile sites including details of how spoil, fill or material would be handled, stockpiled, reused and disposed and a stockpile management protocol detailing locational criteria that would guide the placement of stockpiles and management measures that would be implemented to avoid/ minimise amenity impacts to surrounding residents and environmental risks (including to surrounding water courses). Stockpile sites that affect heritage, threatened species, populations or endangered ecological communities require the approval of the Secretary of the NSW Department of Planning & Environment (DP&E), in consultation with the OEH; (vii) measures to monitor and manage hazard and risks including emergency management; and (viii) the issues identified in condition B36; (f) details of community involvement and complaints handling procedures during construction, consistent with the requirements of conditions B30 to B33; (g) details of compliance and incident management consistent with the requirements of condition B29; and (h) procedures for the periodic review and update of the Construction Environmental Management Plan and sub-plans required under condition B35 and B36 respectively, as necessary (including where minor changes can be approved by the Environmental Representative). The Plan shall be submitted for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E) no later than one month prior to the commencement of construction, or within such period otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E). Construction works shall not commence until written approval has been received from the Secretary of the NSW Department of Planning & Environment (DP&E).					
B36	As part of the Construction Environment Management Plan for the project required under condition B35, the Proponent shall prepare and implement the following sub plan(s): (a) a Construction Traffic Management Sub-plan, prepared in accordance with the Roads and Maritime Service's QA Specification G10 – Control of Traffic and Traffic Control at Work Sites Manual (2003) to manage disruptions to traffic movements as a result of construction traffic associated with the project. The sub-plan shall be developed in consultation with the relevant council and shall include, but not necessarily be limited to: (i) identification of construction traffic routes and quantification of construction traffic volumes (including heavy vehicle/ spoil haulage) on these routes; (ii) details of vehicle movements for construction sites and site compounds including parking, dedicated vehicle turning areas, and ingress and egress points; (iii) details of potential impacts to traffic on the existing highway, the 'Sandtrack', and associated local roads, including, intersection level of service and potential disruptions to pedestrians, public transport, parking, cyclists and property access (iv) details of temporary and interim traffic arrangements to address potential impacts;	Preconstruction	RMS/Fulton Hogan	Compliant	(a) Construction Traffic Management Plan (Rev 3) and Appendices (b) Flora and Fauna Management Sub Plan (Rev H) and Appendices. (c) Noise and Vibration Management Sub Plan (Rev H) and Appendices (d) Soil and Water Quality Management Sub Plan (Rev G) and Appendices (e) Heritage Management Sub Plan (Rev G) and Appendices	Complete

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	(v) details of evidence based mitigation measures to address potential impacts on the 'Sandtrack'; (vi) a response procedure for dealing with traffic incidents; and (vii) mechanism for the monitoring, review and amendment of this sub-plan. (b) a Construction Flora and Fauna Management Sub-plan to detail how construction impacts on ecology will be minimised and managed. The sub-plan shall be developed in consultation with the OEH and DPI (Fishing and Aquaculture) and shall include, but not necessarily be limited to: (i) details of pre-construction surveys undertaken by a suitably qualified and experienced ecologist to verify the construction boundaries/ footprint of the project based on detailed design and to confirm the vegetation to be cleared as part of the project (including tree hollows, threatened flora and fauna species and riparian vegetation); (ii) updated sensitive area/ vegetation maps based on (i) above and previous survey work; (iii) details of general work practices and mitigation measures to be implemented during construction to minimise impacts on native fauna and native vegetation (particularly threatened species and EECs) not proposed to be cleared as part of the project, including, but not necessarily limited to: fencing of sensitive areas, a protocol for the removal and relocation of fauna during clearing, engagement of a suitably qualified and experienced ecologist to identify locations where they would be present and to oversee clearing activities and facilitate fauna rescues and re-location, clearing timing with consideration to breeding periods, measures for maintaining existing habitat features (such as bush rock and tree branches etc), seed harvesting and appropriate topsoil management, construction worker education, weed management (including controls to prevent the introduction or spread of Phytophthora cinnamomi), erosion and sediment control and progressive re-vegetation; (iv) specific procedures to deal with EEC/ threatened species anticipated to be encountered within the project corridor including re-location, translocation and/or management and protection measures; (v) a procedure for dealing with unexpected EEC/threatened species identified during construction including cessation of work and notification of the OEH, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and update of ecological monitoring and/ or biodiversity offset requirements consistent with conditions B7 and B8; and (vi) mechanism for the monitoring, review and amendment of this sub-plan; (c) a Construction Noise and Vibration Management Sub-plan to detail how construction noise and vibration impacts will be minimised and managed. The sub-plan shall be developed in consultation with the EPA and include, but not necessarily be limited to: (i) identification of nearest sensitive receptors and relevant construction noise and vibration goals applicable to the project; (ii) identification of key noise and/or vibration generating construction activities (based on representative construction scenarios, including at ancillary facilities) that have the potential to impact on surrounding sensitive receivers including expected noise/ vibration levels; (iii) identification of feasible and reasonable measures proposed to be implemented to minimise construction noise and vibration impacts (including construction traffic noise impacts); (iv) procedures for dealing with out-of-hour works in accordance with condition C4 and C6, including procedures for notifying the Secretary of the NSW Department of Planning & Environment (DP&E) concerning complaints received in relation to the extended hours approved under condition C4(e); (v) procedures and mitigation measures to ensure relevant vibration and blasting criteria are achieved, including a suitable blast program, applicable buffer distances for vibration intensive works, use of low-vibration generating equipment/ vibration dampeners or alternative construction methodology, and pre- and post-construction dilapidation surveys of sensitive structures where blasting and/ or vibration is likely to result in damage to buildings and structures (including surveys being undertaken immediately following a monitored exceedance of the criteria); (vi) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints; and (vii) a program for construction noise and vibration monitoring clearly indicating monitoring frequency, location, how the results of this monitoring would be recorded and, procedures to be followed where significant exceedances of relevant noise and vibration goals are detected; (d) a Construction Soil and Water Quality Management Sub-plan to manage surface and groundwater impacts during construction of the project. The sub-plan shall be developed in consultation with the OEH, EPA, DPI (Fishing and Aquaculture) and NOW and include, but not necessarily be limited to: (i) identification of potential sources of erosion and sedimentation, and water pollution (including those resulting					

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	from maintenance activities); (ii) details of how construction activities would be managed and mitigated to minimise erosion and sedimentation consistent with condition C20; (iii) where construction activities have the potential to impact on waterways or wetlands (through direct disturbance such as construction of waterway crossings or works in close proximity to waterways or wetlands), site specific mitigation measures to be implemented to minimise water quality, riparian and stream hydrology impacts as far as practicable, including measures to stabilise bed and/ or bank structures where feasible and reasonable, and to rehabilitate affected riparian vegetation to existing or better condition. The timing of rehabilitation of the waterways shall be identified in the sub-plan; (iv) a contingency plan, consistent with the Acid Sulphate Soils Manual, to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage; (v) a tannin leachate management protocol to manage the stockpiling of mulch and use of cleared vegetation and mulch filters for erosion and sediment control; (vi) construction water quality monitoring requirements consistent with condition B16; and (vii) a groundwater management strategy, including (but not necessarily limited to): i. description and identification of groundwater resources (including depths of the water table and water quality) potentially affected by the project based on baseline groundwater monitoring undertaken in accordance with condition B15; ii. identification of surrounding licensed bores, dams or other water supplies and groundwater dependant ecosystems and potential groundwater risks associated with the construction of the project on these groundwater users and ecosystems; iii. measures to manage identified impacts on water table, flow regimes and quality and to groundwater users and ecosystems; iv. groundwater inflow control, handling, treatment and disposal methods; and v. a detailed monitoring plan to identify monitoring methods, locations, frequency, duration and analysis requirements; and (e) a Construction Heritage Management Sub-plan to detail how construction impacts on Aboriginal and non-Aboriginal heritage will be avoided, minimised and managed. The sub-plan shall be prepared by an appropriately qualified heritage consultant(s) and be developed in consultation with the Heritage Council of NSW, the OEH (Aboriginal heritage), and registered Aboriginal stakeholders (for Aboriginal heritage), and include, but not necessarily be limited to: (i) In relation to Aboriginal Heritage: i. details of management measures and strategies for protection, salvage, and/or conservation of sites and items that will be directly or indirectly impacted during construction (including further archaeological investigations, salvage measures and/ or measures to protect unaffected sites during construction works in the vicinity); ii. procedures for dealing with previously unidentified Aboriginal objects (excluding human remains) including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified archaeologist in consultation with the department, OEH and registered Aboriginal stakeholders and assessment of the consistency of any new Aboriginal heritage impacts against the approved impacts of the project, and notification to the OEH, in accordance with section 89A of the National Parks and Wildlife Act 1974, and the department; iii. procedures for dealing with human remains, including cessation of works in the vicinity and notification of the department, NSW Police Force, OEH and registered Aboriginal stakeholders and not recommencing any works in the area unless authorised by the department and/ or the NSW Police Force); and iv. induction processes (identification, protection) for construction personnel (including procedures for keeping records of inductions) and procedures for ongoing Aboriginal consultation and involvement; and (ii) In relation to non-Aboriginal Heritage: i. details of management measures and strategies for protection, excavation, archival recording and/or conservation of heritage items that will be directly or indirectly impacted during construction (including measures to protect unaffected items during construction works in the vicinity); ii. procedures for dealing with previously unidentified items of heritage significance, including cessation of works in the vicinity, assessment of the significance of the item(s) and determination of appropriate mitigation measures including when works can re-commence by a suitably qualified and experienced archaeologist in consultation with the department and the Heritage Council of NSW					

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Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	and assessment of the consistency of any new non-Aboriginal heritage impacts against the approved impacts of the project and notification of the Heritage Council of NSW, in accordance with Section 146 of the NSW Heritage Act 1977, and the department; iii. procedures for dealing with human remains, including cessation of works in the vicinity and notification of the department, NSW Police Force, the Heritage Council of NSW and not recommencing any works in the area unless authorised by the department, and/ or the NSW Police Force); and iv. heritage induction processes (identification, protection) for construction personnel (including procedures for keeping records of inductions).					
PART C - DURING CONSTRUCTION						
Biodiversity						
C1	The Proponent shall employ feasible and reasonable measures to minimise the clearing of native vegetation during the construction of the project.	Construction	Fulton Hogan	Compliant	Flora and Fauna Management Sub Plan (Rev G) and Appendices: contains provisions for minimising clearing. Clearing of native vegetation was minimised during the construction phase of the project.	Complete
Air Quality Impacts						
C2	The Proponent shall employ feasible and reasonable measures (including cessation of relevant works, as appropriate) to ensure that the project is constructed in a manner that minimises dust generation, including wind-blown dust, traffic-generated dust, dust from stockpiles and material tracking from construction and ancillary facility sites onto public roads.	Construction	Fulton Hogan	Compliant	Air Quality Management Sub Plan (Rev G), September 2017 Measures to minimise dust including multiple types of soil binding agents were used during the construction phase of the project.	Complete
Noise and Vibration Impacts - Construction Hours						
C3	The Proponent shall only undertake construction activities associated with the project during the following standard construction hours: (a) For the area south of Tindalls Lane (including Berry township) (i) 7:00am to 6:00pm Mondays to Fridays, inclusive; and (ii) 8:00am to 1:00pm Saturdays; and (iii) at no time on Sundays or public holidays.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev H), October 2018. The project is now in operational phase.	Complete
C4	Works outside of the standard construction hours identified in condition C3 may be undertaken in the following circumstances: (a) works that generate noise that is: (i) LAeq (15 minute) noise levels no more than 5dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009): and (ii) LAeq (15 minute) noise levels no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or (b) where a negotiated agreement has been reached with affected receivers, where the prescribed noise levels cannot be achieved; or (c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or (d) for the area between Toolijooa Road and Tindalls Lane, encompassing Toolijooa cut, Broughton Creek floodplain and major bridge works (outside of Berry township) low noise impact activities and works as follows: (i) between 6:00am and 7:00am Monday to Friday; and (ii) between 6:00pm and 7:00pm Monday to Friday; and (iii) 1:00pm and 5:00pm on Saturdays; and (iv) at no time after 6pm on a day preceding a public holiday long weekend; and (e) where it is required in an emergency to avoid injury or the loss of life, property and/or to prevent environmental harm; or (f) works approved through an EPL, including for works identified in an out of hours procedure.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev H) Appendix E Additional approved out of hour's works have been completed and are compliant to the requirements of the individual supplementary approval. Condition C4 was modified by DP&E 31 July 2015 to allow for the NSW EPA to consider and approve Out of Hours Work (OOHW) in accordance with the Project Environmental Protection Licence (EPL) The project is now in operational phase.	Complete
C5	Except as expressly permitted by an Environment Protection Licence issued for the project, high noise impact activities and works shall only be undertaken: (a) between the hours of 8:00am to 6:00pm Mondays to Fridays; (b) between the hours of 8:00am to 1:00pm Saturdays; and (c) 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. For the purposes of this condition 'continuous' includes any period during which there is less than a one hour respite between ceasing and recommencing any of the work the subject of this condition.	Construction	Fulton Hogan	Compliant	Noise and Vibration Management Sub Plan (Rev H), October 2018, Chapter 7 The project is now in operational phase.	Complete
C6	~~Construction activities (Out of Hours work) may be allowed to occur outside the construction hours specified in condition C3 with the prior written approval of the Secretary of the NSW Department of Planning & Environment (DP&E). Requests for Out of~~	Construction	Fulton Hogan	N/A	Condition C6 deleted by DP&E in accordance with the Modification	N/A

<table>
<tr><th colspan="7">MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979</th></tr>
<tr><th>Ref</th><th>Condition Requirement</th><th>Phase</th><th>Responsibility</th><th>Compliance status</th><th>Compliance notes</th><th>Close out</th></tr>
<tr><td></td><td>~~Hours approval will be considered for construction activities which cannot be undertaken during the construction hours specified in condition C3 for technical or other justifiable reasons and will be considered on a case by case or activity-specific basis. Request for Out of Hours work must be accompanied by:~~
~~(a) details of the nature and need for activities to be conducted during the varied construction hours;~~
~~(b) written evidence to the EPA and the Secretary of the NSW Department of Planning & Environment (DP&E) that activities undertaken during the varied construction hours are justified, appropriate consultation with potentially affected receivers and notification of the relevant Council has been undertaken, issues raised have been addressed, and all feasible and reasonable mitigation measures have been put in place; and~~
~~(c) evidence of consultation with the EPA on the proposed variation in standard construction hours.~~
~~Despite the above, Out of Hours work may also occur in accordance with an approved Construction Environment Management Plan or Construction Noise and Vibration Management Sub-plan for this project, where that plan provides a process for considering the above on a case by case or activity specific basis by the Proponent, including factors (a) to (c) above.~~</td><td></td><td></td><td></td><td>of 31 July 2015</td><td></td></tr>
<tr><td>C7</td><td>Blasting associated with the project shall only be undertaken during the following hours:
(a) 9:00am to 5:00pm, Mondays to Fridays, inclusive;
(b) 9:00am to 1:00pm on Saturdays; and
(c) at no time on Sundays or public holidays.
This condition does not apply in the event of a direction from the NSW Police Force or other relevant authority for safety or emergency reasons to avoid loss of life, property loss and/or to prevent environmental harm.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G), September 2017, Appendix D.
Blasting was completed in July 2016. No further blasting is proposed.</td><td>Complete</td></tr>
<tr><td colspan="7">Construction Noise and Vibration Goals</td></tr>
<tr><td>C8</td><td>The Proponent shall implement feasible and reasonable noise mitigation measures with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) during construction activities. Any activities that could exceed the construction noise management levels shall be identified and managed in accordance with the Construction Noise and Vibration Management Sub-plan required under condition B36.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.1 and Chapter 7
No exceedances were observed in the reporting period. Noise is reported monthly in EPL reports and publically available on the Fulton Hogan website.
(http://www.fultonhogan.com/news-resources/management-plans-reporting/foxground-berry-bypass-nsw/)
The project is now in operational phase</td><td>Complete</td></tr>
<tr><td>C9</td><td>The Proponent shall implement all feasible and reasonable mitigation measures with the aim of achieving the following construction vibration goals:
(a) for structural damage to heritage structures, the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures;
(b) for damage to other buildings and/or structures, the vibration limits set out in the British Standard BS 7385-1:1990 – Evaluation and measurement for vibration in buildings. Guide for measurement of vibration and evaluation of their effects on buildings; and
(c) for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (Department of Environment and Conservation, 2006).</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G), September 2017, Section 4.2 and Chapter 7
No further vibration activities will be undertaken</td><td>Complete</td></tr>
<tr><td>C10</td><td>The Proponent shall ensure that airblast overpressure generated by blasting associated with the project does not exceed the criteria specified in Table 1 when measured at the most affected residence or other sensitive receiver.
Table 1 - Airblast overpressure criteria:
<table><tr><th>Airblast overpressure (dB(Lin Peak))</th><th>Allowable exceedance</th></tr><tr><td>125</td><td>5% of total number of blasts over a 12 month period</td></tr><tr><td>135</td><td>0%</td></tr></table></td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.2, Chapter 7 and Appendix D
Blasting is complete.</td><td>Complete</td></tr>
</table>

<table>
<tr><th colspan="6">MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979</th></tr>
<tr><th>Ref</th><th>Condition Requirement</th><th>Phase</th><th>Responsibility</th><th>Compliance status</th><th>Compliance notes</th><th>Close out</th></tr>
<tr><td>C11</td><td>The Proponent shall ensure that ground vibration generated by blasting associated with the project does not exceed the criteria specified in Table 2 when measured at the most affected residence or other sensitive receiver.
Table 2 – Peak particle velocity criteria
<table><tr><th>Receiver</th><th>Peak particle velocity (mm/s)</th><th>Allowable exceedance</th></tr><tr><td>Residence on privately owned land</td><td>5</td><td>5% of total number of blasts over a 12 month period</td></tr><tr><td></td><td>10</td><td>0%</td></tr><tr><td>Non-Aboriginal Heritage Item</td><td>3</td><td>0%</td></tr></table></td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D
Blasting was completed in this reporting period and no further blasting is required</td><td>Complete</td></tr>
<tr><td>C12</td><td>To ensure that the criteria specified in conditions C10 and C11 are satisfied at the most affected residence or other sensitive receiver, blasting trials shall be undertaken prior to the commencement of the project's blasting program, with results from the trial blasts used to determine site specific blast design to satisfy the relevant criteria.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D
Blasting was completed in this reporting period and no further blasting is required</td><td>Complete</td></tr>
<tr><td>C13</td><td>C13. The blasting criteria identified in conditions C10 and/or C11 may be exceeded where the Proponent has written approval from the Director General. In obtaining the Director General's approval for any such exceedance the Proponent shall submit to the Director General:
(a) a written agreement from the EPA and the relevant landowner to exceed the criteria;
(b) details of the proposed blasting program and justification for the proposed increase to blasting criteria including alternatives considered (where relevant);
(c) an assessment of the environmental impacts of the increased blast limits on the surrounding environment and most affected residences or other sensitive receivers including, but not limited to noise, vibration and air quality and any risk to surrounding utilities, services or other structures;
(d) in relation to any identified non-Aboriginal heritage items in the vicinity of blasting works, an assessment of heritage impacts;
(e) details of the blast management, mitigation and monitoring procedures to be implemented;
(f) details of consultation undertaken (including clear identification of proposed blast limits and potential property impacts) and agreement reached with the relevant landowners and EPA (including a copy of the agreement in relation to increased blasting limits).
Unless otherwise agreed by the Director General, the following exclusions apply to the application of this condition:
(a) any agreements reached may be terminated by the landowner at any time should concerns about the increased blasting limits be unresolved; and
(b) the blasting limit agreed to under any agreement can at no time exceed a maximum Peak Particle Velocity vibration level of 25 mm/s or maximum Airblast Overpressure level of 125 dBL.</td><td>Construction</td><td>Fulton Hogan</td><td>Compliant</td><td>Noise and Vibration Management Sub Plan (Rev G) Section 4.3, Chapter 7 and Appendix D
Modification to C13 was approved on 28th January 2015
Blasting was completed in this reporting period and no further blasting is required</td><td>Complete</td></tr>
<tr><td colspan="7">Operational Noise Mitigation Review</td></tr>
<tr><td>C14</td><td>Unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), within 6 months of commencing construction, the Proponent shall, in consultation with the EPA, prepare and submit for the approval of the Secretary of the NSW Department of Planning & Environment (DP&E), a review of the operational noise mitigation measures proposed to be implemented for the project. The review shall:
(a) confirm the operational noise predictions of the project based on detailed design. This operational noise assessment shall be based on an appropriately calibrated noise model (which has incorporated additional noise monitoring, where necessary for calibration purposes);
(b) review the suitability of the operational noise mitigation measures identified in the documents listed under condition A1 to achieve the criteria outlined in the Road Noise Policy (DECCW, 2011), based on the operational noise performance of the project predicted under (a) above; and
(c) where necessary, investigate additional feasible and reasonable noise mitigation measures to achieve the criteria outlined in the Road Noise Policy (DECCW, 2011).</td><td>Construction</td><td>RMS/Fulton Hogan</td><td>Compliant</td><td>Operational Noise Management Design Report Rev 3 dated 16 March 2015. Approved by DP&E on 12th June 2015</td><td>Complete</td></tr>
<tr><td colspan="7">Heritage Impacts</td></tr>
</table>

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
C15	This approval does not allow the Proponent to destroy, modify or otherwise physically affect human remains as part of the project.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev G), October 2018, Chapter 5 and Appendix A Modification of C15 was approved on 29th September 2017 The project is now in operational phase	Complete
C16	The Proponent shall not destroy, modify or otherwise physically affect Aboriginal sites A3, A20, A37 – A39, and MFT 13-23 and non-Aboriginal sites H25, H26, H51, H52, H58, and H59.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev G), October 2018, Chapter 5 Modification of C16 was approved on 29th September 2017 The project is now in operational phase	Complete
C17	Identified impacts to heritage (both Aboriginal and non-Aboriginal), shall be minimised to the greatest extent practicable through both detailed design and construction, particularly with regard to Aboriginal sites A13, A14, A18 and TRACL, and historic sites H13, H20, H54, H62, H63 and the Southern Illawarra Coastal Plain and Hinterland Cultural Landscape. Where impacts are unavoidable, works shall be undertaken in accordance with the actions to manage heritage construction impacts required by condition B36(e) and under the guidance of an appropriately qualified heritage specialist.	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev G), October 2018, Chapter 5 Detailed design of the Foxground and Berry Bypass Urban Design and Landscaping Plan 20 November 2015 The project is now in operational phase	Complete
C18	The proponent shall not destroy, modify or otherwise physically affect any heritage items outside the approved project footprint, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E) in accordance with Condition C32 of this project approval.	Construction	RMS/Fulton Hogan	Compliant	CEMP Section 3.7 and Appendix A5 Heritage Management Sub Plan (Rev G), October 2018, Chapter 5 The project is now in operational phase	Complete
C19	The measures to protect Aboriginal or historic heritage sites near or adjacent to the project during construction shall be detailed in the Heritage Management Sub-plan required under condition B36(e).	Construction	RMS/Fulton Hogan	Compliant	Heritage Management Sub Plan (Rev G), October 2018, Chapter 5 The project is now in operational phase	Complete
Sedimentation, Erosion and Water						
C20	Soil and water management measures consistent with *Managing Urban Stormwater - Soils and Construction Volumes 1 and 2, 4th Edition* (Landcom, 2004) and *Managing Urban Stormwater Soils And Construction Vols 2A and 2D Main Road Construction* (Department of Environment and Climate Change, 2008) shall be employed during the construction of the project for erosion and sediment control.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev G), October 2018, Section 2.2 and Chapter 5 The project is now in operational phase	Complete
C21	Where available, and of appropriate chemical and biological quality, the Proponent shall use stormwater, recycled water or other water sources in preference to potable water for construction activities, including concrete mixing and dust control.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev G), October 2018, Chapter 5 The project is now in operational phase	Complete
C22	All surface water and groundwater must be adequately treated prior to entering the stormwater system to protect the receiving water source quality.	Construction	RMS/Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev G), October 2018, Chapter 5 The project is now in operational phase	Complete
Property and Landuse						
C23	The Proponent shall construct the project in a manner that minimises impacts to private properties and other public or private structures (such as dams, fences, utilities, services etc.) along the project corridor. In the event that construction of the project results in direct or indirect damage to such property or structure, the Proponent shall arrange and fund repair of the damage to a standard comparable to that in existence prior to the damage occurring, unless otherwise agreed by the relevant property or utility owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Appendices C and E. Noise and Vibration Management Sub Plan (Rev H), October 2018, Chapter 7 Dilapidation Reports have been completed The project is now in operational phase	Complete
C24	Access to private property shall be maintained during construction unless otherwise agreed with the property owner in advance. A landowner's access that is physically affected by the Project shall be reinstated to meet at least equivalent standard and/or relevant road safety standards, in consultation with the property owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Sections 3.4 and 7.2 The project is now in operational phase	Complete
C25	Any damage caused to property as a result of the project shall be rectified or the property owner compensated, within a reasonable timeframe, with the costs borne by the Proponent. This condition is not intended to limit any claims that the property owner may have against the Proponent.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Section 7.2 The project is now in operational phase	Complete
C26	The Proponent shall, in consultation with relevant property owners, construct the project in a manner that minimises intrusion and disruption to agricultural operations/ activities in surrounding properties (e.g. stock access, access to farm dams etc.), unless otherwise agreed by the relevant property owner.	Construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy Section 7.2 The project is now in operational phase	Complete
Traffic Impacts						
C27	The roads likely to be used by the project's heavy construction vehicles shall be identified in the Construction Traffic Management	Pre-construction	RMS/Fulton Hogan	Compliant	Construction Traffic Management Plan (Rev 3) Section 2	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	Sub-plan required under condition B36(a). (a) Road dilapidation reports shall be prepared for local roads likely to be used by the project's construction traffic, and a copy of the report(s) shall be provided to the relevant council, prior to use by the project's heavy construction vehicles. Any damage resulting from the use of the identified local roads by the project's heavy construction vehicles, aside from that resulting from normal wear and tear, shall be repaired at the cost of the Proponent, unless otherwise agreed by the relevant council. (b) A road dilapidation report shall be prepared for the 'Sandtrack' and a copy of the report shall be provided to the relevant council, prior to commencement of construction. Should monitoring in accordance with Condition B36(a) reveal higher than anticipated volumes of traffic (as defined in the document referred to in Condition A1(b)) resulting in a higher rate of deterioration in the condition of local road infrastructure, consultation with the relevant Council shall be undertaken to determine mitigation measures in accordance with condition B36(a). A report shall be prepared and submitted to the Secretary of the NSW Department of Planning & Environment (DP&E) at 12 months and 24 months after commencement of construction, and prior to operation, unless otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).				A road dilapidation report for the 'Sandtrack' prior to operation was sent to Shoalhaven and Kiama councils, and submitted to DPIE on 30th October 2017. The report outlined that the 'Sandtrack' did not receive higher than anticipated traffic volumes and therefore consultation with council is not required.	
Waste Management						
C28	The Proponent shall not cause, permit or allow waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the Protection of the Environment Operations Act 1997, if such a licence is required in relation to that waste.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev I), Chapters 4 and 5 The project is now in operational phase	Complete
C29	The Proponent shall maximise the reuse and/or recycling of waste materials generated on site as far as practicable, to minimise the need for treatment or disposal of those materials off site.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev I), Chapters 4 and 5 The project is now in operational phase	Complete
C30	The Proponent shall ensure that liquid and/or non-liquid waste generated on the site is assessed and classified in accordance with Waste Classification Guidelines (Department of Environment and Climate Change, 2008) and where removed from the site is directed to a waste management facility lawfully permitted to accept the materials.	Construction	RMS/Fulton Hogan	Compliant	Waste and Energy Management Sub Plan (Rev I), Chapters 4 and 5 The project is now in operational phase	Complete
Hazards and Risks						
C31	The Proponent shall store and handle dangerous goods, as defined by the Australian Dangerous Goods Code, strictly in accordance with: (a) relevant Australian Standards; (b) for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and (c) the Environment Protection Manual for Authorised Officers: Bunding and Spill Management, Technical Bulletin (Environment Protection Authority, 1997). In the event of an inconsistency between the requirements listed from (a) to (c) above, the most stringent requirement shall prevail to the extent of the inconsistency.	Pre-construction, Construction	RMS/Fulton Hogan	Compliant	Project Work Health and Safety Management Plan Section 8.4 Soil and Water Quality Management Sub Plan (Rev G), October 2018, Section 5.11 The project is now in operational phase	Complete
Ancillary Facilities						
C32	Unless otherwise approved by the Secretary of the NSW Department of Planning & Environment (DP&E) in accordance with this condition, the sites for ancillary facilities (except stockpiles) associated with the construction of the project shall: (a) be located more than 50 metres from a waterway; (b) have ready access to the road network or direct access to the construction corridor; (c) not require native vegetation clearing beyond that already required by the project; (d) be sited on relatively level land; (e) be separated from the nearest residences by at least 200 metres (or at least 300 metres for a temporary batching plant); (f) not unreasonably affect the land use of adjacent properties; (g) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented; (h) provide sufficient area for the storage of raw materials to minimise, to the greatest extent practical, the number of deliveries required outside standard construction hours; and (i) not impact on heritage items beyond those already impacted by project (including identified Aboriginal cultural value and archaeological sensitivity).	Pre-construction and Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I), Section 2.4 and Appendix A5 As the project risk footprint is reduced, the project team continue to rehabilitate areas formerly used as ancillary facilities All ancillary Facilities have been rehabilitated	Complete
C33	Ancillary sites that do not meet the criteria set out under condition C32 of this approval shall be approved by the Secretary of the NSW Department of Planning & Environment (DP&E) prior to establishment. In obtaining this approval, the Proponent shall assess the ancillary facility against the criteria set out under condition C32 of this approval to demonstrate how the potential environmental impacts can be mitigated and managed to acceptable standards. Such assessment(s) can be submitted separately or as part of the Construction Environmental Management Plan required under B35 of this approval. The assessment shall	Pre-construction and Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5 Operation and construction of sites D and H was approved 15 January 2015 subject to the implementation of Ancillary facilities	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	include, but not necessarily be limited to: (a) a description of the ancillary facility, its components and the surrounding environment; (b) details on the activities to be carried out at the facility, including the hours of use and the storage of dangerous and hazardous goods; (c) an assessment of the environmental impacts on the site and the surrounding environment, including, but not limited to noise, vibration, air quality, traffic access, flora and fauna, heritage and light spill; (d) details on the mitigation, monitoring and management procedures specific to the ancillary facility that would be implemented to minimise the environmental impacts or, where this is not possible, feasible and reasonable measures to offset these impacts and an assessment of the adequacy of the mitigation or offsetting measures. This shall include consideration of restrictions on the hours of use or exclusion of certain activities; (e) details on the timing for the completion of activities at the ancillary facility and how the site will be decommissioned (including any necessary rehabilitation); and (f) demonstrated overall consistency with the approved project. The Proponent shall demonstrate to the satisfaction of the Secretary of the NSW Department of Planning & Environment (DP&E) that there will be no significant adverse impact from that facility's construction or operation.				assessment for proposed ancillary facilities at Broughton Creek (Site D) and Austral Park Road (Site H): Foxground and Berry Bypass, November 2014. No further ancillary facilities will be required	
C34	The Secretary of the NSW Department of Planning & Environment (DP&E)'s approval is not required for minor ancillary facilities (e.g. lunch sheds, office sheds, and portable toilet facilities, etc.) that do not comply with the criteria set out in condition C32 of this approval and which: (a) are located within an active construction zone within the approved project footprint; and (b) have been assessed by the Environmental Representative to have: (i) minimal amenity impacts to surrounding residences, with consideration to matters such as noise and vibration impacts, traffic and access impacts, dust and odour impacts, and visual (including light spill) impacts, and (ii) (minimal environmental impact in respect to waste management, and no impacts on flora and fauna, soil and water, and heritage beyond those approved for the project; and (c) have environmental and amenity impacts that can be managed through the implementation of environmental measures detailed in a Construction Environment Management Plan for the project.	Construction	RMS/Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev H), Section 2.4 and Appendix A5 No further minor ancillary facilities will be required	Complete
PART D - PRIOR TO OPERATIONS						
Operational Environmental Management System						
D1	Prior to the commencement of operation, the Proponent shall incorporate the project into its existing environmental management systems.	Construction	RMS	Compliant	The new highway is being managed in accordance with RMS' existing operation systems.	Complete
PART E - DURING OPERATIONS						
Operational Noise						
E1	Within 12 months of the commencement of operation of the project, or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E), the Proponent shall undertake operational noise monitoring to compare actual noise performance of the project against noise performance predicted in the review of noise mitigation measures required by condition C14, and prepare an Operational Noise Report to document this monitoring The Report shall include, but not necessarily be limited to: (a) noise monitoring to assess compliance with the operational noise levels predicted in the review of operational noise mitigation measures required under condition C14 and documents specified under condition A1 of this approval; (b) a review of the operational noise levels in terms of criteria and noise goals established in the Environmental Criteria for Road Traffic Noise (EPA, 1999); (c) methodology, location and frequency of noise monitoring undertaken, including monitoring sites at which project noise levels are ascertained, with specific reference to locations indicative of impacts on sensitive receivers; (d) details of any complaints and enquiries received in relation to operational noise generated by the project between the date of commencement of operation and the date the report was prepared; (e) any required recalibrations of the noise model taking into consideration factors such as actual traffic numbers and proportions; (f) an assessment of the performance and effectiveness of applied noise mitigation measures together with a review and if necessary, reassessment of all feasible and reasonable mitigation measures; and (g) identification of additional feasible and reasonable measures to those identified in the review of noise mitigation measures required by condition C14, that would be implemented with the objective of meeting the criteria outlined in the Environmental Criteria for Road Traffic Noise (EPA, 1999), when these measures would be implemented and how their effectiveness would be measured and reported to the Secretary of the NSW Department of Planning & Environment (DP&E) and the EPA. The Proponent shall provide the Secretary of the NSW Department of Planning & Environment (DP&E) and the EPA with a copy	Operation	RMS	Compliant	Operational Noise Monitoring Report was published on Roads and Maritime website during December 2018. The report is now available for a view or download through following website link: https://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html	Complete

MCoA – Ministers Conditions of Approval Section 75J of the Environmental Planning and Assessment Act 1979						
Ref	Condition Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	of the Operational Noise Report within 60 days of completing the operational noise monitoring referred to in (a) above or as otherwise agreed by the Secretary of the NSW Department of Planning & Environment (DP&E).					

Table 1: Revised statement of commitments (May 2013)

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
Environmental management						
EM1	The head contractor for the project will have an Environmental Management System (EMS).	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I) and Sub-plans The project is now in operational phase	Complete
EM2	Environmental management plans will be developed and implemented by suitably qualified and experienced personnel and will incorporate as a minimum the mitigation and management measures in the environmental assessment.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I) and Sub-plans The project is now in operational phase	Complete
EM3	Environmentally sensitive areas (such as native vegetation, river flat eucalypt forest and cultural heritage) within the construction site boundary will be marked on sensitive area maps, demarcated and signposted where necessary. Maps will be made available during all on-site inductions to construction personnel.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I), Appendix A6 The project is now in operational phase	Complete
EM4	All construction personnel will receive training regarding environmental management.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I), Chapter 5 The project is now in operational phase	Complete
Community consultation						
CC1	The community will be kept informed with measures such as: - Letter box drops, media releases and community updates. - An internet site established and maintained for the duration of the project. - Variable message signs. - The project office. - Email to registered stakeholders. - Targeted consultation with affected individuals or groups. Information to be provided will include: - Changes to access and traffic conditions. - A detail of future works programs. - General construction progress.	Pre-construction and construction	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2 The project is now in operational phase	Complete
CC2	Communication management will include: - A 24 hour toll-free contact telephone number. - Directions on how to register a complaint or make an inquiry. - Acknowledgement of complaints within 24 hours. - A complaint recording and tracking system.	Pre-construction and construction	RMS/Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Sections 8.1 and 8.2 The project is now in operational phase	Complete
Traffic and transport						
TT1	Construction vehicle movements and works programs will incorporate traffic control measures to minimise traffic and transport impacts on local roads and the existing highway.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Traffic Management Plan (Rev3), Chapter 3 The project is now in operational phase	Complete
TT2	Road safety on 'the Sandtrack' will be monitored during construction. Should additional road safety issues be identified appropriate road safety measures will be implemented where reasonable and feasible, in consultation with Kiama Municipal Council and Shoalhaven City Council.	Construction	RMS	Compliant	Construction Traffic Management Plan (Rev3), Chapter 2	Complete
TT3	Traffic levels and operational performance will be monitored during peak periods, at approximately 6 and 12 months following completion of the project.	Operation	RMS	Compliant	Traffic was monitored over the peak holiday period of Easter 2018 and Christmas 2018. No delays or impacts were experienced on the network within the project area. General operational performance has indicated a travel time saving of between 5 to 10 minutes on pre-build travel times.	Complete
Noise and vibration						
NV1	Mitigation and management measures, such as noise barriers, pre-dilapidation surveys and monitoring, will be used to minimise construction noise and vibration at sensitive receivers.	Construction	Fulton Hogan	Compliant	Construction Noise and Vibration Management Sub-plan (Rev G), Chapter 7 and Section 8.3	Complete

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
					The project is now in operational phase	
NV2	If required due to ground conditions, impact piling ('driven piles') will be conducted during standard working hours.	Construction	Fulton Hogan	Compliant	There are no driven piles on the project.	Complete
NV3	Reasonable and feasible mitigation measures, such as noise barriers in the vicinity of North Street and Huntingdale Park Road and architectural treatments, will be developed and implemented to meet the noise criteria applicable to the project in consultation with the sensitive receiver.	Pre-construction	Fulton Hogan	Compliant	Noise barriers on North street have been constructed as a priority to limit potential noise effects on neighbouring residents. Post construction noise monitoring concluded that the operational noise mitigation measures implemented as part of the project are performing as intended and road traffic noise is consistent with predictions.	Complete
NV4	Operational noise monitoring will be undertaken approximately one year after project opening, in accordance with RMS' Environmental Noise Management Manual (RTA, 2001). If monitoring indicates a clear trend that traffic noise levels exceed those predicted, further feasible and reasonable measures will be investigated in consultation with a qualified and experienced acoustic specialist and affected property owners.	Construction and Operation	Fulton Hogan	Compliant	Operational Noise Monitoring Report was published on Roads and Maritime website during December 2018. The report is now available for a view or download through following website link: https://www.rms.nsw.gov.au/projects/south-coast/foxground-berry-bypass/index.html	Complete
NV5	The feasibility of constructing noise protection on the western side of Mark Radium Park will be investigated.	Pre-construction and construction	Fulton Hogan	Compliant	The Detailed Design Report: Operational Noise Management (Final design) (March 2015), Section 6.4 assessed the acoustic performance of a potential noise barrier at Mark Radium Park and found construction of a barrier was not reasonable or feasible.	Complete
Biodiversity						
BD1	Areas of vegetation identified to be retained will be managed as environmentally sensitive areas.	Pre-construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5	Complete
BD2	Pre-clearing fauna surveys, clearing procedures, including staged clearing where there are hollow trees, and methods to control noxious and environmental weeds and pests will be developed and implemented prior to clearing activities, in consultation with a suitably qualified and experienced ecologist.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendices A and F	Complete
BD3	Natural and artificial habitat features, such as bat roost and nest boxes, will be installed to replace hollow-bearing trees that are removed.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendices A	Complete
BD4	A fauna monitoring program will be developed in consultation with OEH. This program will allow the assessment of the effectiveness of fauna mitigation measures including nest boxes, bat roost boxes, fauna underpasses, rope bridges and fauna fencing.	Pre-construction, construction and operation	RMS	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendix A Ecological Monitoring Program.	Complete
BD5	Soil that has been stripped, stockpiled and/or reinstated as part of the construction works will be appropriately managed to maintain available seed bank.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5, Appendix A Construction Soil and Water Quality Management Sub-plan (Rev D), Appendix F	Complete
BD6	Fauna mitigation structures, such as fauna underpasses, fauna overpasses and fauna fencing will be provided where reasonable and feasible. These structures will be designed to assist the safe passage of fauna underneath or over the highway.	Pre-construction, construction and operation	Fulton Hogan	In progress	Fauna Crossings Report (CoA B5).	Complete
BD7	Vegetation will be retained, where practicable, under bridges, at temporary creek crossing sites, adjacent to ancillary sites and in the vicinity of rope bridges.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5 and Appendix A. Landscape Drawings	Complete
BD8	Permanent and temporary waterway crossings will be designed and constructed in accordance with the fish classification of each waterway.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Flora and Fauna Management Sub-plan (Rev G), Chapter 5	Complete
BD9	A biodiversity offset package will be developed in consultation with the biodiversity offset strategy and in consultation with OEH and DTIRIS. The area of restoration or offsetting would be guided by a simulated assessment of the project impacts and potential offsets using the Bio Banking Assessment Methodology with a minimum of 2:1 for riparian vegetation.	Pre-construction and construction	RMS	Compliant	The Biodiversity Offset Package was approved by DPIE on the 3rd May 2017. All four agreements were lodged with OEH in the previous reporting period. BioBanking credits were issued by OEH during October 2018. All BioBanking credits now retired to offset the impact on biodiversity values.	Complete
Surface water and groundwater						

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
SG1	Water quality measures such as water quality basins, swales or bioretention systems at sensitive receiving environments will be designed and installed to respond to the project water quality design criteria.	Pre-construction and construction	Fulton Hogan	Design compliant; installation in progress.	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5 Detailed Design – Drainage Report	Complete
SG2	A design and revegetation strategy for the Town Creek diversion will be developed during detailed design and will include measures to: Maintain flushing efficiency. Mitigate erosion risk at the connection with Bundewallah Creek. The design of the diversion will be finalised in consultation with directly affected landowners. The Town Creek diversion will be stabilised to mitigate erosion risk prior to operation.	Pre-construction and construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report Urban Design and Landscape Plan, March 2016	Complete
SG3	Permanent losses to farm dam catchments and inflows will be identified during detailed design. Mitigation strategies will be developed in consultation with affected landowners and implemented where reasonable and feasible.	Pre-construction	RMS/ Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG4	Drinking water drawn from Broughton Creek will be maintained through measures identified in commitment AQ1. In the event that water drawn from Broughton Creek does not meet existing drinking water quality standards, an appropriate source of potable water will be made available to affected residents, following consultation.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Chapter 5 Residents have been consulted directly during construction about upcoming and ongoing construction activities. Sensitive water receivers are managed through targeted site works and the implementation of specific erosion and sediment controls.	Complete
SG5	RMS will consult with landholders along the existing Town Creek alignment, below the proposed diversion, to confirm that there are no Basic Landholder Rights (under the Water Management Act 2000) to access water for domestic or stock purposes.	Pre-construction	RMS	Compliant	RMS consulted with landowners and confirmed no Basic Landholder Rights exist along the Town Creek alignment.	Complete
SG6	Waterway structures will be designed to maintain existing flow regimes, where practicable.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG7	Detailed design will seek to minimise increases in peak flood levels in the 1 in 100 year flood event.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG8	Changes to flood impacts on property will be identified as part of detailed design. Where increased flood impacts to structures, such as residences, are identified, mitigation measures will be proposed and implemented where reasonable and feasible.	Pre-construction and construction	Fulton Hogan	Compliant	Hydrological Mitigation Report Detailed Design - Flooding Report Repeated attempts to gain agreement with the landowner have not been successful to date. Roads and Maritime are continuing efforts to resolve this issue.	Ongoing
SG9	Impacts on stream channel structure diversion will be minimised during detailed design. Measures to be considered may include culvert sizing, energy dissipation measures, scour protection and other design features to control flow intensity and direction.	Pre-construction	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
SG10	Groundwater monitoring of water levels and water quality will be undertaken. Where levels and/or quality indicate that the project is potentially having an adverse impact, mitigation measures will be considered and implemented where reasonable and feasible.	Construction	Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev G), Appendix B The project is now in operational phase	Complete
SG11	Water efficient work practices, such as water reuse and recycling for road construction and revegetation irrigation will be implemented, where feasible. In the event that surface water from watercourses or groundwater is required to supply water to the project, a site specific impact assessment will be carried out in consultation with the NSW Office of Water and potentially affected stakeholders.	Construction	Fulton Hogan	Compliant	Soil and Water Quality Management Sub Plan (Rev F), September 2017, Chapter 5	Complete
Landscape character and visual amenity						
VL1	The detailed design will be developed with reference to the minimum reference design requirements and the findings of the CM+ Urban Design Study for the following project components: All bridges within the project, with consideration of the Bridge Aesthetics Design Guidelines (RTA 2003). Embankments across Broughton Creek west of Toolijooa Ridge. Noise attenuation measures barriers along the length of the project.	Pre-construction	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016 Detailed Design - Structures Report	Complete
VL2	Councils and the local community will be engaged during detailed design to receive feedback on an urban and landscape design strategy for the project and the integration of existing pedestrian access and mobility plans for Berry.	Pre-construction	Fulton Hogan	Compliant	Completed during detailed design Detailed Design - Roads Report	Complete
VL3	To respect the rural and historic character of Foxground and Berry, noise barriers and bridges will be designed using forms, materials, colour and texture that are sensitive to the area, that complement the existing rural character and, where possible and desirable, that recede into the landscape. Planting and revegetation will be used to help blend the project into its setting and screen and visually soften built elements.	Pre-construction	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016 Native plant stock has been incorporated into the landscape plantings throughout the rural setting to integrate the project with the surrounding landscape character.	Complete
VL4	Landscaping treatments will include native plant species endemic to the local area and where practicable, locally sourced seed	Pre-construction and	Fulton Hogan	Compliant	Urban Design and Landscape Plan, March 2016	Complete

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	and propagated plant stock will be used to supplement the plant materials required for the project.	construction				
VL5	A lighting strategy and design will be undertaken during detailed design to minimise the impacts of light spill. Detailed design will address mechanisms for reducing the impacts of headlight glare from vehicles travelling on the bridges at Berry and Broughton Creek	Pre-construction	Fulton Hogan	Compliant	Detailed Design - Signage, Linemarking & Road Furniture Report	Complete
Aboriginal heritage						
AH1	Aboriginal sites identified to be conserved will be managed as environmentally sensitive areas.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 Construction Environmental Management Plan (Rev H), Appendix A6	Complete
AH2	Disturbance to the natural soil profile of G2B A13 and G2B A14 will be avoided, where practicable.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5 Alignment Report	Complete
AH3	Conduct a program of archaeological salvage at sites G2B A16, G2B A18, G2B A24, G2B A29, G2B A30, G2B A31, G2B A32, G2B A32, G2B A33, G2B A36, and G2B PAD1.	Construction	RMS	Compliant	Archaeological salvage works have been completed on behalf of RMS by the nominated project archaeologist, Kelleher Nightingale Consulting.	Complete
AH4	If any skeletal remains or unknown Aboriginal objects or places are encountered, works that would potentially impact the find will stop immediately. Works will not re-commence until appropriate clearance has been received.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev G), Chapter 5 and Appendix A The project is now in operational phase	Complete
AH5	All construction personnel will receive training in the management of Aboriginal cultural materials, including legal obligations, the application of protocols and the recognition of Aboriginal cultural materials.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Section 6.2	Complete
Non-Aboriginal heritage						
NA1	Mitigation (archival record, test/salvage excavation) will be completed for impacted heritage items.	Pre-construction and construction	RMS	Compliant	Archival recording and detailed historic research complete.	Complete
NA2	An archival recording of Glen Devon (G2B H11) and its grounds will be conducted prior to the commencement of construction	Pre-construction and construction	RMS	Compliant	Archival recording complete	Complete
NA3	Non-Aboriginal sites identified to be conserved will be managed as environmentally sensitive areas.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev F), Chapter 5	Complete
NA4	If any unknown non-Aboriginal heritage items are encountered, all works that would potentially impact the find will stop immediately. Works will not recommence until appropriate clearance has been received.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Heritage Management Sub-plan (Rev G), Chapter 5 and Appendix A	Complete
NA5	An archival record will be prepared for any directly impacted heritage item. Copies will be kept in RMS' library and distributed to the Kiama library and Shoalhaven library (Nowra branch).	Pre-construction and construction (as relevant)	RMS	Compliant	Archival recording completed. Copies to be sent to Kiama and Shoalhaven libraries.	Complete
Land use and property						
P1	Negotiation for all property acquisitions will be in accordance with RMS' Land Acquisition Information Guide (RTA, 2011). Compensation assessment will be in accordance with the Land Acquisition (Just Terms Compensation) Act 1991.	Pre-construction	RMS	Compliant	Complete	Complete
P2	Property access will be maintained during construction. If temporary or alternative access is required, it will be provided in consultation with the affected landowner/s.	Construction.	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Complete
P3	Affected property owners will be consulted during detailed design regarding long term access requirements via underpasses.	Pre-construction and construction	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Complete
Socio-economic						
SE1	Negotiations for property acquisition will include consideration of property adjustments, where required, to maintain farm management practices.	Pre-construction	RMS	Compliant	Complete	Complete
SE2	Stock refuge will be maintained at Broughton Creek bridge 2 and will be determined during detailed design in consultation with landowners.	Pre-construction	RMS/ Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2 Detailed Design – Alignment Report	Complete
SE3	Appropriate destination signage will be provided near to interchanges.	Operation	Fulton Hogan	N/A at this stage – relates to operation.	Construction Traffic Management Plan (Rev3), Sections 16.3.1 & 16.3.2	Complete

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
					Detailed Design - Signage, Linemarking & Road Furniture Report	
SE4	Consultation with Shoalhaven City Council will continue through detailed design and construction regarding assistance towards the development of strategies to address the continued economic viability of Berry.	Pre-construction and construction	RMS	Compliant	Ongoing via support of the Berry Strategic Plan via the Berry Forum, recognised by SCC as the official consultative community body – ref: http://berryforum.org.au/strategic-plan/	Complete
SE5	Access to recreational facilities will be maintained during construction and operation of the project, where practicable, including consideration of assistance to the relocation of the Berry equestrian centre during construction.	Pre-construction, construction and operation	RMS/ Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2	Complete
SE6	Access to local creeks, including access to the existing Broughton Creek bridge will be maintained during construction and operation to provide access for recreational fishers, where safe and practicable.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Community Communication Strategy (Rev 3), Section 7.2 Detailed Design - Drainage Report	Complete
Soil and water quality						
SW1	Management measures will be designed, installed and maintained to minimise erosion and sedimentation from construction activities.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev G), Chapter 5 The project is now in operational phase	Complete
SW2	A soil conservation specialist will be engaged to provide advice on erosion and sedimentation control.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Chapter 5 SEEC have been engaged as the nominated soil conservationist	Complete
SW3	Stabilisation of exposed areas will be undertaken progressively.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev G), Chapter 5 The project is now in operational phase	Complete
SW4	Monitoring of water quality upstream and downstream of the project site will be undertaken before and during construction.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev G), Appendix B As the project became operational at the end of October 2017 surface water quality monitoring moved into the operational phase of monitoring except for 2 monitoring sites which would monitoring any potential impacts from the Woodhill Mountain Road Compound. Monitoring at the remaining 2 sites ceased in June 2019 as no impacts to water quality was noted during monitoring and the Ancillary Facility rehabilitation was completed. Fulton Hogan, Roads and Maritime and the project ER agreed to this process. Fulton Hogan undertook Surface water quality monitoring at the two sites related to WHMR compound on the following dates: - 5 April 2019 – Minor - 5 June 2019 – Minor RMS undertook surface water quality monitoring on the following dates: - 05 June 2019 - 02-03 September 2019 Water quality monitoring results are provided in Appendix B of this report.	Ongoing
SW5	Areas of ASS to be avoided will be fenced and signposted as exclusion zones before and during any works in the vicinity.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix E	Complete
SW6	Exposed ASS will be neutralised and surface run-on will be minimised. Any acid runoff or acid material will be contained and treated.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix E	Complete

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
SW7	Targeted soil contamination investigations will be undertaken during detailed design, if required. A remedial action plan will be developed if contamination is found to pose unacceptable risks to the environment and human health.	Pre-construction, construction and operation	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev F), Appendix C Detailed Design - Geotechnical Report No contamination identified	Complete
Air quality						
AQ1	Standard dust and emission control measures will be implemented to manage construction air quality impacts at sensitive receivers.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Chapter 5	Complete
AQ2	Monitoring will be undertaken to assess the effectiveness of the air quality environmental management measures. Where required, additional feasible and reasonable environmental management measures will be used.	Construction	Fulton Hogan	Compliant	Construction Air Quality Management Sub-plan (Rev G), Section 6.3	Complete
Hazards and risks						
HR1	Spills will be contained immediately. Bunded areas within the construction site and ancillary facilities, or other areas where suitable containment measures are in place to prevent discharge into watercourses, will be used for storage of potentially hazardous and/or contaminating materials and activities.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev G), Chapter 5 The project is now in operational phase	Complete
HR2	Not used.	NA	NA	NA	NA	NA
HR3	Protection measures for the eastern gas pipeline and suitable construction methods when working in the vicinity of the pipeline will be implemented in consultation with Jemena (Eastern Gas Pipeline).	Pre-construction and construction	Fulton Hogan	Compliant	Detailed Design - Signage, Linemarking & Road Furniture Report	Complete
HR4	Permanent water quality basins, swales or other appropriate controls will be designed during the detailed design phase to protect waterways from spills.	Pre-construction and operation	Fulton Hogan	Compliant	Detailed Design – Drainage Report	Complete
Waste and management						
SM1	Not used.	NA	NA	NA	NA	NA
SM2	The waste minimisation hierarchy principles of avoid, reduce, reuse, recycle or dispose will apply to all aspects of the project.	Construction	Fulton Hogan	Compliant	Construction Waste and Energy Management Plan (Rev I), Chapters 4 and 5 The project is now in operational phase	Complete
Greenhouse gas emissions						
GG1	Energy efficient work practices will be implemented, including consideration of: Energy efficient design of site buildings. Design of site compounds and the batch plant to minimise unnecessary vehicle movement. Regular servicing of site plant and equipment. Training of construction personnel in energy efficient plant operation. The use of accredited GreenPower. Use of locally sourced materials where available and of suitable quality.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Waste and Energy Management Plan (Rev I), Chapters 4 and 5 The project is now in operational phase	Complete
Ancillary facilities						
AF1	Ancillary facilities (excluding temporary stockpiles) not identified in the environmental assessment will be located in areas: More than 50 metres from waterways for the active area of the ancillary facility. Where there is no significant clearing of native vegetation beyond that already required for the project. That minimise impact on amenity of the closest sensitive receiver (unless a negotiated agreement is in place). On relatively level ground.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I), Section 2.4 and Appendix A5 All ancillary facilities have been rehabilitated	Complete
AF2	Ancillary chemical storage facilities will be located above the 1 in 100 year flood level unless otherwise identified the construction environmental management plan.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Environmental Management Plan (Rev I), Section 2.4 and Appendix A5	Complete
AF3	Temporary stockpiles will be located in areas: Of low ecological and heritage conservation significance. At least 50 metres from waterways. Outside the 10 year ARI floodplain.	Pre-construction and construction	Fulton Hogan	Compliant	Construction Soil and Water Quality Management Sub-plan (Rev G), Appendix F The project is now in operational phase	Complete

SoC – Revised statement of commitments (May 2013)						
No.	Commitment Requirement	Phase	Responsibility	Compliance status	Compliance notes	Close out
	On relatively level ground.					

Appendix B Surface Water Quality Monitoring Results

Surface Water Monitoring

Construction Event 38

Monitoring event triggered after 15mm of rainfall was received in 24 hours. This event was of low significance and did not trigger the full suite of analysis as 50mm of rainfall was not received within 24 hours.

Date of Monitoring: 5th April 2019

Rainfall Monitoring is shown below.

Foxground Road	
Date:	Rainfall Received:
04/04/2019	47.8mm
05/04/2019	9.4mm

Scope and Limitations

Due to the stage of the project, monitoring of construction impacts have been significantly reduced to the main compound catchment (SW06 – SW07). The other locations are now considered to be under operational conditions and are now monitored by RMS. This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services
- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services
- 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets including photos are provided in Attachment C.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory Services (ALS)) to be analysed for total suspended solids.

Weather Monitoring

The Project uses the Bureau of Meteorology to monitor weather and rainfall. For the purpose of triggering water quality monitoring events the project uses this weather data. The locations of the rainfall gauges are:

- Foxground Road

During the construction phase, minor events are classified as at least 15 mm of rainfall in 24 hours and major events are classified as at least 50 mm of rainfall in 24 hours.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results, Laboratory results
- Attachment C, Field sheets, Field photos

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction and operation). By comparing upstream water quality with down-stream water quality potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	**Upstream of Alignment (reference site)**	**Downstream of Alignment (test site)**
Connelly's Creek and Bundewallah Creek and Broughton Mill Creek	SW06	SW07

Results summary

The monitoring for this rainfall event was triggered by 15mm of rainfall received in 24 hours. The total event volume 57.2mm across the project in 2 days. This monitoring event had a slight affect to the flow conditions for all catchments across the project given previous rainfall during the month.

In the projects current state there is a reduced risk in site runoff effecting the surrounding catchment due to the completed nature and reduction in construction footprint. Consequently, there were no observed construction impacts as a result of this rainfall event.

Connelly's Creek and Bundewallah Creek and Broughton Mill Creek: Showed no impacts from construction. Both Creek's had low to medium flows. Upstream and downstream monitoring location show very low turbidity levels, however laboratory results showed slightly elevated TSS levels upstream compared to downstream which would be attributed to the increased algal growth. Below site photos show that the water quality was clear.

Attachment A, Location maps

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Surface Water Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Fulton Hogan Pty Ltd
Water Quality Monitoring

Job Number	21-24306
Revision	A
Date	03 Mar 2015

Surface water sampling locations — Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Attachment B, Tabulated results

No.	Date	Time	Temperature		pH	ORP		Conductivity		Turbidity		Dissolved Oxygen	
SW06	5/04/2019	3:00 pm	21.12	°C	7.3	184	mV	0.212	mS/cm	5.3	NTU	7.31	mg/L
SW07	5/04/2019	3:30pm	19.6	°C	7.8	193	mV	0.130	mS/cm	0	NTU	7.79	mg/L

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1901574**	Page	: 1 of 2
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Glenn Davies
Address	: LEVEL 3 - 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Foxground and Berry Bypass	Date Samples Received	: 10-Apr-2019 16:14
Order number	: ----	Date Analysis Commenced	: 11-Apr-2019
C-O-C number	: ----	Issue Date	: 15-Apr-2019 11:51
Sampler	: JAMES DIAMOND		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW6**	**SW7**	**----**	**----**	**----**
			Client sampling date / time	05-Apr-2019 15:00	05-Apr-2019 15:30	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW1901574-001**	**EW1901574-002**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**18**	**5**	**----**	**----**	**----**

Attachment C, Field photos, Field sheets

SW06 – Bundewallah Creek, upstream of works

SW07 – Broughton Mill Creek, downstream of works

Surface Water Monitoring

Construction Event 39

Monitoring event triggered after 15mm of rainfall was received in 24 hours. This event was of low significance and did not trigger the full suite of analysis as 50mm of rainfall was not received within 24 hours.

Date of Monitoring: 5th June 2019

Rainfall Monitoring is shown below.

Kiama (Bombo Headland)	
Date:	Rainfall Received:
04/06/2019	45.0mm
05/06/2019	38.8mm

Scope and Limitations

Due to the stage of the project, monitoring of construction impacts have been significantly reduced to the main compound catchment (SW06 – SW07). The other locations are now considered to be under operational conditions and are now monitored by RMS. This report presents the information collected during the monitoring event with some discussion on field observations and results with respect to upstream vs downstream conditions.

Field Programme

Surface water sampling was undertaken at all surface locations where flow conditions allowed a representative sample to be taken. This monthly water sampling event was conducted in accordance with the sampling program and protocols provided in:

- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services
- 2014, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services
- 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

Field parameters were measured during sampling including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets including photos are provided in Attachment C.

Water samples were submitted to a NATA certified testing laboratory (Australian Laboratory Services (ALS)) to be analysed for total suspended solids.

Weather Monitoring

The Project uses the Bureau of Meteorology to monitor weather and rainfall. For the purpose of triggering water quality monitoring events the project uses this weather data. The locations of the rainfall gauges are:

- Kiama (Bombo Headland)

During the construction phase, minor events are classified as at least 15 mm of rainfall in 24 hours and major events are classified as at least 50 mm of rainfall in 24 hours.

Surface water sampling results

Results for the water quality monitoring event are located as attachments at the end of this document, they are:

- Attachment A, Location maps
- Attachment B, Tabulated results, Laboratory Results
- Attachment C, Field sheets, Field photos

Surface water locations

The upstream location represents the 'reference' (un-impacted) site while the down-stream locations represent the 'test' sites (potentially impacted sites during construction and operation). By comparing upstream water quality with down-stream water quality potential impacts from construction are assessed.

Table 1 Surface water locations within specific surface water bodies

Surface water	**Upstream of Alignment (reference site)**	**Downstream of Alignment (test site)**
Connelly's Creek and Bundewallah Creek and Broughton Mill Creek	SW06	SW07

Results summary

The monitoring for this rainfall event was triggered by 15mm of rainfall received in 24 hours. The total event volume 83.8mm across the project in 2 days. This monitoring event had an affect to the flow conditions for all catchments across the project given the recorded rainfall.

In the projects current state there is a reduced risk in site runoff effecting the surrounding catchment due to the completed nature and reduction in construction footprint. Consequently, there were no observed construction impacts as a result of this rainfall event.

Connelly's Creek and Bundewallah Creek and Broughton Mill Creek: Showed no impacts from construction. Both Creek's had medium flows. Upstream and downstream monitoring location show very low turbidity and TSS levels. The water was affected by natural tannin colouring.

Attachment A, Location maps

1:25,000 (at A3)

0 125 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

N

LEGEND

- Surface Water Sampling Locations
- Berry to Foxground upgrade alignment
- Roads
- Railways
- Waterways
- Lakes and dams

Fulton Hogan Pty Ltd
Water Quality Monitoring

Job Number	21-24306
Revision	A
Date	03 Mar 2015

Surface water sampling locations — Figure 1

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

Attachment B, Tabulated results

No.	Date	Time	Temperature		pH	ORP		Conductivity		Turbidity		Dissolved Oxygen	
SW06	5/06/2019	4:10pm	13.13	°C	7.3	-2	mV	0.216	mS/cm	7.9	NTU	9.35	mg/L
SW07	5/06/2019	4:35pm	11.35	°C	7.6	-15	mV	0.137	mS/cm	7.3	NTU	8.71	mg/L

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1902441**	Page	: 1 of 2
Client	: **FULTON HOGAN PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: MR JAMES DIAMOND	Contact	: Glenn Davies
Address	: LEVEL 3 - 90 BOURKE ROAD ALEXANDRIA NSW, AUSTRALIA 2015	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: +61 02 8346 9400	Telephone	: 02 42253125
Project	: Foxground and Berry Bypass	Date Samples Received	: 06-Jun-2019 14:52
Order number	: ----	Date Analysis Commenced	: 11-Jun-2019
C-O-C number	: ----	Issue Date	: 13-Jun-2019 14:52
Sampler	: ----		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 2		
No. of samples analysed	: 2		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			Client sample ID	**SW6**	**SW7**	**----**	**----**	**----**
			Client sampling date / time	05-Jun-2019 15:00	05-Jun-2019 15:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EW1902441-001**	**EW1902441-002**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**10**	<5	**----**	**----**	**----**

Attachment C, Field photos, Field sheets

SW06 – Bundewallah Creek, upstream of works

SW07 – Broughton Mill Creek, downstream of works

24 June 2019

Ryan Whiddon
Roads and Maritime Services
PO Box 477
Wollongong NSW 2500

Our ref: 2316261-11613
Your ref:

Dear Ryan

FBB Post-Construction Water Quality Monitoring
Interim Monitoring Report Event 11 (Major Event 5)

1 Scope and limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) - Water Monitoring Project Brief (*Contract No. 17.0000303651.0922)*, GHD undertook surface water monitoring at 17 locations (SW01 to SW17). Sampling was triggered due to a major rainfall event (≥ 50 mm rain in a 24 hour period). During the operational phase, minor events are considered to have occurred when at least 15 mm of rainfall has fallen in the past 24 hours, and major events where at least 50 mm of rainfall in the past 24 hours has occurred.

Sampling locations have been selected based on their proximity to permanent water quality basins located along the FBB alignment and proximity to operational water control measures (such as sedimentation basins and vegetation swales). This report documents the eleventh surface water sampling event (Event 11) undertaken since the completion of construction, which is also the fifth major surface water sampling event (Major Event 5) since operation began in October 2017. Limitations are provided in Section 9.

2 Project objectives

The objective of the project is to satisfy the Conditions of Approval for FBB. The Conditions of Approval include the monitoring of surface water parameters along the alignment for a period of three years or until certification can eventually be achieved before the required three years.

3 Interim reporting objectives

The objective of this monitoring event and interim reporting is to collect and assess upstream and downstream waterway data to contribute to their eventual certification. It is not intended for this interim report to conclude with respect to the overall project objectives. The purpose of interim reports is to provide a summary of activities, ensure data integrity throughout the program and identify opportunity to improve water quality based on observations.

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4 Field program

To meet the above objectives surface water sampling was undertaken at surface water locations SW01 to SW17 on the 5 June 2019. Each location had sufficient water available to sample. For sampling locations within the context of the FBB alignment refer to Figure 1, Attachment A. Formal certification of waterways, as rehabilitated, has not occurred; therefore, the 17 locations were targeted during this monitoring event.

The following scope of work was undertaken:

- Measuring field parameters during the monitoring event including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets are provided in Attachment H.
- Where 10% difference in field parameters is observed at a location, another two samples are collected at the location and its associated upstream or downstream location. During this event, an additional two samples were collected from SW01, SW02, SW03, SW04, SW07, SW10, SW11, SW13, SW14 and SW15.
- Analysis of collected water samples submitted to a NATA accredited testing laboratory (ALS) to be analysed for a suite of contaminants of potential concern including turbidity, total suspended solids (TSS), total recoverable hydrocarbons (TRH), total phosphorus and total nitrogen and heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn).
- Preparation of this interim letter report which includes:
  - Summary of sampling activities and results of this current monitoring round.
  - General comments of field and laboratory results relative to the previous round and adopted assessment criteria.

This monthly surface water sampling event was conducted in accordance with the sampling program and protocols provided in:

- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services.
- GHD 2016, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

5 Summary of monitoring events

Table 5-1 below summaries all monitoring events that have been completed by GHD as part of post-construction water quality monitoring for FBB to date.

Table 5-1 Summary of monitoring events post-construction

Date of Monitoring Round	Groundwater	Surface Water	Report reference
14 February 2018		X	Event 1 (Minor Event 1), dated 27 May 2018
26 February 2018		X	Event 2 (Major Event 1), dated 28 May 2018
22 March 2018		X	Event 3 (Minor Event 2), dated 28 May 2018
15 May 2018		X	Event 4 (Minor Event 3), dated 28 August 2018
23 to 24 May 2018	X		Groundwater Event 1, dated 3 September 2018
7 to 8 June 2018		X	Event 5 (Minor Event 4), dated 7 December 2018
5 to 6 September 2018		X	Event 6 (Minor Event 5) dated 7 December 2018
4 to 5 October 2018		X	Event 7 (Major Event 2), dated 7 December 2018
8 to 9 November 2018		X	Event 8 (Minor Event 6), dated 14 January 2019
29 to 30 November 2018		X	Event 9 (Major Event 3), dated 17 March 2019
15 to 16 November 2018	X		Groundwater Event 2, dated 27 February 2019
19 March 2019		X	Event 10 (Major Event 4), dated 3 April 2019
5 June 2019		X	Event 11 (Major Event 5), dated 24 June 2019
Total monitoring events	2	11	24 monitoring rounds required as part of certification

6 Results

This section presents control charts and discusses results with respect to exceedances of criteria or inconsistencies in the surface water results for Event 11 (Major Event 5) in accordance with:

- The limitations provided in Section 9.
- GHD 2016, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

6.1 Control charts

The surface water locations have been grouped into separate control charts by the specific surface water bodies they are located within and whether they are up and down gradient of the FBB alignment. The upstream locations represent the ‘reference’ (un-impacted) sites while the down-stream locations represent the ‘test’ sites (impacted by operation). By comparing upstream water quality with downstream

water quality using the control chart methods it is expected that impacts will be able to be adequately characterised during operation. The groupings used for the control charts are summarised in Table 6-1.

Table 6-1 Surface water locations within specific surface water bodies

Surface water location	Upstream of Alignment	Downstream of Alignment
Broughton Creek	SW01	SW02, SW03, SW05
Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	SW04, SW06	SW07, SW09
Bundewallah Creek and Connelly's Creek	SW08	SW06
Town Creek (realigned)	SW10	SW11
Hitchcocks Lane Creek Tributary	SW12	SW13
Hitchcocks Lane Creek	SW14	SW15
Unnamed Tributary	SW16	SW17

The primary control chart indicators for assessing potential impacts associated with the FBB upgrade works during operation for Event 11 include those for pH, turbidity, TSS, total phosphorus, total nitrogen, EC and heavy metals (zinc and copper), presented in Attachment C.

The median of the downstream post-construction data has been compared against the upstream 80th percentile which has been calculated using data from all phases of the project. Comparing the median against the 80th Percentile will indicate what physical and chemical changes may be occurring following the construction of the FBB. Currently, the control charts 80th percentile values have not reached the required 24 data points or events at each location required by the ANZECC (2000) Guidelines for Fresh and Marine Water Quality[1]. Throughout post-construction monitoring the calculated 80th percentile and median will become more accurate with more sampling events. ANZECC (2000) Lowland Rivers exceedance values have been depicted on the control charts until the required number of data points can be achieved.

A review of Event 11 control charts is provided in Section 7.

6.2 Recorded rainfall event

The rainfall within Broughton Creek catchment and the surface water flows within Broughton Creek are presented in Figure 2, Attachment A. This information was obtained from the WaterNSW website (https://realtimedata.waternsw.com.au/water.stm). The location of this gauge is on Broughton Mill Creek approximately 2 km upstream of SW04.

The data in Figure 2 illustrates a high correlation between rainfall and river flow, with a spike in rainfall coinciding with a spike in river flow. The surface water sampling events are also marked on Figure 2, Attachment A.

[1] The Australian and New Zealand Guidelines for Fresh and Marine Water Quality, (previously known as ANZECC 2000) were updated mid 2018. The revision of the Guidelines was a joint project of the Australian and New Zealand and Australian State and Territory Governments (ANZAST). The trigger values listed in the new ANZAST (2018) guidelines are generally consistent with those in previously published. Therefore, this project will continue to use the ANZECC 2000 trigger values.

6.3 Surface water monitoring QA/QC

Sampling was completed as per the method outlined within the project Water Quality Management Plan (WQMP). The water quality meter used during water quality monitoring is certified every six months and between certification, calibrated before each event. Evidence of calibration is provided in Attachment F.

A field and laboratory quality control assessment of the results from this monthly monitoring round (Event 11 – Major Event 5) is provided in Attachment G. These results indicate the data can be considered valid and of sufficient quality to meet the data quality objectives for the assessment.

7 Discussion of results

The field and laboratory analytical results are summarised in tables located in Attachment B and discussed in the following sections. The adopted assessment criteria are also included in these tables. Laboratory reports are included in Attachment E. Exceedances of assessment criteria in samples analysed are highlighted in these tables and Table 7-1 below.

Exceeding concentrations of contaminants of concern for the post-construction surface water monitoring at the FBB have been summarised in a table located in Attachment D to provide a clearer understanding of differences and similarities across post-construction monitoring event exceedances at each location.

The following results have been ascertained from this monitoring round:

- Median for copper, zinc, total suspended solids (TSS), total nitrogen, total phosphorus, turbidity, pH and/or electrical conductivity (EC) exceeded the 80th at the downstream watercourses sampled. These monitoring results are similar to previous monitoring rounds.
- The 80th percentile has shown an apparent increasing trend over the last three monitoring rounds at:
  - Broughton Creek; Connelly's Creek and Broughton Mill Creek and Bundewallah Creek; Bundewallah Creek and Connelly's Creek; Hitchcock's Lane Creek for zinc.
  - Connelly's Creek and Broughton Mill Creek and Bundewallah Creek; Hitchcock's Lane Creek for copper.
  - Broughton Creek; Town Creek; Connelly's Creek and Broughton Mill Creek and Bundewallah Creek for phosphorus.
  - Connelly's Creek and Broughton Mill Creek and Bundewallah Creek for nitrogen.
- The median phosphorus concentrations at location SW09 is showing an apparent decreasing trend whilst at other locations the median has been variable or similar over the monitoring period.
- pH has maintained a similar median to previous monitoring rounds. Median for pH at SW07 and SW13 has continued to exceed the 80th percentile. The remaining locations were within the 80th and 20th percentile of the respective upstream values.

- Concentrations of copper, zinc, total nitrogen and/or, total phosphorus exceeded the ANZECC (2000) guidelines at the majority of locations sampled. These monitoring results are similar to previous monitoring rounds. Turbidity concentrations reported have exceeded the ADWG (2011) at all locations sampled, which is generally consistent with previous monitoring rounds but were generally lower concentrations than other major events. Additional observations for these analytes are discussed below:
  - Copper: This result is similar to Event 9 and Event 10 but there is a notable increase in copper exceedances in comparison to earlier rounds of monitoring. Prior to monitoring Events 9 and 10, these levels have not been observed since Event 2 (major) where 16 out of 17 locations reported a copper exceedance. From Events 3 to 8, between three and seven locations have reported copper exceedances.
  - Zinc: A notable increase in the number of zinc exceedances, with only Event 2 (major), Event 9 (major) and Event 10 (major) having similar number of zinc exceedance. From Events 3 to 8, between 3 and 7 locations have reported zinc exceedance. SW12 (0.082 mg/L) showed a significant increase in zinc concentrations in previous rounds (<0.05 to 0.02 mg/L).
  - Total nitrogen: This result is similar to Event 10 however at some locations concentrations of nitrogen were higher relative to previous monitoring rounds.
  - Total phosphorus: Slightly higher concentrations of phosphorus were reported at some locations relative to previous monitoring events.
- Concentrations of nickel and lead exceeded the ANZECC (2000) guidelines at locations SW05, SW06, SW09 and/or SW12. Lead and nickel concentrations have not exceeded assessment criteria in previous monitoring rounds (pre- or post-construction). Lead was reported above the limit of reporting for the first time in Event 10, however did not exceed assessment criterion. Nickel results have been reported above the limit of reporting during pre- and post-construction monitoring, however did not exceed the assessment criterion.
- No apparent source of nickel or lead was observed at the time of sampling. At location SW05, vehicle movements were causing water from the road to flow into the creek which could have affected water quality at this location.
- The cadmium exceedance that was reported at location SW11 for the first time in Event 10, was below the laboratory reporting limits for this monitoring round.
- pH exceeded the upper trigger value ANZECC (2000) guidelines at SW01 and lower trigger value at SW17. SW02 exceeded the upper value of the ADWG (2011) pH range. The pH values at the remaining sampling locations were within the trigger value range recommended by ANZECC (2000) guidelines. At SW01, pH values have exceeded assessment criteria for the first time since monitoring commenced and notably alkaline at 9.51. Typically, pH values have been neutral to slightly acidic or slightly alkaline over the post construction monitoring period.
- EC concentrations at locations SW14 and SW15 exceeded the ANZECC (2000) criterion for Lowland Rivers. This is similar to previous monitoring rounds.

Table 7-1 Summary of exceedances at each location against criteria (Event 11)

Location	Watercourse	Concentrations exceeding water quality assessment criteria					
		TSS, pH, Turbidity	Metals	Nitrogen and Phosphorus	Electrical Conductivity	All analytes	
		Median exceeding 80th percentile				ANZECC (2000)	AWDG (2011)
Upstream							
SW01	Broughton Creek					Nitrogen, Phosphorus Copper, Zinc, pH	Turbidity
SW04	Connelly's Creek and Broughton Mill Creek and Bundewallah Creek					Nitrogen, Phosphorus, Copper	Turbidity
SW08	Bundewallah Creek and Connelly's Creek					Nitrogen, Phosphorus, Copper, Zinc	Turbidity
SW10	Town Creek (realigned)					Nitrogen, Phosphorus, Copper, Zinc	Turbidity
SW12	Hitchcock's Lane Creek Tributary					Nitrogen, Phosphorus, Copper, Zinc, Lead	Turbidity
SW14	Hitchcocks Lane Creek					Nitrogen, Phosphorus, Copper, Zinc, EC	Turbidity
SW16	Unnamed Tributary					Nitrogen, Phosphorus, Copper, Zinc	Turbidity
Downstream							
SW02	Broughton Creek	pH	Copper, Zinc			Nitrogen, Phosphorus, Copper, Zinc	Turbidity, pH
SW03			Copper, Zinc			Nitrogen, Phosphorus, Copper	Turbidity
SW05		TSS, Turbidity	Copper, Zinc	Phosphorus	EC	Nitrogen, Phosphorus, Copper, Zinc, Lead	Turbidity
SW07	Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	pH	Copper	Phosphorus		Nitrogen, Phosphorus, Copper, Zinc	Turbidity
SW09				Nitrogen, Phosphorus	EC	Nitrogen, Phosphorus, Copper, Zinc, Lead, Nickel	Turbidity
SW06	Bundewallah Creek and Connelly's Creek		Zinc			Nitrogen, Phosphorus, Copper, Zinc, Lead, Nickel	Turbidity
SW11	Town Creek (realigned)	TSS, Turbidity,	Zinc	Nitrogen	EC	Nitrogen, Phosphorus, Copper, Zinc, TSS	Turbidity
SW13	Hitchcocks Lane Creek Tributary	pH	Copper, Zinc			Nitrogen, Phosphorus, Copper	Turbidity
SW15	Hitchcocks Lane Creek		Copper	Phosphorus		Nitrogen, Phosphorus, Copper, Zinc, EC, TSS	Turbidity
SW17	Unnamed Tributary		Zinc			Nitrogen, Phosphorus, Copper, Zinc, pH	Turbidity

Table notes:

Zinc	Concentration exceeds relevant assessment criteria	TSS	Total Suspended Solids
*	Exceeds the lower trigger value (i.e. more acidic)	NE	No Exceedance
EC	Electrical Conductivity	NS	Not Sampled
	Not applicable		

8 Conclusion

Monitoring data was successfully collected for the June 2019 Event 11 (Major Event 5) round of wet weather surface water monitoring.

Field and laboratory results reported for water quality parameters indicated:

- Upstream water quality:
  - pH control charts suggest an emerging trend towards values observed during baseline monitoring. This trend may become more apparent with additional monitoring data.
  - Zinc and copper reported concentrations which exceeded ANZECC (2000) freshwater trigger values, although elevated, are consistent with baseline monitoring results. Zinc and copper exceedances upstream may be attributable to upstream impacts and/or natural variation where exceedances of the ANZECC (2000) occurred.
  - Total Nitrogen (all locations) and total phosphorus (all locations) exceeded ANZECC (2000) Lowland Rivers criterion. Watercourses monitored predominantly receive water from upstream catchments consisting of farmland with livestock. Given similar nitrogen and phosphorus concentrations were reported during baseline monitoring, it is likely concentrations are attributable to farming activity rather than road upgrade.
- Downstream water quality:
  - Median for copper, zinc, total suspended solids (TSS), total nitrogen, total phosphorus, turbidity, pH and/or electrical conductivity (EC) exceeded the 80th at the downstream watercourses sampled. These monitoring results are similar to previous monitoring rounds.
  - Exceedances of ANZECC (2000) guidelines for pH are consistent with statistical trends and depicted on control charts. No further investigation is required at this stage although further monitoring will reduce statistical error within control charts.
  - Nitrogen concentrations were reported in exceedance of the ANZECC (2000) criteria both up- and down-stream at the majority of locations, which is similar to Event 9 and Event 10 but prior to this has not occurred since Event 2 (major event). There is an apparent trend between exceedances and high levels of turbidity however may be attributed to farmland activity rather than the road upgrade.
  - Zinc and copper exceeded ANZECC (2000) criterion at all locations, which prior to Event 10 has not occurred since Event 2 (major event). The cause of the number of exceeding instances at the site is unclear and appears unrelated to rainfall intensity. The source of zinc and copper is unclear and may be naturally occurring, as upstream exceedances have also been reported. Further assessment would be required to identify the source of the zinc and copper.
  - Concentrations of lead and nickel have exceeded ANZECC (2000) for the first time since monitoring began. These exceedances were noted at up- and down-stream locations where only two locations hydraulically connected (i.e. SW06 and SW09). No apparent source of nickel or lead was observed at the time of sampling. At location SW05, vehicle movements were causing water from the road to flow into the creek which could have affected water quality at this location.
  - A similar observations for cadmium occurred in Event 10 at SW11, however cadmium was below the laboratory reporting limits for Event 11. Further monitoring will be required to assess if lead and nickel exceedances were an isolated occurrence or represent a permanent change in water quality at these locations.

- It is recommended that:
  - Town Creek was diverted to Bundewallah Creek and no longer flows to monitoring location SW11. Therefore this location no longer meets the objective of the monitoring. If SW11 is removed from the monitoring program, then SW10 results can be compared against downstream location SW06 in Bundewallah Creek.
  - Further monitoring of watercourses intersecting the FBB alignment should be continued to further assess zinc, copper, lead and nickel exceedances.

9 Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Roads and Maritime Services (RMS) and may only be used and relied on by RMS for the purpose agreed between GHD and RMS as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than RMS arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Roads and Maritime Services and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

* * *

We trust the information presented in this letter is sufficient for you current requirements. If you have any queries or require further information, please do not hesitate to contact Daniel Deen or the undersigned.

Sincerely
GHD Pty Ltd

Colee Quayle
Team Leader Contamination
+61 2 4222 2300

Attachment A- Figures

Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1A

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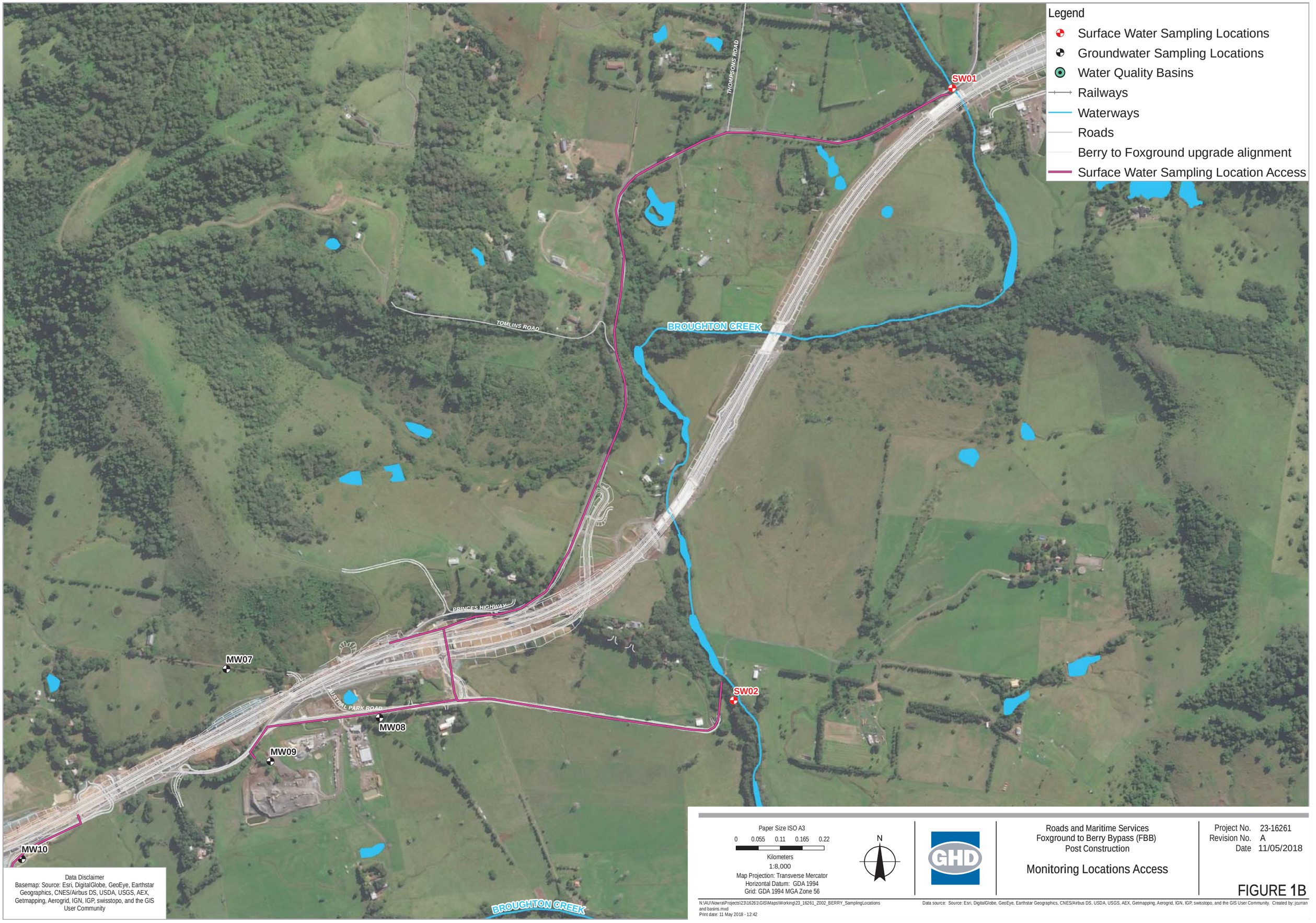
Print date: 11 May 2018 - 12:41

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran



Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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GHD

Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1B

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z002_BERRY_SamplingLocations and basins.mxd
Print date: 11 May 2018 - 12:42

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jsurran

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Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1C

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z002_BERRY_SamplingLocations and basins.mxd
Print date: 11 May 2018 - 12:43

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. 1
Date 27/08/2018

FIGURE 1D

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_2003_BERRY_Sampling Access.mxd
Print date: 27 Aug 2018 - 17:20

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

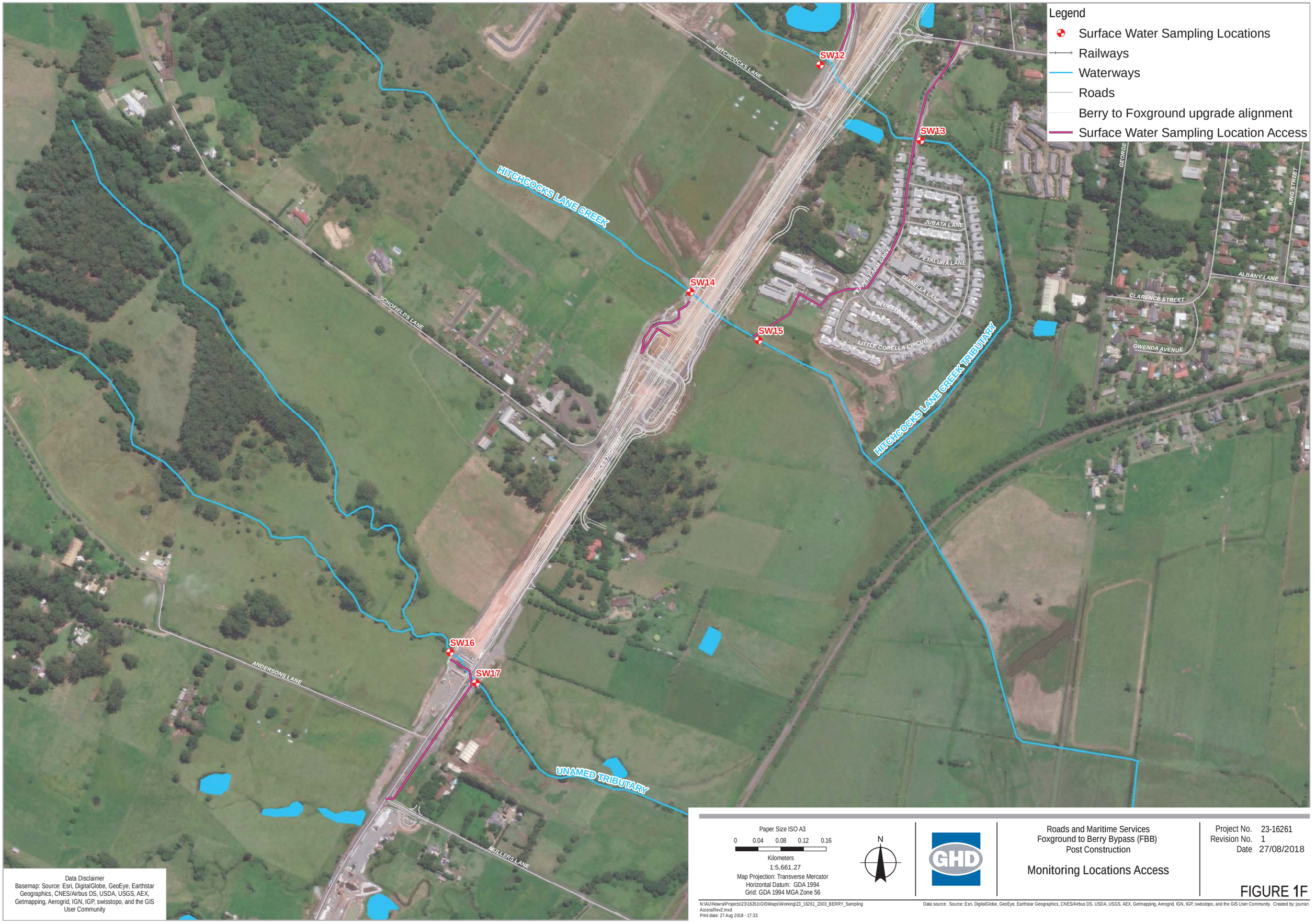
Monitoring Locations Access

Project No. 23-16261
Revision No. 1
Date 27/08/2018

FIGURE 1E

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z003_BERRY_Sampling AccessRev2.mxd
Print date: 27 Aug 2018 - 17:32

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran



Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Monitoring Locations Access

Project No. 23-16261
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FIGURE 1F

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z003_BERRY_Sampling AccessRev2.mxd
Print date: 27 Aug 2018 - 17:33

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

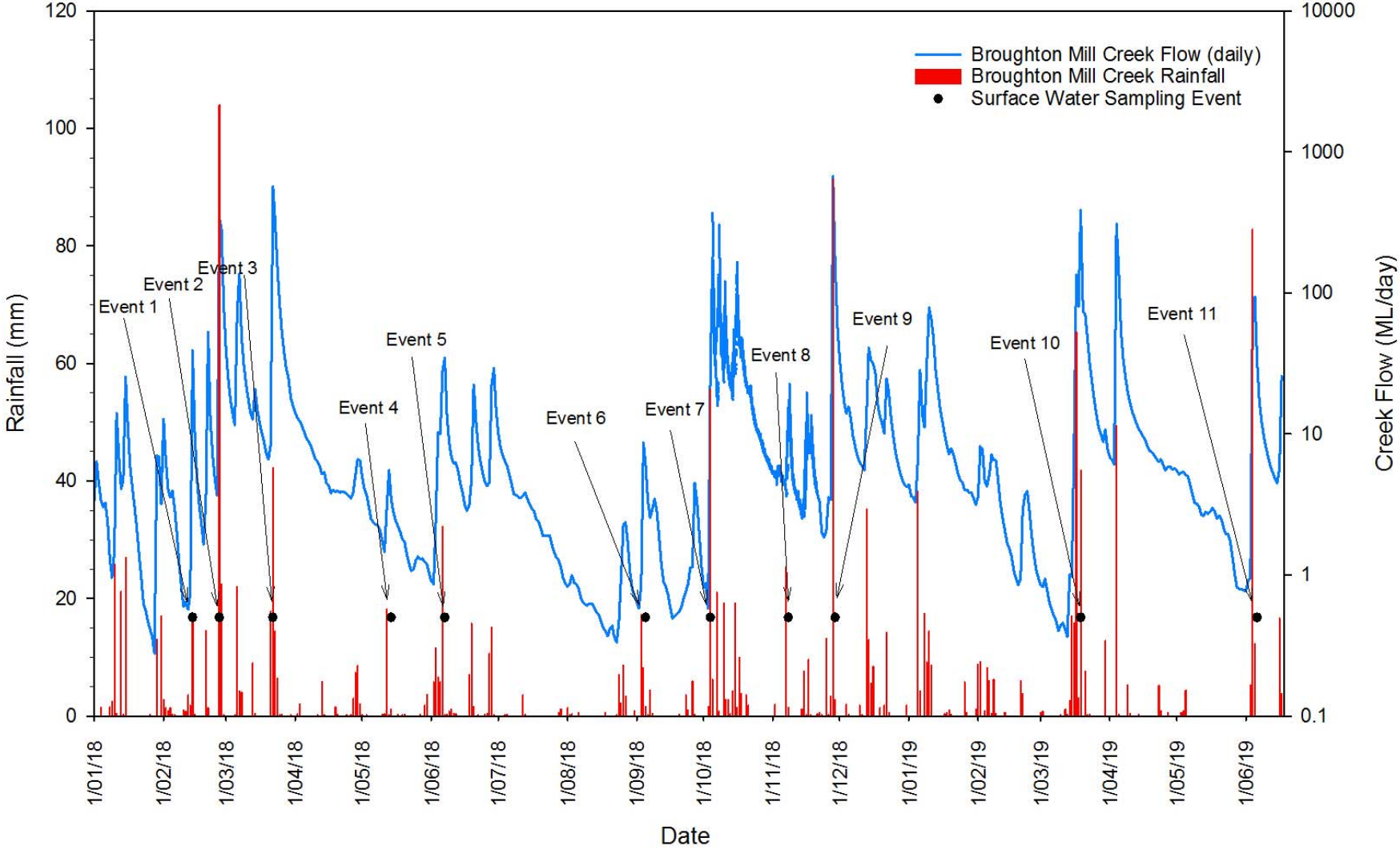


Figure 2 Rainfall vs Flow within Broughton Mill Creek

Attachment B - Tabulated Results

Appendix B
Table B1
Surface Water Event 11

					Field Parameters					Inorganics		Nutrients				Metals							
					pH (Field)	Electrical conductivity (field)	Dissolved Oxygen (Field) (filtered)	Redox (Field)	Temperature (Field)	Turbidity	Total Suspended Solids	Nitrite + Nitrate as N	Nitrogen (Total)	Kjeldahl Nitrogen Total	Phosphorus (Total)	Arsenic (filtered)	Cadmium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Lead (filtered)	Mercury (filtered)	Nickel (filtered)	Zinc (filtered)
					pH Units	µS/cm	mg/L	mV	°C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL										0.1	5	0.01	0.1	0.1	0.01	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005
ADWG 2011 Aesthetic (v3.5 updated 2018)					6.5-8.5					5									1				3
ANZECC 2000 - Lowland Rivers (NSW rivers)					6.5-9	300				50	50		0.6		0.05								
ANZECC 2000 FW 95%																0.013	0.0002	0.001	0.0014	0.0034	0.0006	0.011	0.008
Location Code	**Date**	**Field ID**	**Sample Type**	**Matrix Type**																			
SW01	5/06/2019	SW01_1	Normal	water	9.51	91.4	9.6	50.7	10.7	7.0	7	0.53	1.2	0.7	0.06	<0.001	<0.0001	<0.001	0.015	0.001	<0.0001	0.002	0.032
SW01	5/06/2019	SW01_2	Normal	water						6.0	5	0.54	1.1	0.6	0.06	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005
SW01	5/06/2019	SW01_3	Normal	water						5.2	<5	0.52	1.1	0.6	0.07	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005
SW02	5/06/2019	SW02_1	Normal	water	8.6	91.5	9.82	91.5	10.7	6.9	7	0.55	1.2	0.6	0.09	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005
SW02	5/06/2019	SW02_2	Normal	water						8.4	6	0.56	1.1	0.5	0.07	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
SW02	5/06/2019	SW02_3	Normal	water						7.4	<5	0.54	1.1	0.6	0.07	<0.001	<0.0001	<0.001	0.023	0.002	<0.0001	0.005	0.026
SW03	5/06/2019	SW03_1	Normal	water	8.31	115.5	9.09	102.4	10.8	9.4	5	0.55	1.4	0.8	0.14	<0.001	<0.0001	<0.001	0.004	<0.001	<0.0001	<0.001	0.006
SW03	5/06/2019	SW03_2	Normal	water						10.0	6	0.55	1.4	0.8	0.12	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
SW03	5/06/2019	SW03_3	Normal	water						8.2	10	0.54	1.3	0.8	0.14	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
SW04	5/06/2019	SW04_1	Normal	water	7.5	88.6	8.6	94.8	11.6	6.1	<5	0.70	1.2	0.5	0.06	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW04	5/06/2019	SW04_2	Normal	water						6.2	<5	0.69	1.2	0.5	0.04	<0.001	<0.0001	<0.001	0.005	<0.001	<0.0001	<0.001	0.005
SW04	5/06/2019	SW04_3	Normal	water						5.7	<5	0.71	1.2	0.5	0.05	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW05	5/06/2019	SW05	Normal	water	7.92	14.9	8.35	99.8	10.8	26.3	42	0.68	1.9	1.2	0.26	<0.001	<0.0001	<0.001	0.072	0.007	<0.0001	0.008	0.076
SW06	5/06/2019	SW06	Normal	water	7.3	150	3.63	92.9	12.1	5.6	<5	1.40	2.2	0.8	0.22	<0.001	<0.0001	<0.001	0.048	0.006	<0.0001	0.012	0.070
SW07	5/06/2019	SW07_1	Normal	water	7.73	98.8	8.72	98.1	11.4	6.9	6	0.82	1.3	0.5	0.06	<0.001	<0.0001	<0.001	0.013	<0.001	<0.0001	0.002	0.015
SW07	5/06/2019	SW07_2	Normal	water						6.4	<5	0.81	1.3	0.5	0.09	<0.001	<0.0001	<0.001	0.010	<0.001	<0.0001	0.002	0.014
SW07	5/06/2019	SW07_3	Normal	water						6.4	<5	0.81	1.3	0.5	0.06	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.002	0.020
SW08	5/06/2019	SW08	Normal	water	7.15	145.2	7.17	121.2	11.5	5.7	6	0.92	1.8	0.9	0.20	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.002	0.010
SW09	5/06/2019	SW09	Normal	water	7.52	150.4	8.08	110	12.1	6.1	9	1.50	2.5	1.0	0.27	<0.001	<0.0001	<0.001	0.185	0.020	<0.0001	0.039	0.233
SW10	5/06/2019	SW10_1	Normal	water	7.03	111.7	7.05	98.9	12.3	6.9	5	0.55	1.6	1.0	0.22	<0.001	<0.0001	<0.001	0.015	0.001	<0.0001	0.003	0.052
SW10	5/06/2019	SW10_2	Normal	water						7.0	6	0.55	1.6	1.1	0.23	<0.001	<0.0001	<0.001	0.004	<0.001	<0.0001	<0.001	0.009
SW10	5/06/2019	SW10_3	Normal	water						7.1	8	0.57	1.7	1.1	0.22	<0.001	<0.0001	<0.001	0.039	0.003	<0.0001	0.004	0.047
SW11	5/06/2019	QC1	Field_D	water						17.5	75	1.50	2.6	1.1	0.14	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.002	0.019
SW11	5/06/2019	SW11_1	Normal	water	6.9	250.4	7.33	89.9	13.4	25.1	48	2.02	3.4	1.4	0.13	<0.001	<0.0001	<0.001	0.011	<0.001	<0.0001	0.003	0.019
SW11	5/06/2019	SW11_2	Normal	water						18.4	22	1.59	2.7	1.1	0.12	<0.001	<0.0001	<0.001	0.010	<0.001	<0.0001	0.002	0.017
SW11	5/06/2019	SW11_3	Normal	water						14.7	11	1.59	2.8	1.2	0.15	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.002	0.016
SW12	5/06/2019	SW12	Normal	water	7.05	268.8	6.94	124	11.9	24.9	18	1.19	1.7	0.5	0.07	<0.001	<0.0001	0.001	0.091	0.006	<0.0001	0.003	0.082
SW13	5/06/2019	SW13_1	Normal	water	7.26	292.8	8	118	12	25.3	15	1.13	1.7	0.6	0.06	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	<0.001	<0.005
SW13	5/06/2019	SW13_2	Normal	water						25.5	15	1.15	1.6	0.5	0.05	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	<0.001	<0.005
SW13	5/06/2019	SW13_3	Normal	water						25.1	18	1.16	1.7	0.5	0.07	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	<0.001	<0.005
SW14	5/06/2019	SW14_1	Normal	water	6.96	379.6	5.97	140	12.9	16.8	16	0.30	1.5	1.2	0.20	<0.001	<0.0001	<0.001	0.028	0.001	<0.0001	0.002	0.030
SW14	5/06/2019	SW14_2	Normal	water						15.9	13	0.28	1.2	0.9	0.13	<0.001	<0.0001	<0.001	0.011	<0.001	<0.0001	<0.001	0.006
SW14	5/06/2019	SW14_3	Normal	water						15.0	16	0.29	1.3	1.0	0.15	<0.001	<0.0001	<0.001	0.011	<0.001	<0.0001	<0.001	0.005
SW15	5/06/2019	SW15_1	Normal	water	7.13	305.7	6.64	115	12.5	24.8	43	0.95	2.0	1.0	0.20	<0.001	<0.0001	<0.001	0.007	<0.001	<0.0001	<0.001	0.010
SW15	5/06/2019	SW15_2	Normal	water						34.6	86	0.92	1.8	0.9	0.19	<0.001	<0.0001	<0.001	0.007	<0.001	<0.0001	<0.001	0.011
SW15	5/06/2019	SW15_3	Normal	water						21.5	14	0.92	1.8	0.9	0.15	<0.001	<0.0001	<0.001	0.010	<0.001	<0.0001	0.001	0.030
SW16	5/06/2019	QC2	Field_D	water						8.9	14	2.36	3.2	0.8	0.08	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	0.007
SW16	5/06/2019	SW16	Normal	water	6.54	261	6.25	143.8	14.2	7.7	<5	2.53	3.4	0.9	0.09	<0.001	<0.0001	<0.001	0.004	<0.001	<0.0001	<0.001	0.010
SW17	5/06/2019	SW17	Normal	water	6.48	257.3	6.5	149.6	13.9	7.8	6	2.35	3.2	0.9	0.08	<0.001	<0.0001	<0.001	0.042	0.003	<0.0001	0.003	0.053

	Field ID	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
		BTEXN							TRH - NEPM 2013							TRH - NEPM 1999					PAHs
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		1	2	2	2	2	2	1	20	20	100	100	100	100	100	20	50	100	50	50	5
ADWG 2011 Aesthetic (v3.5 updated 2018)			25	3			20														
ANZECC 2000 - Lowland Rivers (NSW rivers)																					
ANZECC 2000 FW 95%		950			350																16
SW01	SW01_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW01	SW01_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW01	SW01_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	SW02_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	SW02_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	SW02_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	SW03_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	SW03_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	SW03_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	SW04_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	SW04_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	SW04_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW05	SW05	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW06	SW06	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	SW07_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	SW07_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	SW07_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW08	SW08	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW09	SW09	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW10	SW10_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW10	SW10_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW10	SW10_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW11	QC1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW11	SW11_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW11	SW11_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW11	SW11_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW12	SW12	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	SW13_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	SW13_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	SW13_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	SW14_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	SW14_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	SW14_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW15	SW15_1	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW15	SW15_2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW15	SW15_3	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW16	QC2	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW16	SW16	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW17	SW17	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5

Statistics

	pH (Field)	Electrical conductivity (field)	Dissolved Oxygen (Field) (filtered)	Redox (Field)	Temperature (Field)	Turbidity	Total Suspended Solids	Nitrite + Nitrate as N	Nitrogen (Total)	Kjeldahl Nitrogen Total	Phosphorus (Total)	Arsenic (filtered)	Cadmium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Lead (filtered)	Mercury (filtered)	Nickel (filtered)	Zinc (filtered)
Number of Results	17	17	17	17	17	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Number of Detects	17	17	17	17	17	39	30	39	39	39	39	0	0	1	37	10	0	19	28
Minimum Concentration	6.48	14.9	3.63	50.7	10.7	5.2	5	0.28	1.1	0.5	0.04	<0.001	<0.0001	0.001	0.001	0.001	<0.0001	0.001	0.005
Minimum Detect	6.48	14.9	3.63	50.7	10.7	5.2	5	0.28	1.1	0.5	0.04	ND	ND	0.001	0.001	0.001	ND	0.001	0.005
Maximum Concentration	9.51	379.6	9.82	149.6	14.2	34.6	86	2.53	3.4	1.4	0.27	<0.001	<0.0001	0.001	0.185	0.02	<0.0001	0.039	0.233
Maximum Detect	9.51	379.6	9.82	149.6	14.2	34.6	86	2.53	3.4	1.4	0.27	ND	ND	0.001	0.185	0.02	ND	0.039	0.233
Average Concentration *	7.5	181	7.5	108	12	13	15	0.97	1.8	0.81	0.12	0.0005	0.00005	0.00051	0.018	0.0017	0.00005	0.0028	0.025
Median Concentration *	7.26	150	7.33	102.4	12	8.2	7	0.81	1.6	0.8	0.12	0.0005	0.00005	0.0005	0.009	0.0005	0.00005	0.0005	0.01
Standard Deviation *	0.77	101	1.5	24	1.1	8.2	19	0.58	0.69	0.26	0.066	0	0	0.00008	0.034	0.0034	0	0.0064	0.04
Number of Guideline Exceedances	3.00	2	0.0	0	0.0	39.0	2		39.00	0.00									

	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
Number of Results	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.5	1	1	1	1	1	0.5	10	10	50	50	50	50	50	10	25	50	25	25	2.5
Median Concentration *	0.5	1	1	1	1	1	0.5	10	10	50	50	50	50	50	10	25	50	25	25	2.5
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances																				

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

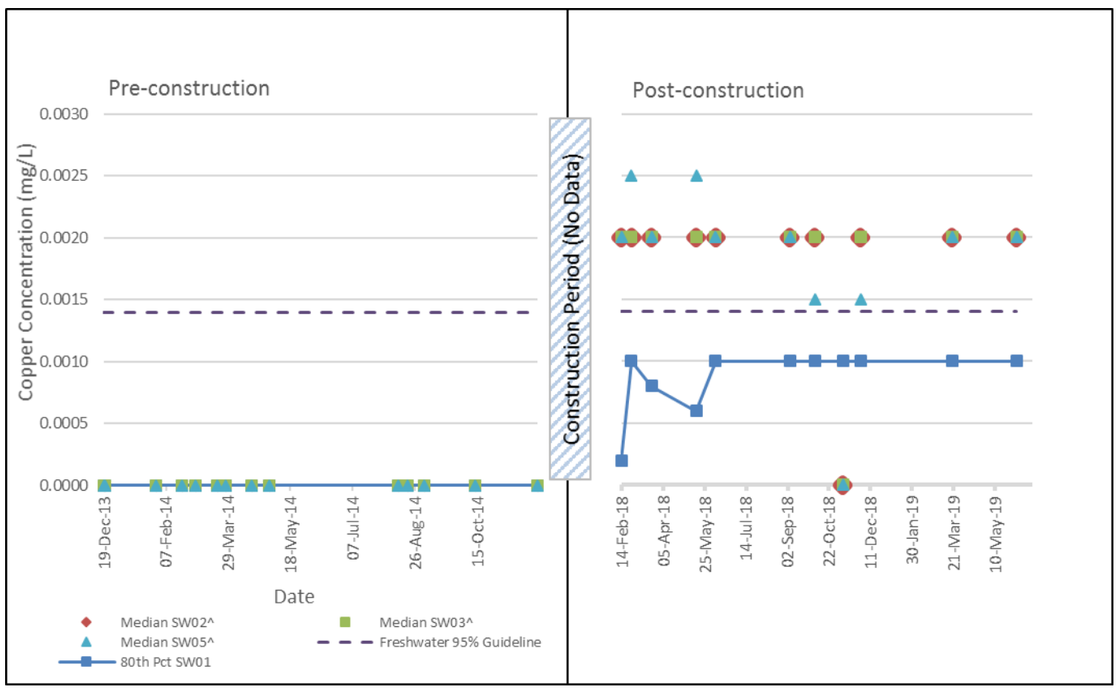
National Health and Medical Research Council, August 2018, ADWG 2011 Aesthetic (v3.5 updated 2018)

		Date	5/06/2019	5/06/2019		5/06/2019	5/06/2019	
		Field ID	SW11_1	QC1		SW16	QC2	
		Lab Report Number	EW1902434	EW1902434		EW1902434	EW1902434	
		Matrix Type	water	water	RPD	water	water	RPD
	Unit	EQL						
Inorganics								
Turbidity	NTU	0.1	25.1	17.5	36	7.7	8.9	14
Total Suspended Solids	mg/L	5	48	75	44	<5	14	95
Nutrients								
Nitrite + Nitrate as N	mg/L	0.01	2.02	1.50	30	2.53	2.36	7
Nitrogen (Total)	mg/L	0.1	3.4	2.6	27	3.4	3.2	6
Kjeldahl Nitrogen Total	mg/L	0.1	1.4	1.1	24	0.9	0.8	12
Phosphorus (Total)	mg/L	0.01	0.13	0.14	7	0.09	0.08	12
Metals								
Arsenic (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Cadmium (filtered)	mg/L	0.0001	<0.0001	<0.0001	0	<0.0001	<0.0001	0
Chromium (III+VI) (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Copper (filtered)	mg/L	0.001	0.011	0.009	20	0.004	0.002	67
Lead (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Mercury (filtered)	mg/L	0.0001	<0.0001	<0.0001	0	<0.0001	<0.0001	0
Nickel (filtered)	mg/L	0.001	0.003	0.002	40	<0.001	<0.001	0
Zinc (filtered)	mg/L	0.005	0.019	0.019	0	0.010	0.007	35
BTEXN								
Benzene	µg/L	1	<1	<1	0	<1	<1	0
Toluene	µg/L	2	<2	<2	0	<2	<2	0
Ethylbenzene	µg/L	2	<2	<2	0	<2	<2	0
Xylene (o)	µg/L	2	<2	<2	0	<2	<2	0
Xylene (m & p)	µg/L	2	<2	<2	0	<2	<2	0
Xylene Total	µg/L	2	<2	<2	0	<2	<2	0
BTEX (Sum of Total) - Lab Calc	µg/L	1	<1	<1	0	<1	<1	0
TRH - NEPM 2013								
F1 (C6-C10 minus BTEX)	µg/L	20	<20	<20	0	<20	<20	0
C6-C10 Fraction	µg/L	20	<20	<20	0	<20	<20	0
F2 (>C10-C16 minus Naphthalene)	µg/L	100	<100	<100	0	<100	<100	0
>C10-C16 Fraction	µg/L	100	<100	<100	0	<100	<100	0
F3 (>C16-C34 Fraction)	µg/L	100	<100	<100	0	<100	<100	0
F4 (>C34-C40 Fraction)	µg/L	100	<100	<100	0	<100	<100	0
>C10-C40 (Sum of Total)	µg/L	100	<100	<100	0	<100	<100	0
TRH - NEPM 1999								
C6-C9 Fraction	µg/L	20	<20	<20	0	<20	<20	0
C10-C14 Fraction	µg/L	50	<50	<50	0	<50	<50	0
C15-C28 Fraction	µg/L	100	<100	<100	0	<100	<100	0
C29-C36 Fraction	µg/L	50	<50	<50	0	<50	<50	0
C10-C36 (Sum of Total)	µg/L	50	<50	<50	0	<50	<50	0
PAHs								
Naphthalene	µg/L	5	<5	<5	0	<5	<5	0

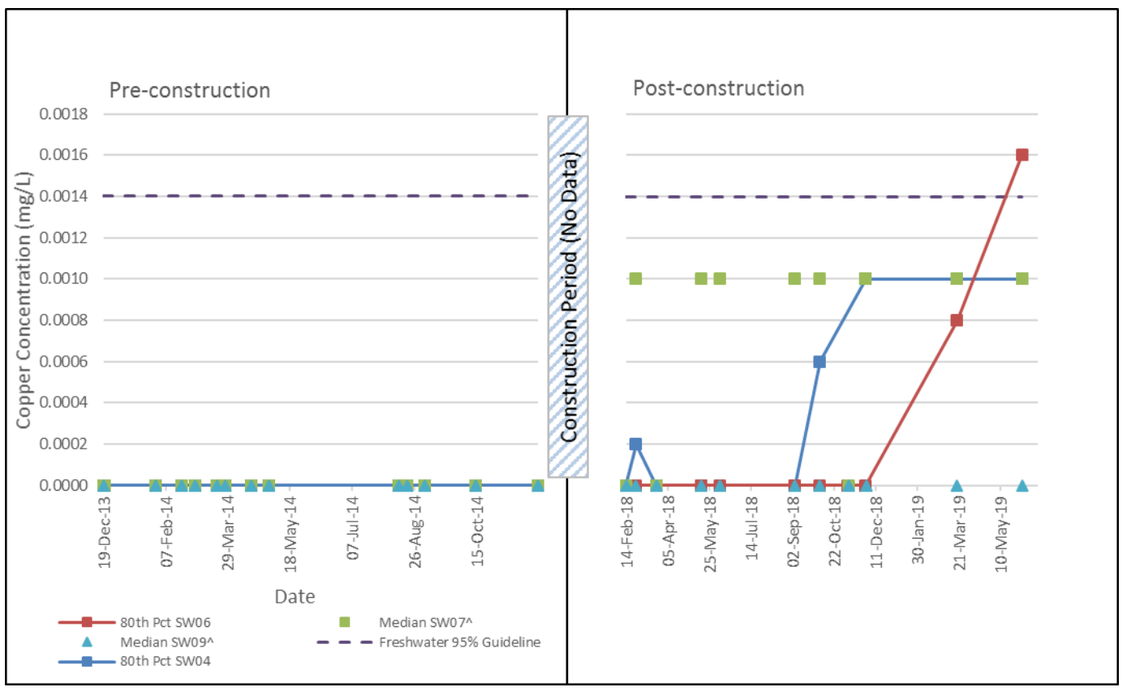
Attachment C - Control Charts

Attachment C
Control Charts – Copper
Exceedances against the 80th Percentile
Event 11

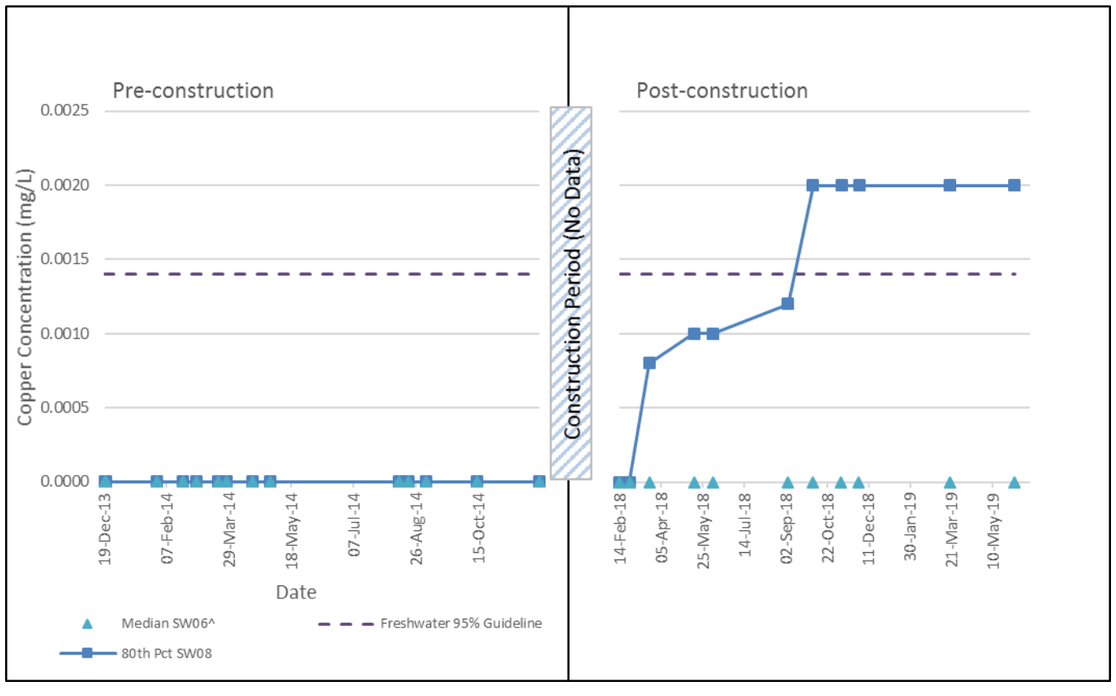
Broughton Creek



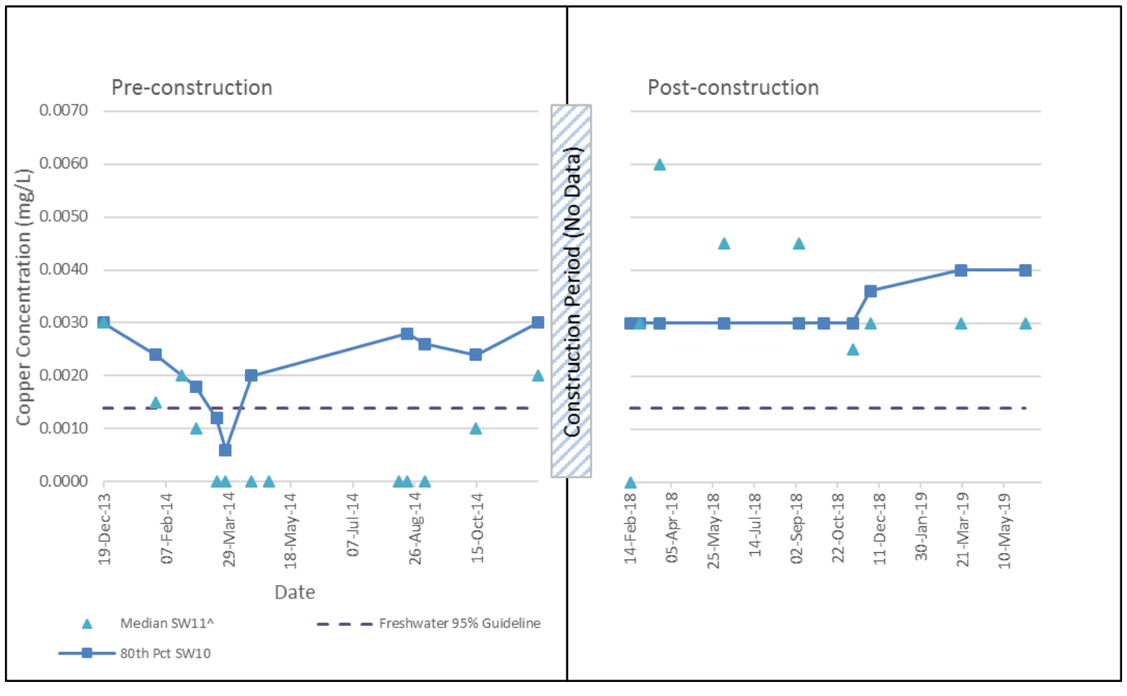
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

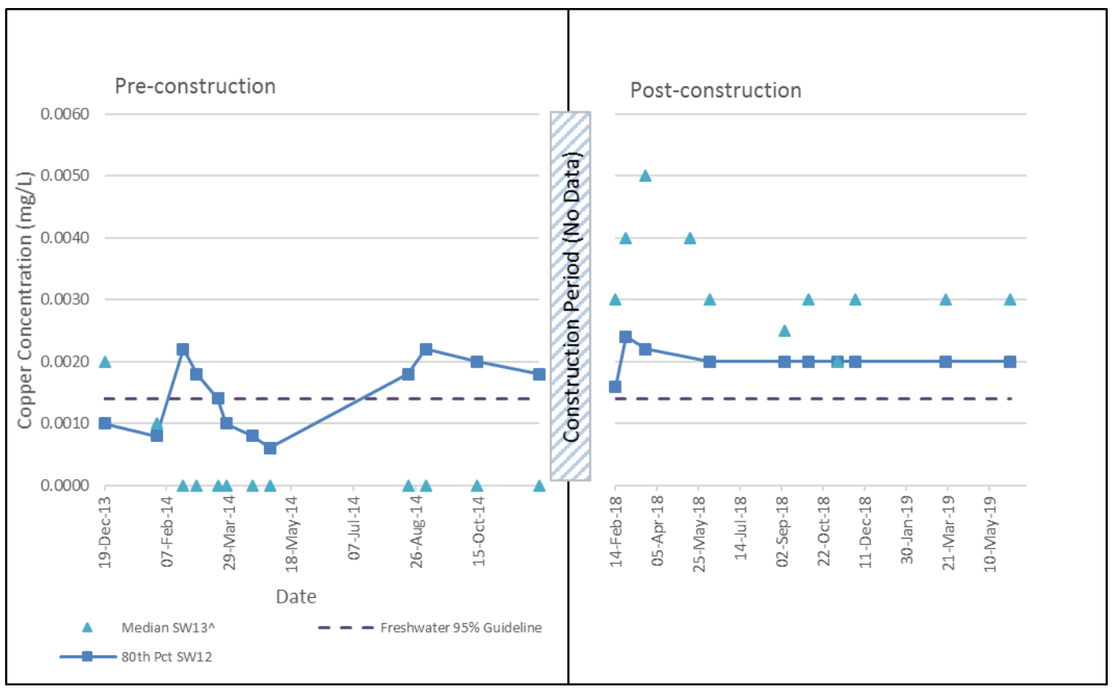


Town Creek

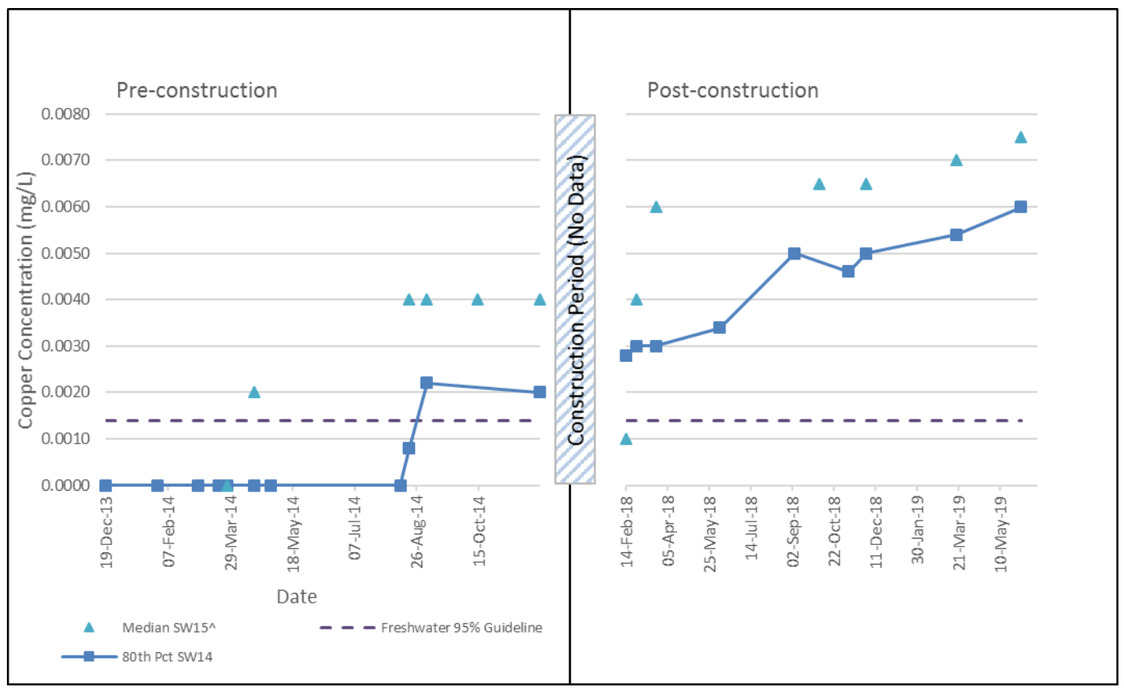


Attachment C
Control Charts – Copper
Exceedances against the 80th Percentile
Event 11

Hitchcock's Lane Creek Tributary

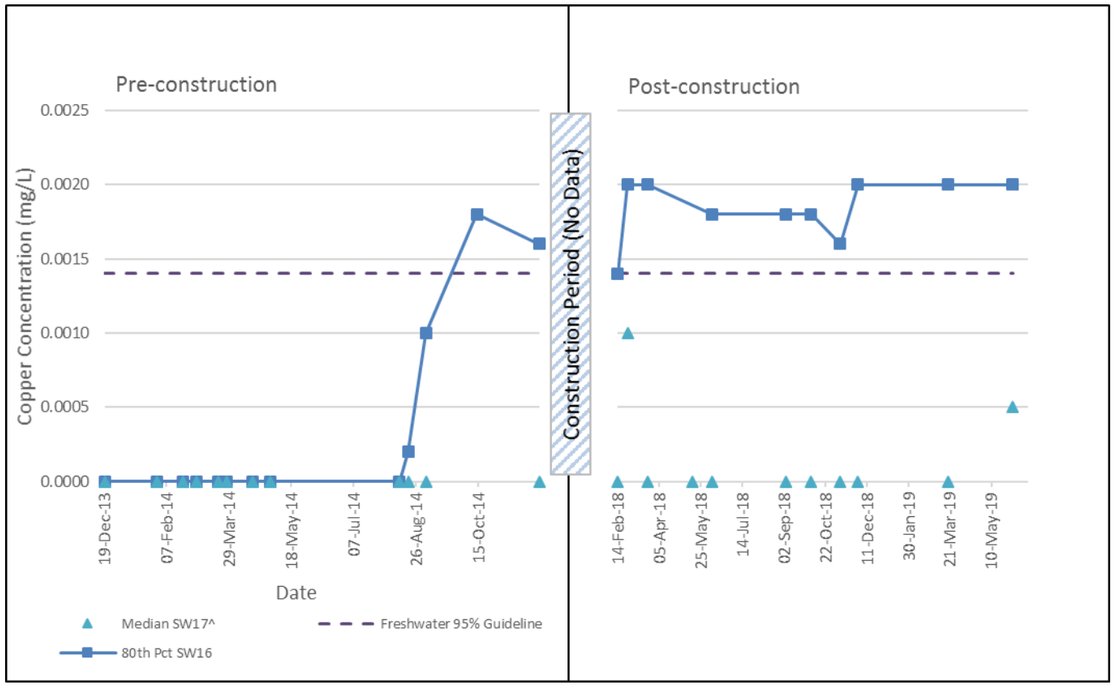


Hitchcock's Lane Creek



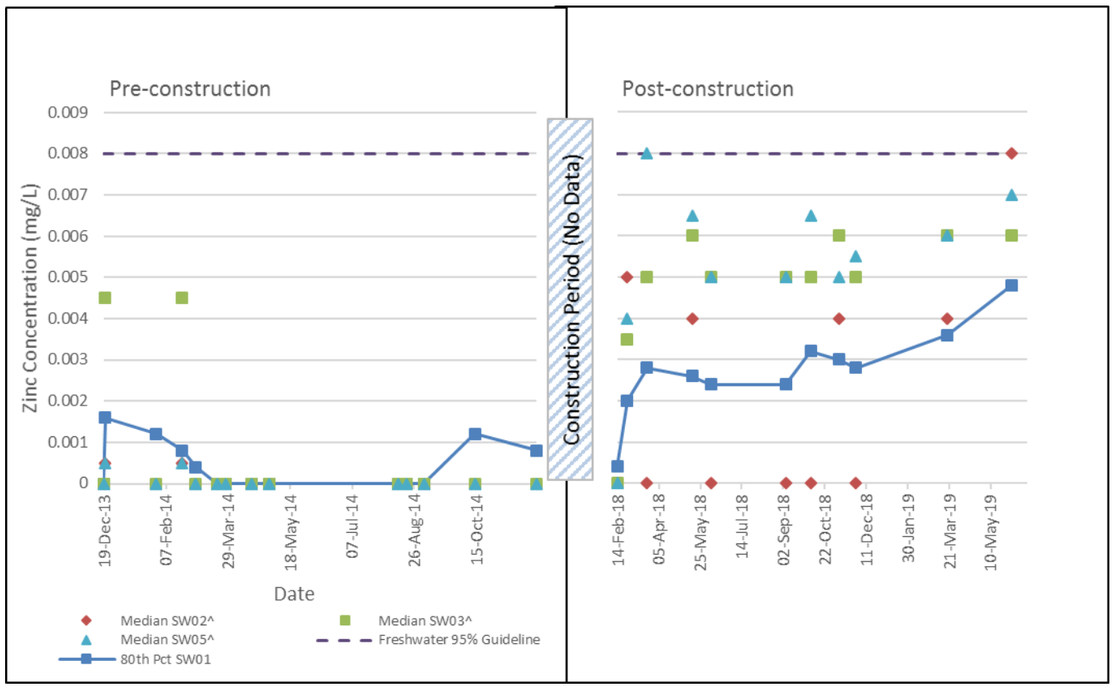
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data.

Unnamed Tributary

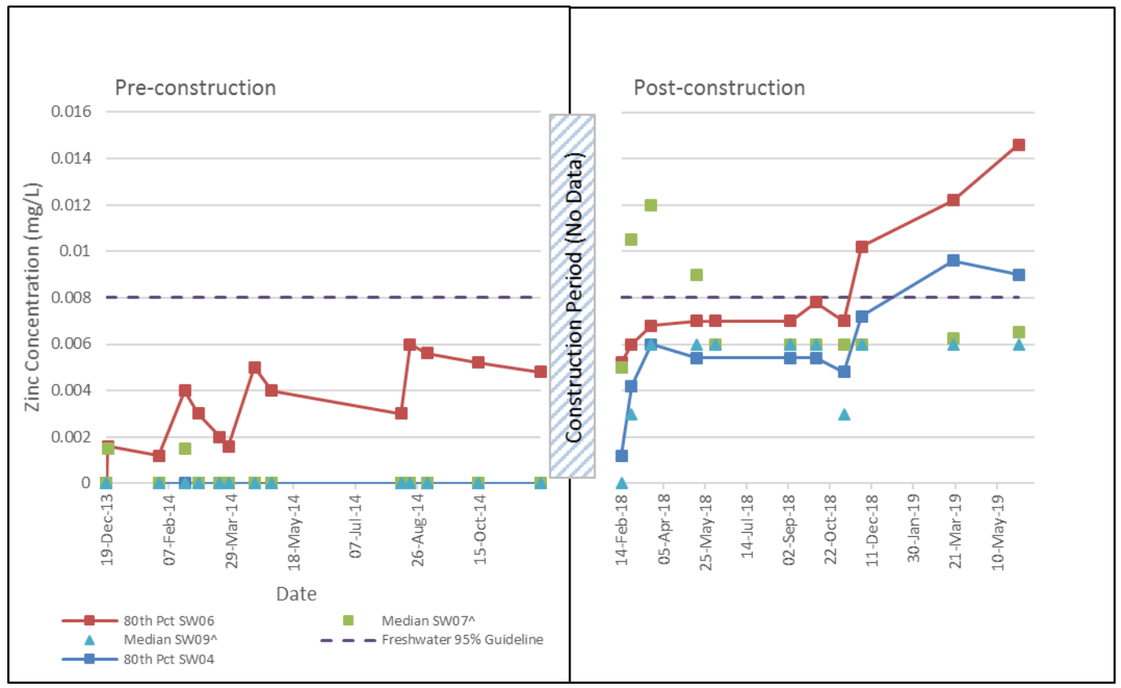


Attachment C
Control Charts – Zinc
Exceedances against the 80th Percentile
Event 11

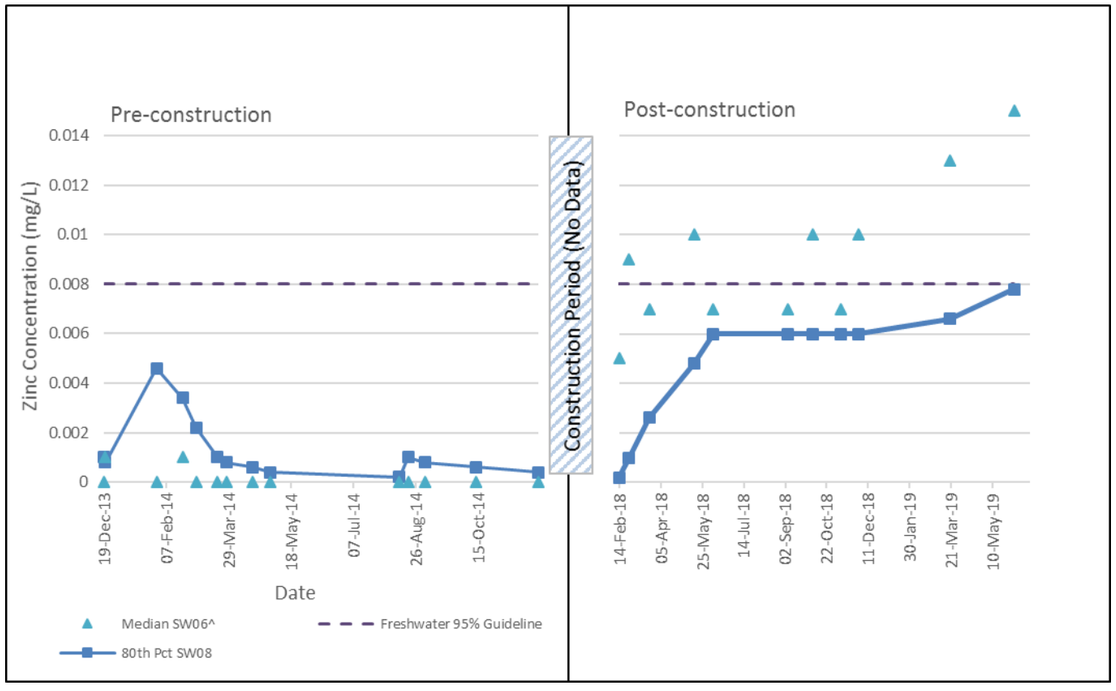
Broughton Creek



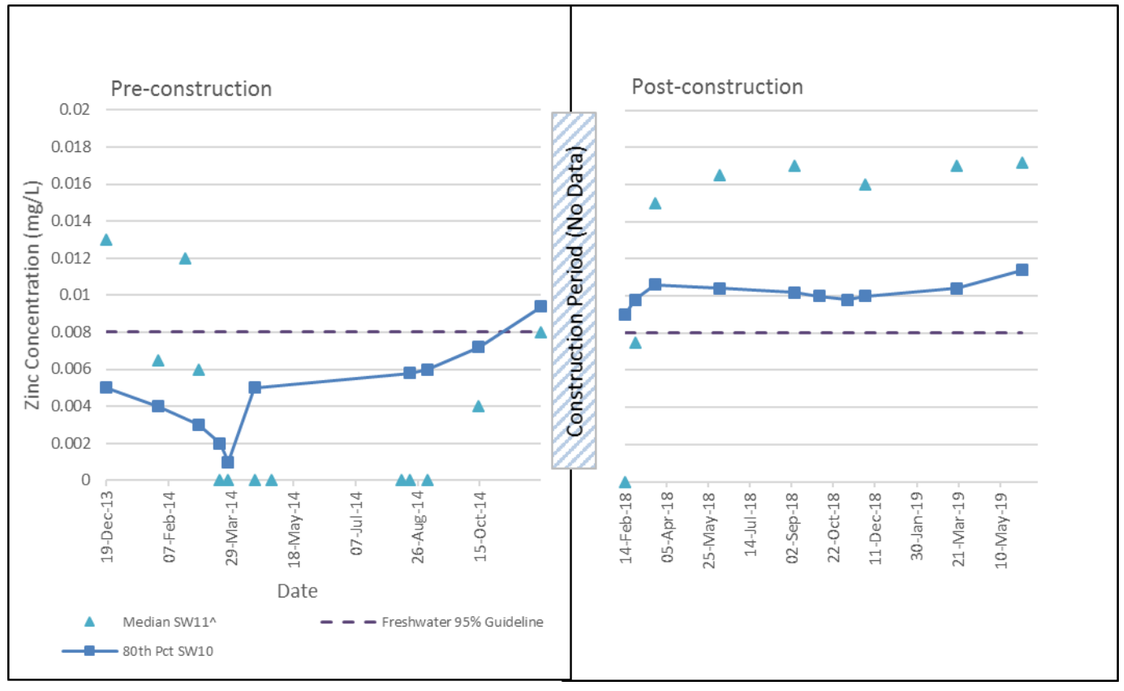
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

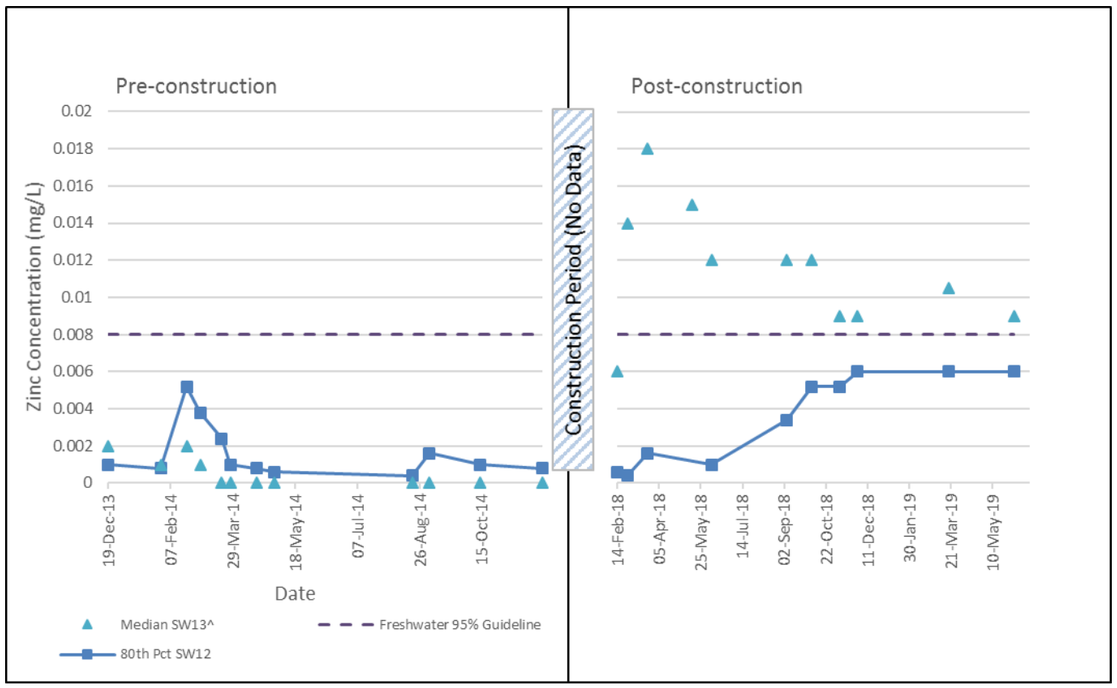


Town Creek

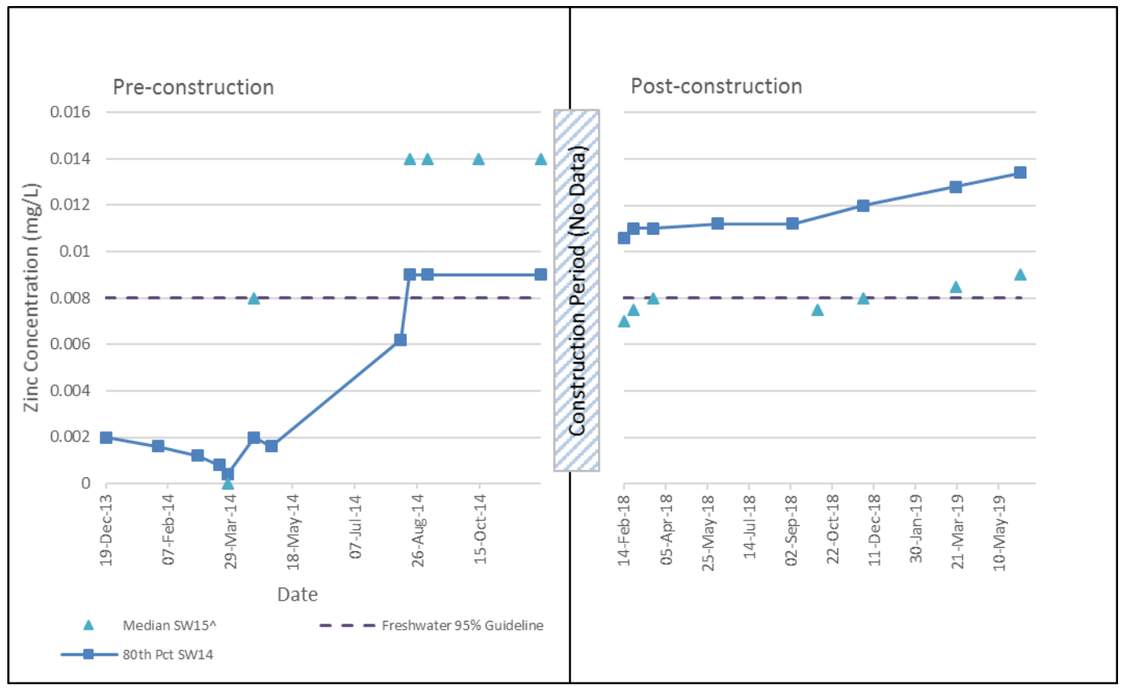


Attachment C
Control Charts – Zinc
Exceedances against the 80th Percentile
Event 11

Hitchcock's Lane Creek Tributary

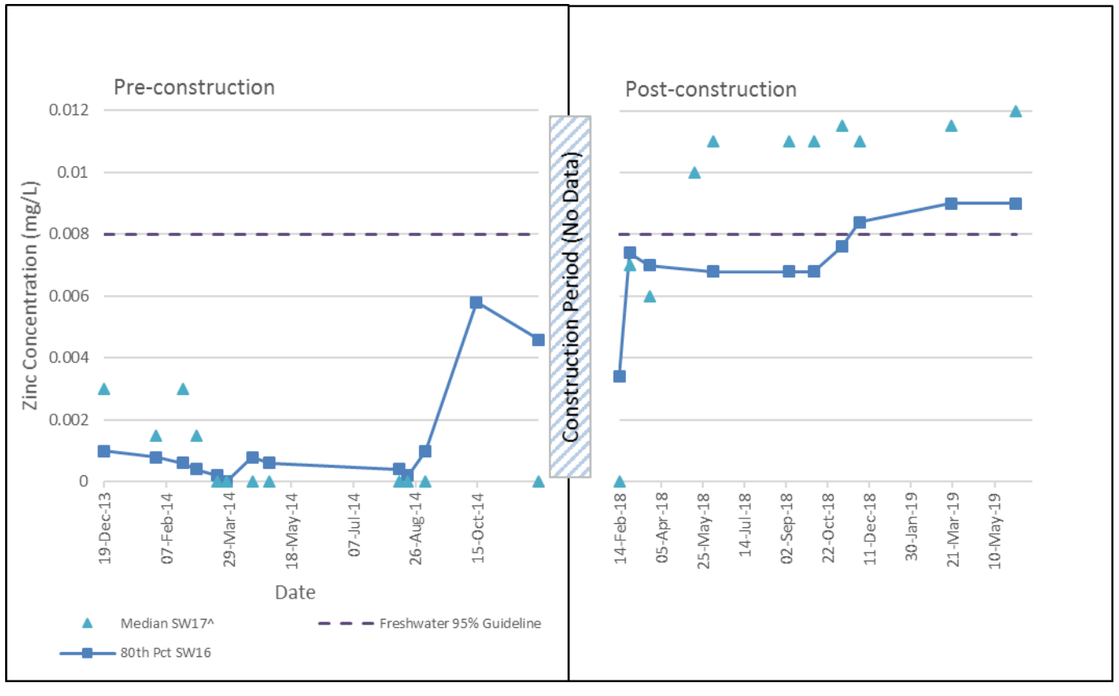


Hitchcock's Lane Creek



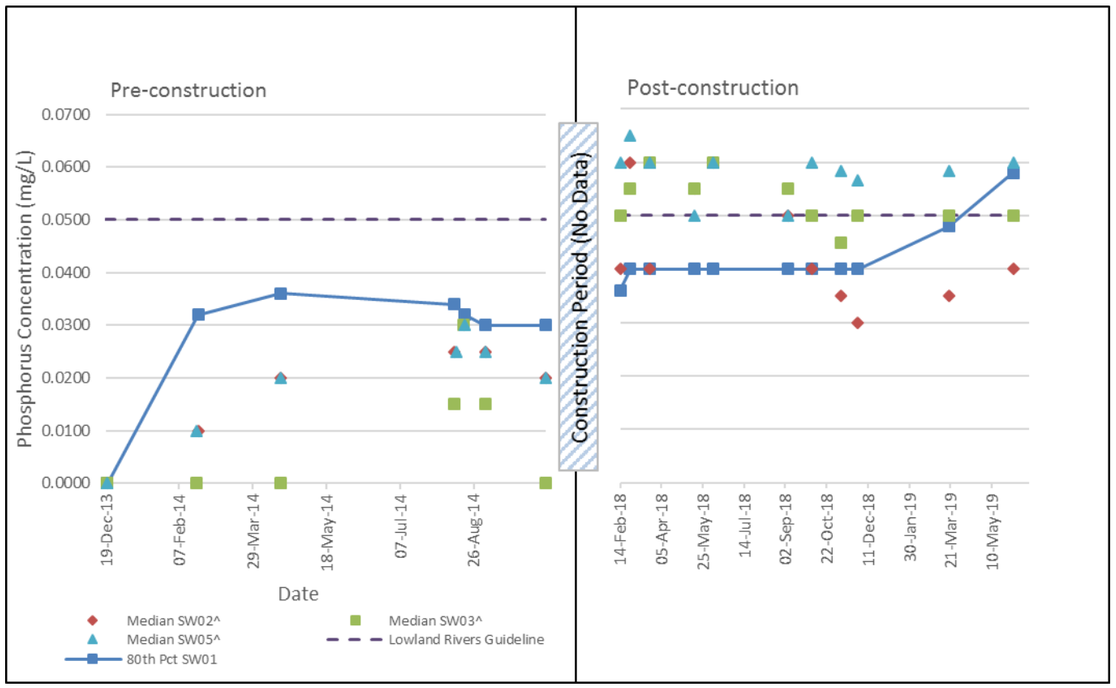
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data

Unnamed Tributary

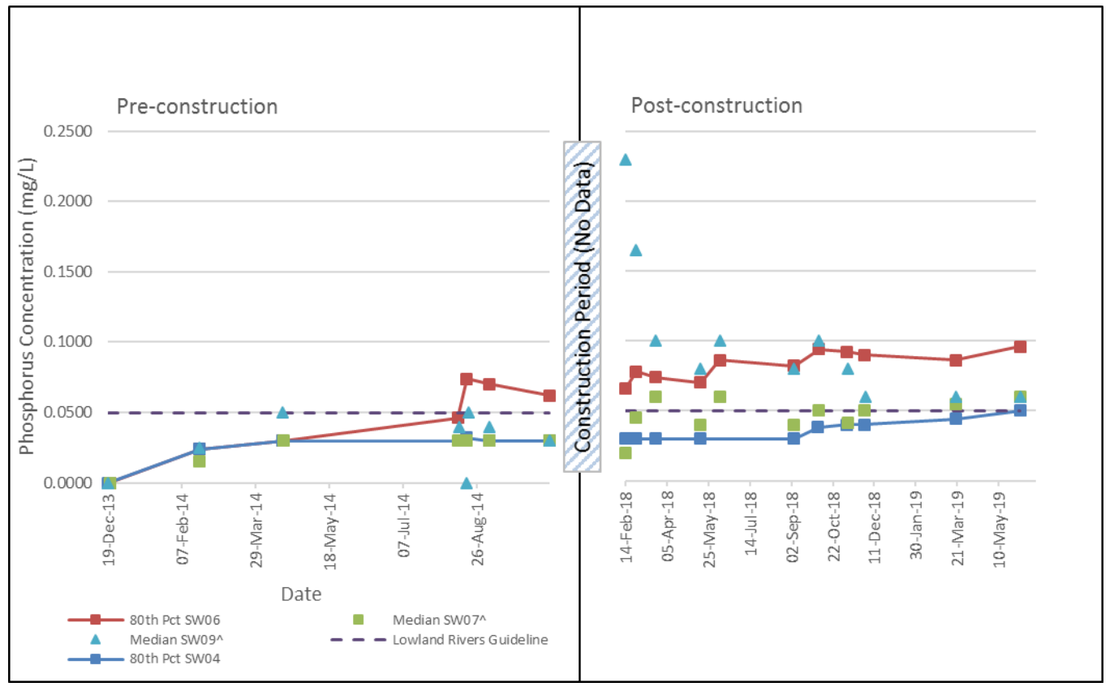


Attachment C
Control Charts – Phosphorus
Exceedances against the 80th Percentile
Event 11

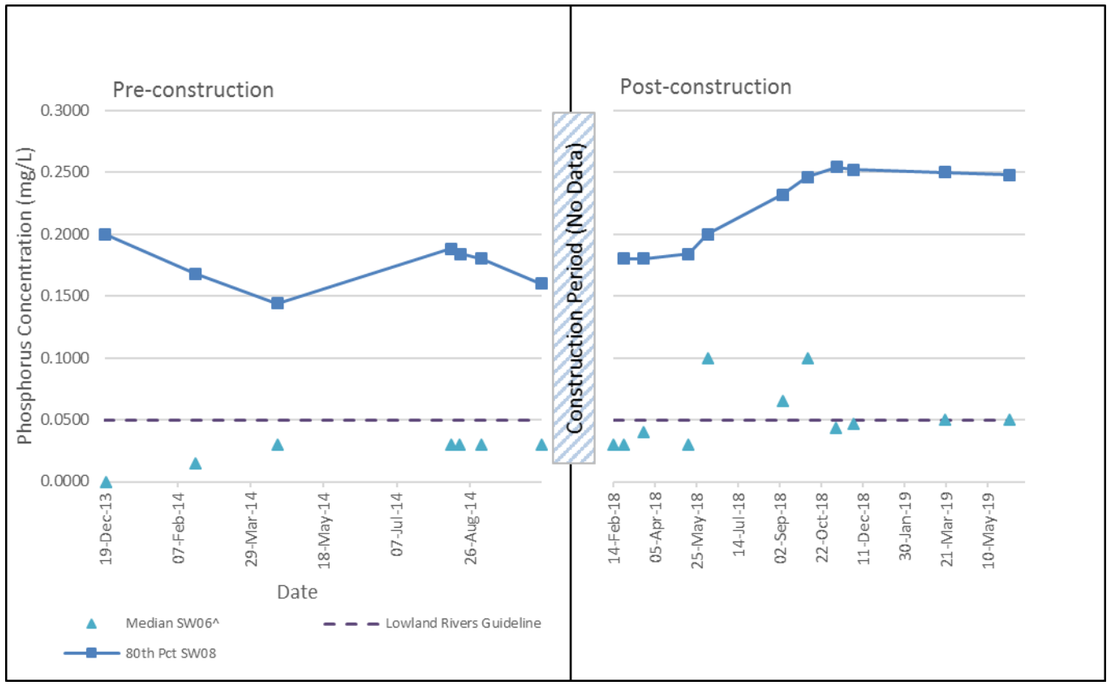
Broughton Creek



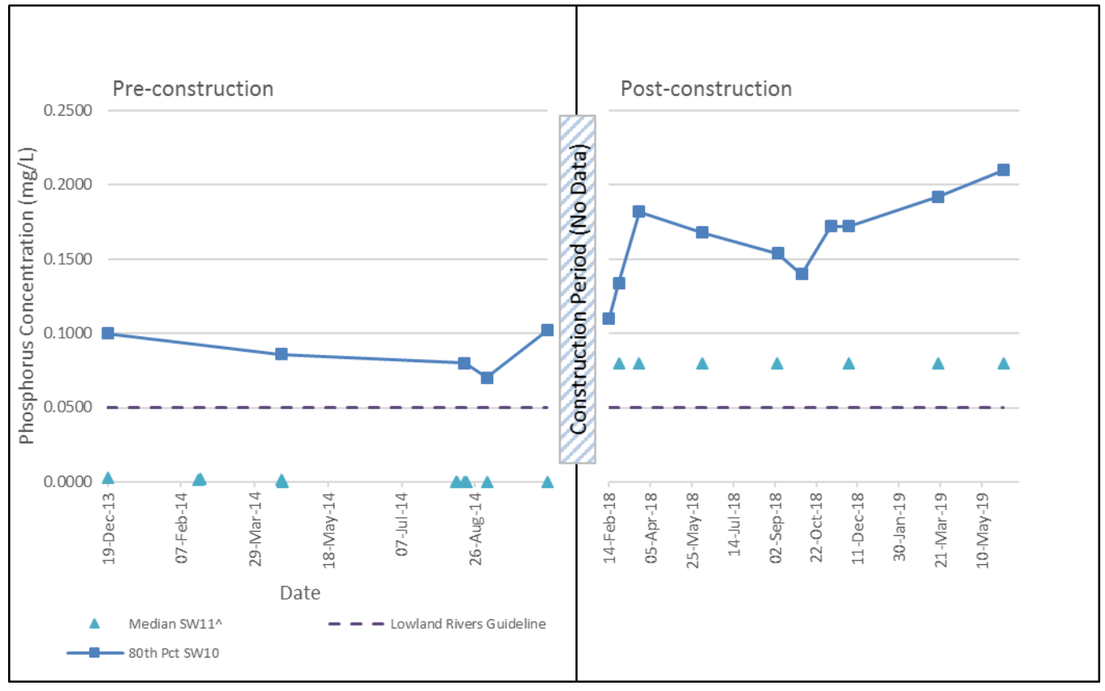
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

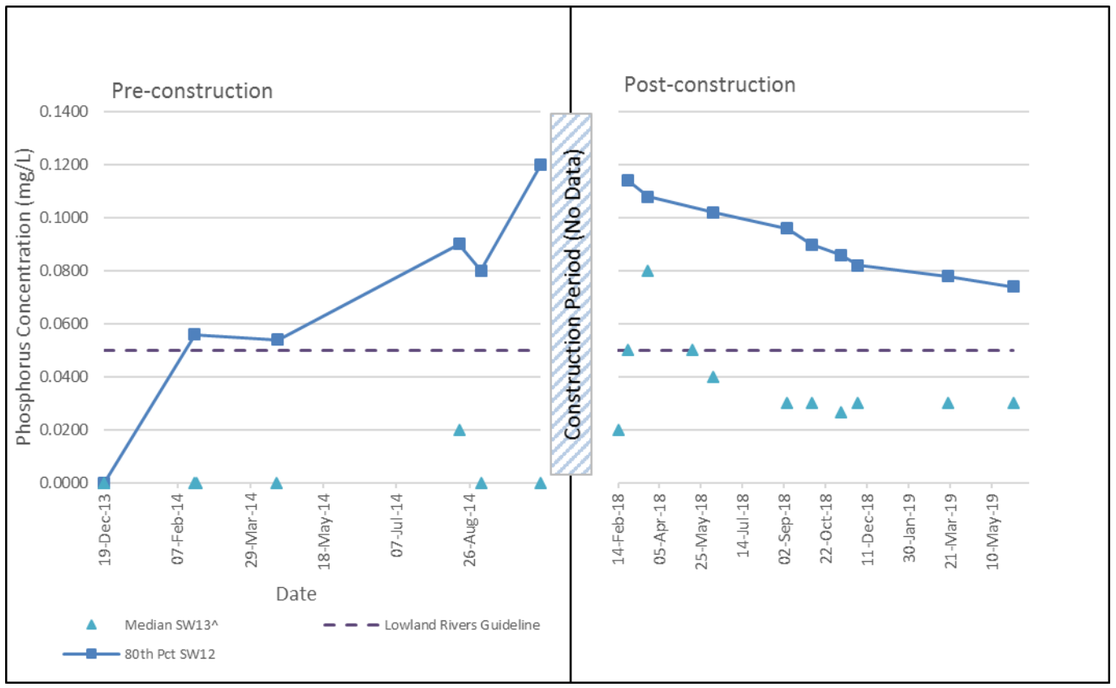


Town Creek

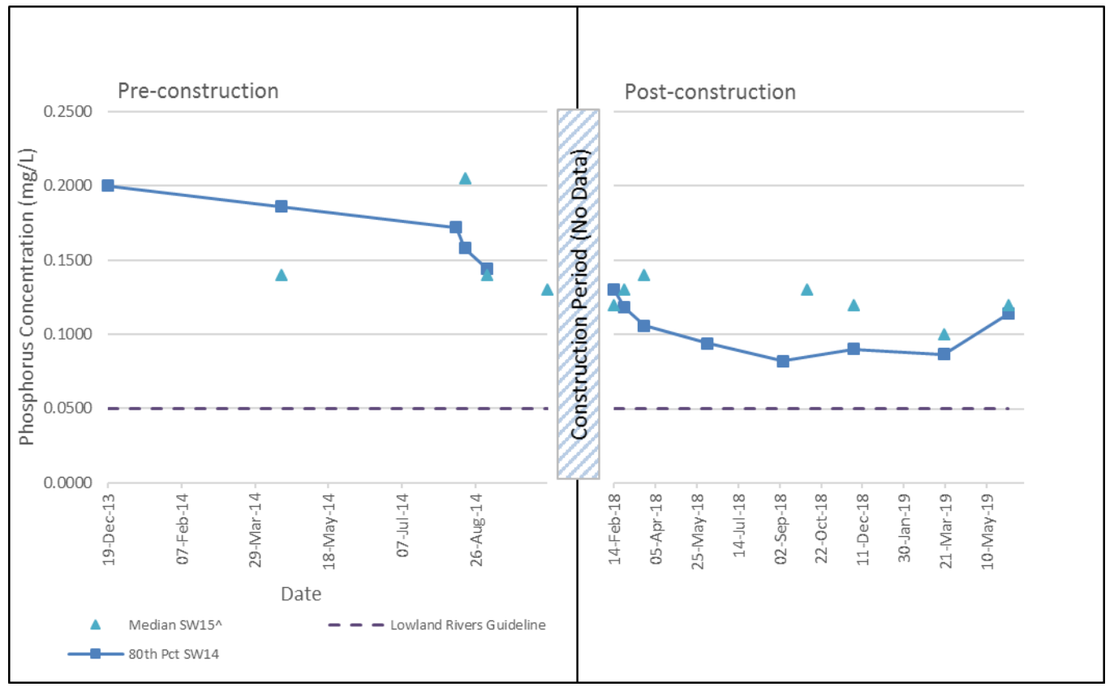


Attachment C
Control Charts – Phosphorus
Exceedances against the 80th Percentile
Event 11

Hitchcock's Lane Creek Tributary

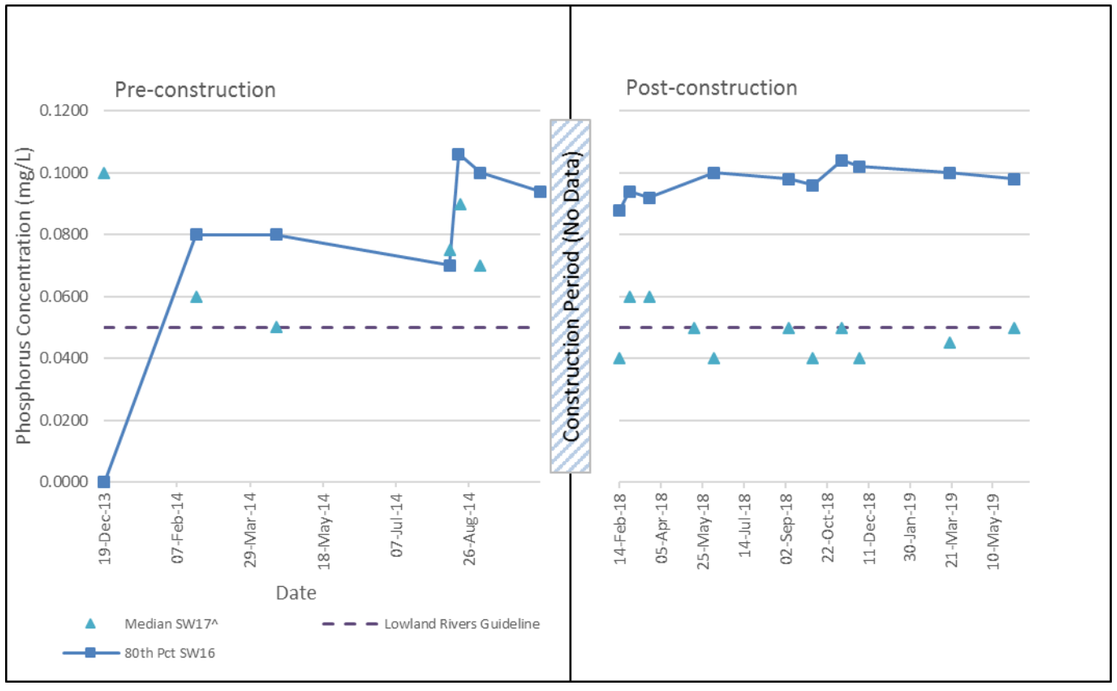


Hitchcock's Lane Creek



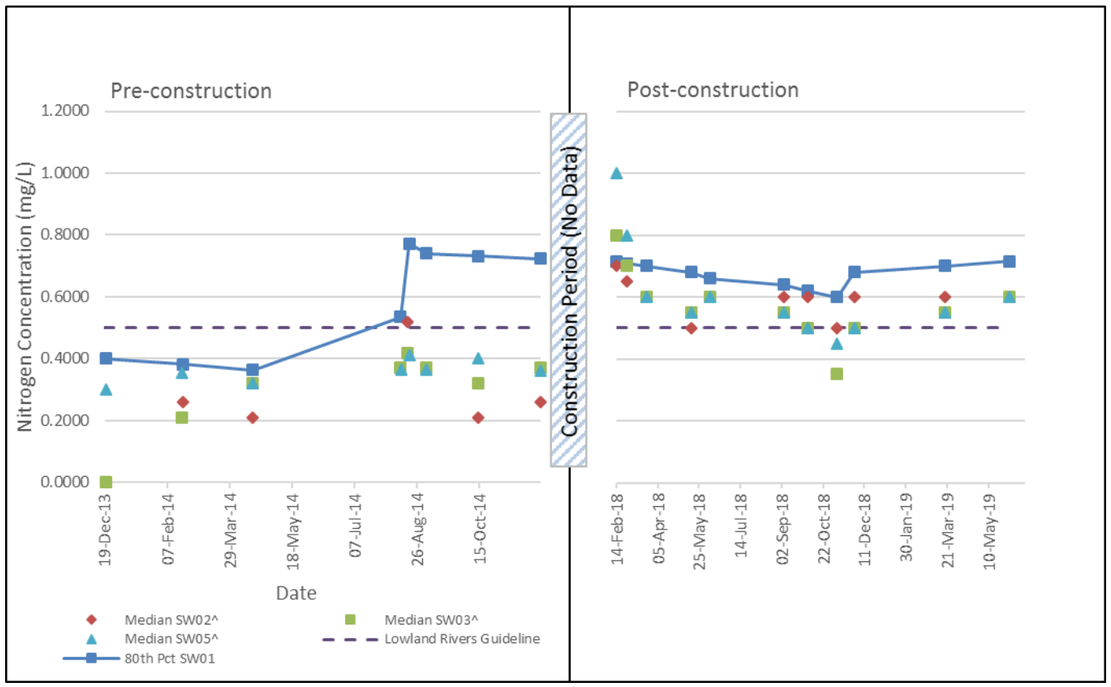
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data.

Unnamed Tributary

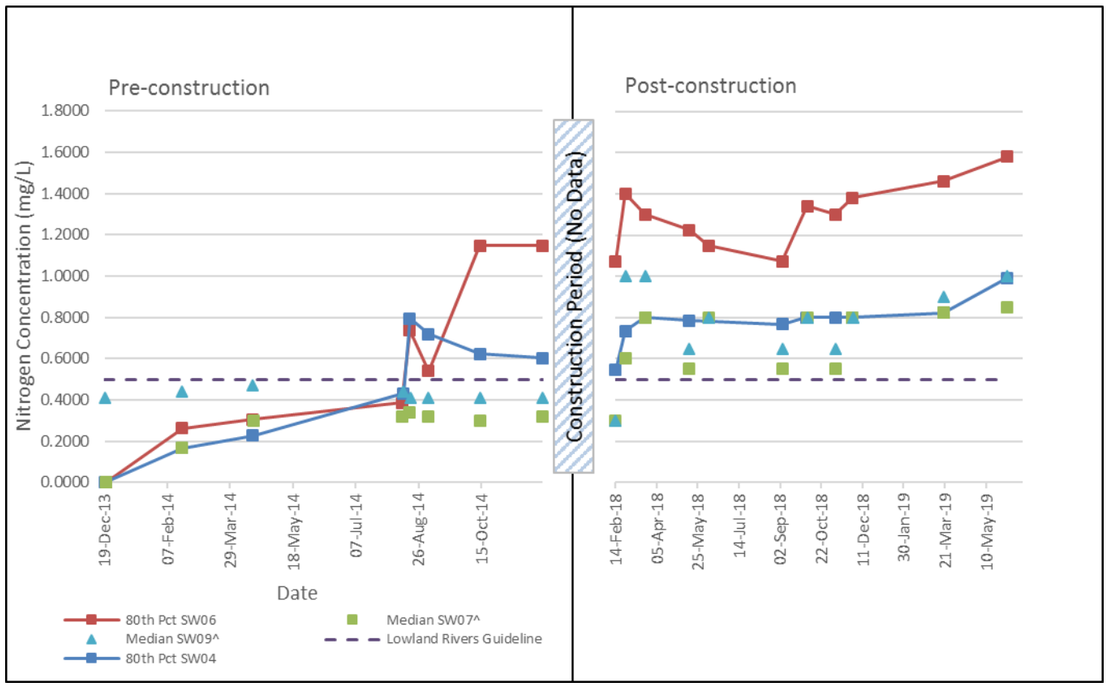


Attachment C
Control Charts – Nitrogen
Exceedances against the 80th Percentile
Event 11

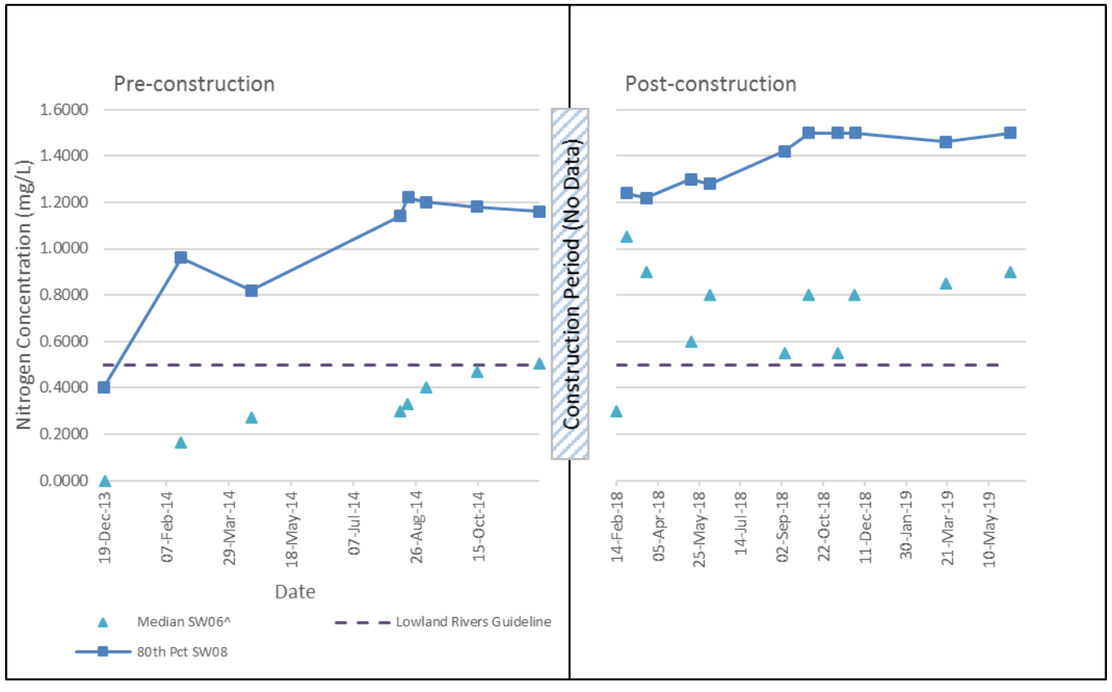
Broughton Creek



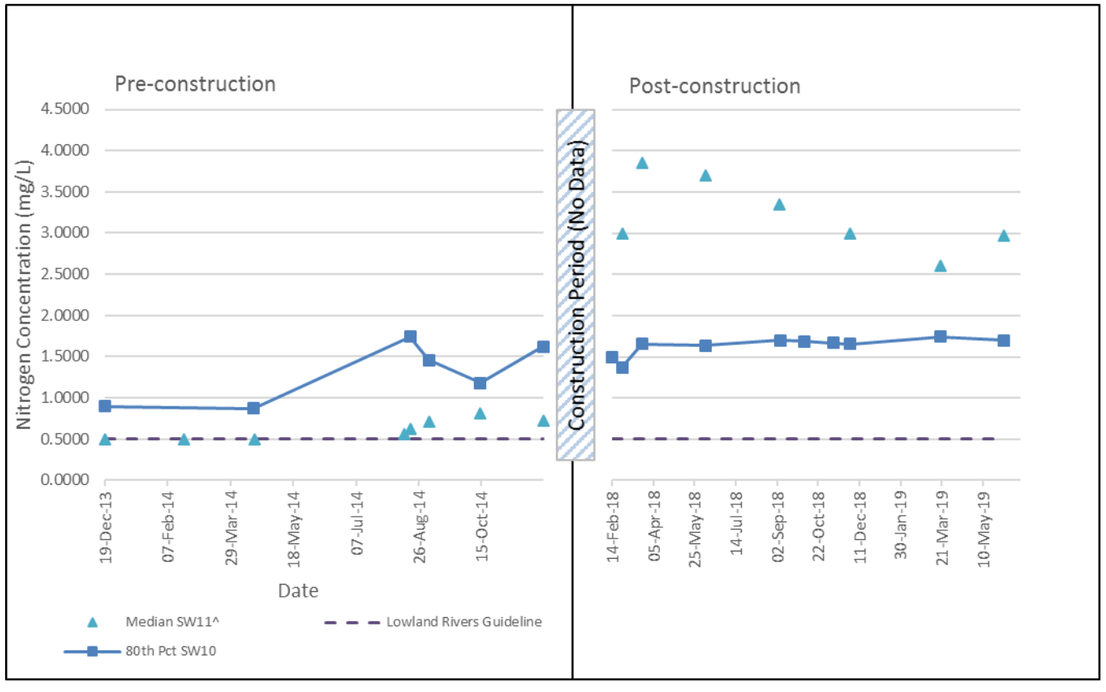
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

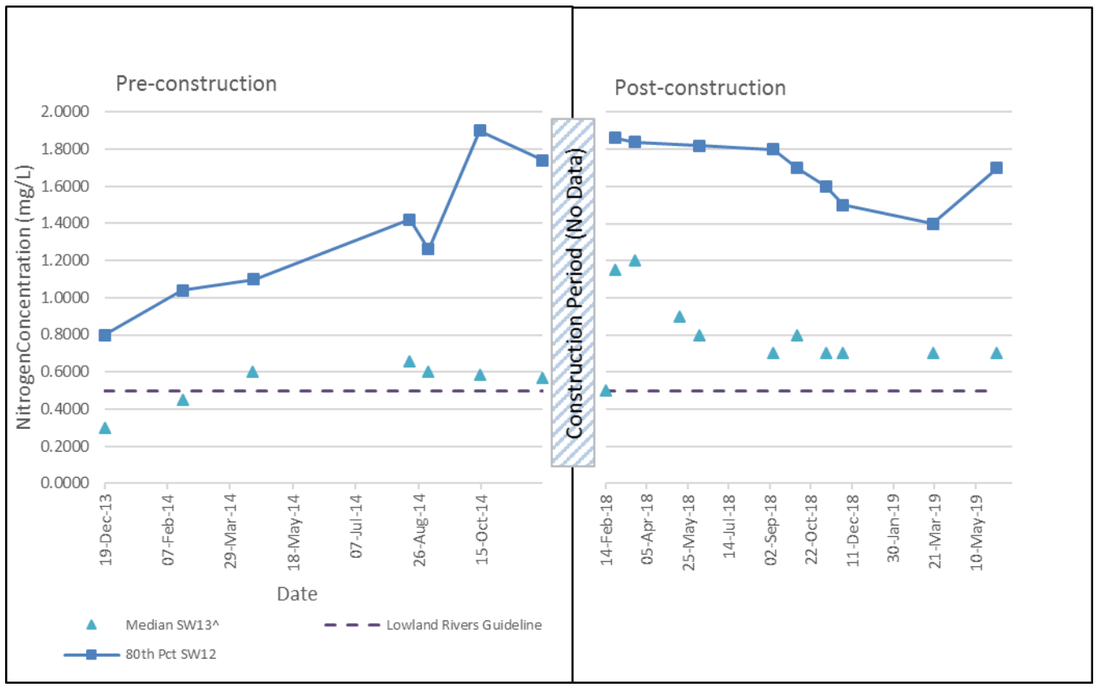


Town Creek

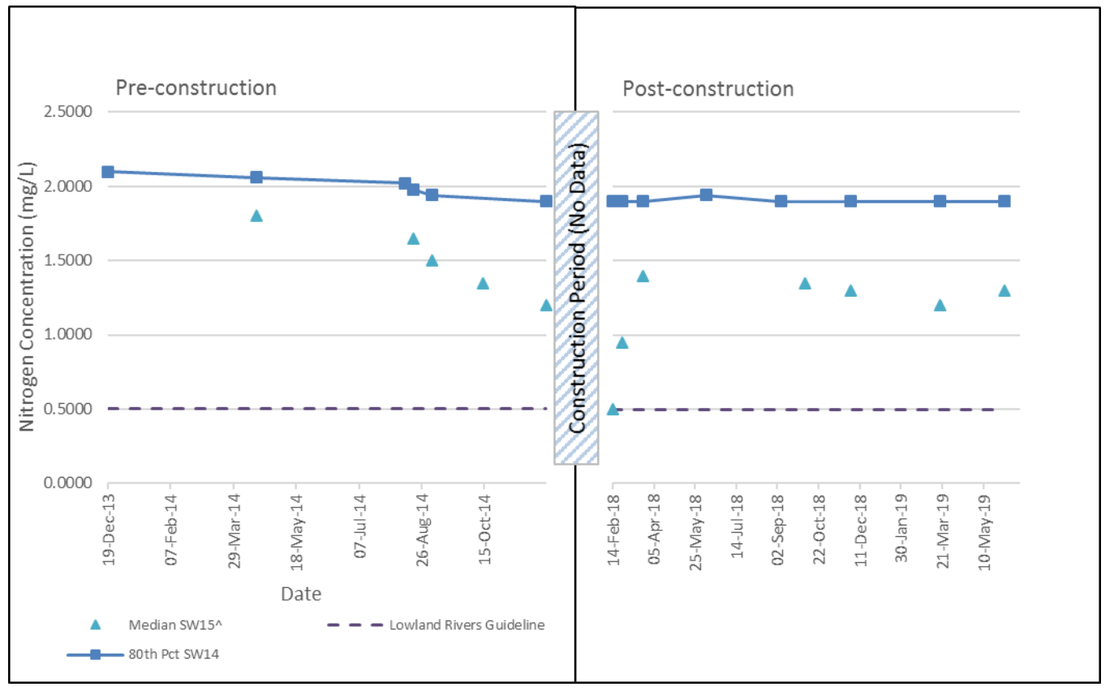


Attachment C
Control Charts – Nitrogen
Exceedances against the 80th Percentile
Event 11

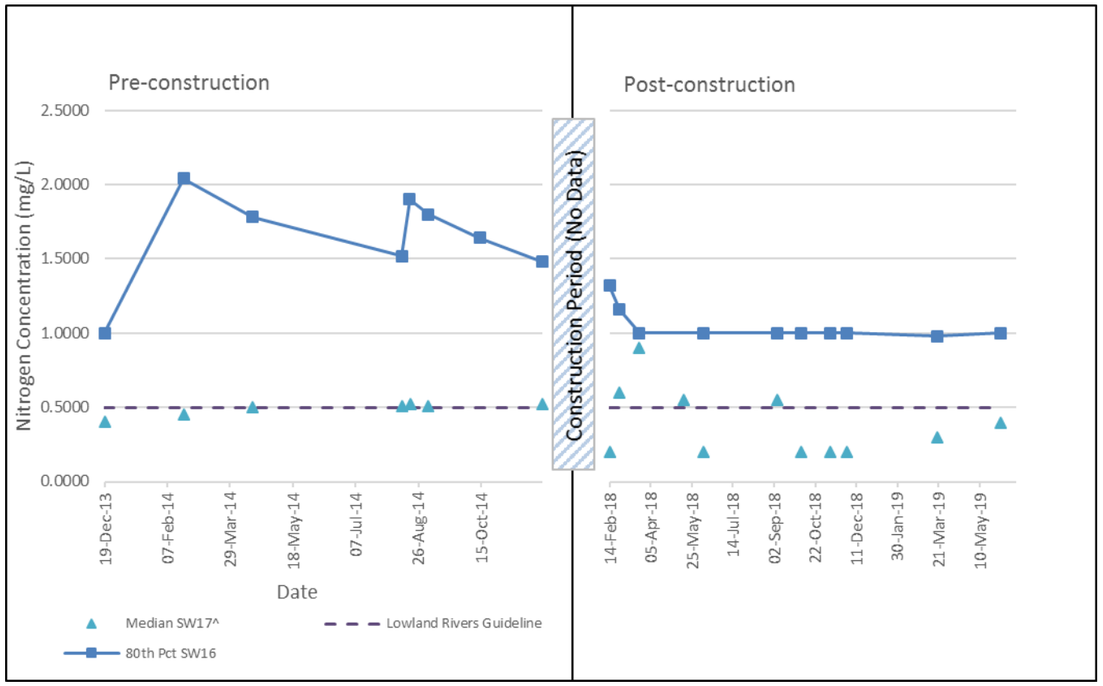
Hitchcock's Lane Creek Tributary



Hitchcock's Lane Creek

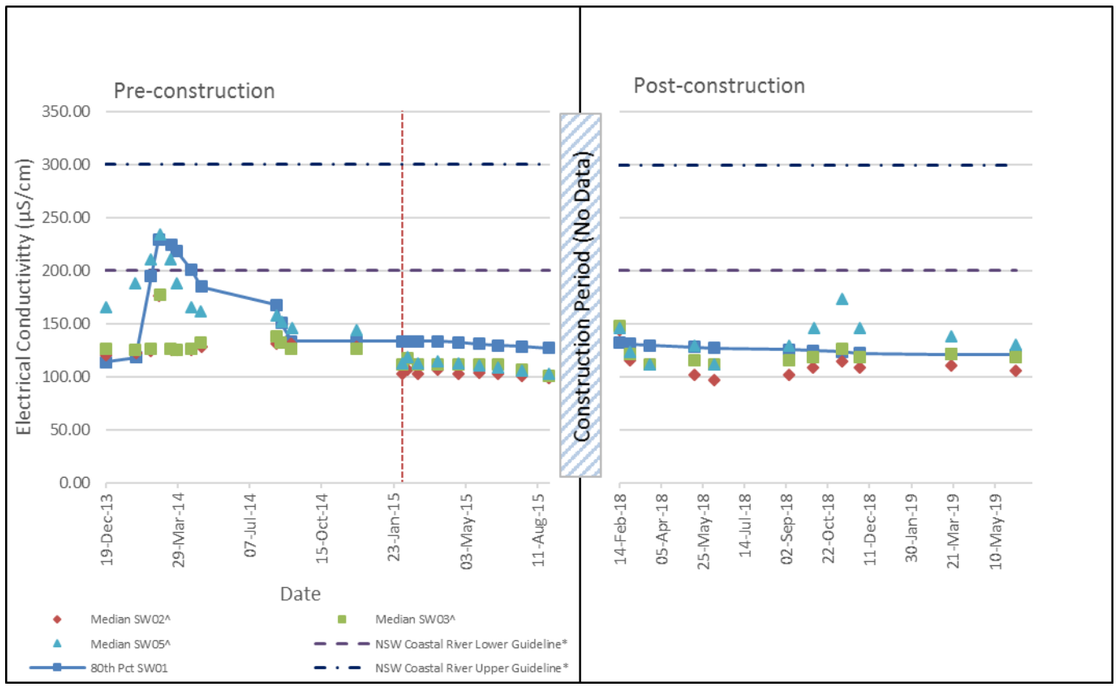


Unnamed Tributary

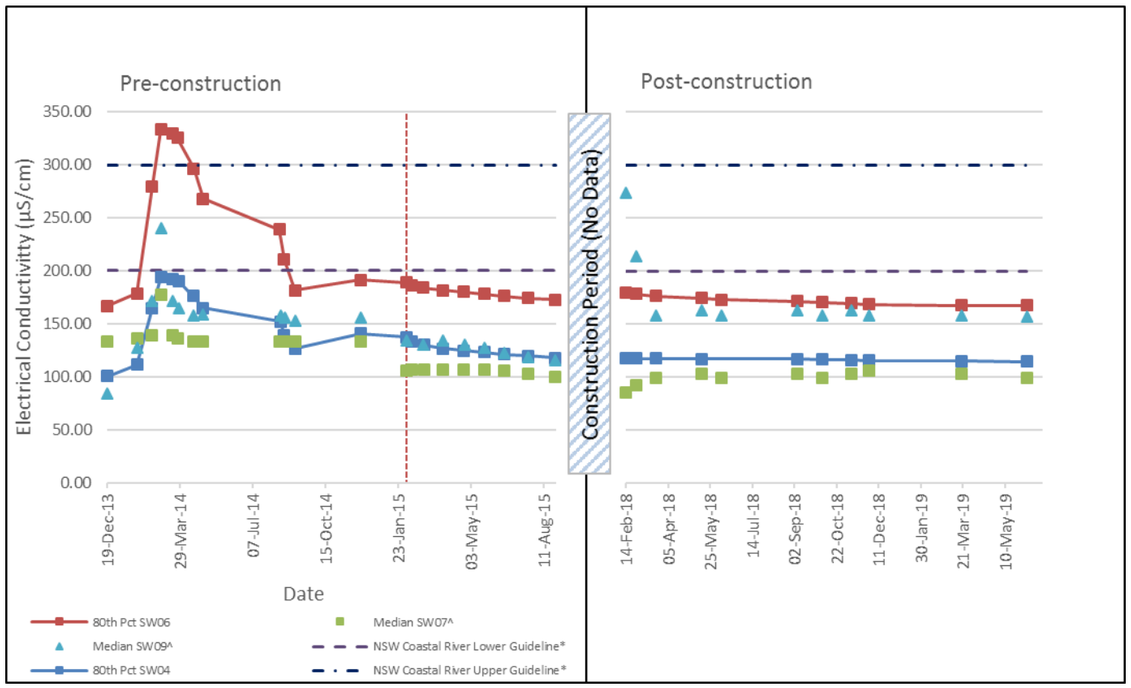


Attachment C
Control Charts – Electrical Conductivity
Exceedances against the 80th Percentile
Event 11

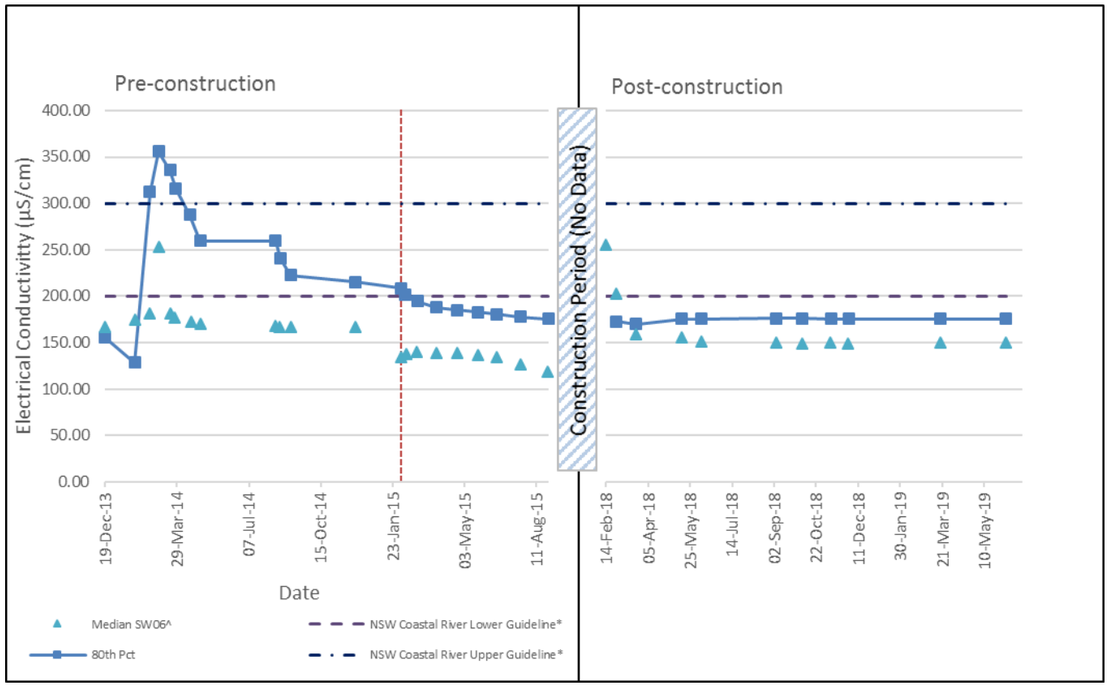
Broughton Creek



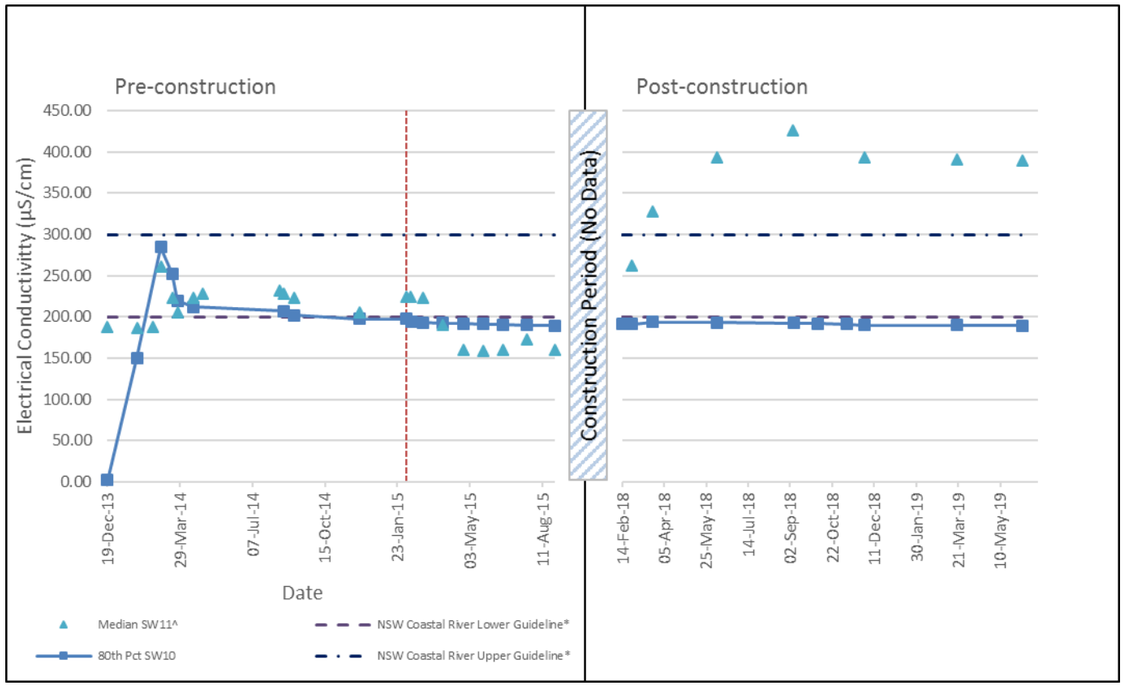
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

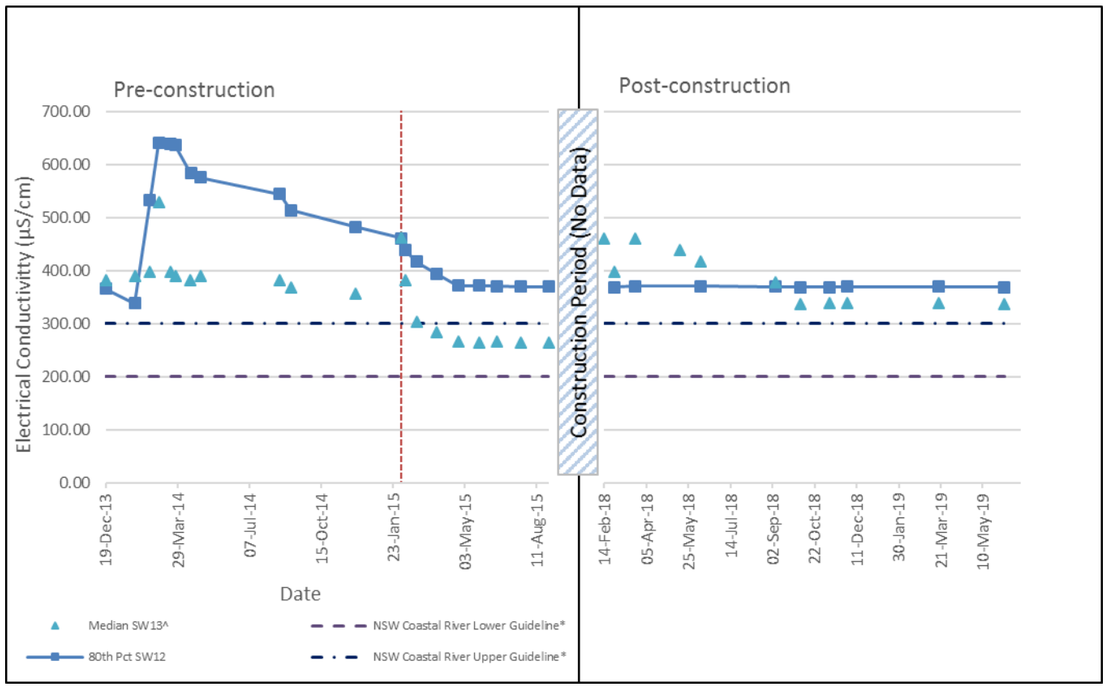


Town Creek

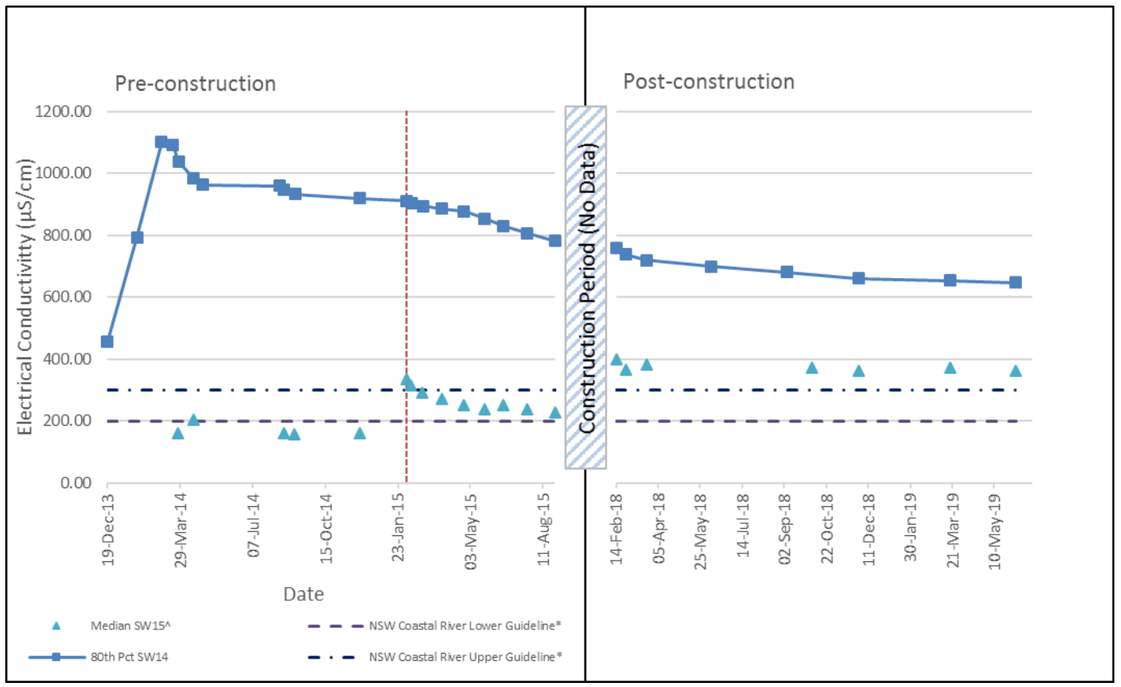


Attachment C
Control Charts – Electrical Conductivity
Exceedances against the 80th Percentile
Event 11

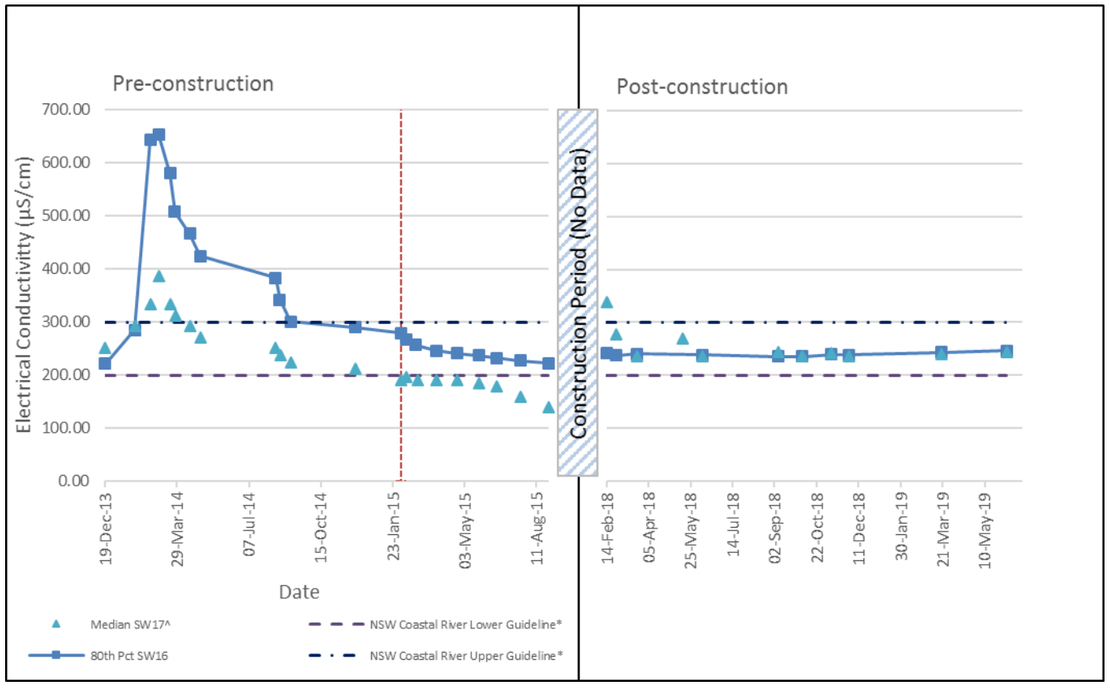
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary



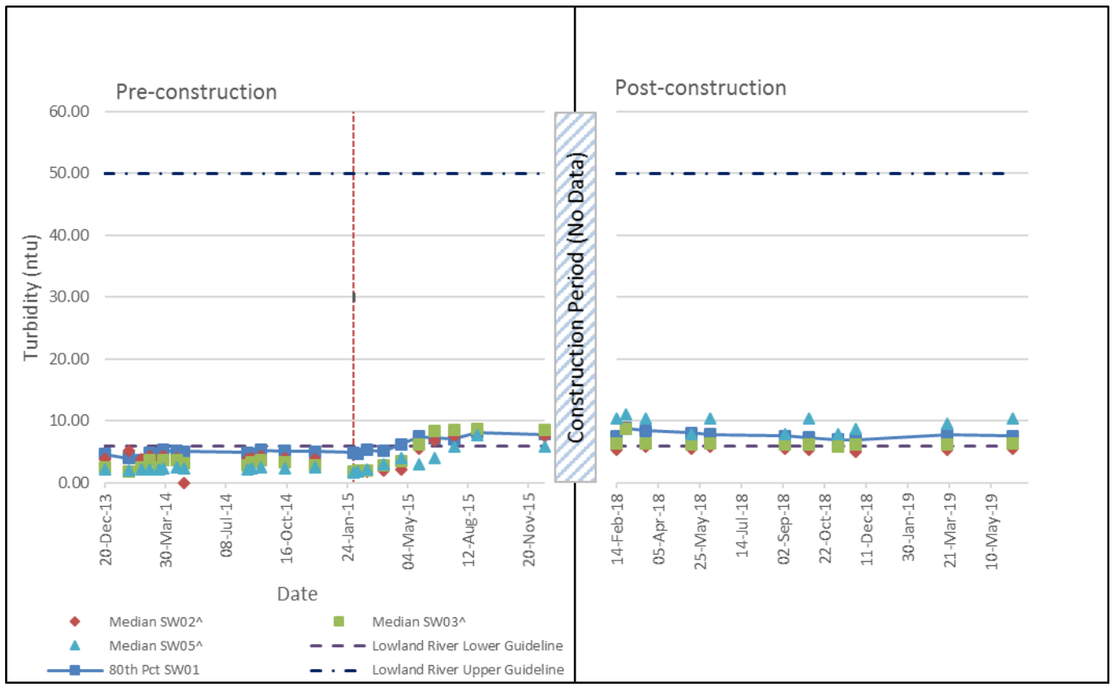
* Lower and Upper Guideline values taken from ANZECC (2000) Table 3.3.3, "NSW coastal rivers are typically in the range 200-300 µS/cm". South-east Australia, Lowland rivers guideline values are otherwise 125-2200 µS/cm and not inclusive of scenarios applicable to the site.

Start of construction period

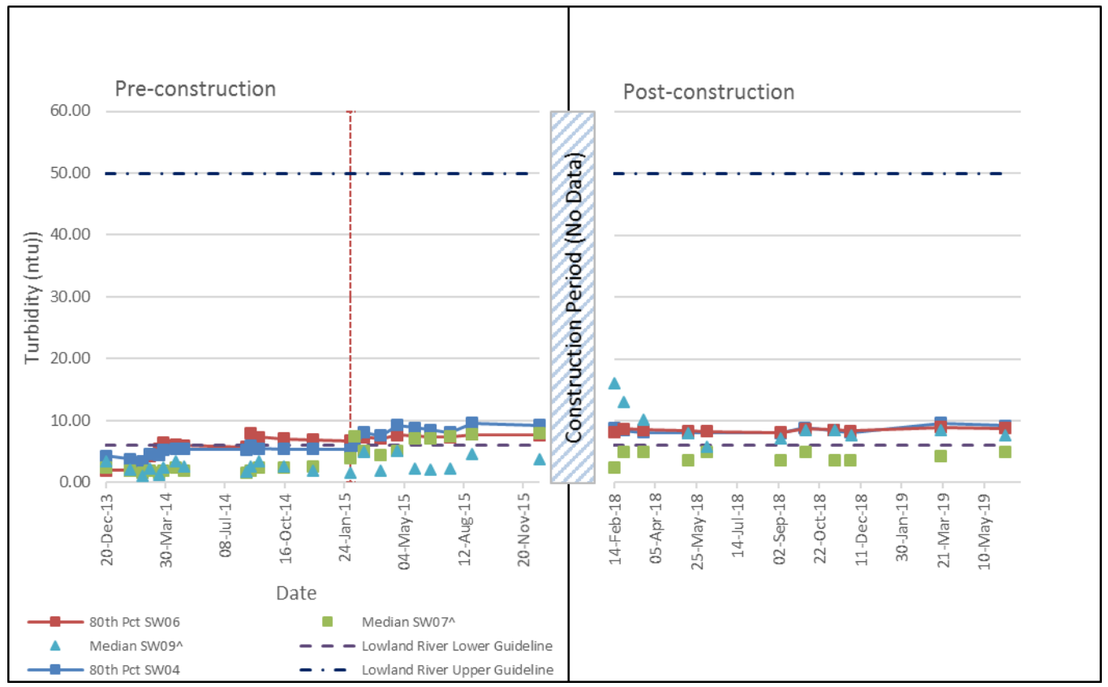
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – Turbidity
Exceedances against the 80th Percentile
Event 11

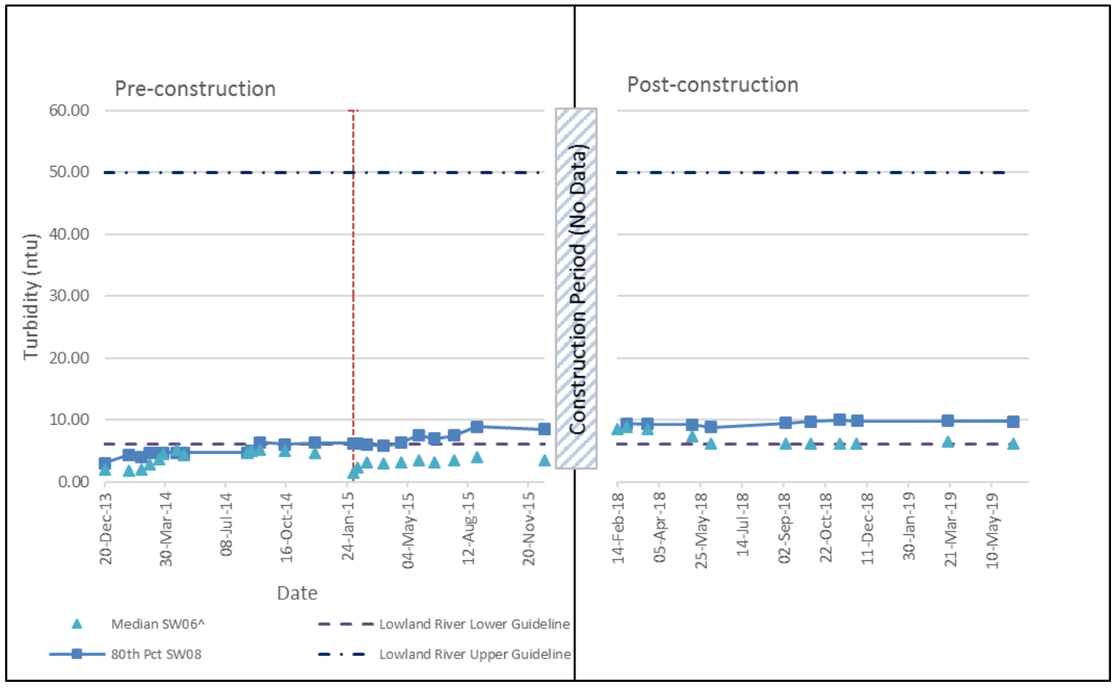
Broughton Creek



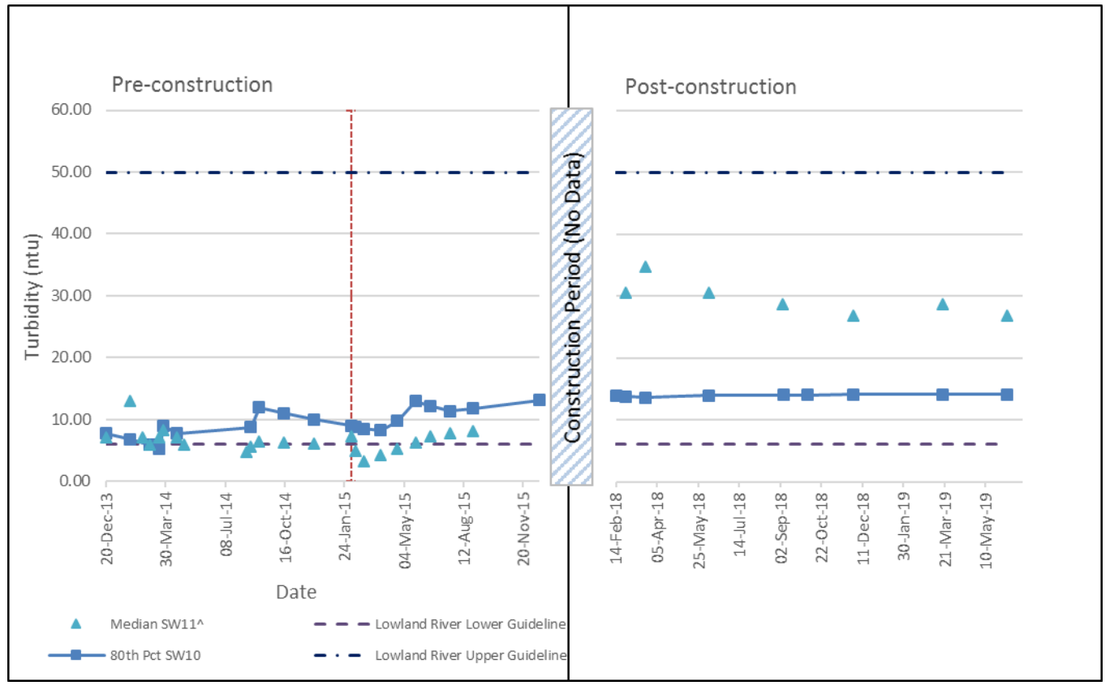
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

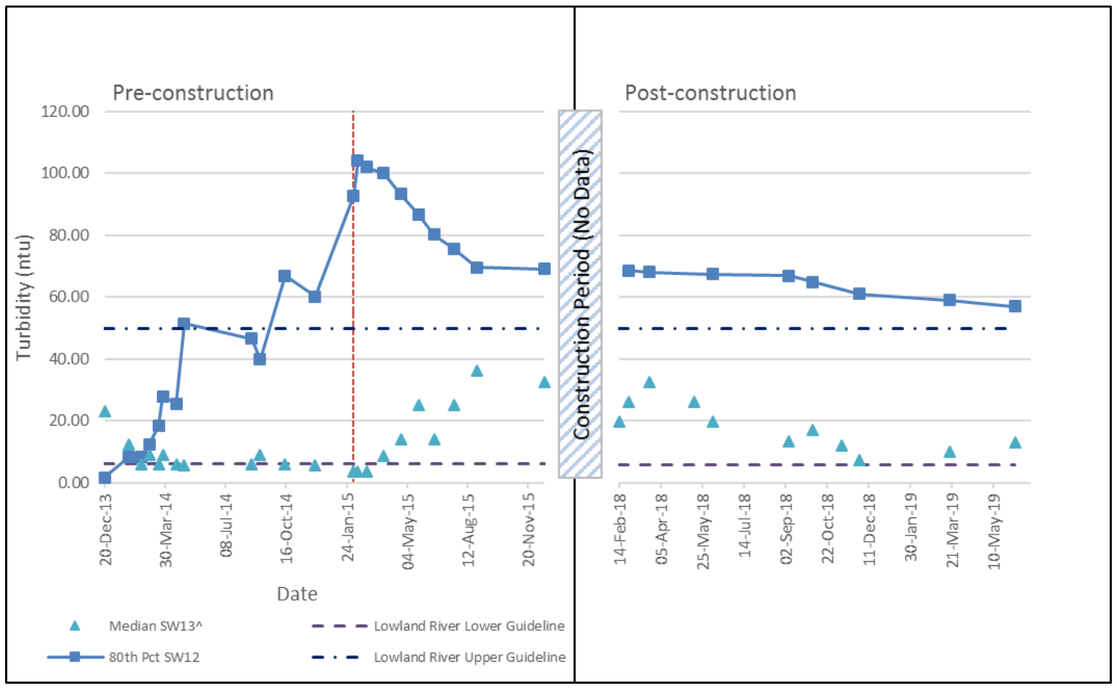


Town Creek

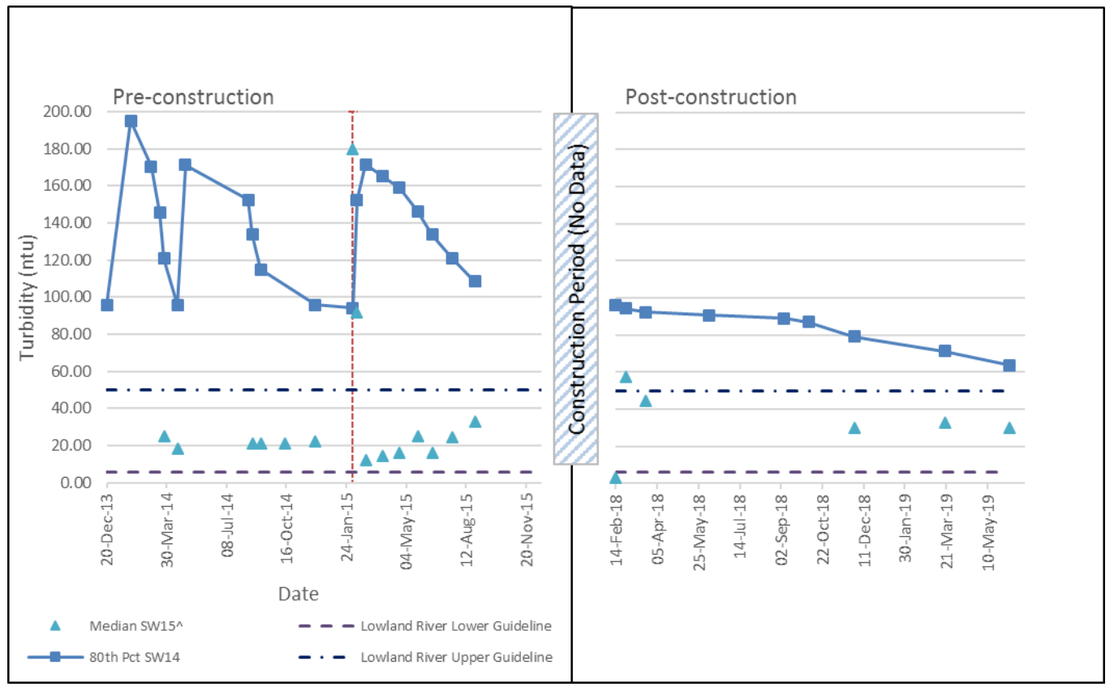


Attachment C
Control Charts – Turbidity
Exceedances against the 80th Percentile
Event 11

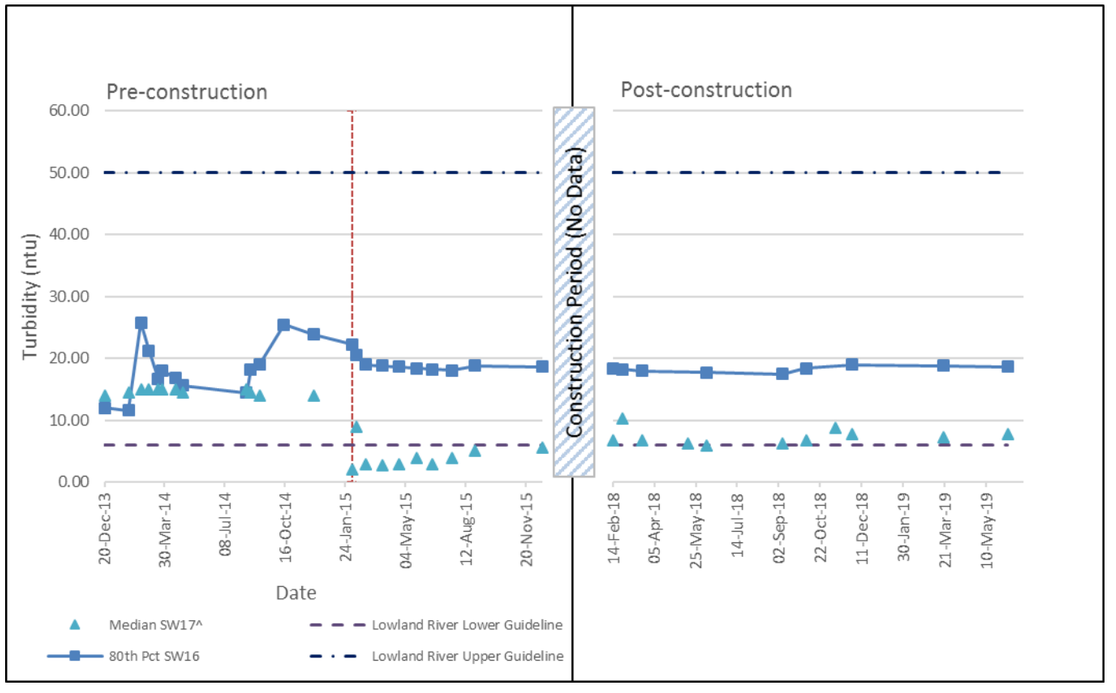
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary

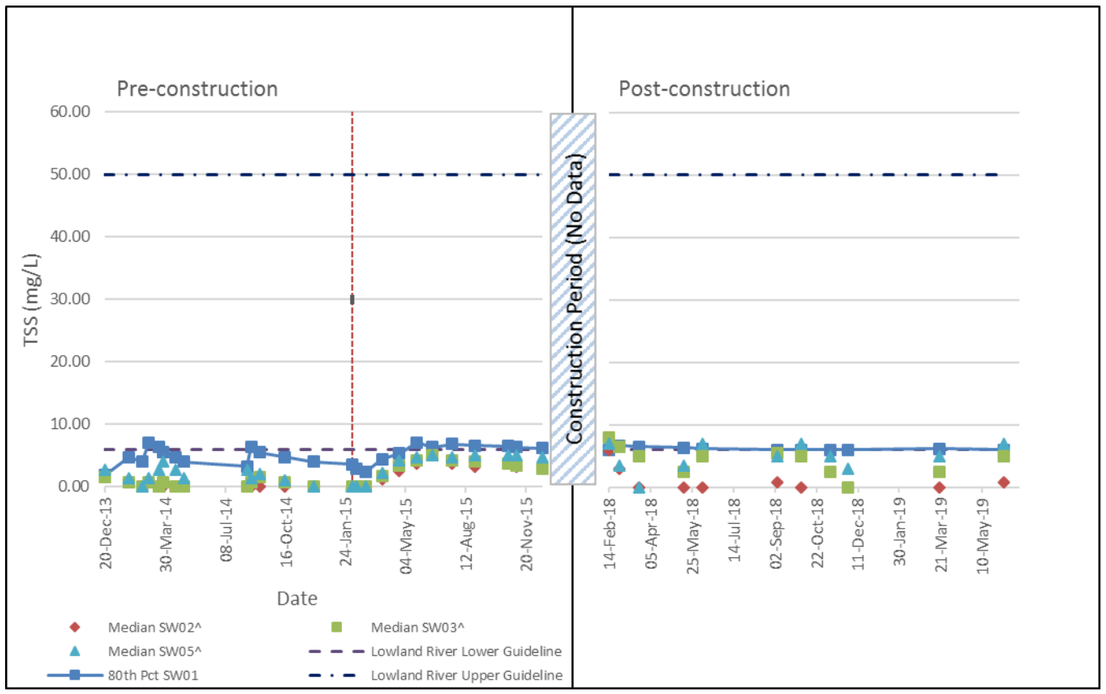


Start of construction period monitoring

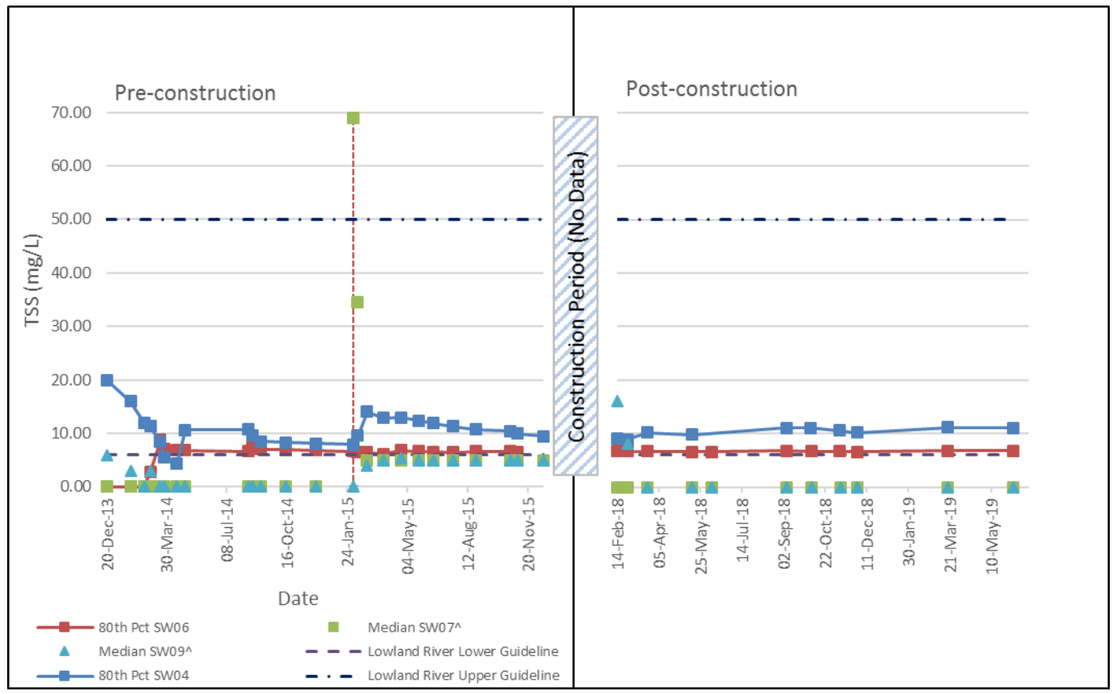
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – Total Suspended Solids
Exceedances against the 80th Percentile
Event 11

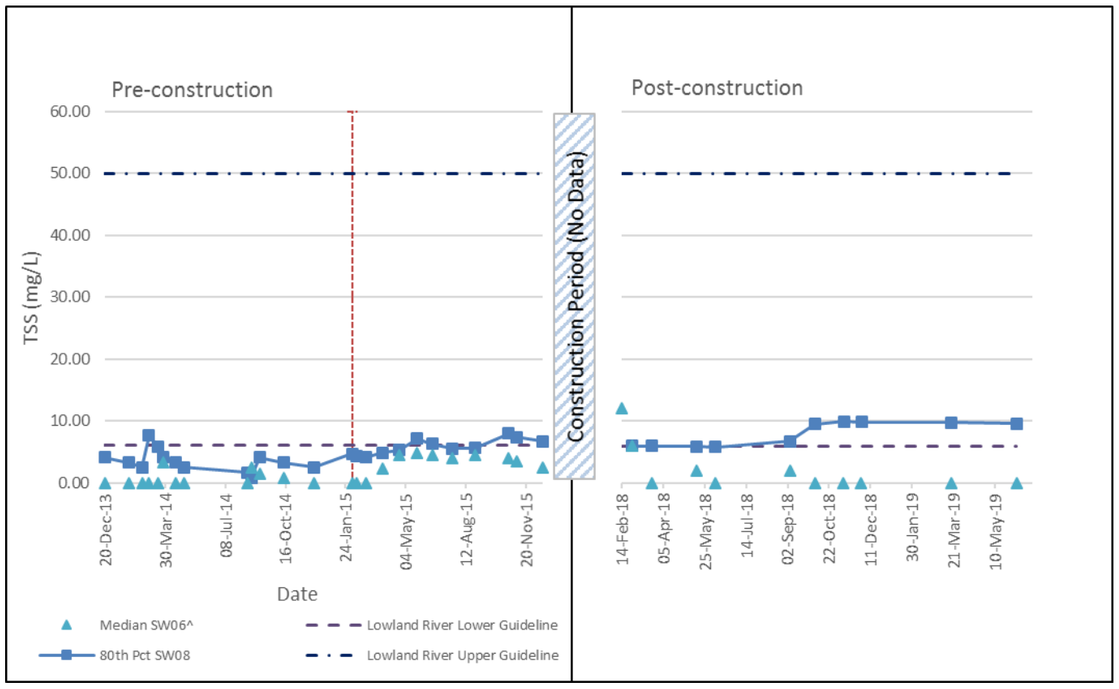
Broughton Creek



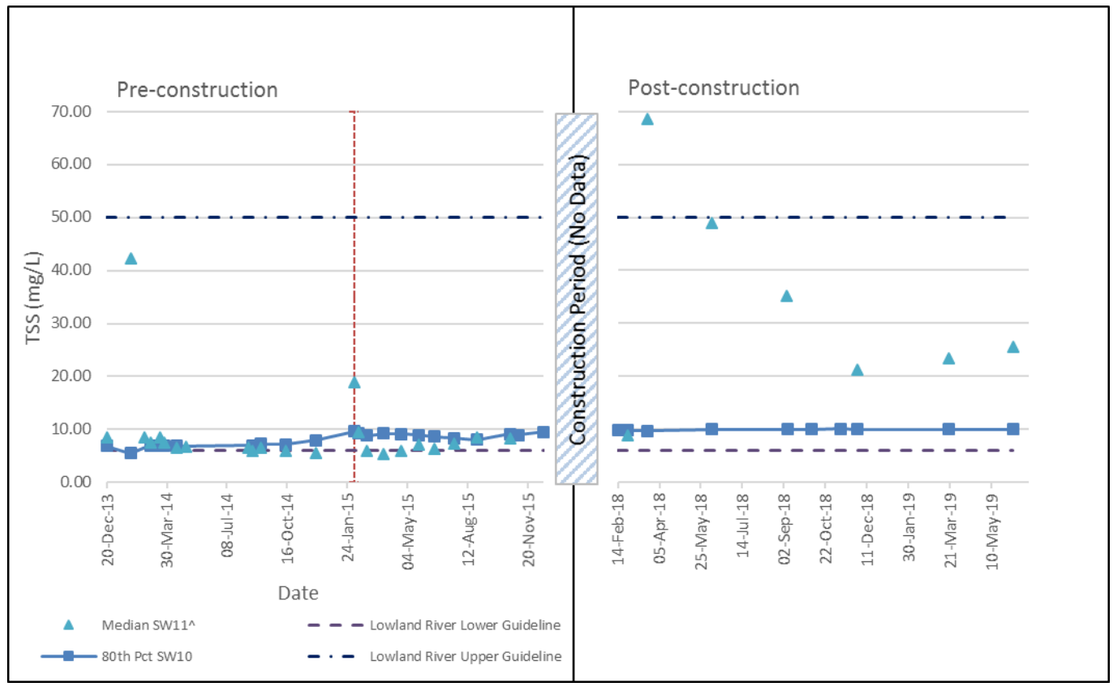
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

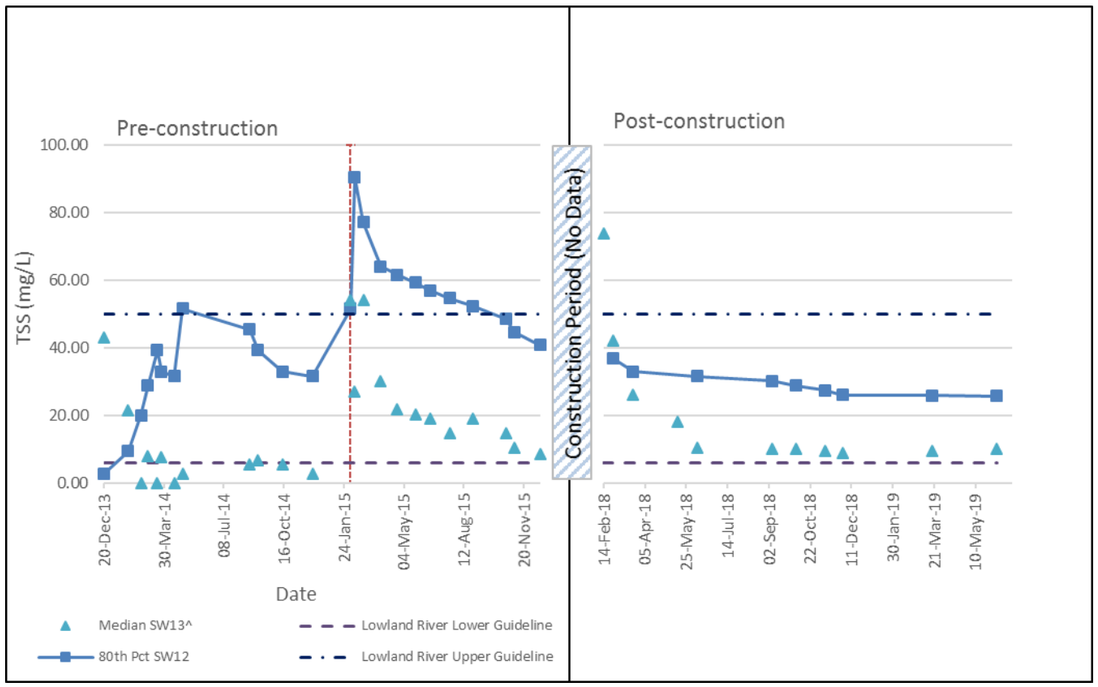


Town Creek

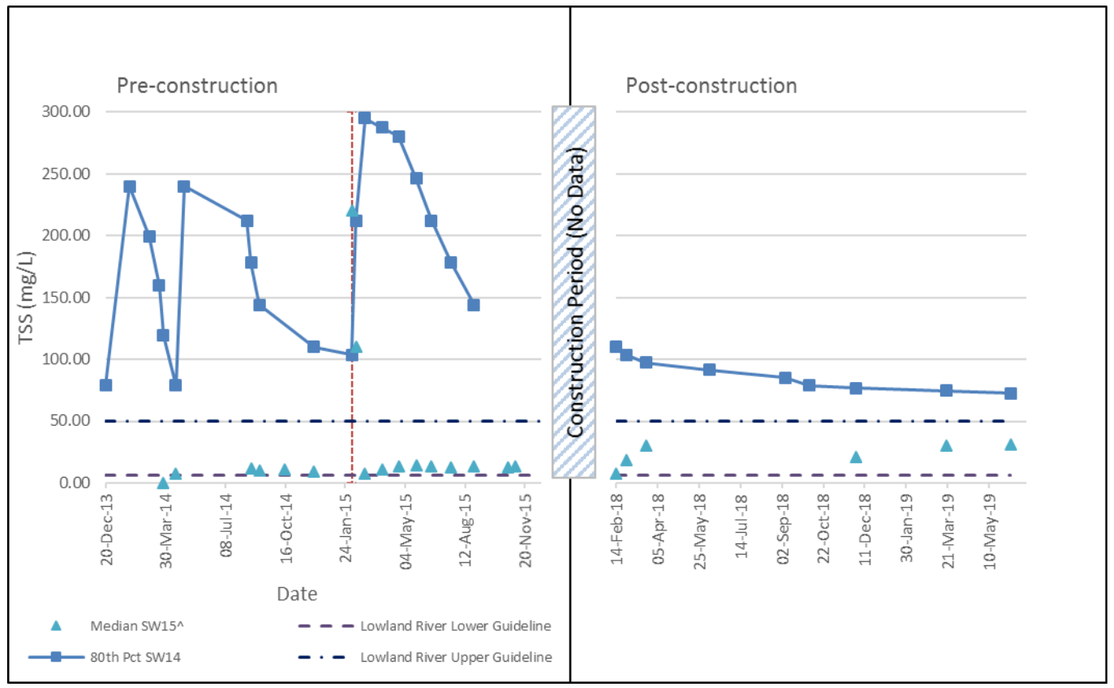


Attachment C
Control Charts – Total Suspended Solids
Exceedances against the 80th Percentile
Event 11

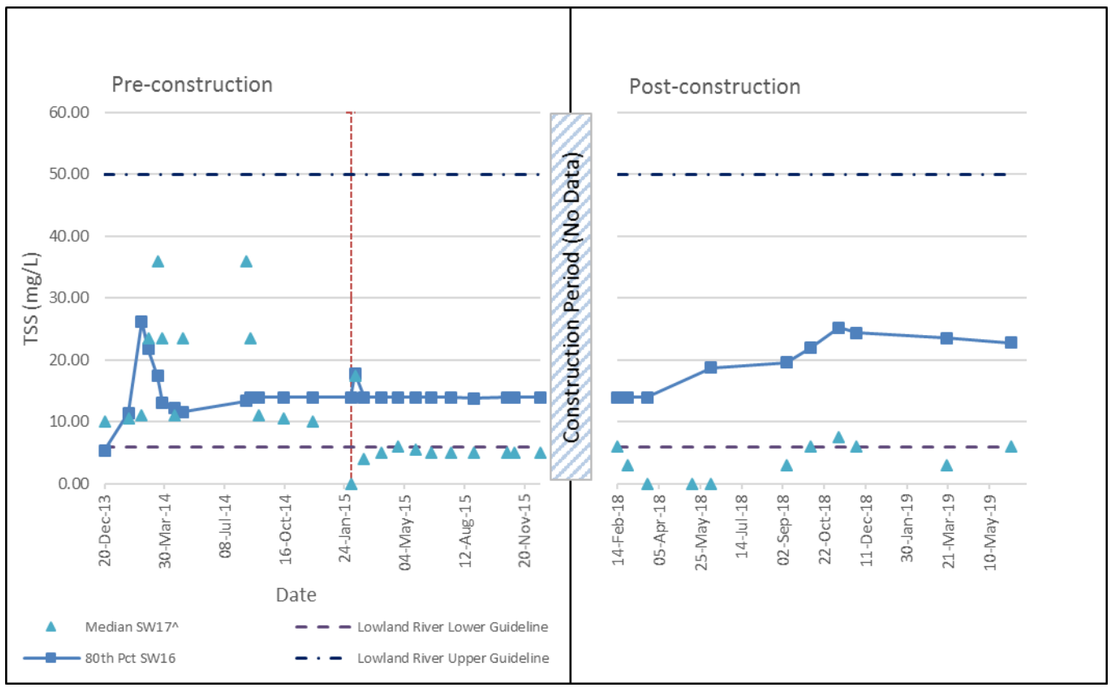
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary

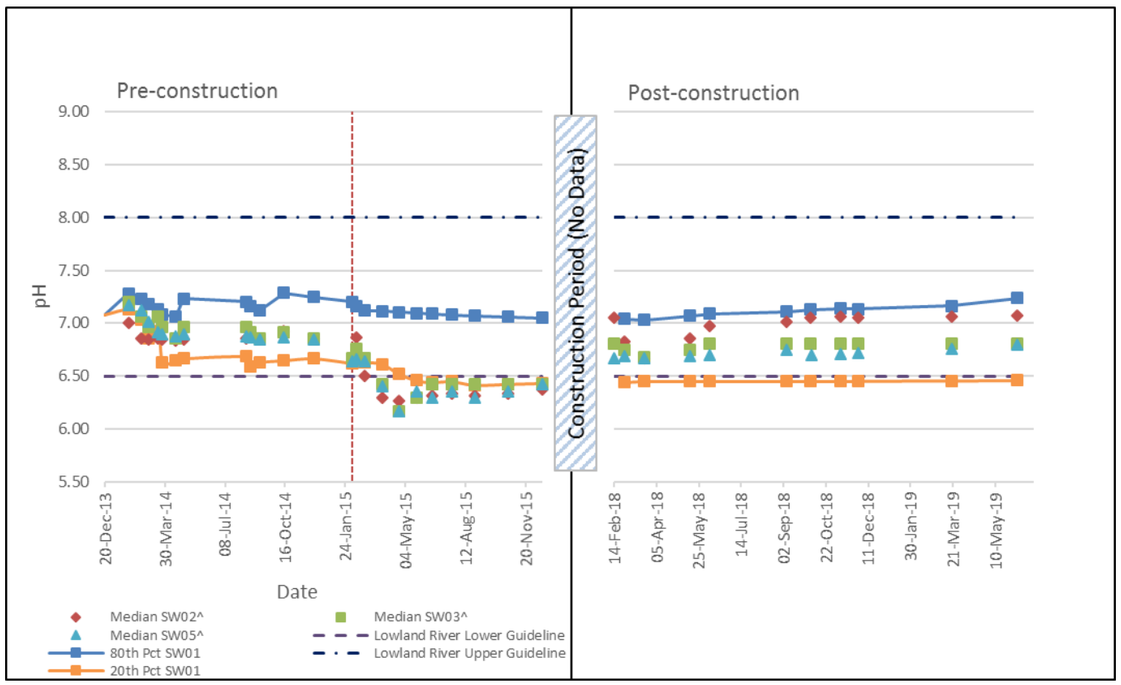


Start of construction period monitoring

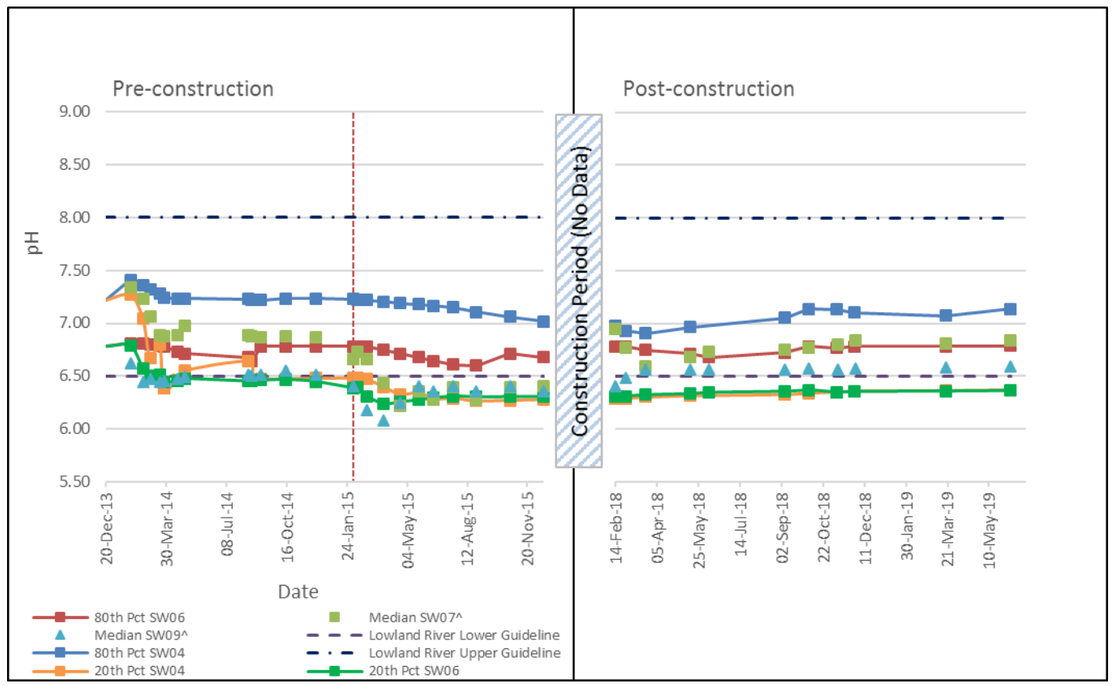
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – pH
Exceedances against the 80th Percentile
Event 11

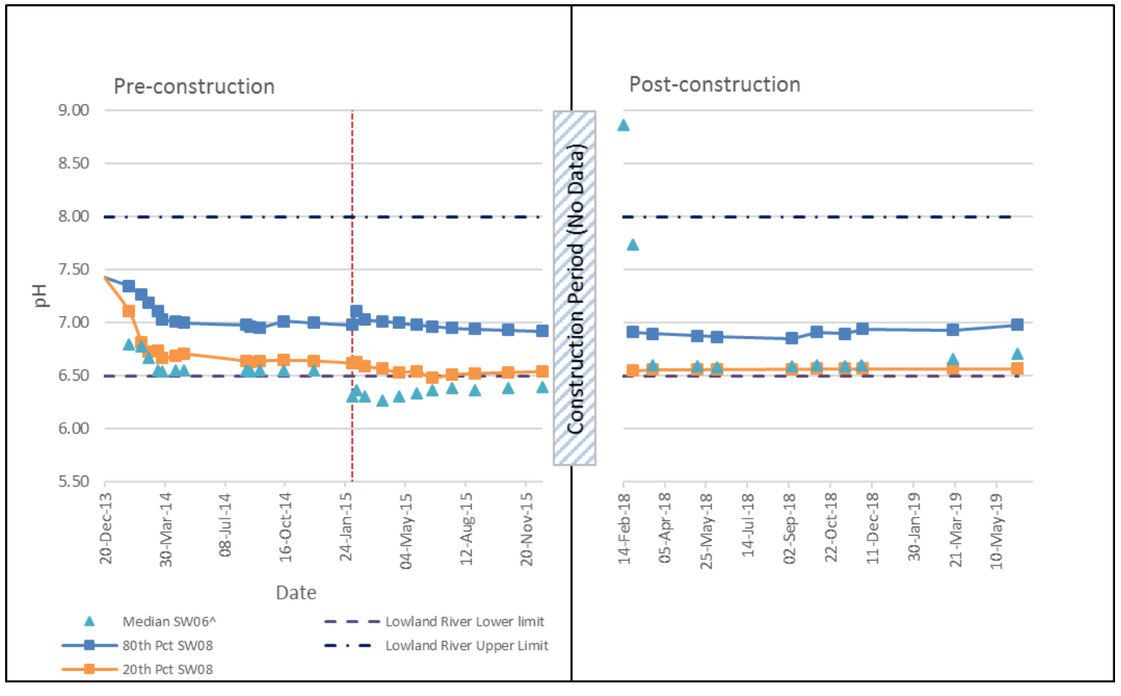
Broughton Creek



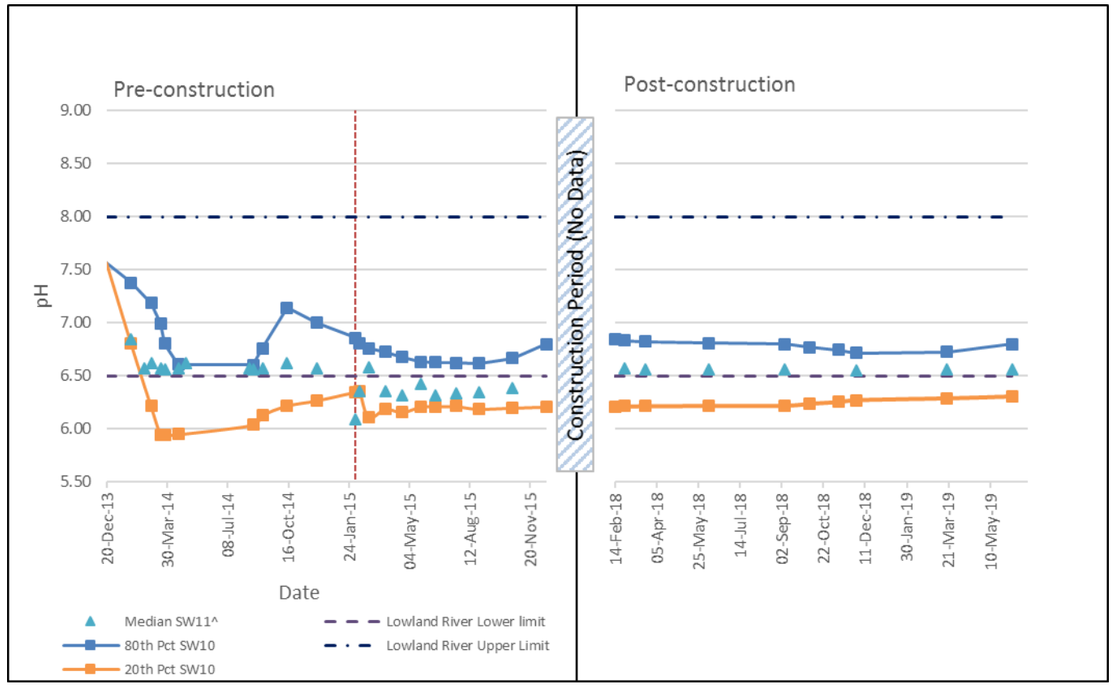
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

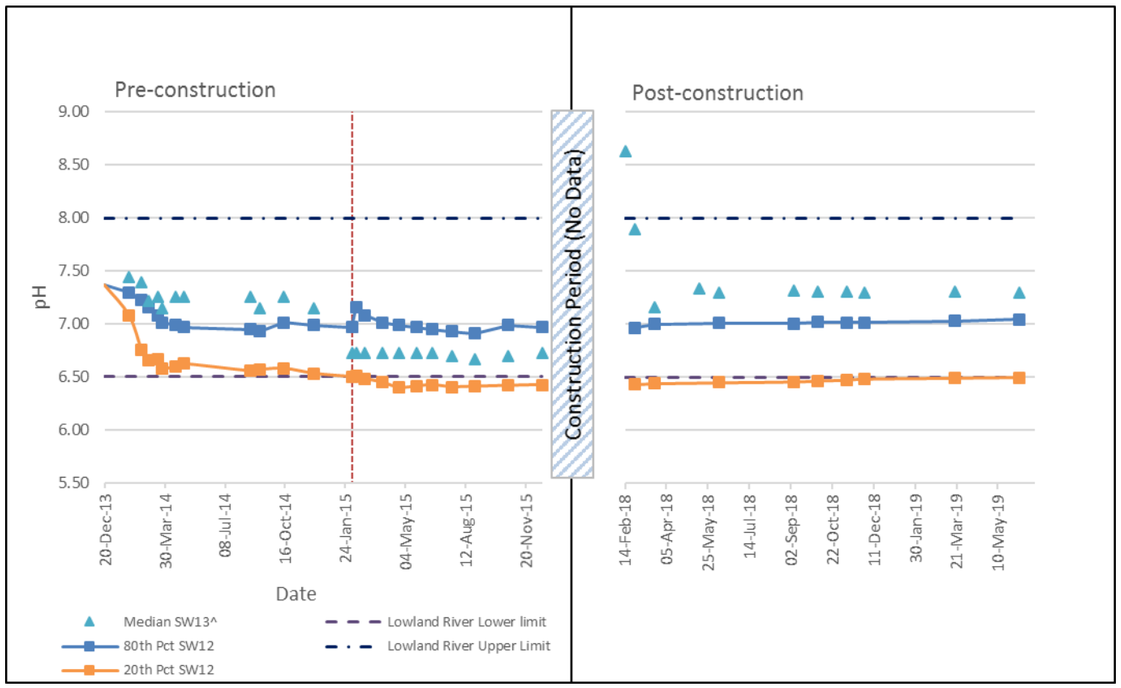


Town Creek

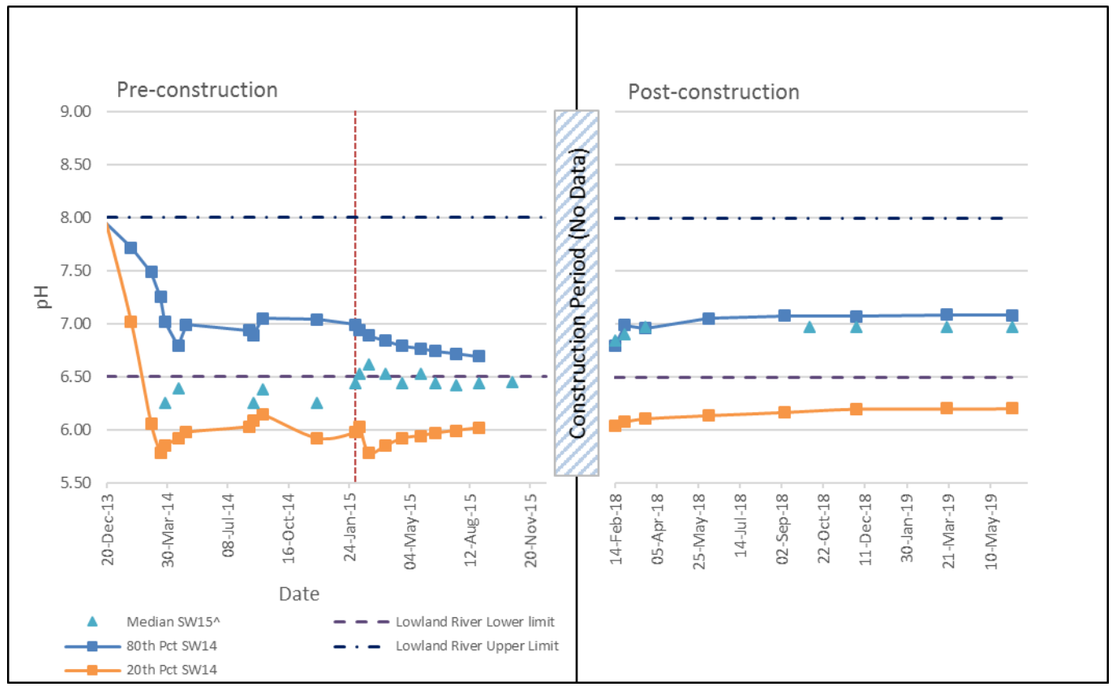


Attachment C
Control Charts – pH
Exceedances against the 80th Percentile
Event 11

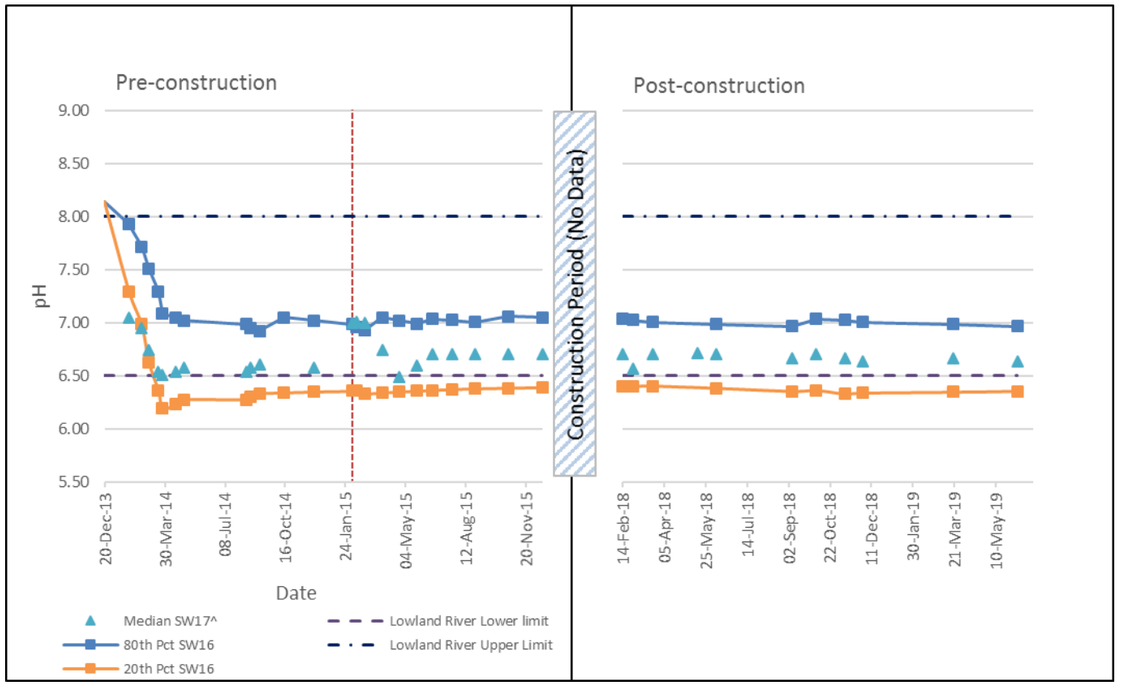
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary



Start of construction period monitoring

^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th and 20th percentile has been calculated using all available data.

Attachment D - Summary of exceedances during post-construction monitoring

Event (m =minor, M=major)		Upstream								Downstream									
		SW01	*SW04*	*SW06*	*SW08*	*SW10*	*SW12*	*SW14*	*SW16*	*SW02*	*SW03*	*SW05*	*SW06*	*SW07*	*SW09*	*SW11*	*SW13*	*SW15*	*SW17*
	1 (m)	TN	Zn	pH, Turb, TP	No flow	TSS, Turb, Cu, TN, TP	No flow	EC, Cu, Zn, TN	Turb	Turb, Cu, TN	Turb, Cu, TN, TP	Turb, Cu, Zn, TN, TP	pH, Turb, TP	**ND**	pH, Turb, TP	No flow	EC, pH, TSS, Turb, Cu	EC, TP	EC, Turb
	2 (M)	Turb, Cu, Zn, TP, TN	Turb, Cr, Zn, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cr, Cu, Zn, TP, TN	Turb, Cr, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	pH, Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cu, Zn, TP, TN	EC, Turb, Cr, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	pH, Turb, Cu, Zn, TP, TN
	3 (m)	NE	TN	Turb, Zn, TP, TN	Zn, TP, TN	Turb, Cu, Zn, TP, TN	EC, Turb, Cu, TP, TN	EC, Turb, Cu, TN	Turb, TP, TN	Turb, Cu	Turb, Cu, TP	Turb	Turb, Zn, TP, TN	Zn, TP, TN	Turb, TP, TN	EC, Turb, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	Turb, TP, TN
	4 (m)	TP	NE	pH, Zn	TP, TN, Cu, Zn	No flow	No flow	No flow	No flow	Zn	Zn	EC, Cu	pH, Zn	Cu	pH, Zn	No flow	EC, TN, Zn	No flow	EC, Zn
	5 (m)	Turb, TN	No access	pH, Turb, TP, TN	Turb, TP, TN, Cu	pH, Turb, TP, TN, Cu	Turb, TP, TN	EC, Turb, TN, Cu, Zn	pH, TP	Turb, TP, TN	Turb, TP, TN, Cu	Turb, TP, TN	pH, Turb, TP, TN	Turb, TP, TN	TP, TN	EC, TSS Turb, TP, TN, Cu, Zn	EC, Turb, TN, Cu	No flow	pH, Zn
	6 (m)	NE	Turb, TP	Turb	Turb, TN, TP, Cu	pH, Turb, TN, TP, Cu, Zn	Turb, Zn	pH, EC, Cu, Zn	pH	TN, Zn	NE	EC	Turb	NE	Turb, TP	pH, Turb, EC, TN, TP Cu, Zn	pH, EC, Cu	No flow	Turb, TN, TP
	7 (M)	NE	Turb, TN	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu	pH, Turb, TN, TP, Cu	Turb, TN, TP, Cu, Zn	No flow	Turb	Zn	Turb, Zn	pH, Turb, EC, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP	Turb, TN, TP	No flow	Turb, TN, Cu	Turb, EC, TN, TP, Cu	Turb
	8 (m)	NE	NE	pH, Zn	Turb, TN, TP	pH, Turb, TN, TP, Cu	Turb, TN, TP, Cu	No flow	pH, Turb, TN, TP	Zn	NE	TP, Zn	pH, Zn	NE	pH	No flow	EC, TN, Cu	No flow	Turb, TN, TP, Zn
	9 (M)	TN, Cu	Turb, TN, Zn	Turb, TN, TP, Cu, Zn	TN, Cu, Zn,	Turb, TN, TP, Cu, Zn	EC, Turb, Cu, Zn	EC, Turb, TN, TP, Cu, Zn	Turb, Cu, Zn	Cu	Turb, TN, Cu	Turb, TN, Cu	Turb, Cu, Zn	TN	Turb, TN, TP	EC, TN, Cu, Zn,	EC, Turb, TN, Cu, Zn	EC, Turb, TN, TP, Cu, Zn	Turb, Cu, Zn
	10 (M)	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	TN, Cu, Zn	TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, EC	Turb, TN, TP, Cu, Zn	Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, Zn	Turb, TN, TP, EC, Cd, Cu, Zn	EC, Turb, TN, Cu, Zn	EC, TSS, Turb, TP, Cu, Zn	Cu, Zn
	11 (M)	Turb, pH, TN, TP, Cu, Zn	Turb, TN, TP, Cu	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn, Pb	Turb, EC, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, pH TN, TP, Cu, Zn	Turb, TN, TP, Cu	Turb, TN, TP, Cu, Pb, Zn	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, TSS, Cu, Zn	Turb, TN, TP, Cu	Turb, EC, TSS, TN, TP, Cu, Zn	Turb, TN, pH, TP, Cu, Zn

Key: EC = Electrical Conductivity, pH = pH, Turb = Turbidity, TSS = Total Suspended Solids, Cr = Chromium, Cd = Cadmium, Cu = Copper Zn = Zinc, TP = Phosphorus (Total), TN = Nitrogen (Total), **ND** = No detects, NE = No exceedances

	ADWG 2011 Aesthetic (v3.4 updated 2017)
	ANZECC 2000 FW 95%
	ANZECC 2000 - Lowland Rivers (NSW rivers)

Attachment E - Laboratory Certificates

GHD Pty Ltd ABN 39 008 488 373
Level 11 Crown Tower 200 Crown Street Wollongong NSW 2500 PO Box 5047 Wollongong New South Wales 2520 Australia
T +61 2 4222 2300 F +61 2 4222 2301 E wolmail@ghd.com W www.ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1902434**	Page	: 1 of 19
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: Colee Quayle	Contact	: Andrew Epps
Address	: 1/51 GRAHAM STREET NOWRA NSW, AUSTRALIA 2541	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: +61 7 3552 8639
Project	: 2316261 - FBB PC	Date Samples Received	: 06-Jun-2019 09:30
Order number	: 2316261	Date Analysis Commenced	: 07-Jun-2019
C-O-C number	: ----	Issue Date	: 13-Jun-2019 17:27
Sampler	: Colee Quayle, Jarrad Mawbey		
Site	: ----		
Quote number	: SY/603/17 A		
No. of samples received	: 39		
No. of samples analysed	: 39		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW01_1	SW01_2	SW01_3	SW02_1	SW02_2
			Client sampling date / time	05-Jun-2019 06:55	05-Jun-2019 06:55	05-Jun-2019 06:55	05-Jun-2019 07:25	05-Jun-2019 07:25
Compound	CAS Number	LOR	Unit	EW1902434-001	EW1902434-002	EW1902434-003	EW1902434-004	EW1902434-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	7	5	<5	7	6
EA045: Turbidity								
Turbidity	----	0.1	NTU	7.0	6.0	5.2	6.9	8.4
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.015	0.001	0.001	0.001	0.002
Nickel	7440-02-0	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.032	<0.005	<0.005	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.53	0.54	0.52	0.55	0.56
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.6	0.6	0.6	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.2	1.1	1.1	1.2	1.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.07	0.09	0.07
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01_1	SW01_2	SW01_3	SW02_1	SW02_2
				Client sampling date / time	05-Jun-2019 06:55	05-Jun-2019 06:55	05-Jun-2019 06:55	05-Jun-2019 07:25	05-Jun-2019 07:25
Compound	CAS Number	LOR	Unit		EW1902434-001	EW1902434-002	EW1902434-003	EW1902434-004	EW1902434-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**111**	**121**	**112**	**115**	**122**
Toluene-D8	2037-26-5	2	%		**108**	**111**	**106**	**107**	**119**
4-Bromofluorobenzene	460-00-4	2	%		**108**	**113**	**109**	**108**	**120**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW02_3	SW03_1	SW03_2	SW03_3	SW04_1
				Client sampling date / time	05-Jun-2019 07:25	05-Jun-2019 08:15	05-Jun-2019 08:15	05-Jun-2019 08:15	05-Jun-2019 10:45
Compound	CAS Number	LOR	Unit		EW1902434-006	EW1902434-007	EW1902434-008	EW1902434-009	EW1902434-010
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	5	6	10	<5
EA045: Turbidity									
Turbidity	----	0.1	NTU		7.4	9.4	10.0	8.2	6.1
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.023	0.004	0.002	0.002	<0.001
Nickel	7440-02-0	0.001	mg/L		0.005	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		0.002	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		0.026	0.006	<0.005	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		0.54	0.55	0.55	0.54	0.70
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		0.6	0.8	0.8	0.8	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.1	1.4	1.4	1.3	1.2
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.07	0.14	0.12	0.14	0.06
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW02_3	SW03_1	SW03_2	SW03_3	SW04_1
				Client sampling date / time	05-Jun-2019 07:25	05-Jun-2019 08:15	05-Jun-2019 08:15	05-Jun-2019 08:15	05-Jun-2019 10:45
Compound	CAS Number	LOR	Unit		EW1902434-006	EW1902434-007	EW1902434-008	EW1902434-009	EW1902434-010
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**116**	**117**	**115**	**118**	**117**
Toluene-D8	2037-26-5	2	%		**112**	**114**	**109**	**113**	**112**
4-Bromofluorobenzene	460-00-4	2	%		**114**	**112**	**111**	**112**	**113**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW04_2	SW04_3	SW05	SW06	SW07_1
			Client sampling date / time	05-Jun-2019 10:45	05-Jun-2019 10:45	05-Jun-2019 08:55	05-Jun-2019 10:00	05-Jun-2019 09:15
Compound	CAS Number	LOR	Unit	EW1902434-011	EW1902434-012	EW1902434-013	EW1902434-014	EW1902434-015
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	42	<5	6
EA045: Turbidity								
Turbidity	----	0.1	NTU	6.2	5.7	26.3	5.6	6.9
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.005	<0.001	0.072	0.048	0.013
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.008	0.012	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.007	0.006	<0.001
Zinc	7440-66-6	0.005	mg/L	0.005	<0.005	0.076	0.070	0.015
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.69	0.71	0.68	1.40	0.82
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	1.2	0.8	0.5
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.2	1.2	1.9	2.2	1.3
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.26	0.22	0.06
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW04_2	SW04_3	SW05	SW06	SW07_1
				Client sampling date / time	05-Jun-2019 10:45	05-Jun-2019 10:45	05-Jun-2019 08:55	05-Jun-2019 10:00	05-Jun-2019 09:15
Compound	CAS Number	LOR	Unit		EW1902434-011	EW1902434-012	EW1902434-013	EW1902434-014	EW1902434-015
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**108**	**110**	**109**	**116**	**108**
Toluene-D8	2037-26-5	2	%		**104**	**102**	**104**	**104**	**98.4**
4-Bromofluorobenzene	460-00-4	2	%		**104**	**105**	**104**	**106**	**102**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW07_2	SW07_3	SW08	SW09	SW10_1
			Client sampling date / time	05-Jun-2019 09:15	05-Jun-2019 09:15	05-Jun-2019 11:50	05-Jun-2019 09:30	05-Jun-2019 12:00
Compound	CAS Number	LOR	Unit	EW1902434-016	EW1902434-017	EW1902434-018	EW1902434-019	EW1902434-020
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	6	9	5
EA045: Turbidity								
Turbidity	----	0.1	NTU	6.4	6.4	5.7	6.1	6.9
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.010	0.008	0.009	0.185	0.015
Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.002	0.039	0.003
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	0.020	0.001
Zinc	7440-66-6	0.005	mg/L	0.014	0.020	0.010	0.233	0.052
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.81	0.81	0.92	1.50	0.55
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.9	1.0	1.0
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.3	1.3	1.8	2.5	1.6
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.09	0.06	0.20	0.27	0.22
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW07_2	SW07_3	SW08	SW09	SW10_1
				Client sampling date / time	05-Jun-2019 09:15	05-Jun-2019 09:15	05-Jun-2019 11:50	05-Jun-2019 09:30	05-Jun-2019 12:00
Compound	CAS Number	LOR	Unit		EW1902434-016	EW1902434-017	EW1902434-018	EW1902434-019	EW1902434-020
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**105**	**116**	**118**	**119**	**113**
Toluene-D8	2037-26-5	2	%		**93.7**	**109**	**111**	**112**	**97.8**
4-Bromofluorobenzene	460-00-4	2	%		**97.7**	**110**	**111**	**114**	**102**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW10_2	SW10_3	SW11_1	SW11_2	SW11_3
			Client sampling date / time	05-Jun-2019 13:20	05-Jun-2019 13:20	05-Jun-2019 12:50	05-Jun-2019 12:50	05-Jun-2019 12:50
Compound	CAS Number	LOR	Unit	EW1902434-021	EW1902434-022	EW1902434-023	EW1902434-024	EW1902434-025
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	6	8	48	22	11
EA045: Turbidity								
Turbidity	----	0.1	NTU	7.0	7.1	25.1	18.4	14.7
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.004	0.039	0.011	0.010	0.009
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	0.003	0.002	0.002
Lead	7439-92-1	0.001	mg/L	<0.001	0.003	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.009	0.047	0.019	0.017	0.016
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.55	0.57	2.02	1.59	1.59
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	1.1	1.4	1.1	1.2
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.6	1.7	3.4	2.7	2.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.23	0.22	0.13	0.12	0.15
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW10_2	SW10_3	SW11_1	SW11_2	SW11_3
				Client sampling date / time	05-Jun-2019 13:20	05-Jun-2019 13:20	05-Jun-2019 12:50	05-Jun-2019 12:50	05-Jun-2019 12:50
Compound	CAS Number	LOR	Unit		EW1902434-021	EW1902434-022	EW1902434-023	EW1902434-024	EW1902434-025
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.6**	**102**	**105**	**104**	**106**
Toluene-D8	2037-26-5	2	%		**96.3**	**110**	**110**	**112**	**112**
4-Bromofluorobenzene	460-00-4	2	%		**92.5**	**100**	**99.3**	**101**	**101**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW12	SW13_1	SW13_2	SW13_3	SW14_1
			Client sampling date / time	05-Jun-2019 13:45	05-Jun-2019 14:00	05-Jun-2019 05:00	05-Jun-2019 14:15	05-Jun-2019 15:40
Compound	CAS Number	LOR	Unit	EW1902434-026	EW1902434-027	EW1902434-028	EW1902434-029	EW1902434-030
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**18**	**15**	**15**	**18**	**16**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**24.9**	**25.3**	**25.5**	**25.1**	**16.8**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	**0.001**	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.091**	**0.003**	**0.003**	**0.003**	**0.028**
Nickel	7440-02-0	0.001	mg/L	**0.003**	<0.001	<0.001	<0.001	**0.002**
Lead	7439-92-1	0.001	mg/L	**0.006**	<0.001	<0.001	<0.001	**0.001**
Zinc	7440-66-6	0.005	mg/L	**0.082**	<0.005	<0.005	<0.005	**0.030**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**1.19**	**1.13**	**1.15**	**1.16**	**0.30**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.5**	**0.6**	**0.5**	**0.5**	**1.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.7**	**1.7**	**1.6**	**1.7**	**1.5**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.07**	**0.06**	**0.05**	**0.07**	**0.20**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW12	SW13_1	SW13_2	SW13_3	SW14_1
				Client sampling date / time	05-Jun-2019 13:45	05-Jun-2019 14:00	05-Jun-2019 05:00	05-Jun-2019 14:15	05-Jun-2019 15:40
Compound	CAS Number	LOR	Unit		EW1902434-026	EW1902434-027	EW1902434-028	EW1902434-029	EW1902434-030
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**89.6**	**107**	**101**	**105**	**92.8**
Toluene-D8	2037-26-5	2	%		**93.1**	**109**	**98.7**	**109**	**93.1**
4-Bromofluorobenzene	460-00-4	2	%		**85.2**	**99.1**	**91.4**	**97.4**	**81.2**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW14_2	SW14_3	SW15_1	SW15_2	SW15_3
			Client sampling date / time	05-Jun-2019 15:15	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit	EW1902434-031	EW1902434-032	EW1902434-033	EW1902434-034	EW1902434-035
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	13	16	43	86	14
EA045: Turbidity								
Turbidity	----	0.1	NTU	15.9	15.0	24.8	34.6	21.5
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.007	0.007	0.010
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.006	0.005	0.010	0.011	0.030
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.28	0.29	0.95	0.92	0.92
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.0	1.0	0.9	0.9
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	1.2	1.3	2.0	1.8	1.8
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.13	0.15	0.20	0.19	0.15
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW14_2	SW14_3	SW15_1	SW15_2	SW15_3
				Client sampling date / time	05-Jun-2019 15:15	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00
Compound	CAS Number	LOR	Unit		EW1902434-031	EW1902434-032	EW1902434-033	EW1902434-034	EW1902434-035
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**104**	**114**	**110**	**113**	**109**
Toluene-D8	2037-26-5	2	%		**101**	**118**	**114**	**116**	**110**
4-Bromofluorobenzene	460-00-4	2	%		**92.6**	**102**	**99.2**	**102**	**95.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW16	SW17	QC1	QC2	----
			Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit	EW1902434-036	EW1902434-037	EW1902434-038	EW1902434-039	--------
				Result	Result	Result	Result	----
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	6	75	14	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	7.7	7.8	17.5	8.9	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L	0.004	0.042	0.009	0.002	----
Nickel	7440-02-0	0.001	mg/L	<0.001	0.003	0.002	<0.001	----
Lead	7439-92-1	0.001	mg/L	<0.001	0.003	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L	0.010	0.053	0.019	0.007	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	2.53	2.35	1.50	2.36	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	0.9	1.1	0.8	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	3.4	3.2	2.6	3.2	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.09	0.08	0.14	0.08	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW16	SW17	QC1	QC2	----
				Client sampling date / time	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	05-Jun-2019 00:00	----
Compound	CAS Number	LOR	Unit		EW1902434-036	EW1902434-037	EW1902434-038	EW1902434-039	--------
					Result	Result	Result	Result	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	----
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	----
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	----
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	----
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**105**	**108**	**115**	**109**	----
Toluene-D8	2037-26-5	2	%		**107**	**108**	**116**	**105**	----
4-Bromofluorobenzene	460-00-4	2	%		**96.4**	**95.4**	**101**	**92.3**	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EW1902434**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: Colee Quayle	Contact	: Andrew Epps
Address	: 1/51 GRAHAM STREET NOWRA NSW, AUSTRALIA 2541	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: +61 7 3552 8639
Project	: 2316261 - FBB PC	Date Samples Received	: 06-Jun-2019
Order number	: 2316261	Date Analysis Commenced	: 07-Jun-2019
C-O-C number	: ----	Issue Date	: 13-Jun-2019
Sampler	: Colee Quayle, Jarrad Mawbey		
Site	: ----		
Quote number	: SY/603/17 A		
No. of samples received	: 39		
No. of samples analysed	: 39		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2399773)									
EW1902434-001	SW01_1	EA025H: Suspended Solids (SS)	----	5	mg/L	7	<5	36.7	No Limit
EW1902434-011	SW04_2	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2399774)									
EW1902434-021	SW10_2	EA025H: Suspended Solids (SS)	----	5	mg/L	6	7	27.4	No Limit
EW1902434-031	SW14_2	EA025H: Suspended Solids (SS)	----	5	mg/L	13	8	41.9	No Limit
EA045: Turbidity (QC Lot: 2392829)									
EW1902434-001	SW01_1	EA045: Turbidity	----	0.1	NTU	7.0	6.9	1.86	0% - 20%
EW1902434-010	SW04_1	EA045: Turbidity	----	0.1	NTU	6.1	6.0	0.00	0% - 20%
EA045: Turbidity (QC Lot: 2392830)									
EW1902434-021	SW10_2	EA045: Turbidity	----	0.1	NTU	7.0	7.0	0.00	0% - 20%
EW1902453-004	Anonymous	EA045: Turbidity	----	0.1	NTU	37.6	37.6	0.00	0% - 20%
EA045: Turbidity (QC Lot: 2392835)									
ES1917478-006	Anonymous	EA045: Turbidity	----	0.1	NTU	0.6	0.5	0.00	No Limit
EW1902434-029	SW13_3	EA045: Turbidity	----	0.1	NTU	25.1	25.2	0.398	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2393171)									
EW1902434-001	SW01_1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.015	0.014	8.64	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.032	0.019	49.4	No Limit
EW1902434-011	SW04_2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2393171) - continued									
EW1902434-011	SW04_2	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.005	0.006	18.6	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2393174)									
EW1902434-023	SW11_1	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.002	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.019	0.018	6.76	No Limit
EW1902434-031	SW14_2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.011	0.011	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2393172)									
EW1902434-002	SW01_2	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EW1902434-010	SW04_1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2393173)									
EW1902434-022	SW10_3	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EW1902434-030	SW14_1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2393583)									
EW1902434-001	SW01_1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.53	0.53	0.00	0% - 20%
EW1902434-010	SW04_1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.70	0.69	0.00	0% - 20%
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2393584)									
EW1902434-021	SW10_2	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.55	0.56	0.00	0% - 20%
EW1902434-030	SW14_1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.30	0.29	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2393579)									
EW1902434-001	SW01_1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.7	0.7	0.00	No Limit
EW1902434-011	SW04_2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.5	0.5	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2393582)									
EW1902434-021	SW10_2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.1	1.0	9.79	0% - 50%
EW1902434-031	SW14_2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.9	1.0	13.6	0% - 50%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2393580)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2393580) - continued									
EW1902434-001	SW01_1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.09	36.8	No Limit
EW1902434-011	SW04_2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2393581)									
EW1902434-021	SW10_2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.23	0.22	7.34	0% - 20%
EW1902434-031	SW14_2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.13	0.16	21.2	0% - 50%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2397599)									
EW1902434-001	SW01_1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EW1902434-011	SW04_2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2397600)									
EW1902433-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	0.05 mg/L	60	0.00	No Limit
EW1902434-030	SW14_1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2397599)									
EW1902434-001	SW01_1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EW1902434-011	SW04_2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2397600)									
EW1902433-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	0.06 mg/L	60	0.00	No Limit
EW1902434-030	SW14_1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2397599)									
EW1902434-001	SW01_1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EW1902434-011	SW04_2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 2397600)									
EW1902433-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	0.002 mg/L	2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	0.003 mg/L	3	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	0.003 mg/L	3	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2397600) - continued									
EW1902433-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	0.016 mg/L	17	7.21	No Limit
EW1902434-030	SW14_1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2399773)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.0	83	129
				<5	1000 mg/L	93.8	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2399774)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	98.0	83	129
				<5	1000 mg/L	91.3	82	110
EA045: Turbidity (QCLot: 2392829)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	98.2	91	105
EA045: Turbidity (QCLot: 2392830)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	97.8	91	105
EA045: Turbidity (QCLot: 2392835)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	97.8	91	105
EG020F: Dissolved Metals by ICP-MS (QCLot: 2393171)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.8	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.1	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	92.8	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	92.9	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	97.4	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 2393174)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.7	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	91.2	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.8	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.3	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	87.8	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.5	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 2393172)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.3	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2393173)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.7	83	105
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2393583)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	101	91	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2393584)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	102	91	113
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2393579)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.0	69	101
				<0.1	1 mg/L	97.8	70	118
				<0.1	5 mg/L	99.0	74	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2393582)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	94.2	69	101
				<0.1	1 mg/L	89.2	70	118
				<0.1	5 mg/L	99.0	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2393580)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.4	71	101
				<0.01	0.442 mg/L	85.1	72	108
				<0.01	1 mg/L	107	78	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2393581)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	86.2	71	101
				<0.01	0.442 mg/L	82.8	72	108
				<0.01	1 mg/L	105	78	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2394619)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	84.7	70	113
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	89.7	81	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	85.4	67	117
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2394620)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	83.3	70	113
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	84.1	81	111
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	76.3	67	117
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2397599)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	90.7	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2397600)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	105	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2394619)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	80.8	76	112
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	86.8	65	118
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	78.8	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2394620)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	78.1	76	112
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	77.4	65	118
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	89.7	77	119
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2397599)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2397599) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	94.4	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2397600)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	106	75	127
EP080: BTEXN (QCLot: 2397599)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.8	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	94.0	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	93.7	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	90.8	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	94.6	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	98.2	70	120
EP080: BTEXN (QCLot: 2397600)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	87.0	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	96.1	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	88.7	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	88.1	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	97.5	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	110	70	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2393171)							
EW1902434-004	SW02_1	EG020A-F: Arsenic	7440-38-2	1 mg/L	92.1	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.2	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	101	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.2	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	94.6	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.8	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	94.4	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2393174)							
EW1902434-024	SW11_2	EG020A-F: Arsenic	7440-38-2	1 mg/L	92.6	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2393174) - continued							
EW1902434-024	SW11_2	EG020A-F: Chromium	7440-47-3	1 mg/L	100	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	97.4	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	95.4	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	91.5	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	94.1	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2393172)							
EW1902434-003	SW01_3	EG035F: Mercury	7439-97-6	0.01 mg/L	76.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2393173)							
EW1902434-021	SW10_2	EG035F: Mercury	7439-97-6	0.01 mg/L	80.1	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2393583)							
EW1902434-001	SW01_1	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	109	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2393584)							
EW1902434-021	SW10_2	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	105	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2393579)							
EW1902434-002	SW01_2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	110	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2393582)							
EW1902434-022	SW10_3	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	114	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2393580)							
EW1902434-002	SW01_2	EK067G: Total Phosphorus as P	----	1 mg/L	101	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2393581)							
EW1902434-022	SW10_3	EK067G: Total Phosphorus as P	----	1 mg/L	99.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2397599)							
EW1902434-001	SW01_1	EP080: C6 - C9 Fraction	----	325 µg/L	104	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2397600)							
EW1902433-001	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	112	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2397599)							
EW1902434-001	SW01_1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	103	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2397600)							
EW1902433-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	112	70	130
EP080: BTEXN (QCLot: 2397599)							
EW1902434-001	SW01_1	EP080: Benzene	71-43-2	25 µg/L	94.4	70	130
		EP080: Toluene	108-88-3	25 µg/L	96.0	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	99.8	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 2397599) - continued							
EW1902434-001	SW01_1	EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	99.5	70	130
EP080: BTEXN (QCLot: 2397600)							
EW1902433-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	106	70	130
		EP080: Toluene	108-88-3	25 µg/L	118	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	112	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	99.2	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	102	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	78.2	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EW1902434**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: Colee Quayle	Telephone	: +61 7 3552 8639
Project	: 2316261 - FBB PC	Date Samples Received	: 06-Jun-2019
Site	: ----	Issue Date	: 13-Jun-2019
Sampler	: Colee Quayle, Jarrad Mawbey	No. of samples received	: 39
Order number	: 2316261	No. of samples analysed	: 39

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	39	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	39	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**----**	----	----	**12-Jun-2019**	12-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA045: Turbidity							
Clear Plastic Bottle - Natural (EA045)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**----**	----	----	**07-Jun-2019**	07-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**----**	----	----	**07-Jun-2019**	02-Dec-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**----**	----	----	**11-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK059G)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**----**	----	----	**07-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**07-Jun-2019**	03-Jul-2019	✓	**07-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**07-Jun-2019**	03-Jul-2019	✓	**07-Jun-2019**	03-Jul-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**11-Jun-2019**	12-Jun-2019	✓	**12-Jun-2019**	21-Jul-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**11-Jun-2019**	12-Jun-2019	✓	**12-Jun-2019**	21-Jul-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW10_1, SW10_2, SW10_3, SW11_1, SW11_2, SW11_3, SW12, SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW14_3, SW16, SW15_1, SW15_2, SW15_3, SW17, QC1, QC2	**05-Jun-2019**	**12-Jun-2019**	19-Jun-2019	✓	**12-Jun-2019**	19-Jun-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	39	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	6	50	**12.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	39	**10.26**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	39	**15.38**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	39	**15.38**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	3	50	**6.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	3	50	**6.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	39	**5.13**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	39	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EW1902434**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: Colee Quayle	Contact	: Andrew Epps
Address	: 1/51 GRAHAM STREET NOWRA NSW, AUSTRALIA 2541	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
E-mail	: colee.quayle@ghd.com	E-mail	: andrew.epps@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3552 8639
Facsimile	: ----	Facsimile	: W 02 42253128 N 02 44232083
Project	: 2316261 - FBB PC	Page	: 1 of 3
Order number	: 2316261	Quote number	: ES2017GHDSER0038 (SY/603/17 A)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Colee Quayle, Jarrad Mawbey		

Dates

Date Samples Received	: 06-Jun-2019 09:30	Issue Date	: 06-Jun-2019
Client Requested Due Date	: 13-Jun-2019	Scheduled Reporting Date	: **13-Jun-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 2.1 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 39 / 39

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Analytical work for this work order will be conducted at ALS Sydney.**
- **Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.**
- **Please direct any queries you have regarding this work order to the above ALS laboratory contact.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - NT-11 Total Nitrogen and Total Phosphorus	WATER - TPH TRH (C6-C40)	WATER - W-02 8 Metals
EW1902434-001	05-Jun-2019 06:55	SW01_1	✓	✓	✓	✓	✓
EW1902434-002	05-Jun-2019 06:55	SW01_2	✓	✓	✓	✓	✓
EW1902434-003	05-Jun-2019 06:55	SW01_3	✓	✓	✓	✓	✓
EW1902434-004	05-Jun-2019 07:25	SW02_1	✓	✓	✓	✓	✓
EW1902434-005	05-Jun-2019 07:25	SW02_2	✓	✓	✓	✓	✓
EW1902434-006	05-Jun-2019 07:25	SW02_3	✓	✓	✓	✓	✓
EW1902434-007	05-Jun-2019 08:15	SW03_1	✓	✓	✓	✓	✓
EW1902434-008	05-Jun-2019 08:15	SW03_2	✓	✓	✓	✓	✓
EW1902434-009	05-Jun-2019 08:15	SW03_3	✓	✓	✓	✓	✓
EW1902434-010	05-Jun-2019 10:45	SW04_1	✓	✓	✓	✓	✓
EW1902434-011	05-Jun-2019 10:45	SW04_2	✓	✓	✓	✓	✓
EW1902434-012	05-Jun-2019 10:45	SW04_3	✓	✓	✓	✓	✓
EW1902434-013	05-Jun-2019 08:55	SW05	✓	✓	✓	✓	✓
EW1902434-014	05-Jun-2019 10:00	SW06	✓	✓	✓	✓	✓
EW1902434-015	05-Jun-2019 09:15	SW07_1	✓	✓	✓	✓	✓
EW1902434-016	05-Jun-2019 09:15	SW07_2	✓	✓	✓	✓	✓
EW1902434-017	05-Jun-2019 09:15	SW07_3	✓	✓	✓	✓	✓
EW1902434-018	05-Jun-2019 11:50	SW08	✓	✓	✓	✓	✓
EW1902434-019	05-Jun-2019 09:30	SW09	✓	✓	✓	✓	✓
EW1902434-020	05-Jun-2019 12:00	SW10_1	✓	✓	✓	✓	✓
EW1902434-021	05-Jun-2019 13:20	SW10_2	✓	✓	✓	✓	✓
EW1902434-022	05-Jun-2019 13:20	SW10_3	✓	✓	✓	✓	✓
EW1902434-023	05-Jun-2019 12:50	SW11_1	✓	✓	✓	✓	✓
EW1902434-024	05-Jun-2019 12:50	SW11_2	✓	✓	✓	✓	✓
EW1902434-025	05-Jun-2019 12:50	SW11_3	✓	✓	✓	✓	✓
EW1902434-026	05-Jun-2019 13:45	SW12	✓	✓	✓	✓	✓
EW1902434-027	05-Jun-2019 14:00	SW13_1	✓	✓	✓	✓	✓
EW1902434-028	05-Jun-2019 05:00	SW13_2	✓	✓	✓	✓	✓
EW1902434-029	05-Jun-2019 14:15	SW13_3	✓	✓	✓	✓	✓
EW1902434-030	05-Jun-2019 15:40	SW14_1	✓	✓	✓	✓	✓
EW1902434-031	05-Jun-2019 15:15	SW14_2	✓	✓	✓	✓	✓
EW1902434-032	05-Jun-2019 00:00	SW14_3	✓	✓	✓	✓	✓
EW1902434-033	05-Jun-2019 00:00	SW15_1	✓	✓	✓	✓	✓
EW1902434-034	05-Jun-2019 00:00	SW15_2	✓	✓	✓	✓	✓
EW1902434-035	05-Jun-2019 00:00	SW15_3	✓	✓	✓	✓	✓

			WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - NT-11 Total Nitrogen and Total Phosphorus	WATER - TPH TRH (C6-C40)	WATER - W-02 8 Metals
EW1902434-036	05-Jun-2019 00:00	SW16	✓	✓	✓	✓	✓
EW1902434-037	05-Jun-2019 00:00	SW17	✓	✓	✓	✓	✓
EW1902434-038	05-Jun-2019 00:00	QC1	✓	✓	✓	✓	✓
EW1902434-039	05-Jun-2019 00:00	QC2	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE (Brisbane)

- A4 - AU Tax Invoice (INV)	Email	ap-fss@ghd.com

Colee Quayle

- *AU Certificate of Analysis - NATA (COA)	Email	colee.quayle@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	colee.quayle@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	colee.quayle@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	colee.quayle@ghd.com
- Chain of Custody (CoC) (COC)	Email	colee.quayle@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	colee.quayle@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	colee.quayle@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	colee.quayle@ghd.com

GHD LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)	Email	GHDLabreports@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	GHDLabreports@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	GHDLabreports@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	GHDLabreports@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	GHDLabreports@ghd.com
- Electronic SRN for ESdat (ESRN_ESDAT)	Email	GHDLabreports@ghd.com

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5630 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
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NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
Wollongong NSW 2500

Environmental Division
Wollongong
Work Order Reference
EW1902434

Telephone : 02 42253125

CLIENT: GHD	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☐ Standard TAT (List due date):	5 Day TAT
OFFICE: Nowra/Wollongong		☐ Non Standard or urgent TAT (List due date):	
PROJECT: FBB PC	ALS QUOTE NO.:	SY/603/17A	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7
ORDER NUMBER: 2316261			
PROJECT MANAGER: Colee Quayle	CONTACT PH: 0403 242 431		
SAMPLER: Jarrad Mawbey, Colee Quayle	SAMPLER MOBILE: 0476 019 212	RELINQUISHED BY: Daniel Deen DATE/TIME: 06/06/2019 / 0830	RECEIVED BY: ALS Wollongong DATE/TIME: 06/06/2019 / 0830
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SW01_1	5/06/2019 6:55	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
2	SW01_2	5/06/2019 6:55	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
3	SW01_3	5/06/2019 6:55	w	P, N, AG, V, H	6	X	X	X	X	X				
4	SW02_1	5/06/2019 7:25	w	P, N, AG, V, H	6	X	X	X	X	X				
5	SW02_2	5/06/2019 7:25	w	P, N, AG, V, H	6	X	X	X	X	X				
6	SW02_3	5/06/2019 7:25	w	P, N, AG, V, H	6	X	X	X	X	X				
7	SW03_1	5/06/2019 8:15	w	P, N, AG, V, H	6	X	X	X	X	X				
8	SW03_2	5/06/2019 8:15	w	P, N, AG, V, H	6	X	X	X	X	X				
9	SW03_3	5/06/2019 8:15	w	P, N, AG, V, H	6	X	X	X	X	X				
10	SW04_1	5/06/2019 10:45	w	P, N, AG, V, H	6	X	X	X	X	X				
11	SW04_2	5/06/2019 10:45	w	P, N, AG, V, H	6	X	X	X	X	X				
12	SW04_3	5/06/2019 10:45	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	72	12	12	12	12	12				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

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☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):**	5 Day TAT
OFFICE: Nowra/Wollongong		☐ Non Standard or urgent TAT **(List due date):**	
PROJECT: FBB PC	**ALS QUOTE NO.:**	SY/603/17A	
ORDER NUMBER: 2316261			
PROJECT MANAGER: Colee Quayle	**CONTACT PH:** 0403 242 431		
SAMPLER: Jarrad Mawbey, Colee Quayle	**SAMPLER MOBILE:** 0476 019 212		
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**		
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			

COC SEQUENCE NUMBER (Circle)

COC: 1 **2** 3 4 5 6 7

OF: 1 2 3 **4** 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment:

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Daniel Deen	*ALS Wollongong*		
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
06/06/2019 / 0830	06/06/2019 / 0830		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	SW05	5/06/2019 8:55	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
14	SW06	5/06/2019 10:00	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
15	SW07_1	5/06/2019 09:15	w	P, N, AG, V, H	6	X	X	X	X	X				
16	SW07_2	5/06/2019 9:15	w	P, N, AG, V, H	6	X	X	X	X	X				
17	SW07_3	5/06/2019 9:15	w	P, N, AG, V, H	6	X	X	X	X	X				
18	SW08	5/06/2019 11:50	w	P, N, AG, V, H	6	X	X	X	X	X				
19	SW09	5/06/2019 9:30	w	P, N, AG, V, H	6	X	X	X	X	X				
20	SW10_1	5/06/2019 12:00	w	P, N, AG, V, H	6	X	X	X	X	X				
21	SW10_2	5/06/2019 13:20	w	P, N, AG, V, H	6	X	X	X	X	X				
22	SW10_3	5/06/2019 13:20	w	P, N, AG, V, H	6	X	X	X	X	X				
23	SW11_1	5/06/2019 12:50	w	P, N, AG, V, H	6	X	X	X	X	X				
24	SW11_2	5/06/2019 12:50	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	72	12	12	12	12	12				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

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☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD
OFFICE: Nowra/Wollongong
PROJECT: FBB PC
ORDER NUMBER: 2316261
PROJECT MANAGER: Colee Quayle — **CONTACT PH:** 0403 242 431
SAMPLER: Jarrad Mawbey, Colee Quayle — **SAMPLER MOBILE:** 0476 019 212
COC emailed to ALS? (YES / NO) — **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☐ Standard TAT **(List due date):** 5 Day TAT
☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.: SY/603/17A

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt:
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Daniel Deen	*ALS Wollongong*		
DATE/TIME: 06/06/2019 / 0830	DATE/TIME: 06/06/2019 / 0830	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE | SAMPLE DETAILS MATRIX: SOLID (S) WATER (W) | CONTAINER INFORMATION | **ANALYSIS REQUIRED including SUITES** (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required). | **Additional Information**

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
25	SW11_3	5/06/2019 12:50	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
26	SW12	5/06/2019 13:45	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
27	SW13_1	5/06/2019 14:00	w	P, N, AG, V, H	6	X	X	X	X	X				
28	SW13_2	5/06/2019 14:15	w	P, N, AG, V, H	6	X	X	X	X	X				
29	SW13_3	5/06/2019 14:15	w	P, N, AG, V, H	6	X	X	X	X	X				
30	SW14_1	5/06/2019 15:40	w	P, N, AG, V, H	6	X	X	X	X	X				
31	SW14_2	5/06/2019 16:00	w	P, N, AG, V, H	6	X	X	X	X	X				
32	SW14_3	5/06/2019 16:00	w	P, N, AG, V, H	6	X	X	X	X	X				
33	SW15_1	5/06/2019 14:35	w	P, N, AG, V, H	6	X	X	X	X	X				
34	SW15_2	5/06/2019 14:35	w	P, N, AG, V, H	6	X	X	X	X	X				
35	SW15_3	5/06/2019 14:35	w	P, N, AG, V, H	6	X	X	X	X	X				
36	SW16	5/06/2019 15:05	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	72	12	12	12	12	12				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 16 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4-13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☐ Standard TAT (List due date): 5 Day TAT ☐ Non Standard or urgent TAT (List due date):
OFFICE: Nowra/Wollongong		
PROJECT: FBB PC	**ALS QUOTE NO.:** SY/603/17A	
ORDER NUMBER: 2316261		
PROJECT MANAGER: Colee Quayle	**CONTACT PH:** 0403 242 431	
SAMPLER: Jarrad Mawbey, Daniel Deen	**SAMPLER MOBILE:** 0476 019 212	
COC emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com		
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com		

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
OF:	1	2	3	4	5	6	7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:	°C		
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Daniel Deen	*ALS Wollongong*		
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
06/06/2019 / 0830	06/06/2019 / 0830		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
37	SW17	5/06/2019 15:15	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
38	QC1	5/06/2019	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
39	QC2	5/06/2019	w	P, N, AG, V, H	6	X	X	X	X	X				
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
		5/06/2019												
				TOTAL	18	3	3	3	3	3				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Attachment F - Calibration Certificates

airmet
Work with Confidence

Calibration Certificate

AirMet Scientific P/L
Level 3, 18-26 Dickson Avenue
Artarmon
NSW 2064, Australia
Tel: 02 8425 8300
Fax: 02 8425 8399

This document certifies that the instrument detailed has been calibrated to the parameters

Certificate Print Date: 18-Mar-2019
Calibration Date: 18-Mar-2019
Next Calibration Due: 14-Sep-2019

Call ID: 236014
Job Number: S2360140001

Customer: GHD Pty Ltd-ID 202583
Serial No: 13J100151
Description: YSI Professional Plus hand held unit only. Includ

Calibration Summary

Frequency: 180 Days **Temp:** 24°C **As Found:** Out of Tolerance **Result:** Pass
Humidity: 60% **Certificate:** S2360140001

Desc	As Found Actual	As Found Result	As Left (Cal Status) Actual	As Left (Cal Status) Result
PH4	4.17	Pass	4.0	Pass
PH7	7.14	Pass	7.0	Pass
EC µS/cm	2233.0	Fail	2760.0	Pass
DO @Air %	90.0	Fail	99.1	Pass
DO @Zero %	0.41	Pass	0.0	Pass
ORP @23°C mV	227.0	Pass	227.4	Pass
Temp °C	22.0	Pass	23.0	Pass
Barometer mmHg	758.0	Pass	758.0	Pass

Standard Used

Equip ID	Description	Valid Until	Cert
631	Testo Mini Thermonmeter	26-04-2019	
323356	PH7 (pH = 7.00 +/- 0.02 @ 25 deg)	27-08-2019	
SYFRESHAIR	Ambient Air	29-08-2028	
322349	Conductivity (2760 us/cm @ 25 deg)	29-12-2019	
325421	Zobel B: 1/50 mole K4Fe(CN) 6 in 0.1molar KCl	26-08-2023	
328104	PH4 (pH = 4.01 +/- 0.02 @ 25 deg)	26-11-2019	
325420	Zobel A: 1/50 mole K3Fe(CN) 6 in 0.1molar KCl	26-08-2023	
5656	DO Powder (Sodium Suplphite Solution)	29-10-2019	

Completed By: Jason Cheng
Signed:

eDoc V1R0

Attachment G - Laboratory Quality Assurance and Quality Control Results

Field Program surface water

Intra- and inter-laboratory duplicate samples were collected and analysed as part of the surface water sampling program and the relative percentage differences (RPD) were calculated. Intra-laboratory measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the original sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criterion of 30% RPD. Where a sample concentration is ten times the limit of report (LOR) the RPD must be below 30%. Where a sample concentration is less than ten times the LOR the RPD has no limit. Surface water QA/QC results are presented as Table B2, Attachment B. RPD of turbidity and TSS between duplicate pairs SW11_1 and QC1, of 36% and 44%, respectively, which is above the acceptance criterion. Turbidity concentrations were exceeded the ADWG (2011) criterion, therefore the variability observed is unlikely to affect the conclusions of the report. However, TSS concentrations reported for sample QC1 exceeded (ANZECC 2000) criterion whilst the primary sample (SW11_1) was marginally below the assessment criterion. This result indicates some variability in TSS concentrations which will need to be considered in this assessment. However, based on the TSS concentrations, it is likely that TSS concentration exceed the assessment criterion and will be assumed for this report.

The remaining RPD's recorded were within the adopted control limits.

Sample Receipt

The laboratory measured samples temperatures at 2.1°C upon receipt to the laboratory, which is below the recommended 6°C.

Laboratory Program

The NATA accredited laboratories utilised for this assessment (ALS) undertook their own quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are attached in the laboratory reports as Attachment E.

The laboratory provided the following summary of QA/QC compliance assessment:

- No method blank value outliers occur.
- No duplicate outliers occur.
- No laboratory control outliers occur.
- No matrix spike outliers occur.
- For all regular sample matrices, no surrogate recovery outliers occur
- No analysis holding time outliers exist.
- Quality control sample frequency outliers exist for TRH duplicate and matrix spike. The laboratory indicated the frequency was zero, which was lower than the recommended frequency of ten and five, respectively. The laboratory indicated that there was insufficient sample to carry out this quality control test. This is not considered significant as TRH concentrations have historically been below the laboratory reporting limits and field duplicate results were within adopted control limits.
- All samples were noted to be correctly preserved.

Summary of Quality Assurance / Quality Control Results

QA/QC results show that the samples collected, have met the appropriate standards and therefore, the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

Attachment H - Field sheets

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	6:55
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW01		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast, showers
VEGETATION	Exposed gravel
SLOPE	–
EROSION	Not evident
OTHER	Underneath bridge

FIELD MEASUREMENTS

SAMPLE	SW01_1		
TEMPERATURE (°C)	10.7		
CONDUCTIVITY (uS/cm)	91.4		
pH	9.51		
DO (ppm)	9.60		
REDOX (mV)	50.7		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Moderate to fast flow
CROSS SECTION WIDTH (m)	10m wide
DEPTH (m)	Approx 0.5-1m depth
OTHER	No change in site conditions since last visit, water clear, brown tinge, not very turbid like last event

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW01_1	6		SW01_2	
			SW01_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	7.25
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:			

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)* Grab

DETAILED SAMPLE LOCATION DESCRIPTION SW02

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast, slight shower/drizzle
VEGETATION	Vegetated banks
SLOPE	
EROSION	N/A
OTHER	Not flowing over road crossing, but turbulent underneath

FIELD MEASUREMENTS

SAMPLE	SW02-1		
TEMPERATURE (°C)	10.7		
CONDUCTIVITY (uS/cm)	101.7		
pH	8.6		
DO (ppm)	9.82		
REDOX (mV)	91.5		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Moderate - fast flow
CROSS SECTION WIDTH (m)	220m
DEPTH (m)	71m, had to assess
OTHER	Brown tinted water, clear, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW02-1	6	-	SW02_2	
			SW02_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	8:15
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW03		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast, occasional light rain
VEGETATION	Vegetated banks - Farmland beyond banks, shrubs, trees, grass
SLOPE	Flat to North
EROSION	Not present in immediate area, slight erosion/runoff @ road bank
OTHER	Mod-Fast flowing

FIELD MEASUREMENTS

SAMPLE	SW03		
TEMPERATURE (°C)	10.8		
CONDUCTIVITY (uS/cm)	115.5		
pH	8.31		
DO (ppm)	82.0% / 9.09		
REDOX (mV)	102.4		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Mod-Fast flowing
CROSS SECTION WIDTH (m)	~5-20m in pots
DEPTH (m)	Not accessed. Approx 0.5-1.0m
OTHER	Clear to slight brown tinge, increase turbidity towards centre of creek, no sheen or odour observed

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW03_1	6		SW03_2	
			SW03_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	10:45
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW04		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Sample taken on eastern side of creek		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast and showers
VEGETATION	Sparse trees, c mainly grasses on bk.
SLOPE	Unchanged from last, flat & slight undulating paddock
EROSION	Some erosion of bks on both sides
OTHER	Cows present in paddock next to creek

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.6		
CONDUCTIVITY (uS/cm)	88.6		
pH	7.15		
DO (ppm)	8.60		
REDOX (mV)	94.8		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Moderate to high flow
CROSS SECTION WIDTH (m)	10-15m
DEPTH (m)	Difficult to assess, ~0.5-1.0m
OTHER	Brown tinge, slightly turbid, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW04_1	6	~	SW04_2	
			SW04_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	0955
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW05		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION			

ENVIRONMENTAL OBSERVATIONS

WEATHER	Slight Showers / Overcast
VEGETATION	Veg Banks trees / shrubs
SLOPE	Flat to the west, hill to the east
EROSION	Significant erosion of soil banks underneath to bridge
OTHER	

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	10.8		
CONDUCTIVITY (uS/cm)	141.9		
pH	7.92		
DO ~~(ppm)~~ mg/L	8.35		
REDOX (mV)	99.8		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low to Mod Flow
CROSS SECTION WIDTH (m)	20-25m
DEPTH (m)	Same as previous. Cars washing water off road upstream into water.
OTHER	" Possibly runoff on sides of road into River near location.

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW05	6	-	N/A	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	**FBB PC**	**TIME:**	10.00
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW06		

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)* Grab

DETAILED SAMPLE LOCATION DESCRIPTION Sample from northern side of creek

ENVIRONMENTAL OBSERVATIONS

WEATHER: Overcast, no rain

VEGETATION: Vegetated banks, shrubs, small trees, grass

SLOPE: Relatively flat either side

EROSION: No evident

OTHER: –

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	12.1		
CONDUCTIVITY (uS/cm)	150.0		
pH	7.30		
DO (ppm)	3.63		
REDOX (mV)	92.9		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available): Low flow

CROSS SECTION WIDTH (m): ~5m

DEPTH (m): Difficult to assess. >1m

OTHER: Brown, turbid, cloudy @ edge, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW06	6	–	N/A	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	0915
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW07		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Same as previous.		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast - Showers (10 minutes prior)
VEGETATION	Same as previous
SLOPE	"
EROSION	"
OTHER	"

Some water free flowing out of culverts into a River.

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.4		
CONDUCTIVITY (uS/cm)	98.8		
pH	7.73		
DO ~~(ppm)~~ mg/L	8.72		
REDOX (mV)	98.1		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous, low to moderate flow
CROSS SECTION WIDTH (m)	" ~ 10-15m
DEPTH (m)	" Difficult to assess ~ 1-2m
OTHER	" Broom hinged, slightly turbid, no sheen or odour Some some floating vege matter

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW07-1	6	-	SW07-2	
			SW07-3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	1150
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW08		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION			

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast and showers
VEGETATION	Heavily vegetated banks on the side of creek
SLOPE	—
EROSION	Not present in immediate area
OTHER	—

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.5		
CONDUCTIVITY (uS/cm)	145.2		
pH	7.15		
DO (ppm)	7.17		
REDOX (mV)	121.2		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	< 5m
DEPTH (m)	~ 0.5m
OTHER	Brown tinge, very slightly turbid, no odour or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW08	6	—	N/A	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	9.30
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW09		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Northern side of creek, underneath creek bridge		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Partly Sunny & overcast
VEGETATION	As per Vegetated banks, shrubs, grasses, trees
SLOPE	Relatively flat either side of creek
EROSION	Not evident, vegetation covered
OTHER	Previously noted flood debris piled up on bridge support

FIELD MEASUREMENTS

SAMPLE	SW09		
TEMPERATURE (°C)	12.1		
CONDUCTIVITY (uS/cm)	150.4		
pH	7.52		
DO (ppm)	8.08		
REDOX (mV)	110.0		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Moderate to fast flows
CROSS SECTION WIDTH (m)	
DEPTH (m)	~0.5m
OTHER	Brown tinge, clear @ edges, slightly turbid in centre no odour or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW09	6	~	N/A	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	1200 & 1320 (Second visit)
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW10		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Same as previous		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast, slight drizzle
VEGETATION	Same as previous — grassed banks either side, paddocks to north, road to south
SLOPE	" — Relatively flat
EROSION	" — Small amount, both sides creek
OTHER	Cows present in paddock

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.8	12.3	
CONDUCTIVITY (uS/cm)	108.4	111.7	
pH	7.02	7.03	
DO (~~ppm~~) mg/L	7.47	7.05	
REDOX (mV)	133.8	98.9	

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous	Small trickle
CROSS SECTION WIDTH (m)	"	0.5m
DEPTH (m)	"	< 100mm
OTHER	"	No sheen / film observed

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW10-1	6	-	SW10-2	
			SW10-3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	12:50
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW11		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION			

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast, slight Shower	
VEGETATION	Same as previous	Slightly vigitation banks - trees, grass, shrubs
SLOPE	"	Flat either sd
EROSION	"	Not evident
OTHER		landscaping of slopes along bank

FIELD MEASUREMENTS

SAMPLE	SW11	(SW11 UPSTREAM)	
TEMPERATURE (°C)	13.4	13.4	
CONDUCTIVITY (uS/cm)	250.4	388.9	
pH	6.90	6.59	
DO (ppm)	7.33	5.95	
REDOX (mV)	89.9	95.7	

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous → Not flowing, steady body, small ripples	
CROSS SECTION WIDTH (m)	1m	2m
DEPTH (m)	"	<0.5m
OTHER	"	Brown tinge, no odour or sheen, vige weeds in water

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW11_01	6	-	SW11-02	
			SW11_03	
			QC1	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	1345
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW12		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Same as previous → Near culvert		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Same as previous →	Overcast & light shower
VEGETATION	" →	Grasses
SLOPE	" →	
EROSION	" →	Not visual
OTHER	" →	

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.9		
CONDUCTIVITY (uS/cm)	2688		
pH	7.05		
DO ~~(ppm)~~ mg/L	6.94		
REDOX (mV)	124.0		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous. → Slight trickle of water flow
CROSS SECTION WIDTH (m)	" → <0.5m
DEPTH (m)	" → 100-200mm
OTHER	Grey, slightly turbid, no sheen, no odour, Slight decaying organics odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW12	6	—	NONE	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	1400 | 14:15 (2nd/3rd)
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW13		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Southern side of creek		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast and light showers
VEGETATION	Grassed river banks, trees further east
SLOPE	Flat surface (grassed) either side
EROSION	Erosion noted on either side
OTHER	

FIELD MEASUREMENTS

SAMPLE	SW13		
TEMPERATURE (°C)	12.0		
CONDUCTIVITY (uS/cm)	292.8		
pH	7.26		
DO ~~(ppm)~~ mg/L	8.00		
REDOX (mV)	118.0		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	20.5m
DEPTH (m)	200-300mm
OTHER	Clear, slightly turbid, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW13_1	6		SW13_2	
			SW13_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	3:40 pm | 16:00 (2nd/2nd)
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW14		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Pool of water near culvert		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Overcast
VEGETATION	Grasses
SLOPE	-
EROSION	-
OTHER	-

FIELD MEASUREMENTS

SAMPLE	SW14		
TEMPERATURE (°C)	12.9		
CONDUCTIVITY (uS/cm)	379.6		
pH	6.96		
DO (ppm)	5.97		
REDOX (mV)	140.0		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Not flowing
CROSS SECTION WIDTH (m)	-
DEPTH (m)	<100mm
OTHER	Clear pale grey, slightly turbid, no sheen or odour slight green algae

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW14-1	6	-	SW14-2	
			SW14-3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	1435
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW15		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Same as previous Northern side of creek, water body covered by vegetation		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Same as previous →	Overcast – patchy cloud cover
VEGETATION	" →	Heavily vegetated with reeds, grasses & rushes
SLOPE	" →	Relatively flat
EROSION	" →	No erosion present in immediate area
OTHER		

FIELD MEASUREMENTS

SAMPLE	SW15		
TEMPERATURE (°C)	12.5		
CONDUCTIVITY (uS/cm)	305.7		
pH	7.13		
DO (ppm)	6.64		
REDOX (mV)	115.0		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous →	No flow, standing body of water
CROSS SECTION WIDTH (m)	" →	<0.5m
DEPTH (m)	" →	100-200mm
OTHER	" →	Clear, slightly turbid, no sheen or odour, some suspended solids (seeds/grass)

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW15-1	6	–	SW15-2	
			SW15-3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	15:05
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW#6		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Western side of bridge.		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Same as previous	Overast, patchy cloud
VEGETATION	"	Grasses, reeds
SLOPE	"	—
EROSION	"	Not present in immediate area.
OTHER		—

FIELD MEASUREMENTS

SAMPLE	SW#6		
TEMPERATURE (°C)	14.2		
CONDUCTIVITY (uS/cm)	261.0		
pH	6.54		
DO (ppm)	6.25		
REDOX (mV)	143.8		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous	Not flowing, standy body of water
CROSS SECTION WIDTH (m)	"	1-2m
DEPTH (m)	"	<400mm
OTHER	"	No green algae present. Clear, non-turbid, no odour or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW#6	6	—	QC2	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	05/06/2019
PROJECT NAME:	FBB PC	**TIME:**	15~~00~~15
CLIENT:	RMS	**SAMPLING OFFICERS:**	Jarrad Mawbey/Daniel Deen
SITE:	SW~~1~~7		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Eastern Side of Bridge		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Same as previous.	Overast, patchy shower
VEGETATION	"	Grasses & reeds, banks grasses & small shrubs
SLOPE	"	–
EROSION	"	Not evident in immediate area
OTHER	"	–

FIELD MEASUREMENTS

SAMPLE	SW~~1~~7		
TEMPERATURE (°C)	13.9		
CONDUCTIVITY (uS/cm)	257.3		
pH	6.48		
DO (ppm)	6.50		
REDOX (mV)	149.6		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Same as previous	Not flowing
CROSS SECTION WIDTH (m)	"	1-2m
DEPTH (m)	"	< 100mm
OTHER	"	suspended solids in water, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW~~1~~7	6	–	N/A	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

25 September 2019

Ryan Whiddon
Roads and Maritime Services
PO Box 477
Wollongong NSW 2500

Our ref: 2316261-44628
Your ref:

Dear Ryan

FBB Post-Construction Water Quality Monitoring
Interim Monitoring Report Event 12 (Minor Event 7)

1 Scope and limitations

In accordance with the Princes Highway upgrade for Foxground and Berry Bypass (FBB) - Water Monitoring Project Brief (*Contract No. 17.0000303651.0922)*, GHD undertook surface water monitoring at 17 locations (SW01 to SW17). Sampling was triggered due to a minor rainfall event (≥ 15 mm rain in a 24 hour period). During the operational phase, minor events are considered to have occurred when at least 15 mm of rainfall has fallen in the past 24 hours, and major events where at least 50 mm of rainfall in the past 24 hours has occurred.

Sampling locations have been selected based on their proximity to permanent water quality basins located along the FBB alignment and proximity to operational water control measures (such as sedimentation basins and vegetation swales). This report documents the twelfth surface water sampling event (Event 12) undertaken since the completion of construction, which is also the seventh minor surface water sampling event (Minor Event 7) since operation began in October 2017. Limitations are provided in Section 9.

2 Project objectives

The objective of the project is to satisfy the Conditions of Approval for FBB. The Conditions of Approval include the monitoring of surface water parameters along the alignment for a period of three years or until certification can eventually be achieved before the required three years.

3 Interim reporting objectives

The objective of this monitoring event and interim reporting is to collect and assess upstream and downstream waterway data to contribute to their eventual certification. It is not intended for this interim report to conclude with respect to the overall project objectives. The purpose of interim reports is to provide a summary of activities, ensure data integrity throughout the program and identify opportunity to improve water quality based on observations.

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4 Field program

To meet the above objectives surface water sampling was undertaken at surface water locations SW01 to SW17 on the 2 and 3 September 2019. SW10, SW11 and SW15 did not have sufficient water available to sample. For sampling locations within the context of the FBB alignment refer to Figure 1, Attachment A. Formal certification of waterways as rehabilitated has not occurred; therefore, the 17 locations were targeted during this monitoring event.

The following scope of work was undertaken:

- Measuring field parameters during the monitoring event including temperature, pH, electrical conductivity (EC), dissolved oxygen (DO), and reduction-oxidation potential (redox), and are provided in Table B1, Attachment B. Field sheets are provided in Attachment H.
- Where 10% difference in field parameters is observed at a location, another two samples are collected at the location and its associated upstream or downstream location. During this event, an additional two samples were collected from SW01, SW02, SW03, SW04, SW05, SW07, SW13 and SW14.
- Analysis of collected water samples submitted to a NATA accredited testing laboratory (ALS) to be analysed for a suite of contaminants of potential concern including turbidity, total suspended solids (TSS), total recoverable hydrocarbons (TRH), total phosphorus and total nitrogen and heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn).
- Preparation of this interim letter report which includes:
  - Summary of sampling activities and results of this current monitoring round.
  - General comments of field and laboratory results relative to the previous round and adopted assessment criteria.

This monthly surface water sampling event was conducted in accordance with the sampling program and protocols provided in:

- GHD 2014, Foxground to Berry Bypass Water Quality Management - Surface Water and Groundwater Sampling Protocol, prepared for Roads and Maritime Services.
- GHD 2016, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

5 Summary of monitoring events

Table 5-1 below summaries all monitoring events that have been completed by GHD as part of post-construction water quality monitoring for FBB to date.

It is noted that a minor rainfall (i.e. > 15 mm) event occurred Friday 5 July 2019. Sampling was not undertaken in July as samples would not be received by the laboratory within the recommended holding times for certain analytes.

Table 5-1 Summary of monitoring events post-construction

Date of Monitoring Round	Groundwater	Surface Water	Report reference
14 February 2018		X	Event 1 (Minor Event 1), dated 27 May 2018
26 February 2018		X	Event 2 (Major Event 1), dated 28 May 2018
22 March 2018		X	Event 3 (Minor Event 2), dated 28 May 2018
15 May 2018		X	Event 4 (Minor Event 3), dated 28 August 2018
23 to 24 May 2018	X		Groundwater Event 1, dated 3 September 2018
7 to 8 June 2018		X	Event 5 (Minor Event 4), dated 7 December 2018
5 to 6 September 2018		X	Event 6 (Minor Event 5) dated 7 December 2018
4 to 5 October 2018		X	Event 7 (Major Event 2), dated 7 December 2018
8 to 9 November 2018		X	Event 8 (Minor Event 6), dated 14 January 2019
29 to 30 November 2018		X	Event 9 (Major Event 3), dated 17 March 2019
15 to 16 November 2018	X		Groundwater Event 2, dated 27 February 2019
19 March 2019		X	Event 10 (Major Event 4), dated 3 April 2019
5 June 2019		X	Event 11 (Major Event 5), dated 24 June 2019
2 to 3 September 2019		X	Event 12 (Minor Event 7), dated 25 September 2019
Total monitoring events	2	12	24 monitoring rounds required as part of certification

6 Results

This section presents control charts and discusses results with respect to exceedances of criteria or inconsistencies in the surface water results for Event 12 (Minor Event 7) in accordance with:

- The limitations provided in Section 9.
- GHD 2016, Foxground to Berry Bypass Water Quality Management - Surface Water Quality Management Plan, prepared for Roads and Maritime Services.
- GHD 2014, Princes Highway Upgrade – Foxground to Berry Bypass Project, Final Interpretive Water Monitoring Report, prepared for Roads and Maritime Services.

6.1 Control charts

The surface water locations have been grouped into separate control charts by the specific surface water bodies they are located within and whether they are up and down gradient of the FBB alignment. The upstream locations represent the 'reference' (un-impacted) sites while the down-stream locations represent the 'test' sites (impacted by operation). By comparing upstream water quality with downstream water quality using the control chart methods it is expected that impacts will be able to be adequately characterised during operation. The groupings used for the control charts are summarised in Table 6-1.

Table 6-1 Surface water locations within specific surface water bodies

Surface water location	Upstream of Alignment	Downstream of Alignment
Broughton Creek	SW01	SW02, SW03, SW05
Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	SW04, SW06	SW07, SW09
Bundewallah Creek and Connelly's Creek	SW08	SW06
Town Creek (realigned)	SW10	SW11
Hitchcocks Lane Creek Tributary	SW12	SW13
Hitchcocks Lane Creek	SW14	SW15
Unnamed Tributary	SW16	SW17

The primary control chart indicators for assessing potential impacts associated with the FBB upgrade works during operation for Event 12 include those for pH, turbidity, TSS, total phosphorus, total nitrogen, EC and heavy metals (zinc and copper), presented in Attachment C.

The median of the downstream post-construction data has been compared against the upstream 80th percentile which has been calculated using data from all phases of the project. Comparing the median against the 80th Percentile will indicate what physical and chemical changes may be occurring following the construction of the FBB. Currently, the control charts 80th percentile values have not reached the required 24 data points or events at each location required by the ANZECC (2000) Guidelines for Fresh and Marine Water Quality[1]. Throughout post-construction monitoring the calculated 80th percentile and median will become more accurate with more sampling events. ANZECC (2000) Lowland Rivers exceedance values have been depicted on the control charts until the required number of data points can be achieved.

A review of Event 12 control charts is provided in Section 7.

[1] The Australian and New Zealand Guidelines for Fresh and Marine Water Quality, (previously known as ANZECC 2000) were updated mid 2018. The revision of the Guidelines was a joint project of the Australian and New Zealand and Australian State and Territory Governments (ANZAST). The trigger values listed in the new ANZAST (2018) guidelines are generally consistent with those in previously published. Therefore, this project will continue to use the ANZECC 2000 trigger values.

6.2 Recorded rainfall event

The rainfall within Broughton Creek catchment and the surface water flows within Broughton Creek are presented in Figure 2, Attachment A. This information was obtained from the WaterNSW website (https://realtimedata.waternsw.com.au/water.stm). The location of this gauge is on Broughton Mill Creek approximately 2 km upstream of SW04.

The data in Figure 2 illustrates a high correlation between rainfall and river flow, with a spike in rainfall coinciding with a spike in river flow. The surface water sampling events are also marked on Figure 2, Attachment A.

6.3 Surface water monitoring QA/QC

Sampling was completed as per the method outlined within the project Water Quality Management Plan (WQMP). The water quality meter used during water quality monitoring is certified every six months and between certification, calibrated before each event. Evidence of calibration is provided in Attachment F.

A field and laboratory quality control assessment of the results from this monthly monitoring round (Event 12 – Minor Event 7) is provided in Attachment G. These results indicate the data can be considered valid and of sufficient quality to meet the data quality objectives for the assessment.

7 Discussion of results

The field and laboratory analytical results are summarised in tables located in Attachment B and discussed in the following sections. The adopted assessment criteria are also included in these tables. Laboratory reports are included in Attachment E. Exceedances of assessment criteria in samples analysed are highlighted in these tables and Table 7-1 below.

Exceeding concentrations of contaminants of concern for the post-construction surface water monitoring at the FBB have been summarised in a table located in Attachment D to provide a clearer understanding of differences and similarities across post-construction monitoring event exceedances at each location.

The following results have been ascertained from this monitoring round:

- Medians for copper, zinc, total phosphorus, turbidity, pH and/or electrical conductivity (EC) exceeded the 80th percentile at the downstream watercourses sampled. No median values exceeded the 80th for total suspended solids (TSS) or nitrogen. These monitoring results are similar to previous monitoring rounds.
- The 80th percentile has shown an apparent increasing trend during recent monitoring rounds at:
  - Broughton Creek; Connelly's Creek and Broughton Mill Creek and Bundewallah Creek; Bundewallah Creek and Connelly's Creek; Hitchcock's Lane Creek and unnamed tributary for zinc.
  - Connelly's Creek and Broughton Mill Creek and Bundewallah Creek and Hitchcock's Lane Creek for copper.
  - Connelly's Creek and Broughton Mill Creek and Bundewallah Creek and Hitchcocks Lane Creek and Tributary, and Town Creek for phosphorus.
  - Bundewallah Creek and Connelly's Creek for nitrogen.
  - Unnamed Tributary for TSS.

- pH has maintained a similar median to previous monitoring rounds. Median for pH at SW07 and SW13 has continued to exceed the 80th percentile. The remaining locations were within the 80th and 20th percentile of the respective upstream values.
- Concentrations of copper, zinc and phosphorus exceeded the ANZECC (2000) guidelines at the majority of locations sampled. These monitoring results are similar to previous monitoring rounds. Turbidity and phosphorus concentrations reported have exceeded the ADWG (2011) at a number of the locations sampled, which is generally lower than previous monitoring rounds. Additional observations for these analytes are discussed below:
  - Copper: This result is similar to previous events but there is a notable increase in the number of copper exceedances in comparison to earlier rounds of monitoring. Prior to monitoring Events 9, these levels have not been observed since Event 2 (major) where 16 out of 17 locations reported a copper exceedance. From Events 3 to 8, between three and seven locations have reported copper exceedances. Copper concentrations have shown significantly increased at SW06 and SW17 during the past three monitoring rounds. The cause of this increase is unknown as there was no apparent changes observed during fieldwork and has occurred over both minor and major rainfall events.
  - Zinc: A notable increase in the number of zinc exceedances, with only Event 2 (major), Event 9 (major) and Event 10 (major) and Event 11 (major) having similar number of zinc exceedance. From Events 3 to 8, between three and seven locations have reported zinc exceedance.
  - Total phosphorus: Slightly lower concentrations of phosphorus were reported at some locations relative to previous monitoring events.
- Concentrations of nickel exceeded the ANZECC (2000) guidelines at locations SW08, and SW14. Nickel concentrations exceeded the assessment criteria in the previous monitoring rounds for the first time (pre- or post-construction). Nickel results have been reported above the limit of reporting during pre- and post-construction monitoring, however did not exceed the assessment criterion. No apparent source of nickel or lead was observed at the time of sampling.
- pH values were within the trigger value range recommended by ANZECC (2000) guidelines. Notably the pH at SW01 reduced from 9.51 recorded during Event 11 and is now within the adopted trigger value range. Similarly, at SW17 a pH of 6.48 was recorded in Event 11, which was outside the lower trigger value of the recommended range; but for this round pH values are now within the adopted trigger value range. Typically, pH values have been neutral to slightly acidic or slightly alkaline over the post construction monitoring period.
- EC concentrations at locations SW13 and SW14 exceeded the ANZECC (2000) criterion for Lowland Rivers. This is similar to previous monitoring rounds.

Table 7-1 Summary of exceedances at each location against criteria (Event 12)

Location	Watercourse	Concentrations exceeding water quality assessment criteria					
		TSS, pH, Turbidity	Metals	Nitrogen and Phosphorus	Electrical Conductivity	All analytes	
		Median exceeding 80th percentile				ANZECC (2000)	AWDG (2011)
Upstream							
SW01	Broughton Creek					Copper, Zinc	NE
SW04	Connelly's Creek and Broughton Mill Creek and Bundewallah Creek					Phosphorus, Copper, Zinc	NE
SW08	Bundewallah Creek and Connelly's Creek					Nitrogen, Phosphorus, Copper, Nickel, Zinc	Turbidity
SW10	Town Creek (realigned)					NS	NS
SW12	Hitchcock's Lane Creek Tributary					Phosphorus, Copper, Zinc,	Turbidity
SW14	Hitchcocks Lane Creek					EC, Turbidity, TSS, Nitrogen, Phosphorus, Copper, Nickel, Zinc	Turbidity
SW16	Unnamed Tributary					Phosphorus, Copper, Zinc	Turbidity
Downstream							
SW02	Broughton Creek	NE	Copper, Zinc	NE	NE	Phosphorus, Copper, Zinc	Turbidity
SW03		NE	Copper, Zinc	NE	NE	Phosphorus, Copper	NE
SW05		Turbidity	Copper, Zinc	Phosphorus	EC	Phosphorus, Copper, Zinc	NE
SW07	Connelly's Creek and Broughton Mill Creek and Bundewallah Creek	pH	NE	NE	NE	Phosphorus, Copper, Zinc	NE
SW09		NE	NE	Phosphorus	EC	Phosphorus, Copper, Zinc	NE
SW06	Bundewallah Creek and Connelly's Creek	NE	Zinc	NE	NE	Copper, Zinc	NE
SW11	Town Creek (realigned)	NS	NS	NS	NS	NS	NS
SW13	Hitchcocks Lane Creek Tributary	pH	Copper, Zinc	NE	NE	EC, Copper, Zinc	Turbidity
SW15	Hitchcocks Lane Creek	NS	NS	NS	NS	NS	NS
SW17	Unnamed Tributary	NE	Zinc	NE	NE	Copper, Zinc	NE

Table notes:

Zinc	Concentration exceeds relevant assessment criteria	TSS	Total Suspended Solids
*	Exceeds the lower trigger value (i.e. more acidic)	NE	No Exceedance
EC	Electrical Conductivity	NS	Not Sampled
	Not applicable		

8 Conclusion

Monitoring data was successfully collected for the September 2019 Event 12 (Minor Event 7) round of wet weather surface water monitoring.

Field and laboratory results reported for water quality parameters indicated:

- Upstream water quality:
  - pH control charts suggest an emerging trend towards values observed during baseline monitoring. This trend may become more apparent with additional monitoring data.
  - Zinc and copper reported concentrations exceeded ANZECC (2000) freshwater trigger values. Although elevated with respect to these trigger values, are consistent with baseline monitoring results. Zinc and copper exceedances upstream may be attributable to upstream impacts and/or natural variation where exceedances of the ANZECC (2000) occurred.
  - Total nitrogen (two locations) and total phosphorus (11 locations) exceeded ANZECC (2000) Lowland Rivers criterion. Watercourses monitored predominantly receive water from upstream catchments consisting of farmland with livestock. Given similar nitrogen and phosphorus concentrations were reported during baseline monitoring, it is likely concentrations are attributable to farming activity rather than road upgrade.
- Downstream water quality:
  - Median for copper, zinc, total phosphorus, turbidity, pH and/or electrical conductivity (EC) exceeded the 80th at the downstream watercourses sampled. These monitoring results are similar to previous monitoring rounds.
  - Exceedances of ANZECC (2000) guidelines for pH are consistent with statistical trends and depicted on control charts. No further investigation is required at this stage although further monitoring will reduce statistical error within control charts.
  - Zinc and copper concentrations exceeded ANZECC (2000) criteria at all sampled locations except for zinc at SW03, which prior to Events 10 and 11, has not occurred since Event 2 (major event). The cause of the number of exceeding instances at the site is unclear and appears unrelated to rainfall intensity. The source of zinc and copper is unclear and may be naturally occurring, as upstream exceedances have also been reported. Further assessment would be required to identify the source of the zinc and copper.
  - Concentrations of nickel have exceeded ANZECC (2000) for the second time since monitoring began. These exceedances were only noted at upstream locations. No apparent source of nickel was observed at the time of sampling. Further monitoring will be required to assess if nickel exceedances were an isolated occurrence or represent a permanent change in water quality at these locations.
- It is recommended that:
  - Town Creek was diverted to Bundewallah Creek and no longer flows to monitoring location SW11. Therefore, this location no longer meets the objective of the monitoring. If SW11 is removed from the monitoring program, then SW10 results can be compared against downstream location SW06 in Bundewallah Creek.
  - Further monitoring of watercourses intersecting the FBB alignment should be continued to further assess zinc, copper and nickel exceedances.

9 Limitations

This report has been prepared by GHD Pty Ltd (GHD) for Roads and Maritime Services (RMS) and may only be used and relied on by RMS for the purpose agreed between GHD and RMS as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than RMS arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Roads and Maritime Services and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

* * *

We trust the information presented in this letter is sufficient for you current requirements. If you have any queries or require further information, please do not hesitate to contact Daniel Deen or the undersigned.

Sincerely
GHD Pty Ltd

Colee Quayle
Team Leader Contamination
+61 2 4222 2331

Attachment A- Figures

Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

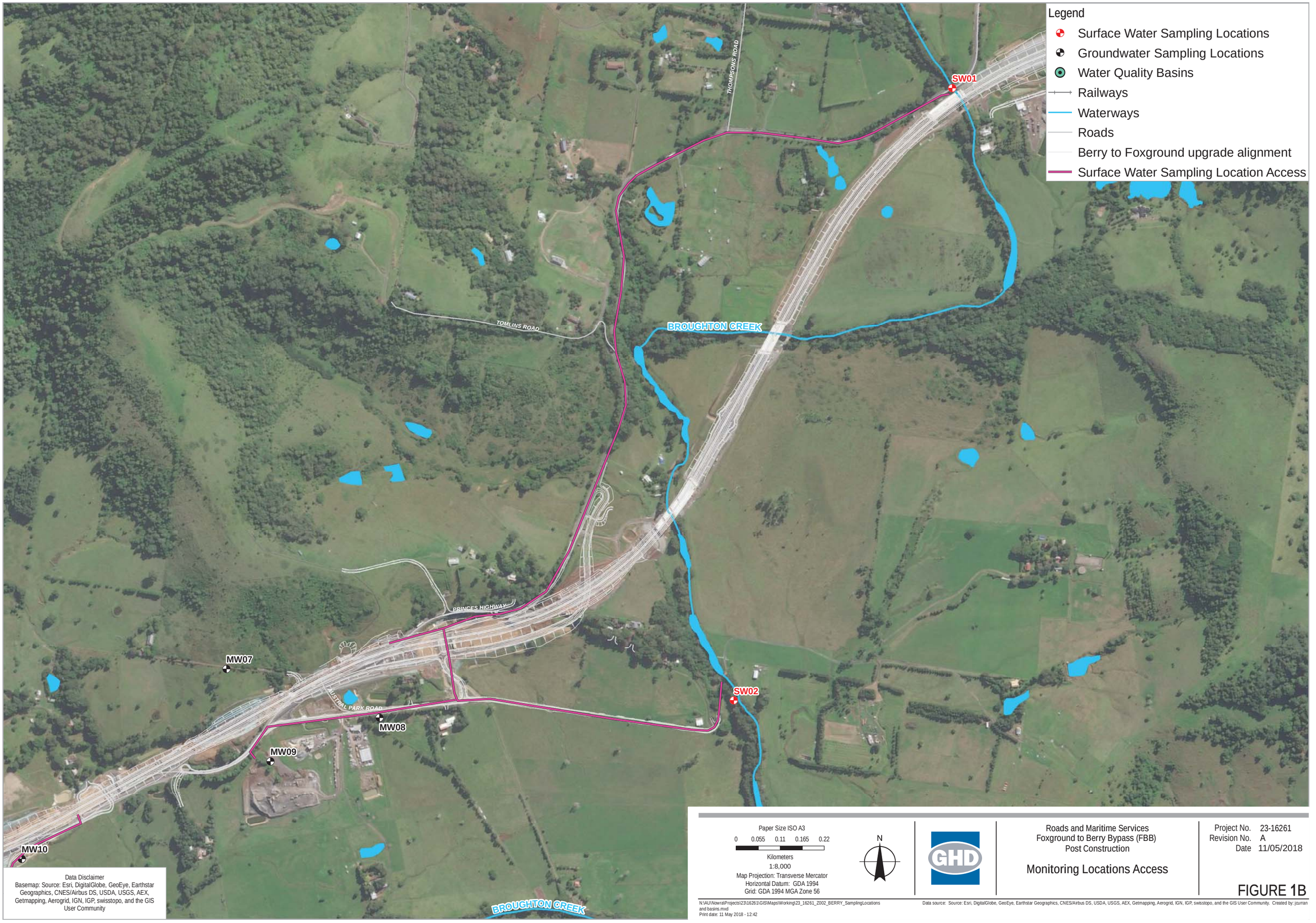
Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1A

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z002_BERRY_SamplingLocations and basins.mxd
Print date: 11 May 2018 - 12:41

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran



Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1B

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z002_BERRY_SamplingLocations and basins.mxd
Print date: 11 May 2018 - 12:42

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jsurran

Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.055 0.11 0.165 0.22

Kilometers

1:8,000

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. A
Date 11/05/2018

FIGURE 1C

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z002_BERRY_SamplingLocations and basins.mxd
Print date: 11 May 2018 - 12:43

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. 1
Date 27/08/2018

FIGURE 1D

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_2003_BERRY_Sampling Access.mxd
Print date: 27 Aug 2018 - 17:20

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

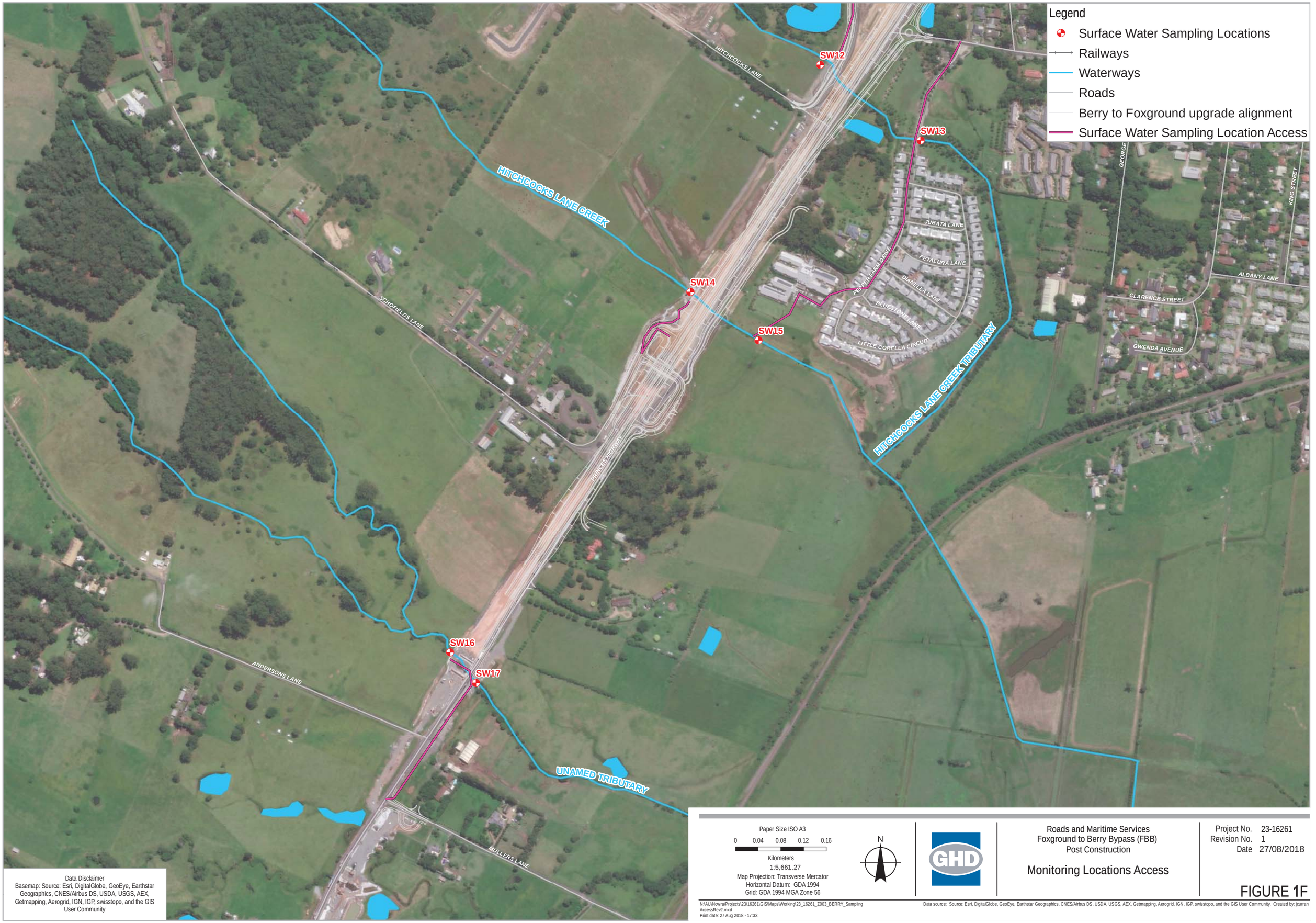
Monitoring Locations Access

Project No. 23-16261
Revision No. 1
Date 27/08/2018

FIGURE 1E

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z003_BERRY_Sampling AccessRev2.mxd
Print date: 27 Aug 2018 - 17:32

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran



Data Disclaimer
Basemap: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Paper Size ISO A3

0 0.04 0.08 0.12 0.16

Kilometers

1:5,661.27

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

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Roads and Maritime Services
Foxground to Berry Bypass (FBB)
Post Construction

Monitoring Locations Access

Project No. 23-16261
Revision No. 1
Date 27/08/2018

FIGURE 1F

N:\AU\Nowra\Projects\23\16261\GIS\Maps\Working\23_16261_Z003_BERRY_Sampling AccessRev2.mxd
Print date: 27 Aug 2018 - 17:33

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Created by: jcurran

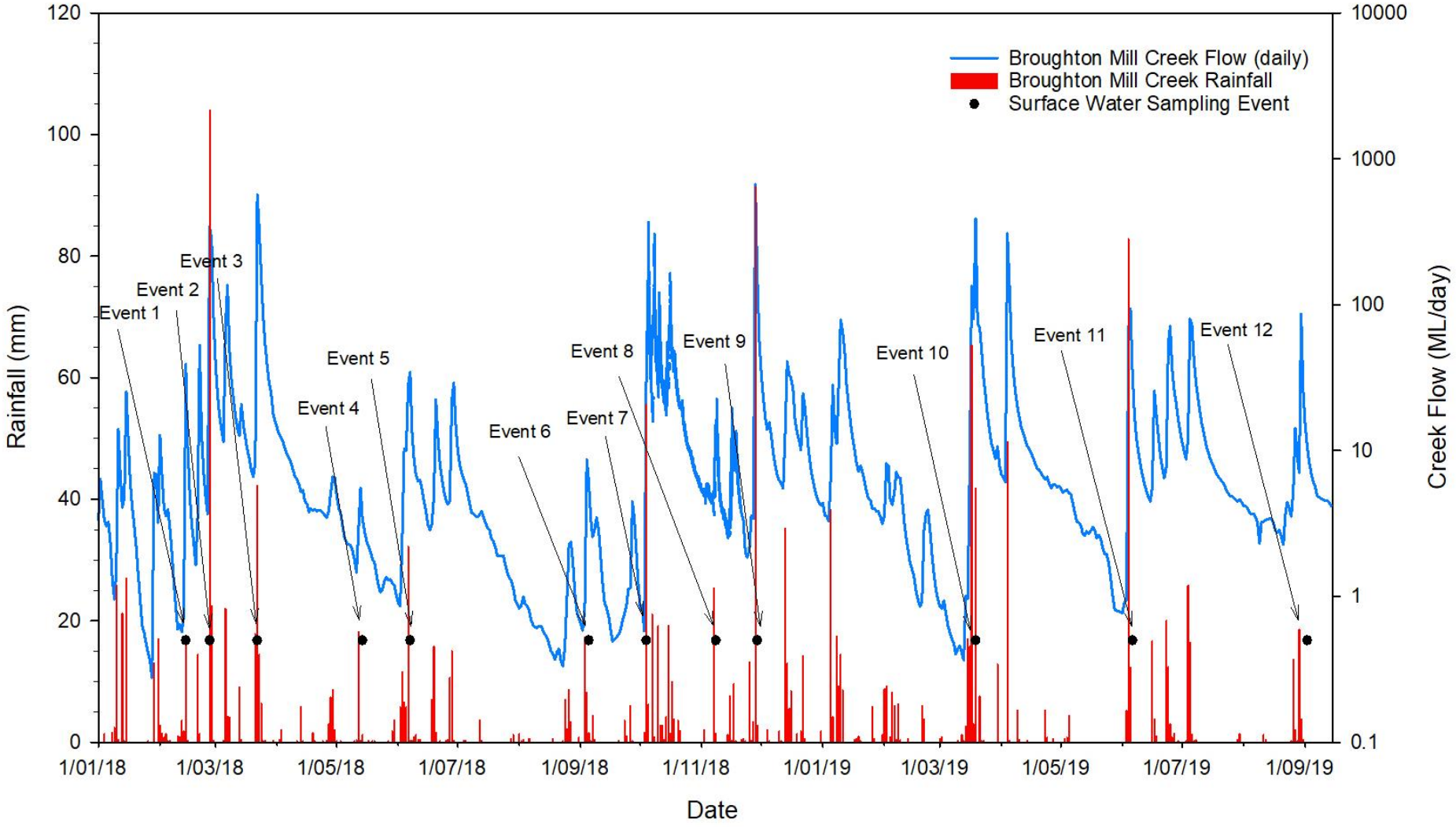


Figure 2 Rainfall vs Flow within Broughton Mill Creek

Attachment B - Tabulated Results

Appendix B
Table B1
Analytical Results

Foxground to Berry Bypass Post construction
Woodhill Mountain Road

					Field Parameters					Inorganics		Nutrients				Metals								BTEXN		
					pH (Field)	Electrical conductivity (field)	Dissolved Oxygen (Field) (filtered)	Redox (Field)	Temperature (Field)	Turbidity	Total Suspended Solids	Nitrite + Nitrate as N	Nitrogen (Total)	Kjeldahl Nitrogen Total	Phosphorus (Total)	Arsenic (filtered)	Cadmium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Lead (filtered)	Mercury (filtered)	Nickel (filtered)	Zinc (filtered)	Benzene	Toluene	Ethylbenzene
					pH Units	µS/cm	mg/L	mV	°C	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L
EQL										0.1	5	0.01	0.1	0.1	0.01	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	1	2	2
ADWG 2011 Aesthetic (v3.5 updated 2018)					6.5-8.5					5									1				3		25	3
ANZECC 2000 - Lowland Rivers (NSW rivers)					6.5-9	300				50	50		0.6		0.05											
ANZECC 2000 FW 95%																0.013	0.0002	0.001	0.0014	0.0034	0.0006	0.011	0.008	950		
Location Code	**Date**	**Field ID**	**Sample Type**	**Matrix Type**																						
SW01	2/09/2019	SW01_1	Normal	water	7.37	94.8	5.18	117	12.3	2.1	<5	0.09	0.3	0.2	0.04	<0.001	<0.0001	<0.001	0.004	<0.001	<0.0001	0.003	0.014	<1	<2	<2
SW01	2/09/2019	SW01_2	Normal	water						1.9	<5	0.05	0.2	0.2	0.05	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2
SW01	2/09/2019	SW01_3	Normal	water						2.0	<5	0.05	0.2	0.2	0.04	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2
SW02	2/09/2019	SW02_1	Normal	water	7.33	104.8	5.09	126.5	12.6	5.6	6	0.05	0.4	0.3	0.06	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	0.005	<1	<2	<2
SW02	2/09/2019	SW02_2	Normal	water						7.5	12	0.08	0.3	0.2	0.05	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	<0.001	0.011	<1	<2	<2
SW02	2/09/2019	SW02_3	Normal	water						5.8	<5	0.05	0.2	0.2	0.05	<0.001	<0.0001	<0.001	0.003	<0.001	<0.0001	<0.001	0.006	<1	<2	<2
SW03	2/09/2019	SW03_1	Normal	water	7.33	108.0	5.45	131	11.9	2.6	<5	0.13	0.3	0.2	0.04	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	0.001	0.007	<1	<2	<2
SW03	2/09/2019	SW03_2	Normal	water						2.9	<5	0.11	0.4	0.3	0.07	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	0.007	<1	<2	<2
SW03	2/09/2019	SW03_3	Normal	water						2.7	<5	0.14	0.4	0.3	0.05	<0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2
SW04	2/09/2019	SW04_1	Normal	water	7.02	78.6	5.07	121.3	12.5	2.1	<5	0.06	0.4	0.3	0.04	<0.001	<0.0001	<0.001	0.006	<0.001	<0.0001	0.005	0.027	<1	<2	<2
SW04	2/09/2019	SW04_2	Normal	water						2.0	<5	0.06	0.3	0.2	0.10	<0.001	<0.0001	<0.001	0.004	<0.001	<0.0001	0.004	0.015	<1	<2	<2
SW04	2/09/2019	SW04_3	Normal	water						2.8	<5	0.06	0.4	0.3	0.06	<0.001	<0.0001	<0.001	0.006	<0.001	<0.0001	0.004	0.021	<1	<2	<2
SW05	2/09/2019	SW05_01	Normal	water	7.06	287.6	5.15	111.1	12.6	2.5	<5	0.07	0.3	0.2	0.06	<0.001	<0.0001	<0.001	0.013	<0.001	<0.0001	0.011	0.069	<1	<2	<2
SW05	2/09/2019	SW05_2	Normal	water	7.20	221.8	5.18	130.4	12.8	3.9	<5	0.06	0.4	0.3	0.05	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2
SW05	2/09/2019	SW05_3	Normal	water						3.3	<5	0.06	0.3	0.2	0.05	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	<0.001	<0.005	<1	<2	<2
SW06	2/09/2019	SW06	Normal	water	6.63	163.3	5.02	111.3	13.3	1.4	<5	0.02	<0.1	<0.1	0.04	<0.001	<0.0001	<0.001	0.017	<0.001	<0.0001	0.011	0.065	<1	<2	<2
SW07	2/09/2019	SW07_1	Normal	water	7.63	91.0	5.04	106.3	12.3	2.0	<5	0.05	0.2	0.2	0.04	<0.001	<0.0001	<0.001	0.006	<0.001	<0.0001	0.002	0.019	<1	<2	<2
SW07	2/09/2019	SW07_2	Normal	water						2.2	<5	0.05	0.4	0.3	0.03	<0.001	<0.0001	<0.001	0.010	0.001	<0.0001	0.002	0.023	<1	<2	<2
SW07	2/09/2019	SW07_3	Normal	water						2.4	<5	0.05	0.2	0.2	0.08	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.002	0.025	<1	<2	<2
SW08	2/09/2019	SW08	Normal	water	6.64	225.8	4.93	127.9	14.9	6.6	10	0.32	1.9	1.6	0.81	<0.001	<0.0001	<0.001	0.018	0.001	<0.0001	0.012	0.094	<1	<2	<2
SW09	2/09/2019	SW09	Normal	water	6.90	171.3	5.00	49.6	14.1	0.7	<5	<0.01	<0.1	<0.1	0.10	<0.001	<0.0001	<0.001	0.014	0.002	<0.0001	0.003	0.026	<1	<2	<2
SW12	2/09/2019	SW12	Normal	water	7.54	244.2	5.33	124.8	10.8	13.5	16	<0.01	0.6	0.6	0.09	<0.001	<0.0001	<0.001	0.006	<0.001	<0.0001	0.001	0.011	<1	<2	<2
SW13	3/09/2019	SW13_1	Normal	water	7.43	388.3	5.41	110.1	12	2.2	8	0.06	0.3	0.2	0.04	<0.001	<0.0001	<0.001	0.010	<0.001	<0.0001	0.006	0.030	<1	<2	<2
SW13	3/09/2019	SW13_2	Normal	water						1.6	<5	0.05	0.2	0.1	0.03	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.005	0.023	<1	<2	<2
SW13	3/09/2019	SW13_3	Normal	water						1.9	<5	0.06	0.2	0.1	0.04	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.004	0.023	<1	<2	<2
SW14	3/09/2019	QC1	Field_D	water	6.94	549.0	6.65	145.1	11.8	63.7	144	<0.01	1.7	1.7	0.24	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.003	0.030	<1	<2	<2
SW14	3/09/2019	SW14_1	Normal	water						45.2	108	<0.01	1.5	1.5	<0.01	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.002	0.040	<1	<2	<2
SW14	3/09/2019	SW14_2	Normal	water						78.8	192	<0.01	1.7	1.7	0.25	<0.001	<0.0001	<0.001	0.019	<0.001	<0.0001	0.016	0.073	<1	<2	<2
SW16	3/09/2019	SW16	Normal	water	6.94	227.2	5.47	112.2	12.4	6.0	27	0.02	0.3	0.3	0.12	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.003	0.024	<1	<2	<2
SW17	3/09/2019	SW17	Normal	water	6.92	252.2	5.48	111.4	11.4	1.0	<5	0.03	0.2	0.2	0.03	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.002	0.021	<1	<2	<2
Statistics																										
Number of Results					15	15	15	15	15	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Number of Detects					15	15	15	15	15	30	9	25	28	28	29	0	0	0	29	3	0	21	25	0	0	0
Minimum Concentration					6.6	78.6	4.9	49.6	10.8	0.7	<5	<0.01	<0.1	0.1	<0.01	<0.001	<0.0001	<0.001	0.001	0.001	<0.0001	0.001	0.005	<1	<2	<2
Minimum Detect					6.6	78.6	4.9	49.6	10.8	0.7	6	0.02	0.2	0.1	0.03	ND	ND	ND	0.001	0.001	ND	0.001	0.005	ND	ND	ND
Maximum Concentration					7.6	549.0	6.7	145.1	14.9	78.8	192	0.32	1.9	1.7	0.81	<0.001	<0.0001	<0.001	0.019	0.002	<0.0001	0.016	0.094	<1	<2	<2
Maximum Detect					7.6	549.0	6.7	145.1	14.9	78.8	192	0.32	1.9	1.7	0.81	ND	ND	ND	0.019	0.002	ND	0.016	0.094	ND	ND	ND
Average Concentration *					7.1	213.9	5.3	115.7	12.5	9.3	19	0.062	0.48	0.41	0.092	0.0005	0.00005	0.0005	0.007	0.00058	0.00005	0.0036	0.024	0.5	1	1
Geometric Average *					7.1	183.8	5.3	113.1	12.5	3.7	5.1	0.04	0.33	0.27	0.058	0.0005	0.00005	0.0005	0.0049	0.00055	0.00005	0.002	0.015	0.5	1	1
Median Concentration *					7.1	221.8	5.2	117.0	12.4	2.55	2.5	0.05	0.3	0.2	0.05	0.0005	0.00005	0.0005	0.006	0.0005	0.00005	0.002	0.021	0.5	1	1
Standard Deviation *					0.3	127.1	0.4	21.1	1.0	19	45	0.06	0.5	0.49	0.15	0	0	0	0.0052	0.0003	0	0.004	0.023	0	0	0

* A Non Detect Multiplier of 0.5 has been applied.

				BTEXN	BTEXN	BTEXN	BTEXN	TRH - NEPM 2013							TRH - NEPM 1999						PAHs
				Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)	>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				2	2	2	1	20	20	100	100	100	100	100	20	50	100	50	50	5
ADWG 2011 Aesthetic (v3.5 updated 2018)						20														
ANZECC 2000 - Lowland Rivers (NSW rivers)																				
ANZECC 2000 FW 95%				350																16
Location Code	**Date**	**Field ID**	**Sample Type**	**Matrix Type**																
SW01	2/09/2019	SW01_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW01	2/09/2019	SW01_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW01	2/09/2019	SW01_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	2/09/2019	SW02_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	2/09/2019	SW02_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW02	2/09/2019	SW02_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	2/09/2019	SW03_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	2/09/2019	SW03_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW03	2/09/2019	SW03_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	2/09/2019	SW04_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	2/09/2019	SW04_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW04	2/09/2019	SW04_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW05	2/09/2019	SW05_01	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW05	2/09/2019	SW05_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW05	2/09/2019	SW05_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW06	2/09/2019	SW06	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	2/09/2019	SW07_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	2/09/2019	SW07_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW07	2/09/2019	SW07_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW08	2/09/2019	SW08	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW09	2/09/2019	SW09	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW12	2/09/2019	SW12	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	3/09/2019	SW13_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	3/09/2019	SW13_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW13	3/09/2019	SW13_3	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	3/09/2019	QC1	Field_D	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	3/09/2019	SW14_1	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW14	3/09/2019	SW14_2	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW16	3/09/2019	SW16	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
SW17	3/09/2019	SW17	Normal	water	<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
Statistics																				
Number of Results				30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
Minimum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration				<2	<2	<2	<1	<20	<20	<100	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *				1	1	1	0.5	10	10	50	50	50	50	50	10	25	50	25	25	2.5
Geometric Average *				1	1	1	0.5	10	10	50	50	50	50	50	10	25	50	25	25	2.5
Median Concentration *				1	1	1	0.5	10	10	50	50	50	50	50	10	25	50	25	25	2.5
Standard Deviation *				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* A Non Detect Multiplier of 0.5 has been applied.

Appendix B
Table B2
QAQC Results

Foxground to Berry Bypass Post construction
Woodhill Mountain Road

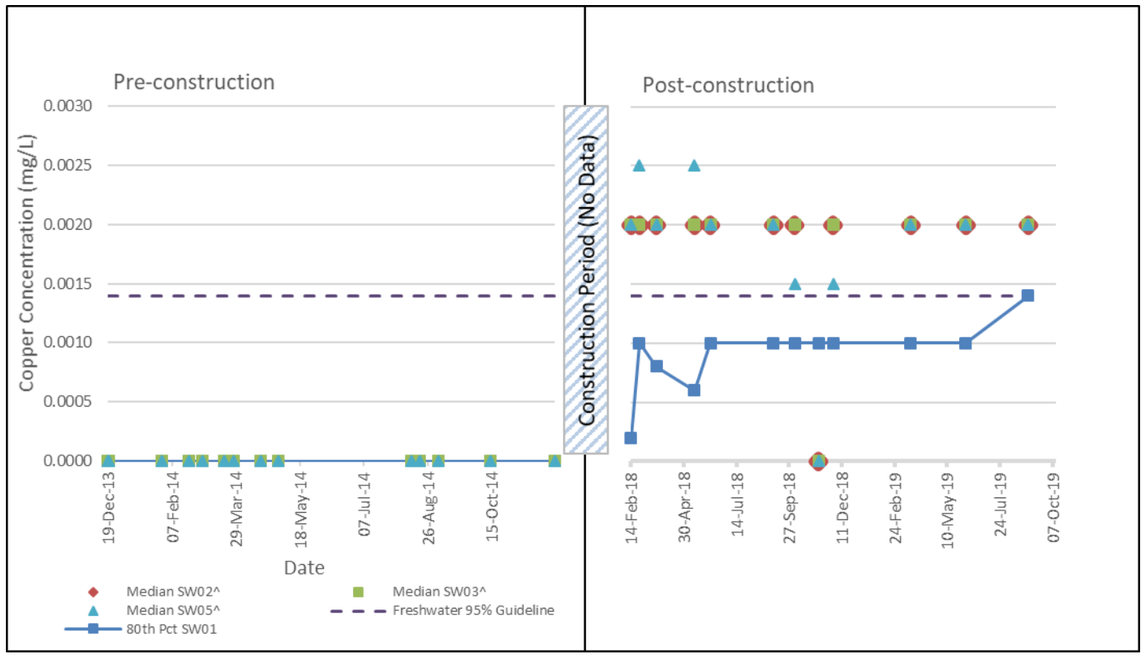
				Inorganics		Nutrients				Metals								BTEXN							TRH - NEPM 2013		
				Turbidity	Total Suspended Solids	Nitrite + Nitrate as N	Nitrogen (Total)	Kjeldahl Nitrogen Total	Phosphorus (Total)	Arsenic (filtered)	Cadmium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Lead (filtered)	Mercury (filtered)	Nickel (filtered)	Zinc (filtered)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	F1 (C6-C10 minus BTEX)	C6-C10 Fraction	F2 (>C10-C16 minus Naphthalene)
				NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.1	5	0.01	0.1	0.1	0.01	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005	1	2	2	2	2	2	1	20	20	100
Date	**Field ID**	**Lab Report Number**	**Matrix Type**																								
3/09/2019	SW14_1	EW1903806	water	45.2	108	<0.01	1.5	1.5	<0.01	<0.001	<0.0001	<0.001	0.008	<0.001	<0.0001	0.002	0.040	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100
3/09/2019	QC1	EW1903806	water	63.7	144	<0.01	1.7	1.7	0.24	<0.001	<0.0001	<0.001	0.009	<0.001	<0.0001	0.003	0.030	<1	<2	<2	<2	<2	<2	<1	<20	<20	<100
RPD				34	29	0	12	12	184	0	0	0	12	0	0	40	29	0	0	0	0	0	0	0	0	0	0

				TRH - NEPM 2013				TRH - NEPM 1999					PAHs
				>C10-C16 Fraction	F3 (>C16-C34 Fraction)	F4 (>C34-C40 Fraction)	>C10-C40 (Sum of Total)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 (Sum of Total)	Naphthalene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				100	100	100	100	20	50	100	50	50	5
Date	**Field ID**	**Lab Report Number**	**Matrix Type**										
3/09/2019	SW14_1	EW1903806	water	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
3/09/2019	QC1	EW1903806	water	<100	<100	<100	<100	<20	<50	<100	<50	<50	<5
RPD				0	0	0	0	0	0	0	0	0	0

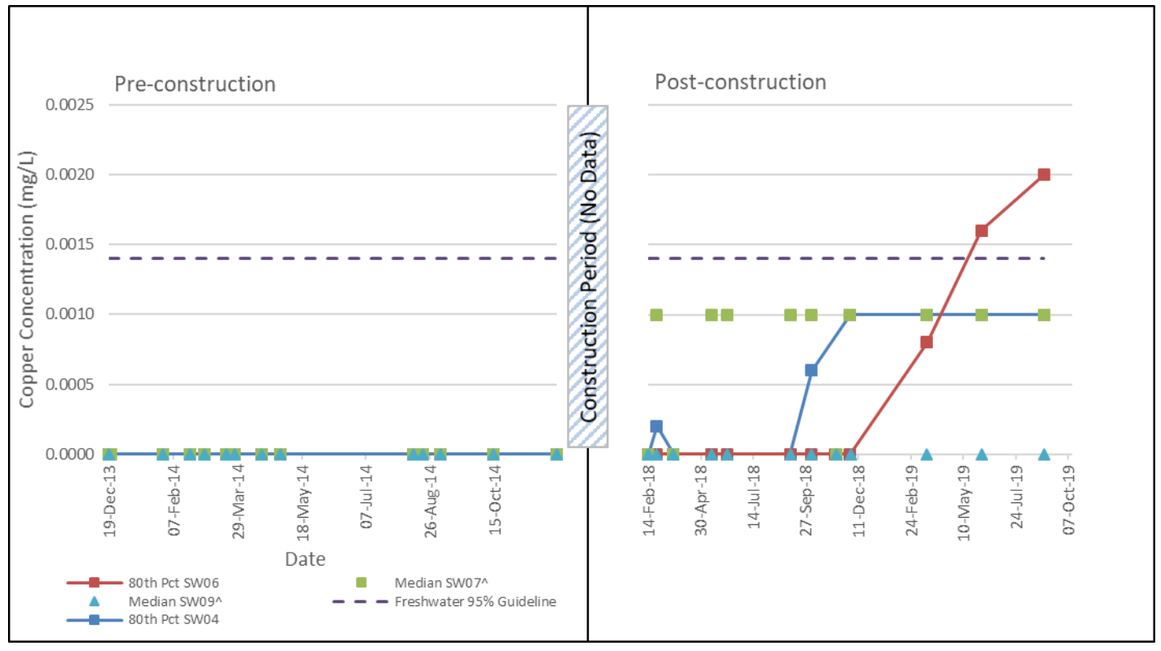
Attachment C - Control Charts

Attachment C
Control Charts – Copper
Exceedances against the 80th Percentile
Event 12

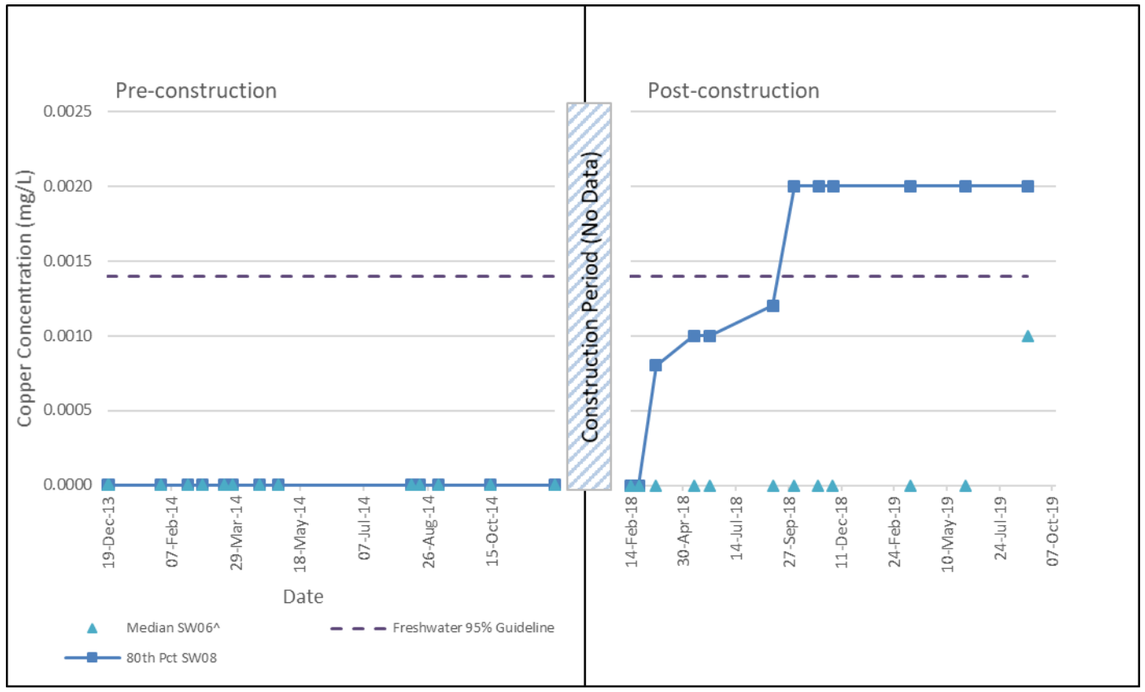
Broughton Creek



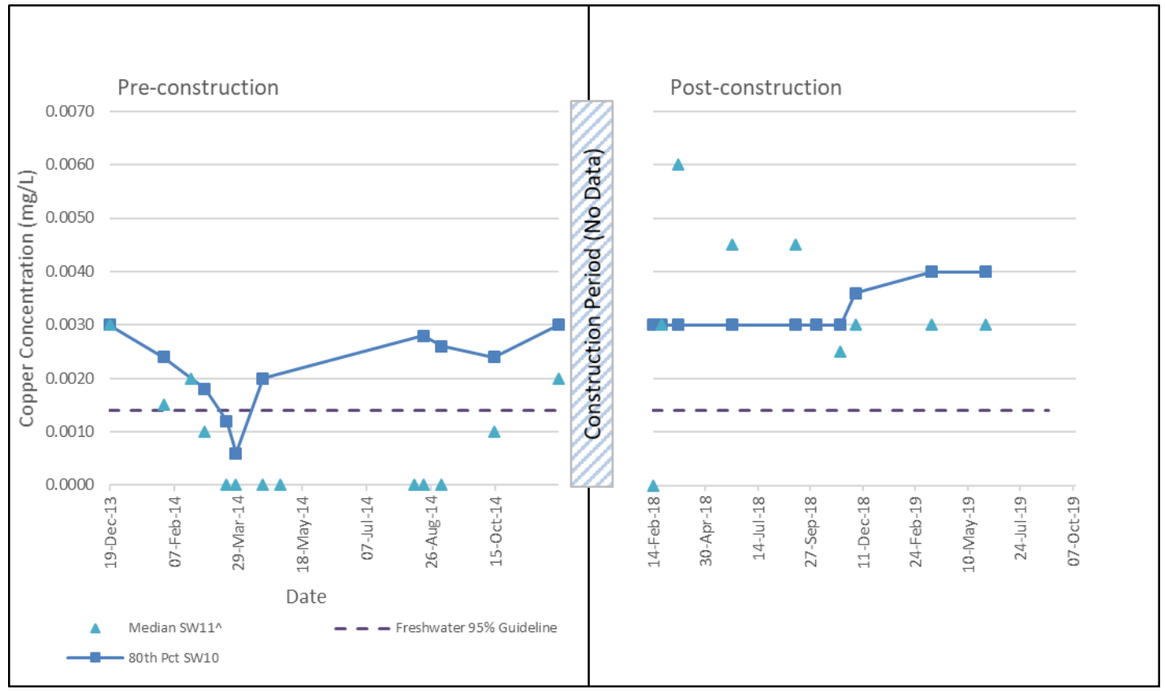
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

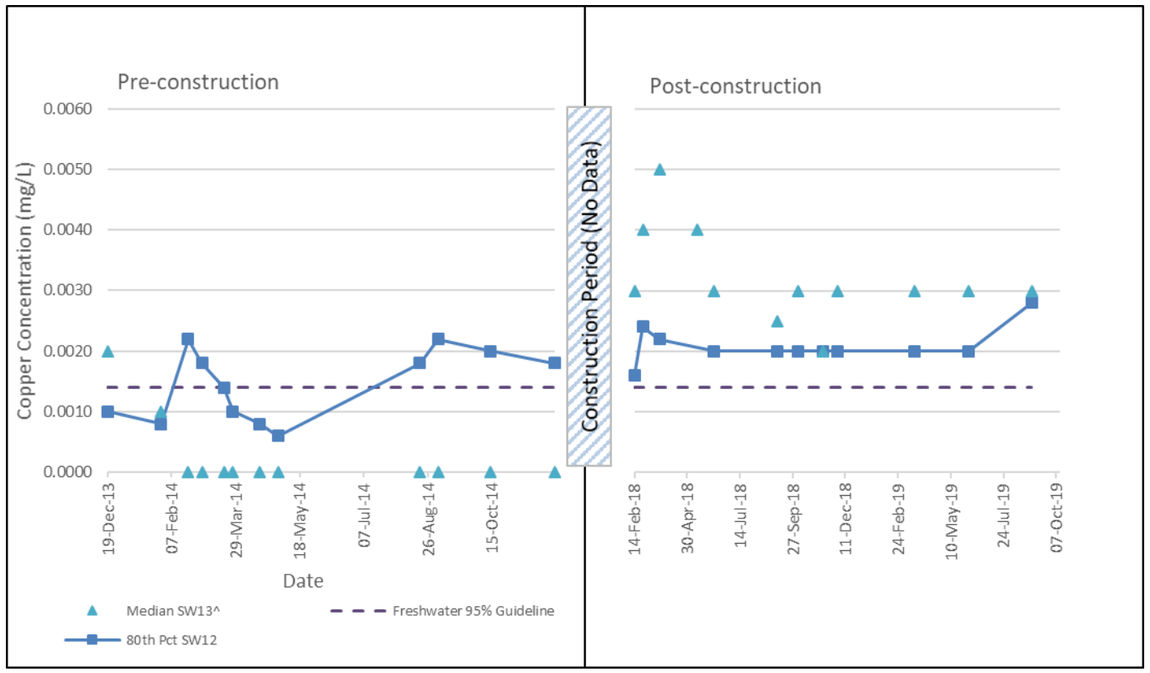


Town Creek

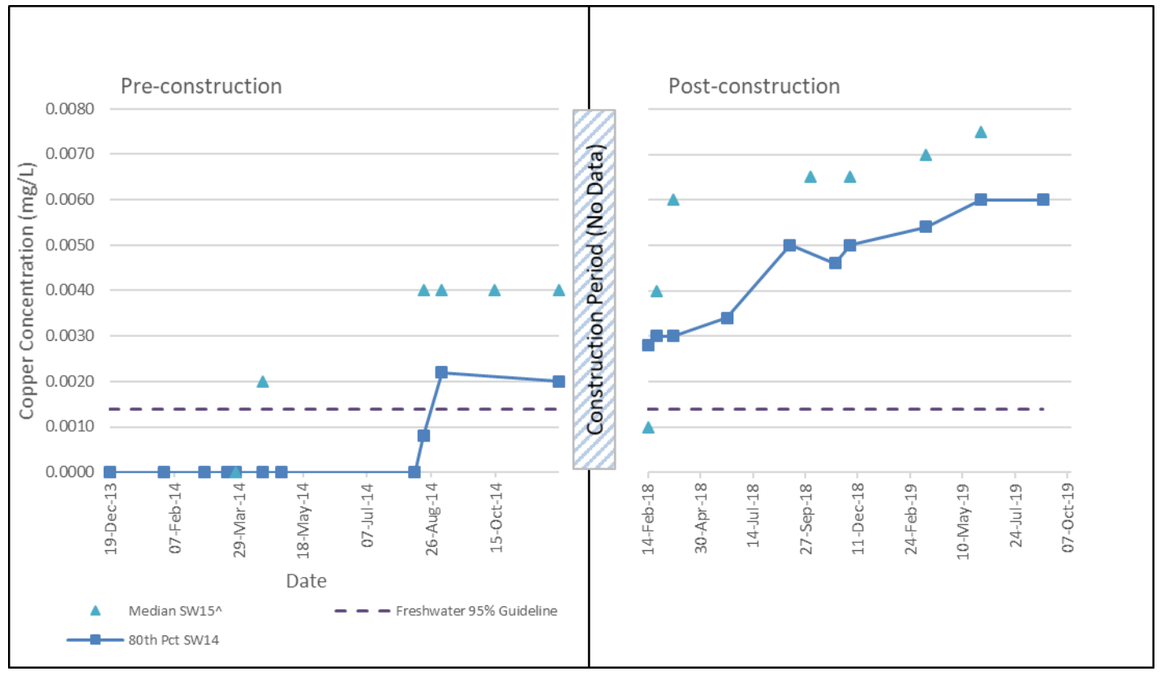


Attachment C
Control Charts – Copper
Exceedances against the 80th Percentile
Event 12

Hitchcock's Lane Creek Tributary

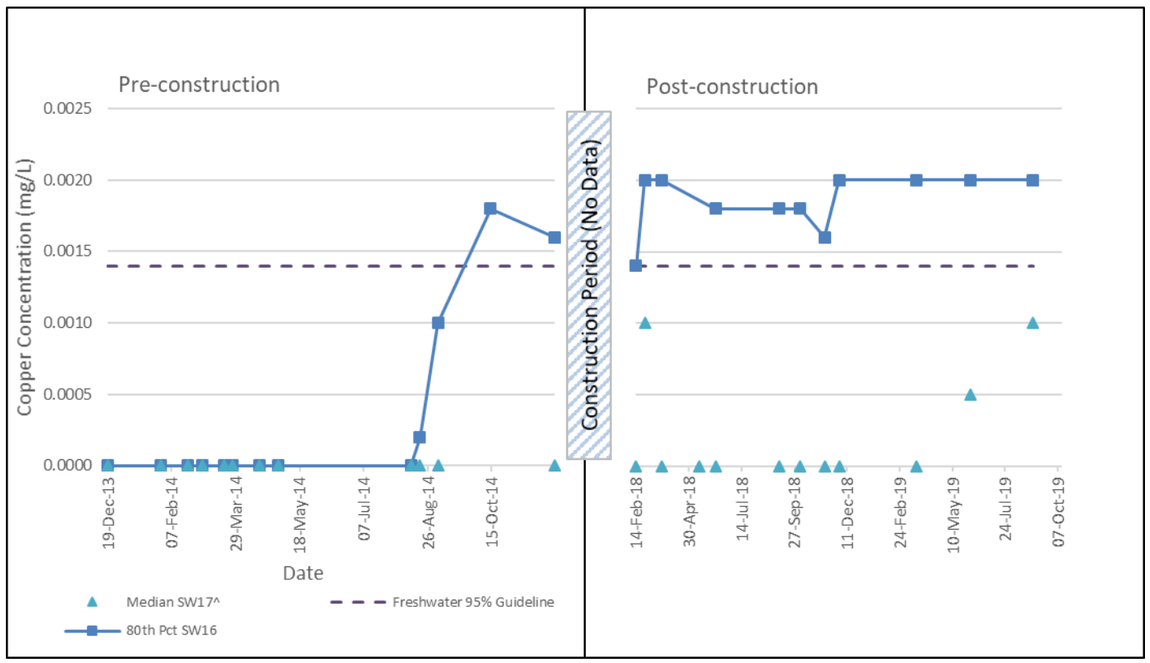


Hitchcock's Lane Creek



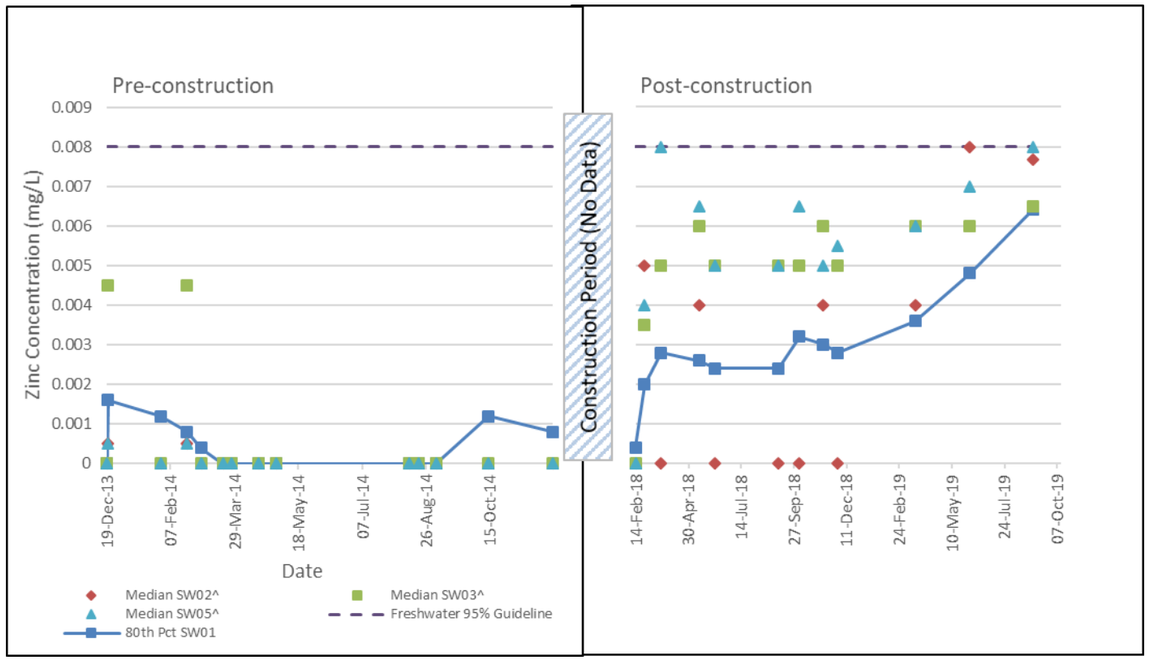
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data.

Unnamed Tributary

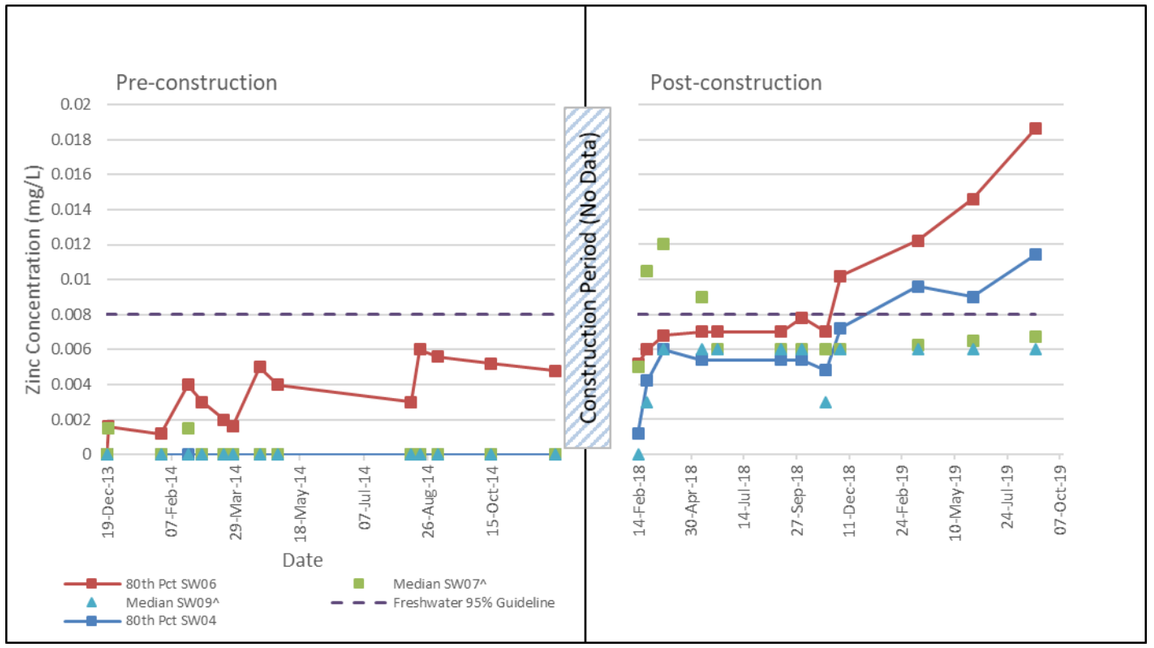


Attachment C
Control Charts – Zinc
Exceedances against the 80th Percentile
Event 12

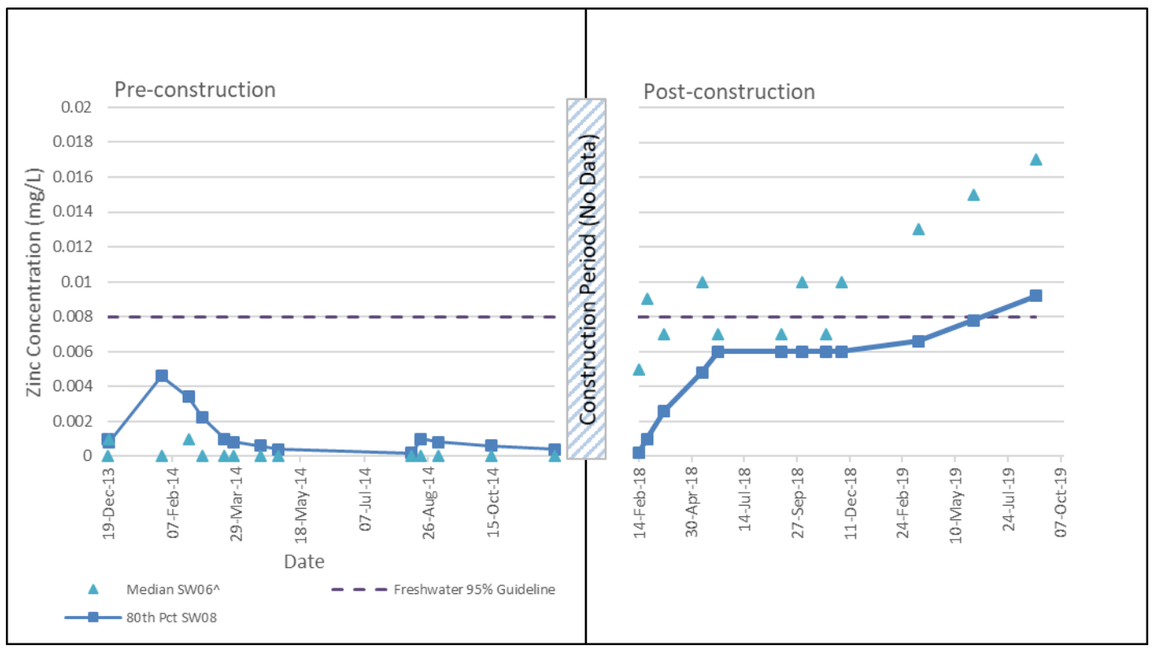
Broughton Creek



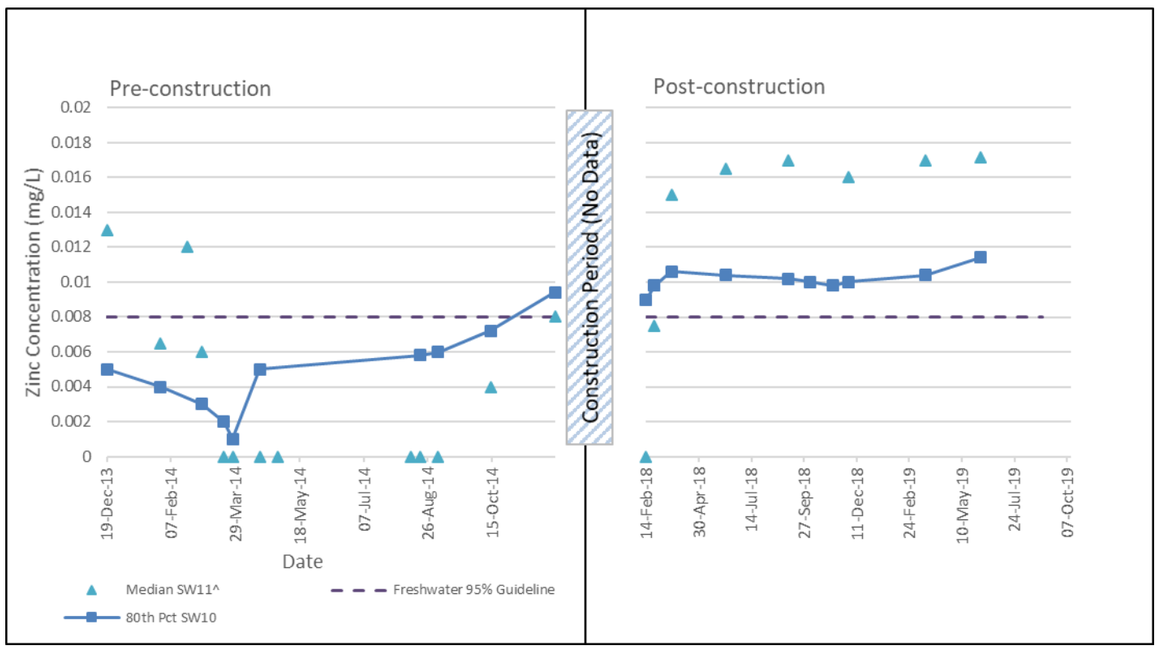
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek



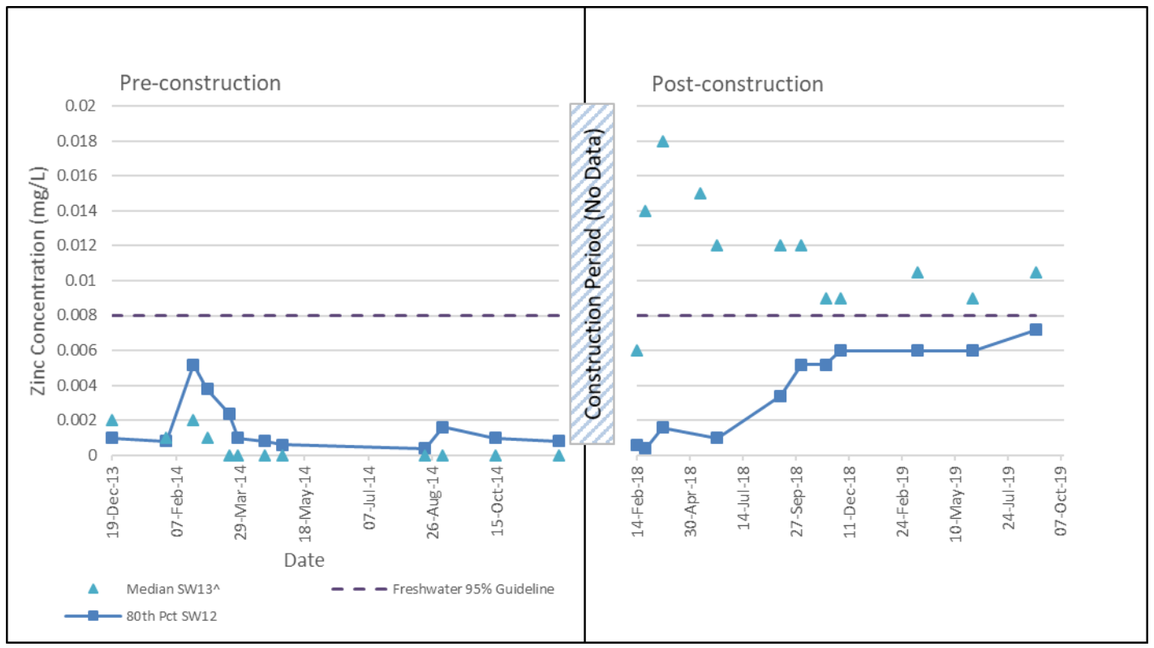
Town Creek

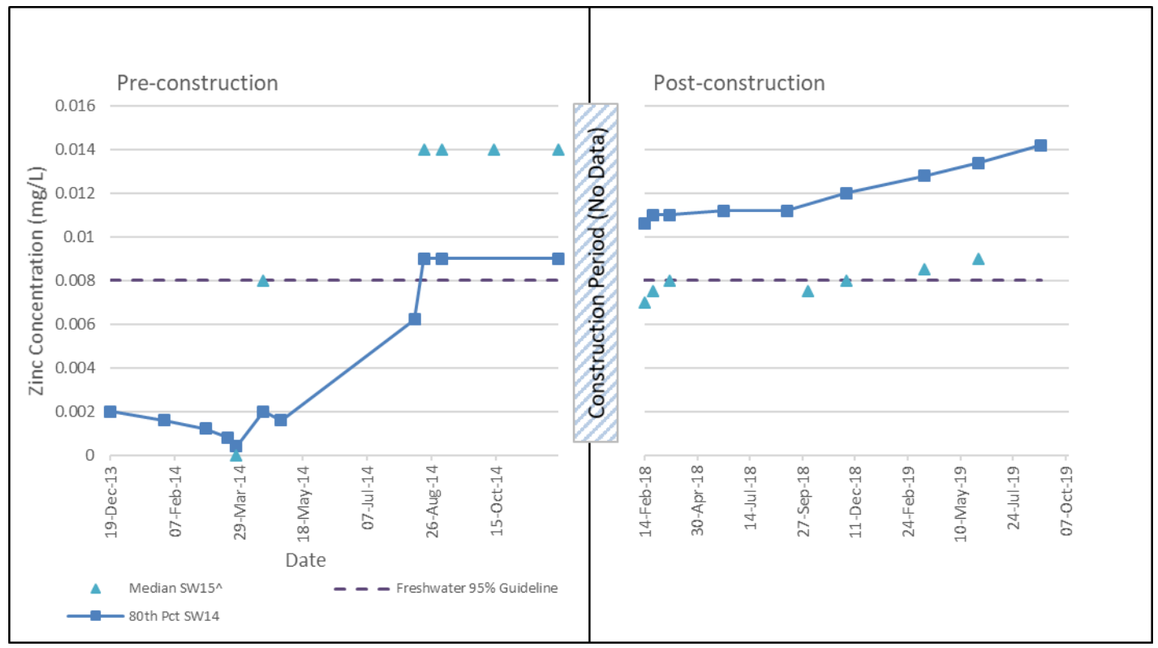


Hitchcock's Lane Creek Tributary

Hitchcock's Lane Creek

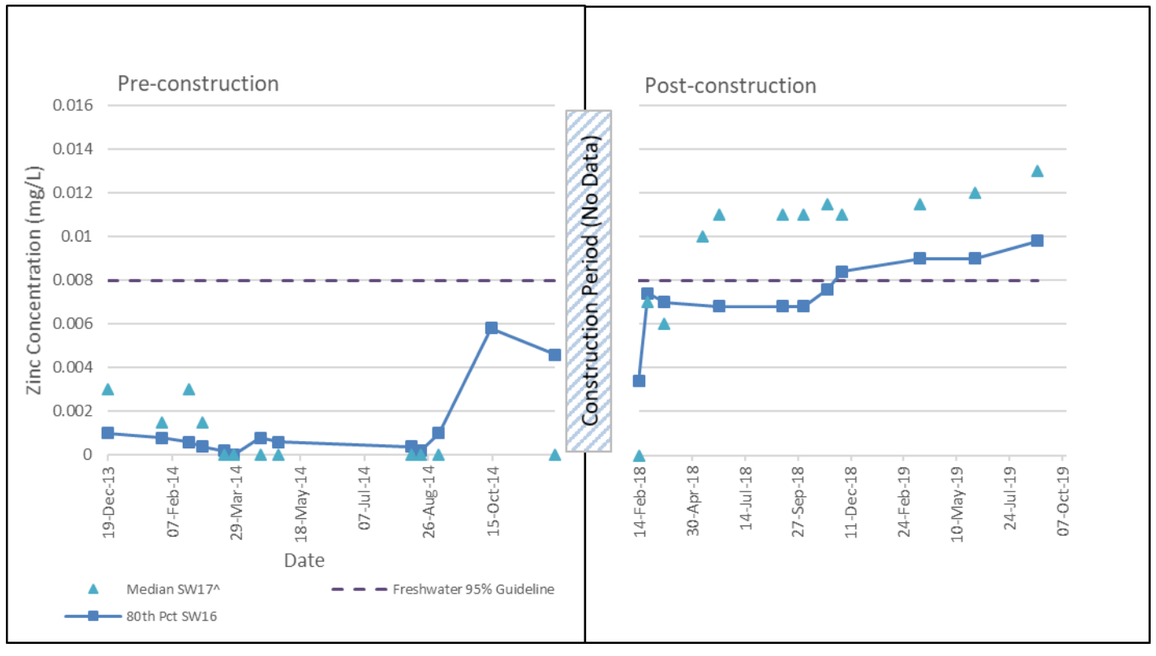
Attachment C
Control Charts – Zinc
Exceedances against the 80th Percentile
Event 12





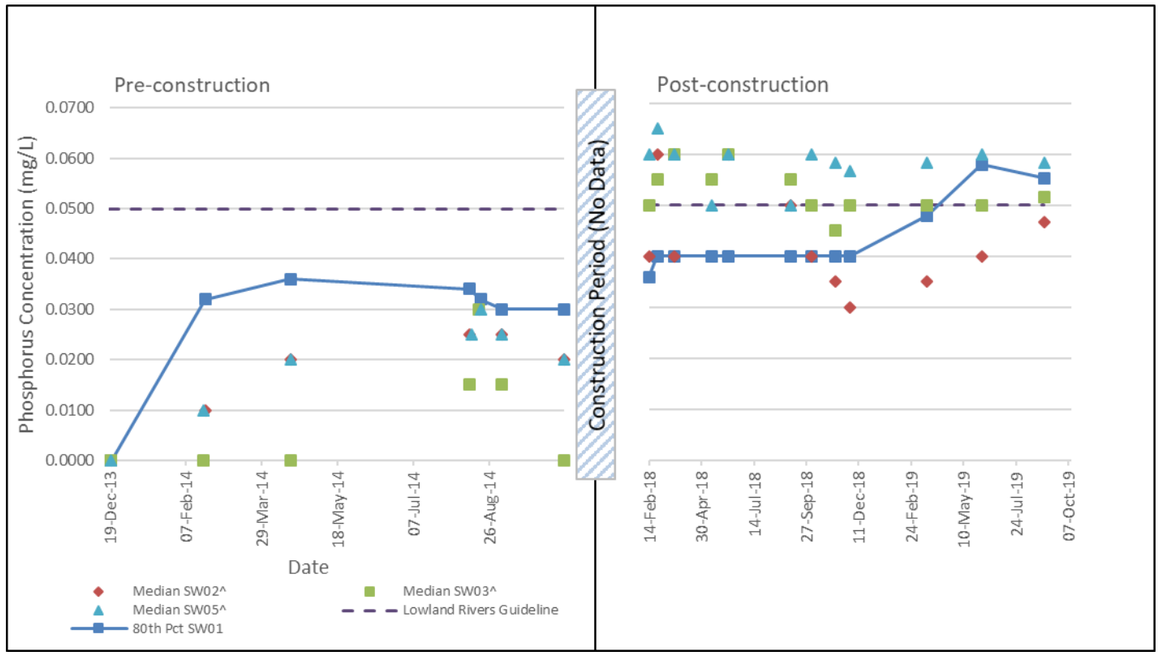
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data

Unnamed Tributary

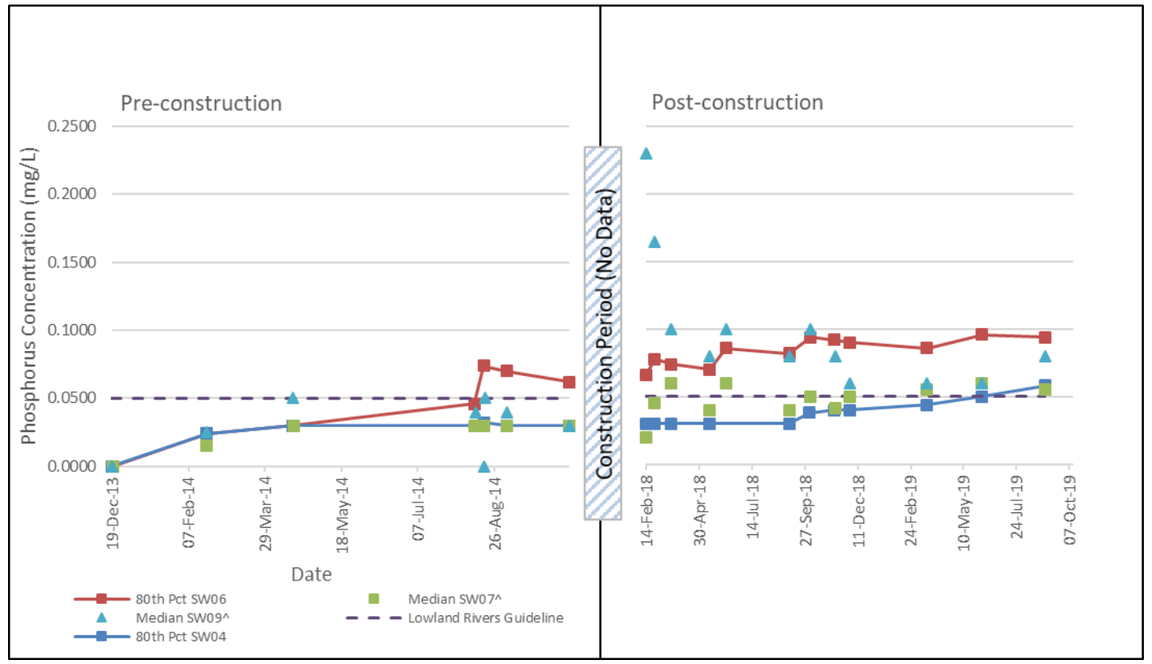


Attachment C
Control Charts – Phosphorus
Exceedances against the 80th Percentile
Event 12

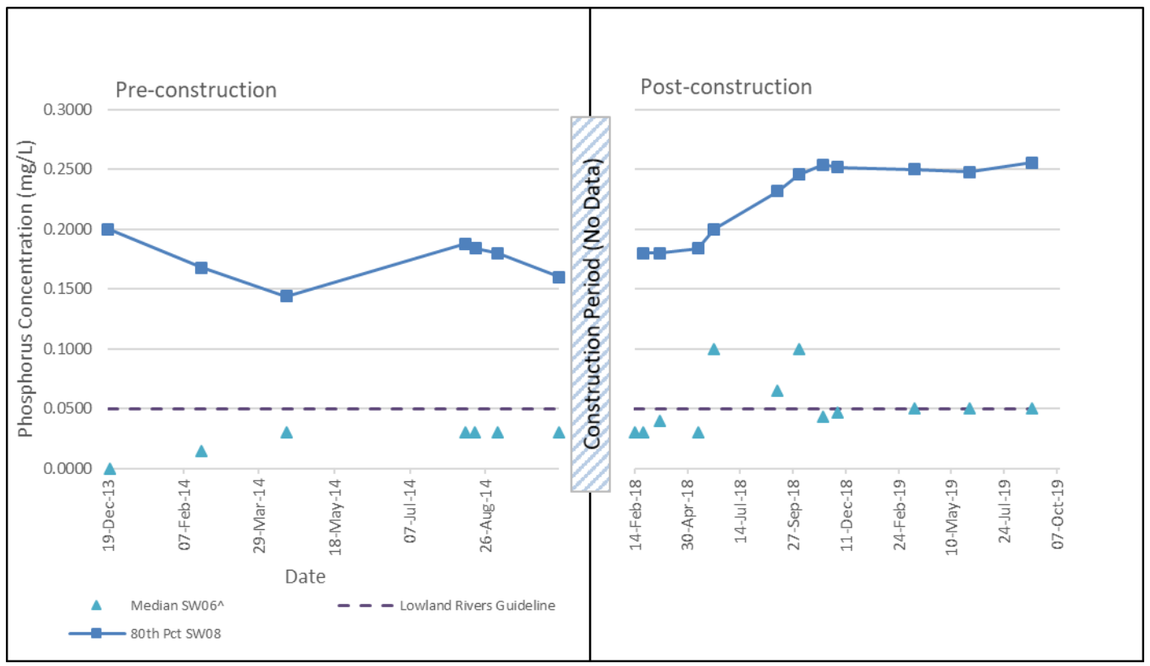
Broughton Creek



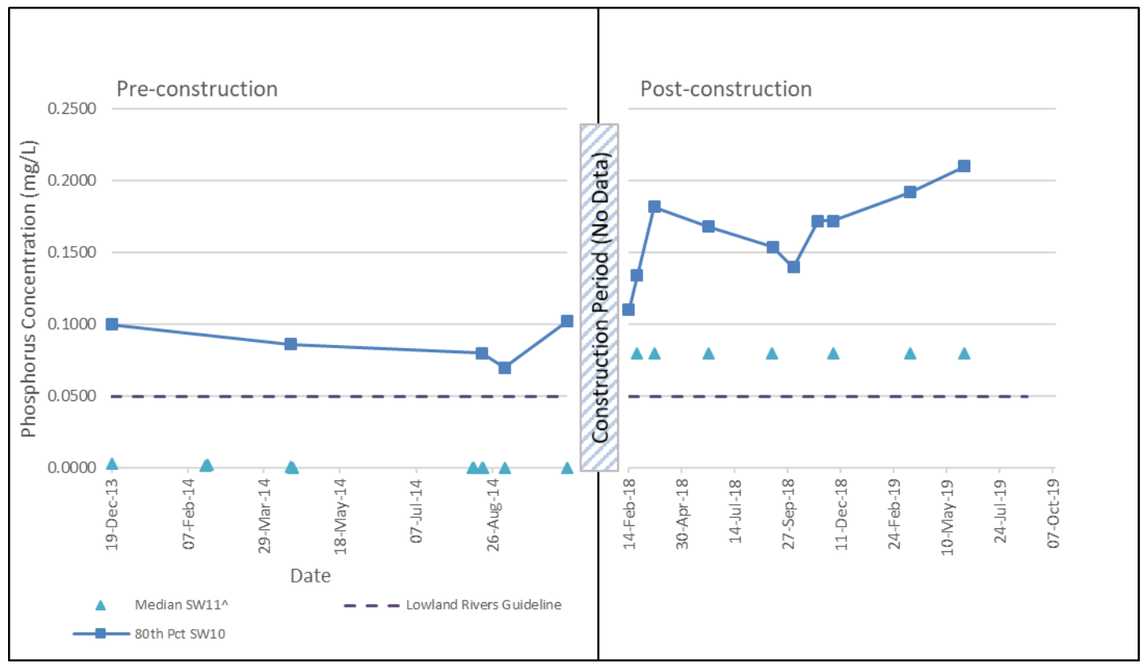
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

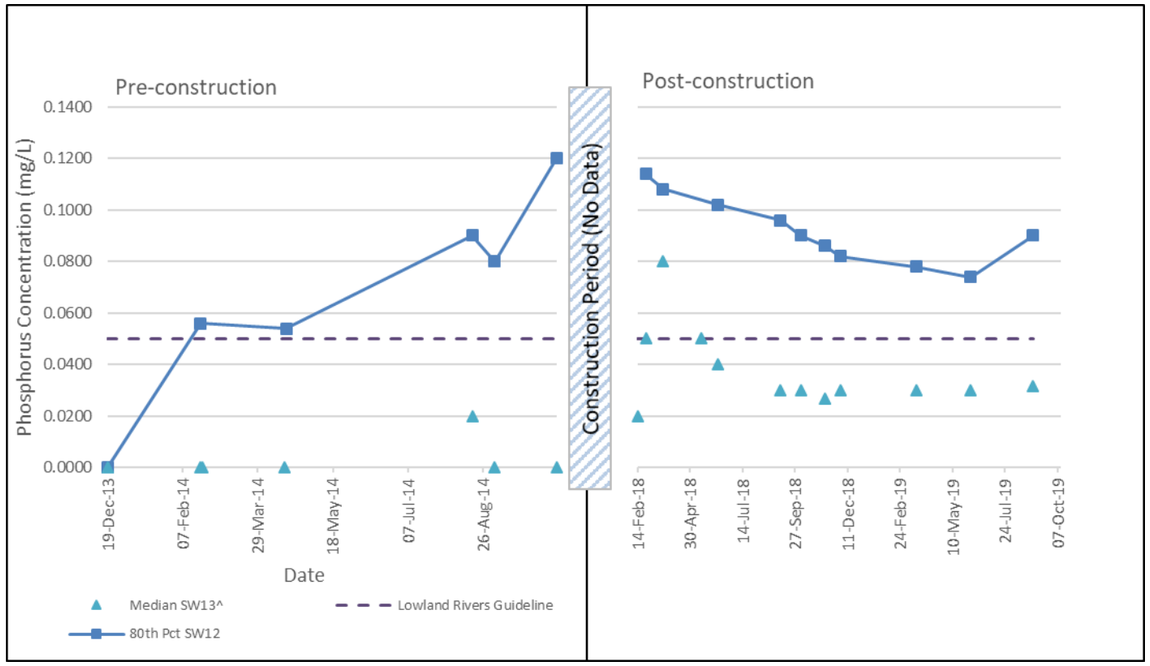


Town Creek

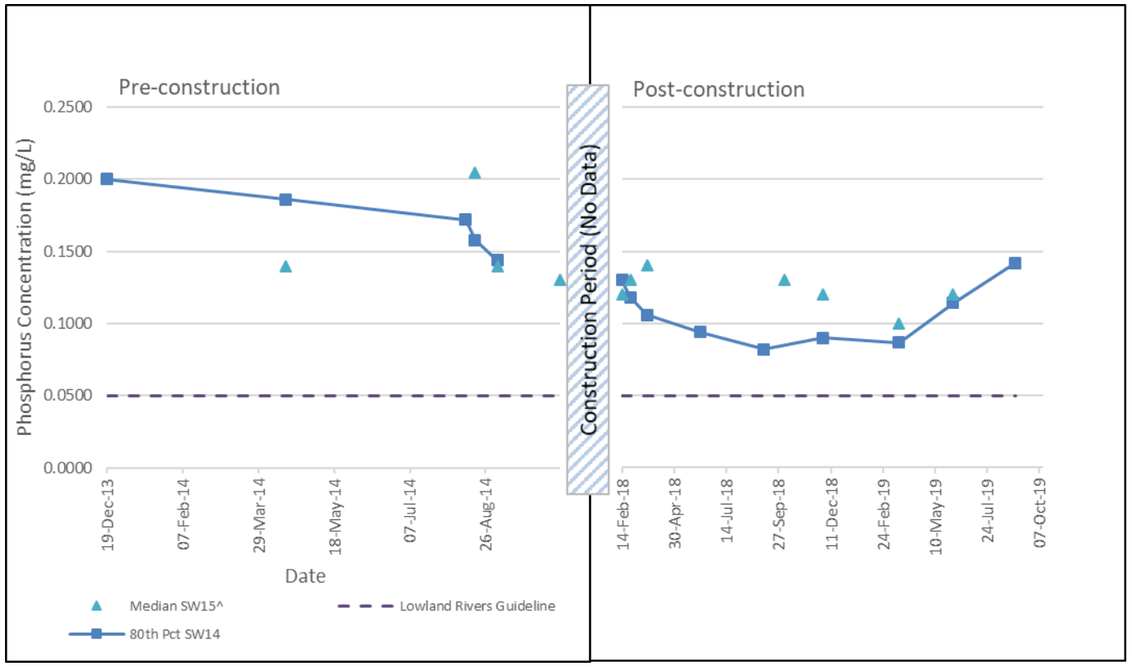


Attachment C
Control Charts – Phosphorus
Exceedances against the 80th Percentile
Event 12

Hitchcock's Lane Creek Tributary

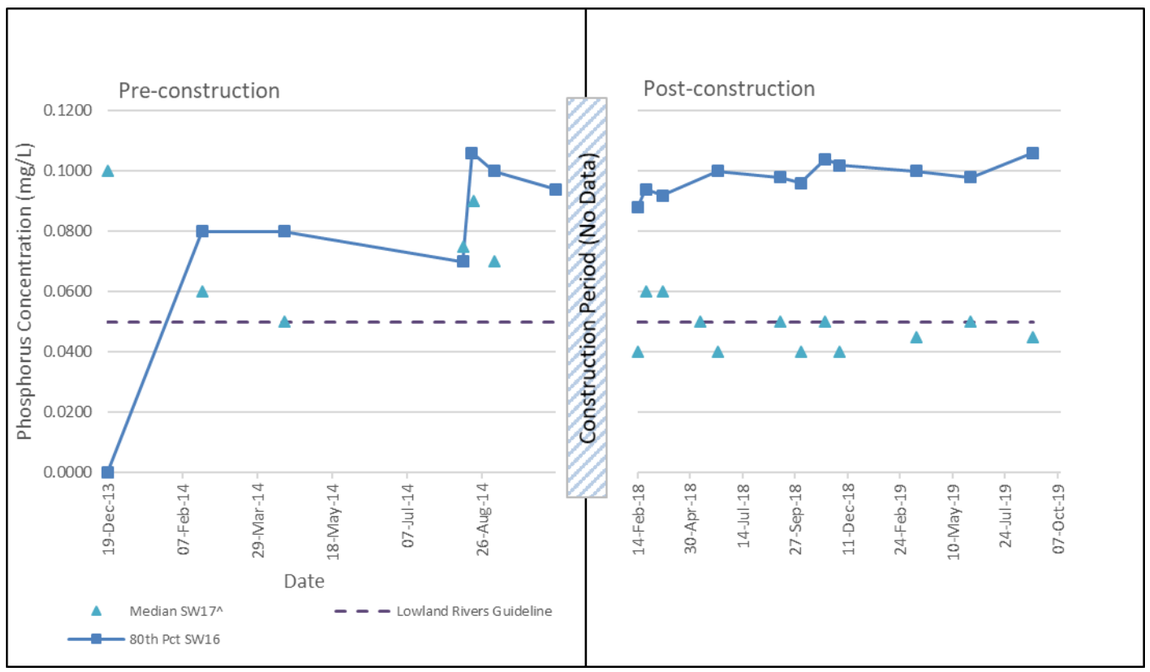


Hitchcock's Lane Creek



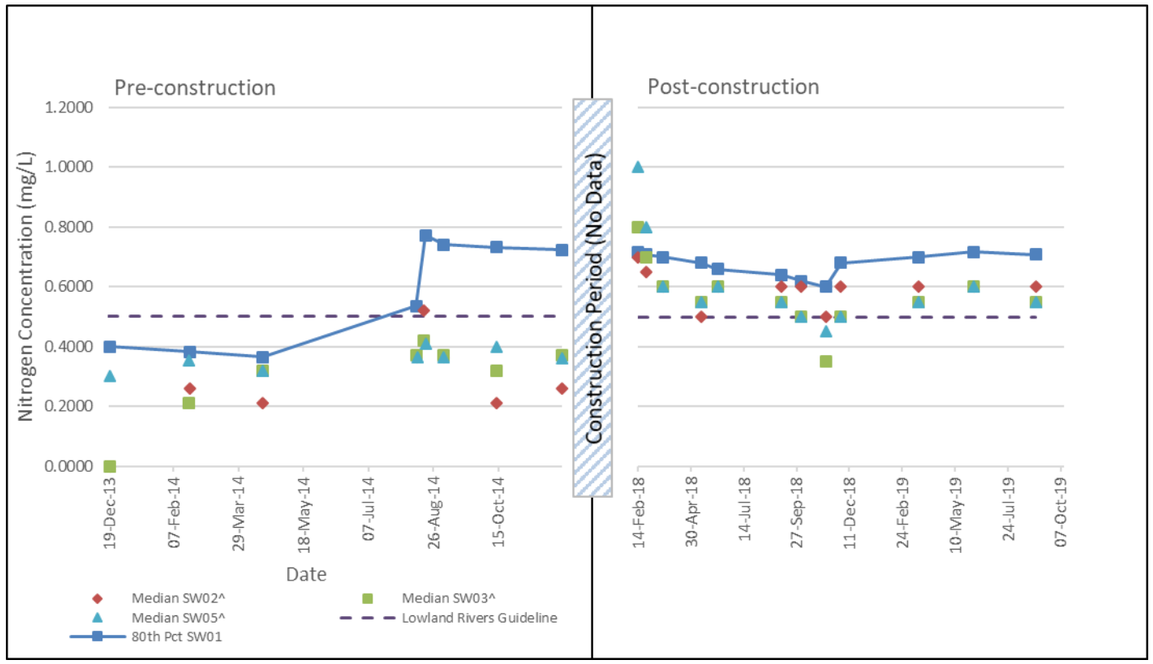
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th Percentile has been calculated using all available data.

Unnamed Tributary

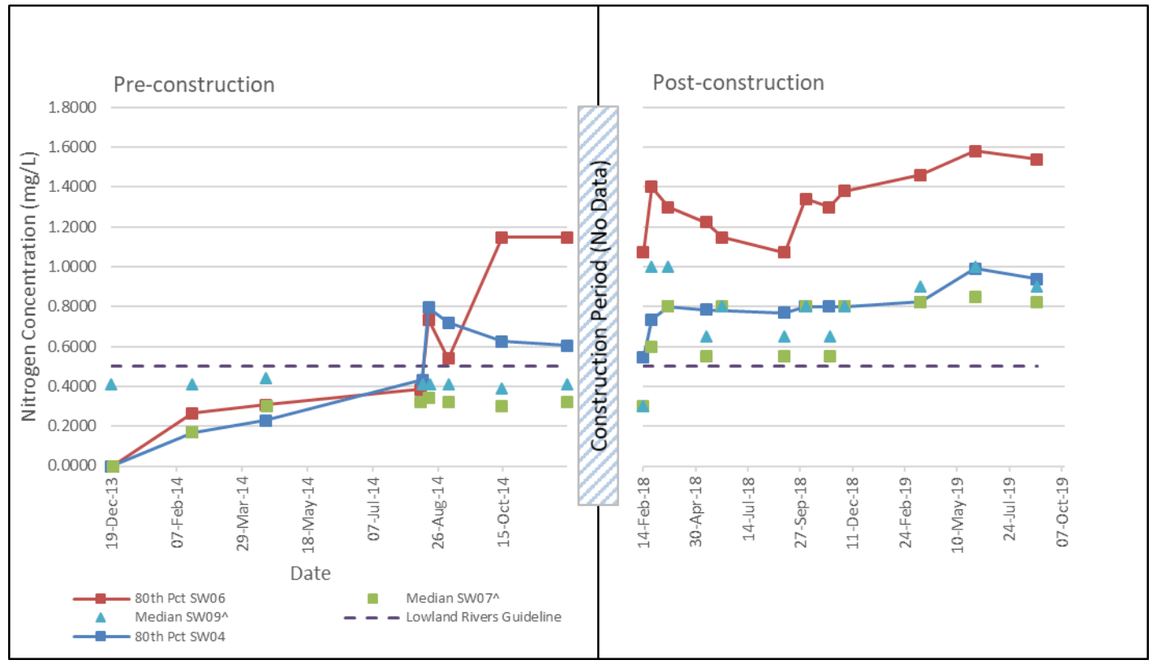


Attachment C
Control Charts – Nitrogen
Exceedances against the 80th Percentile
Event 12

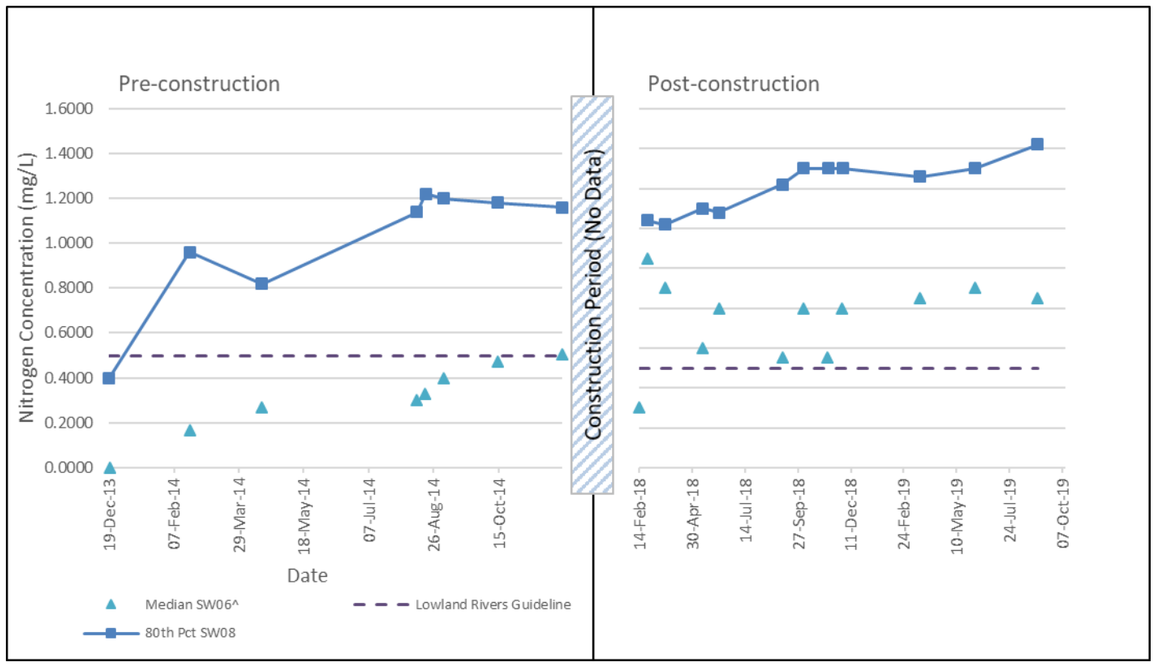
Broughton Creek



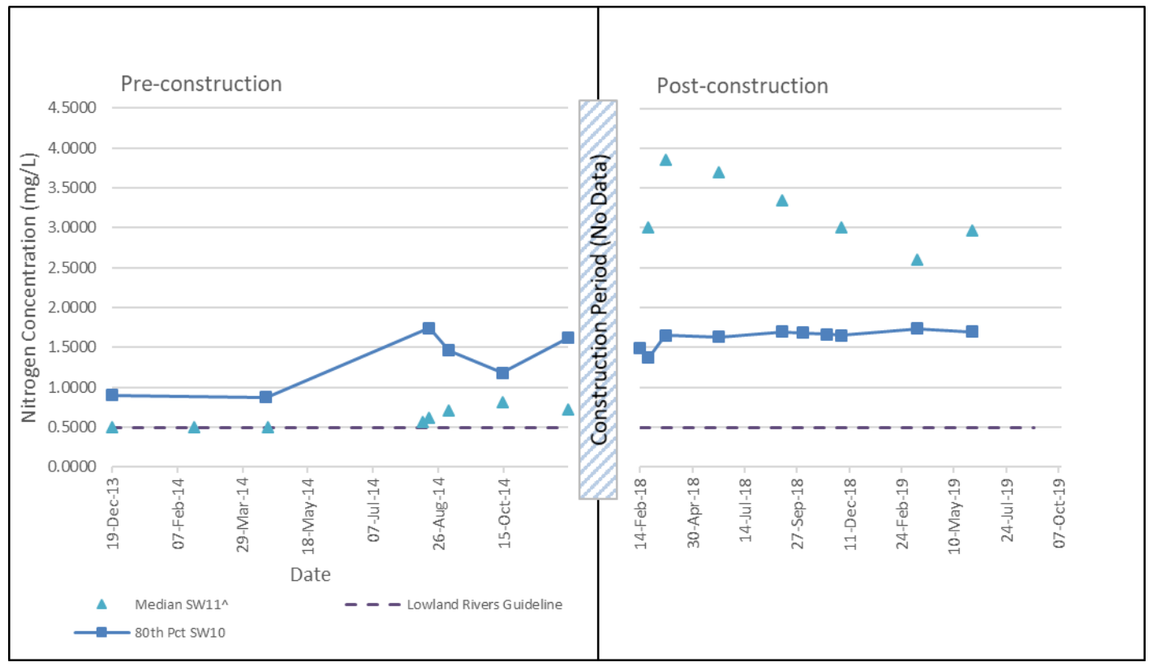
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

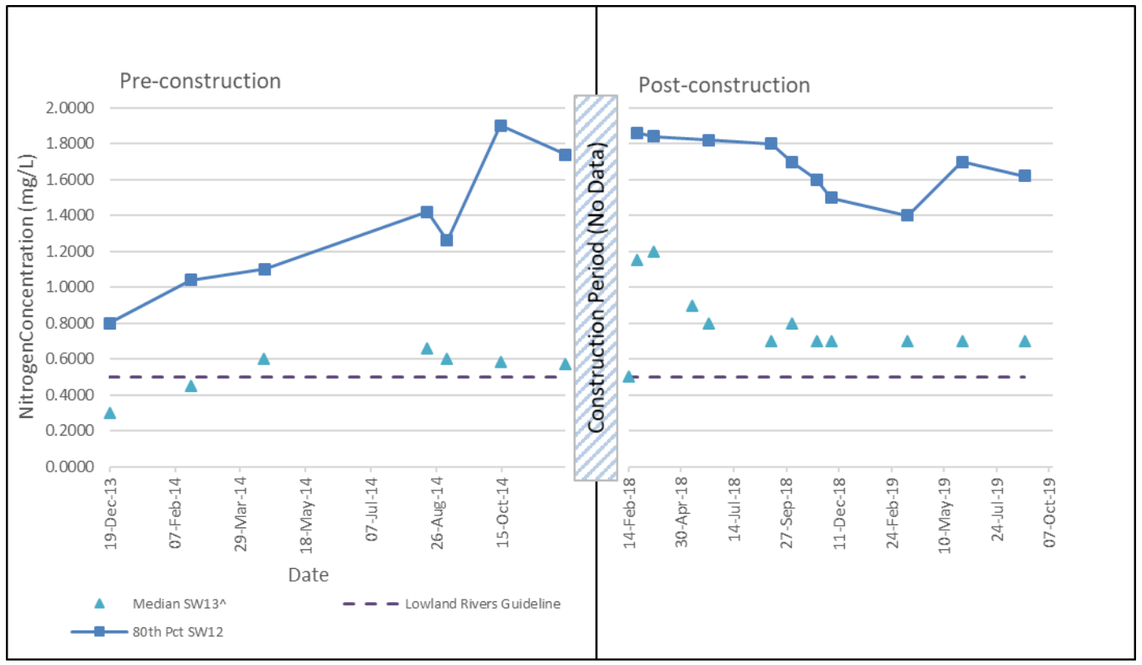


Town Creek

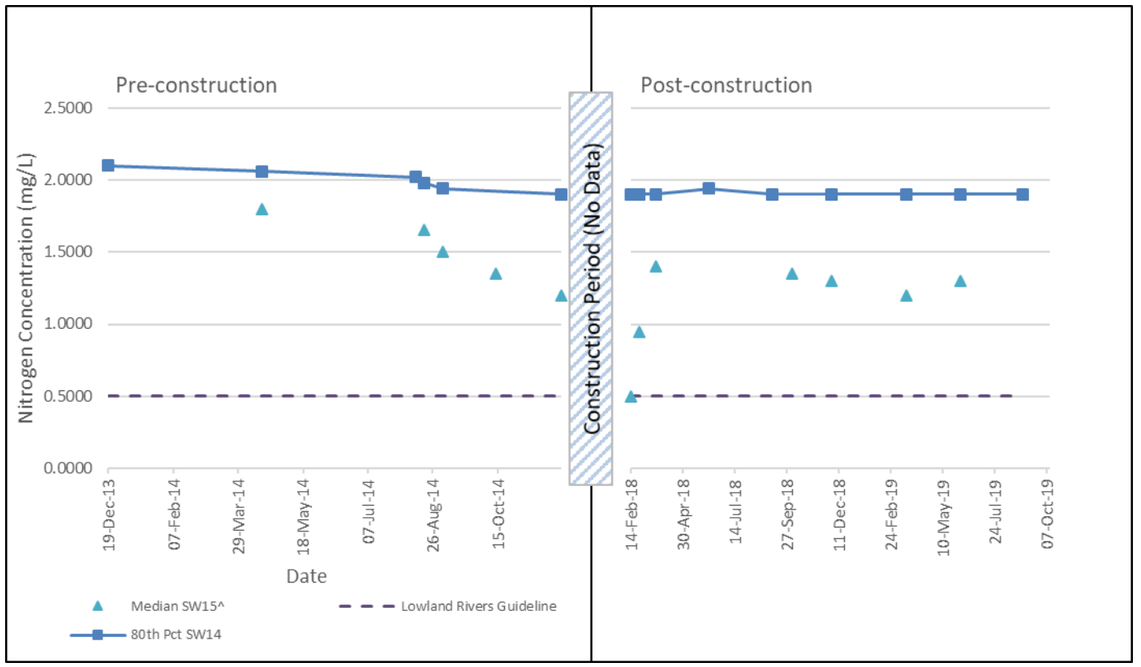


Attachment C
Control Charts – Nitrogen
Exceedances against the 80th Percentile
Event 12

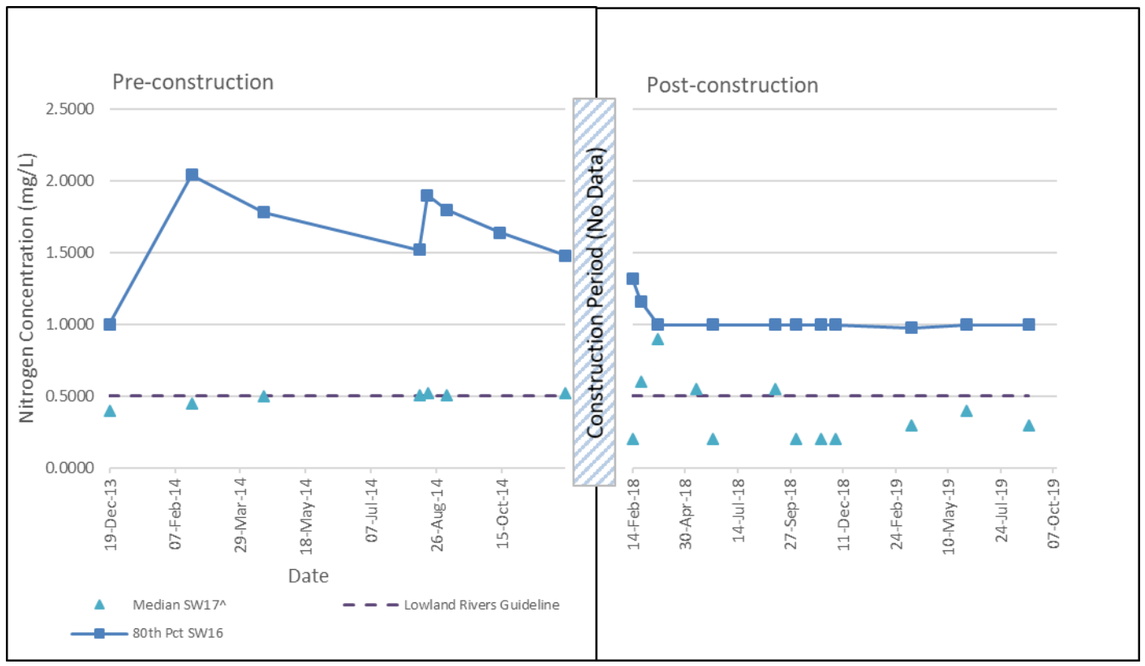
Hitchcock's Lane Creek Tributary



Hitchcock's Lane Creek

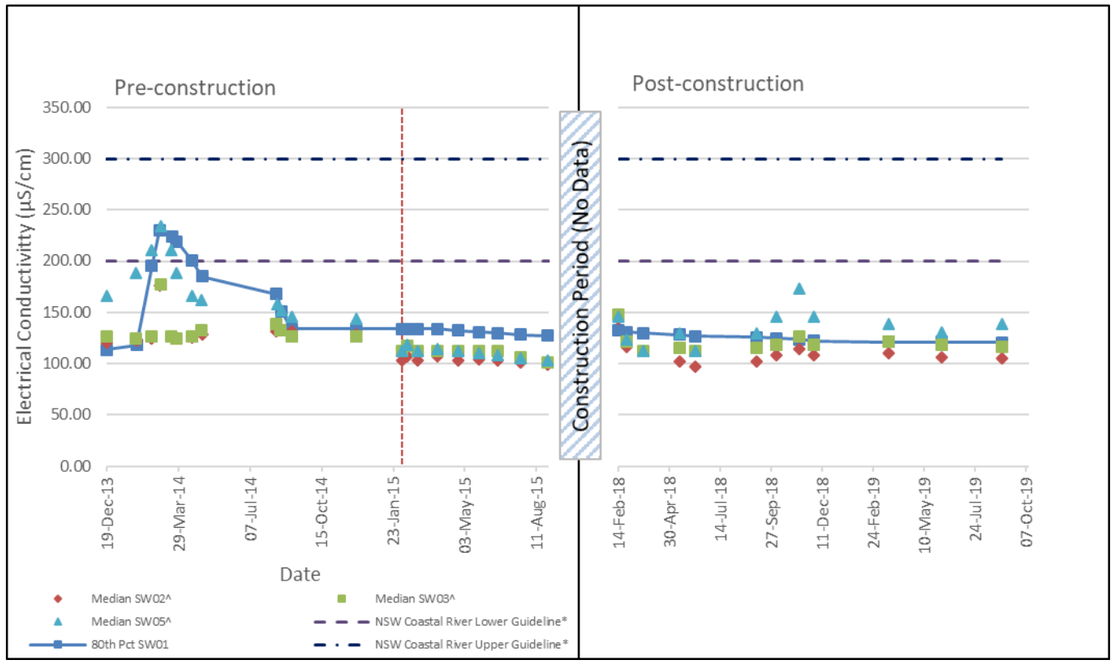


Unnamed Tributary

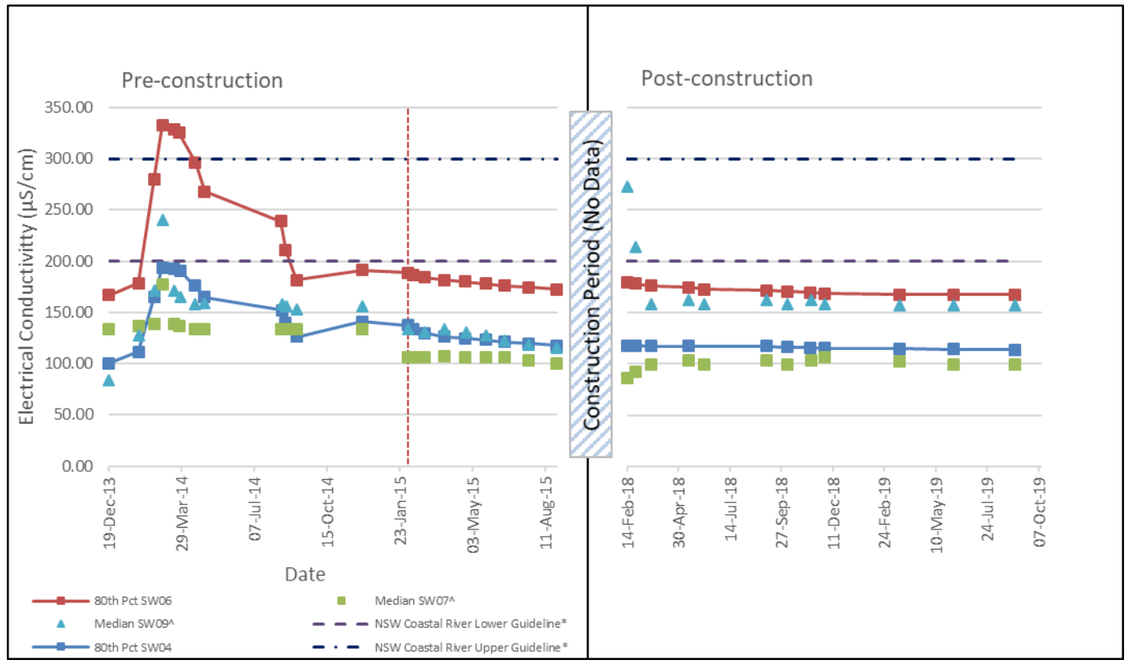


Attachment C
Control Charts – Electrical Conductivity
Exceedances against the 80th Percentile
Event 12

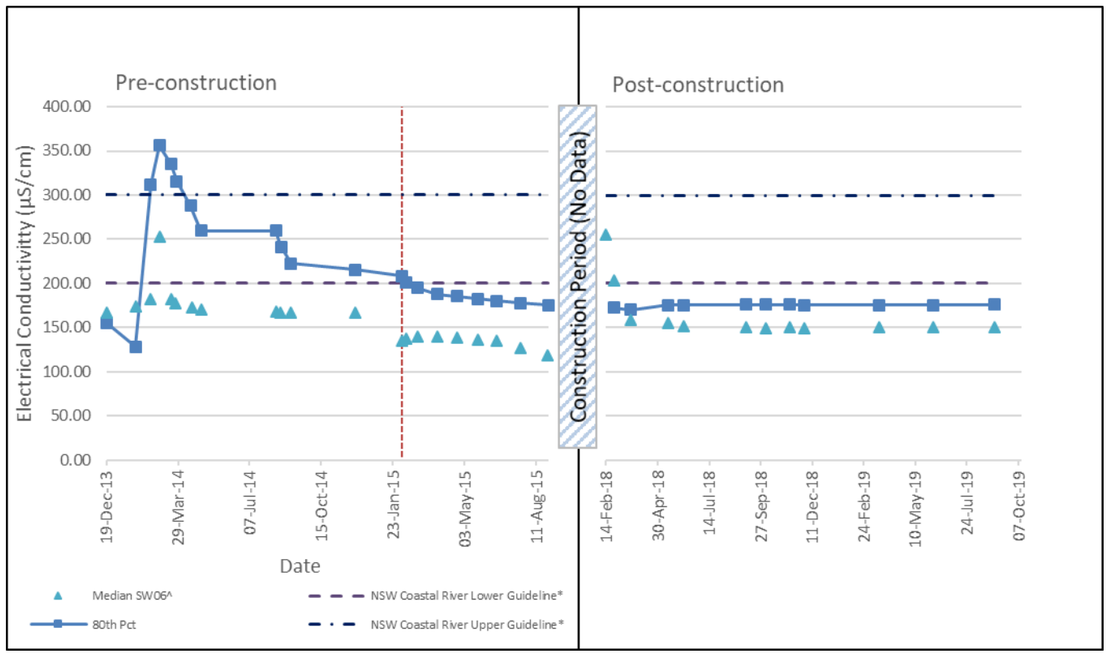
Broughton Creek



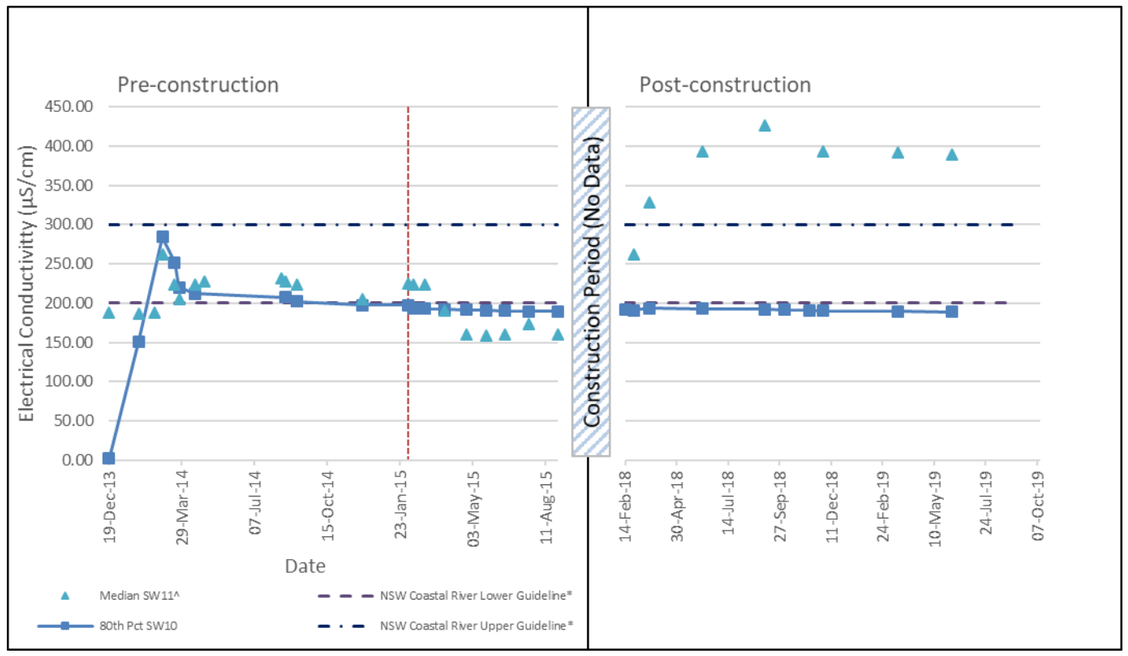
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

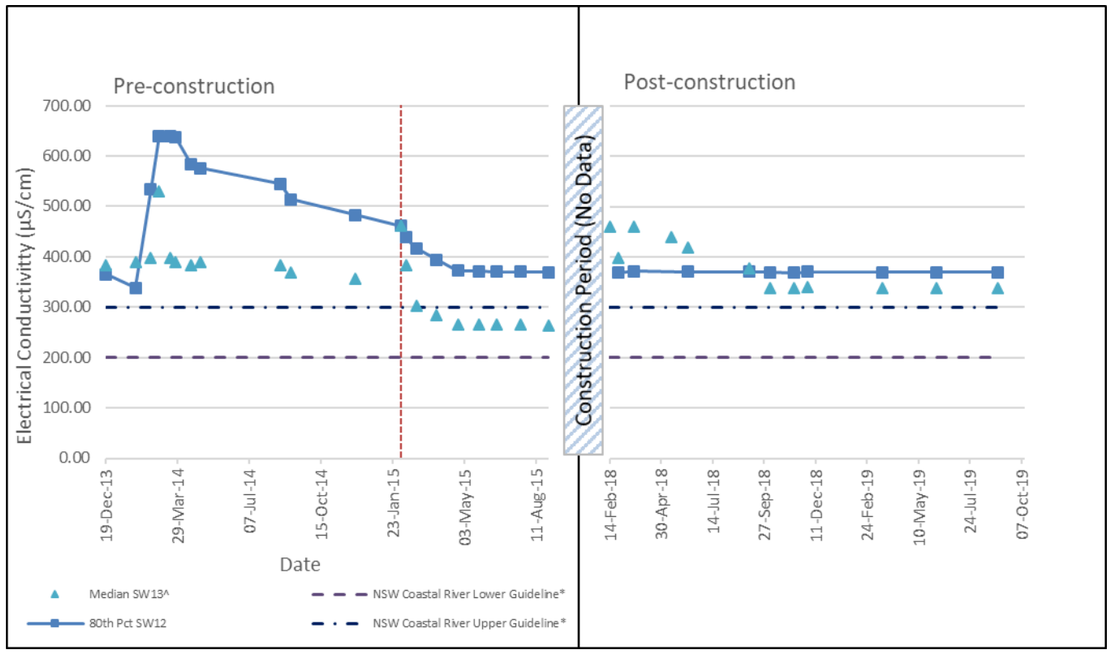


Town Creek

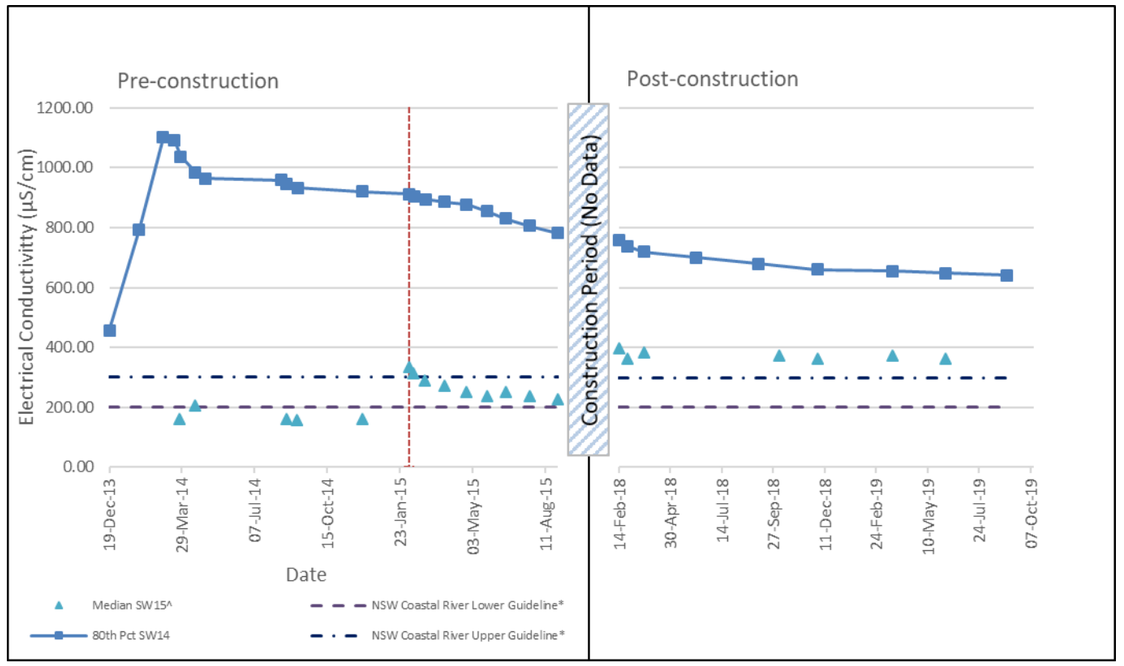


Attachment C
Control Charts – Electrical Conductivity
Exceedances against the 80th Percentile
Event 12

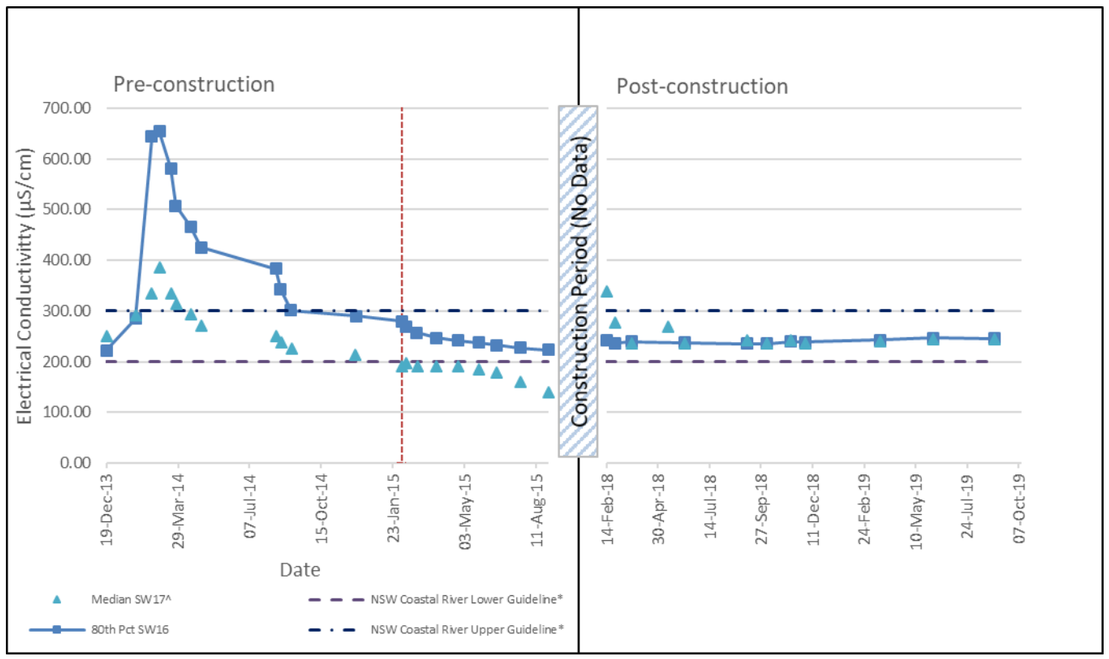
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary



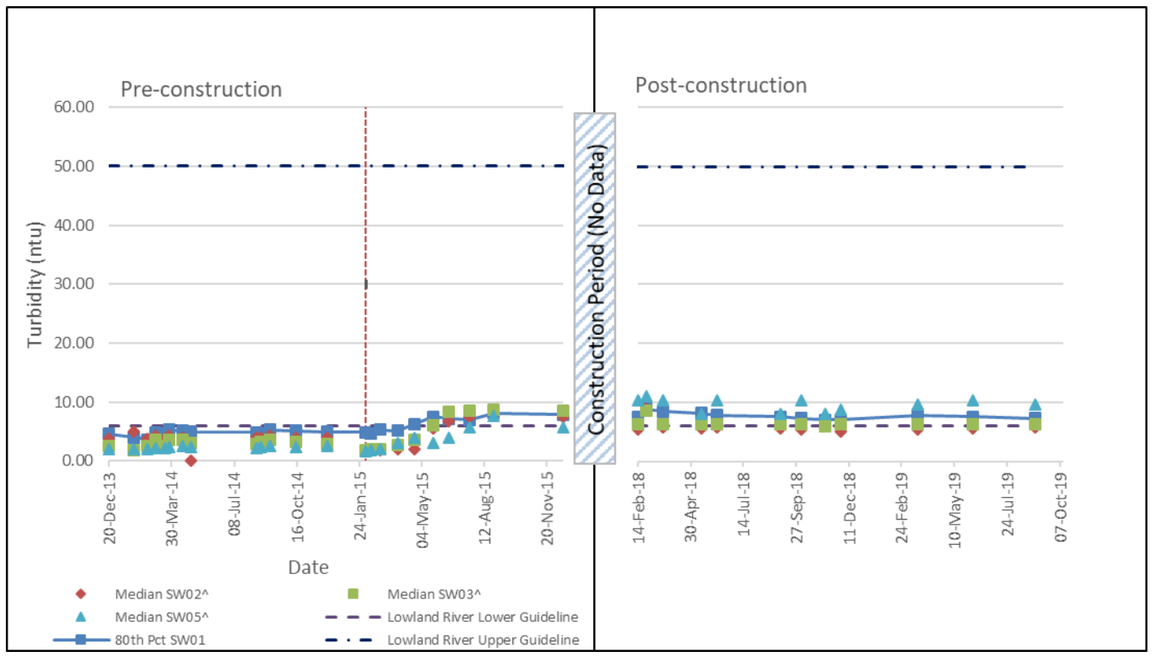
* Lower and Upper Guideline values taken from ANZECC (2000) Table 3.3.3, "NSW coastal rivers are typically in the range 200-300 µS/cm". South-east Australia, Lowland rivers guideline values are otherwise 125-2200 µS/cm and not inclusive of scenarios applicable to the site.

Start of construction period

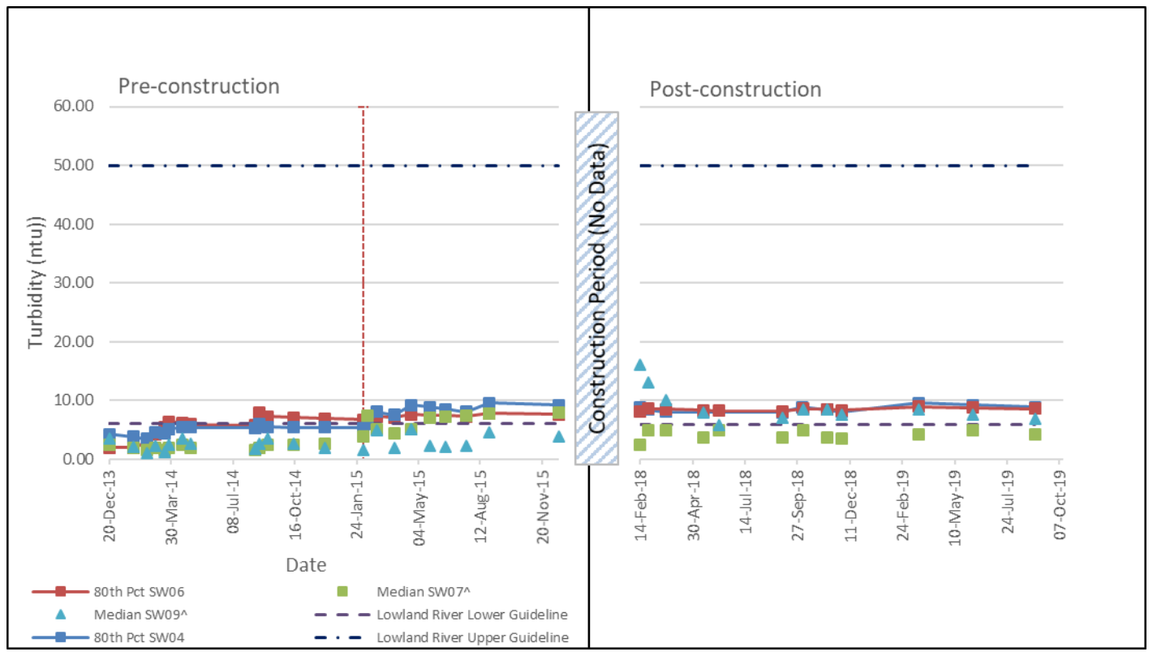
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – Turbidity
Exceedances against the 80th Percentile
Event 12

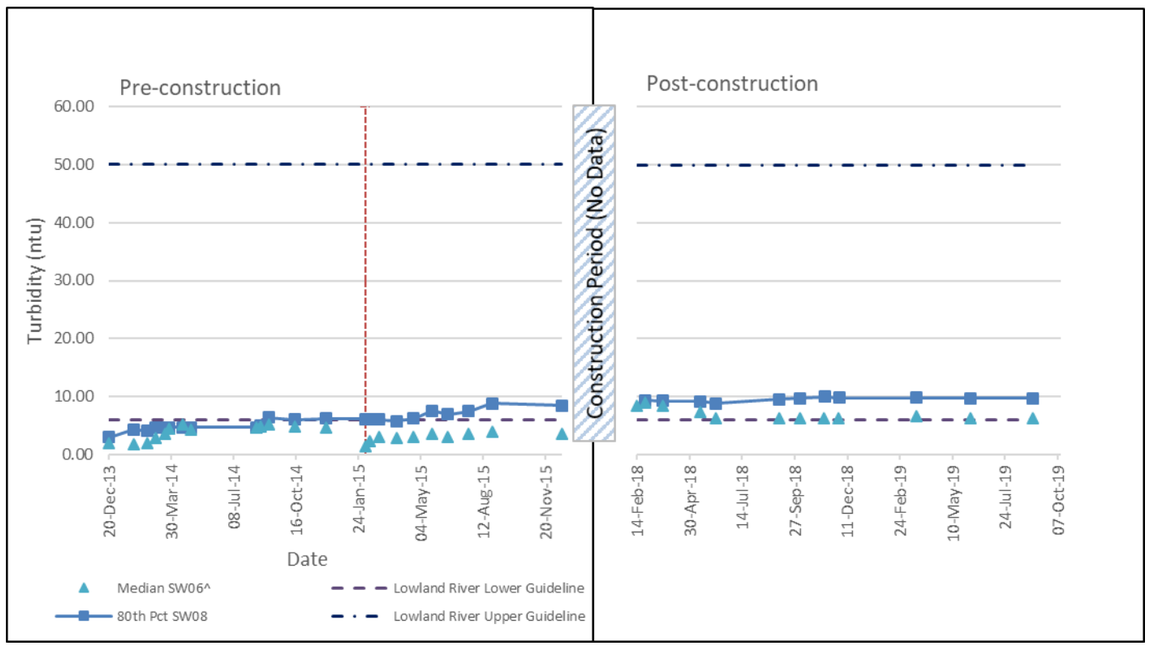
Broughton Creek



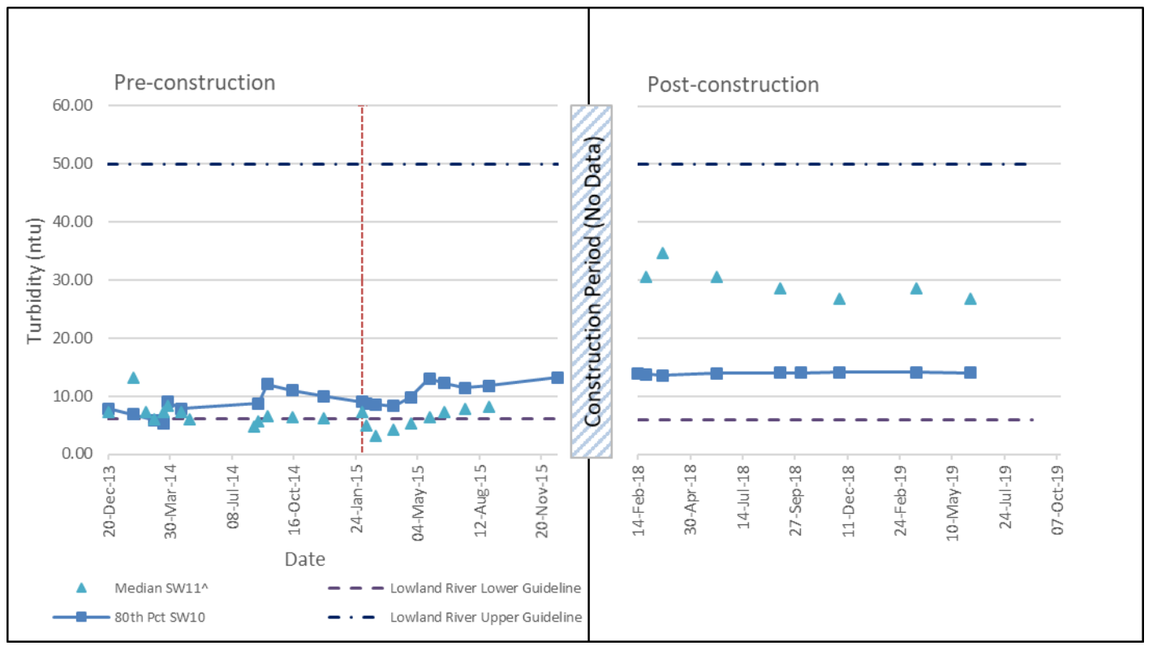
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

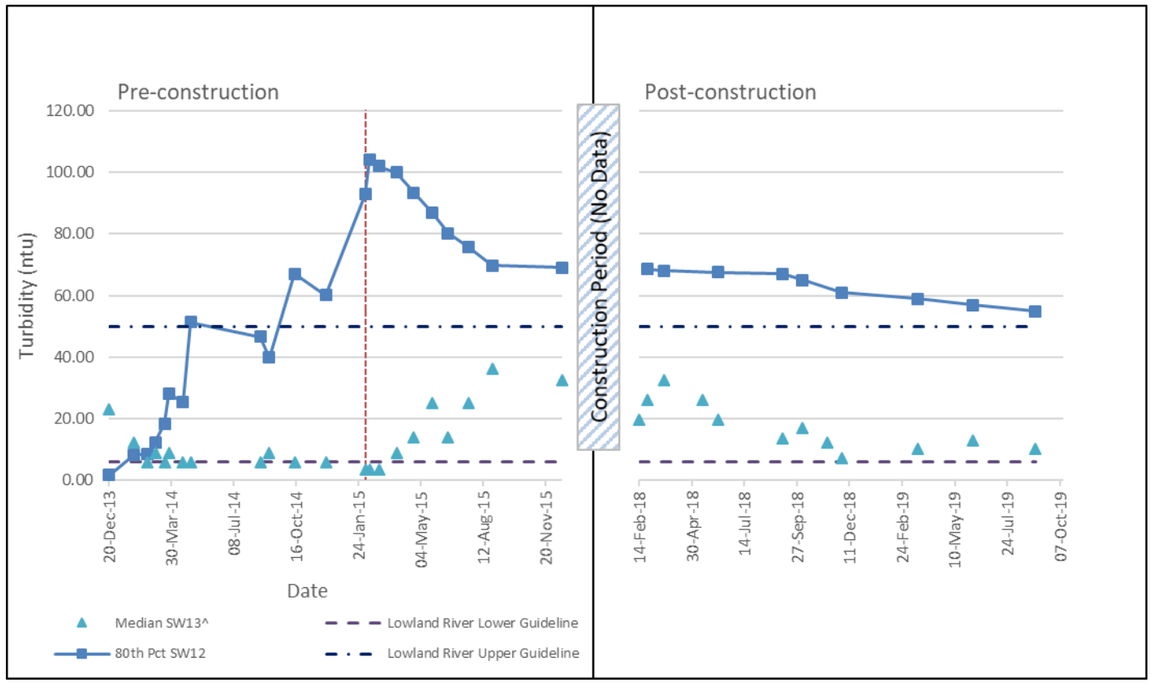


Town Creek

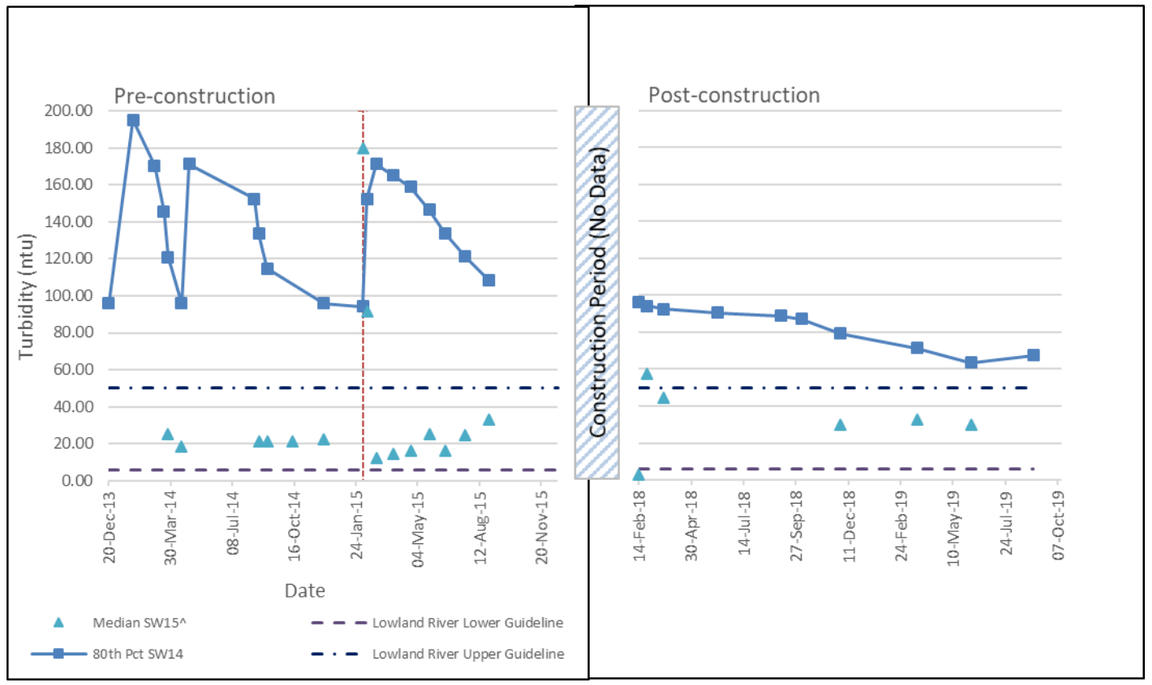


Attachment C
Control Charts – Turbidity
Exceedances against the 80th Percentile
Event 12

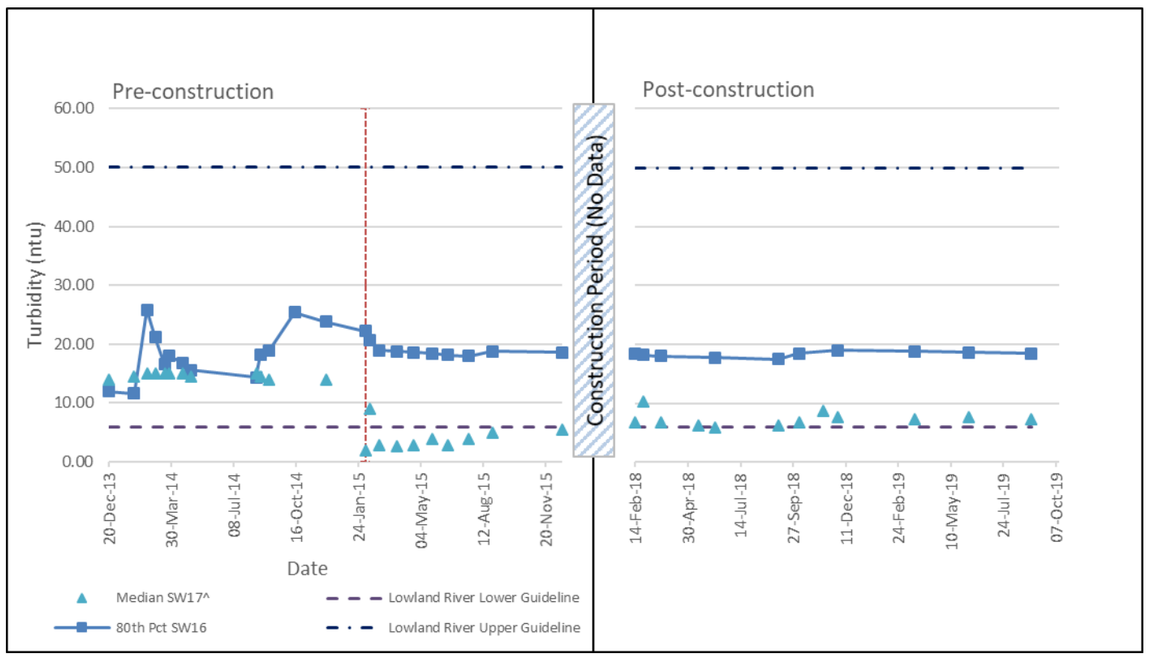
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary

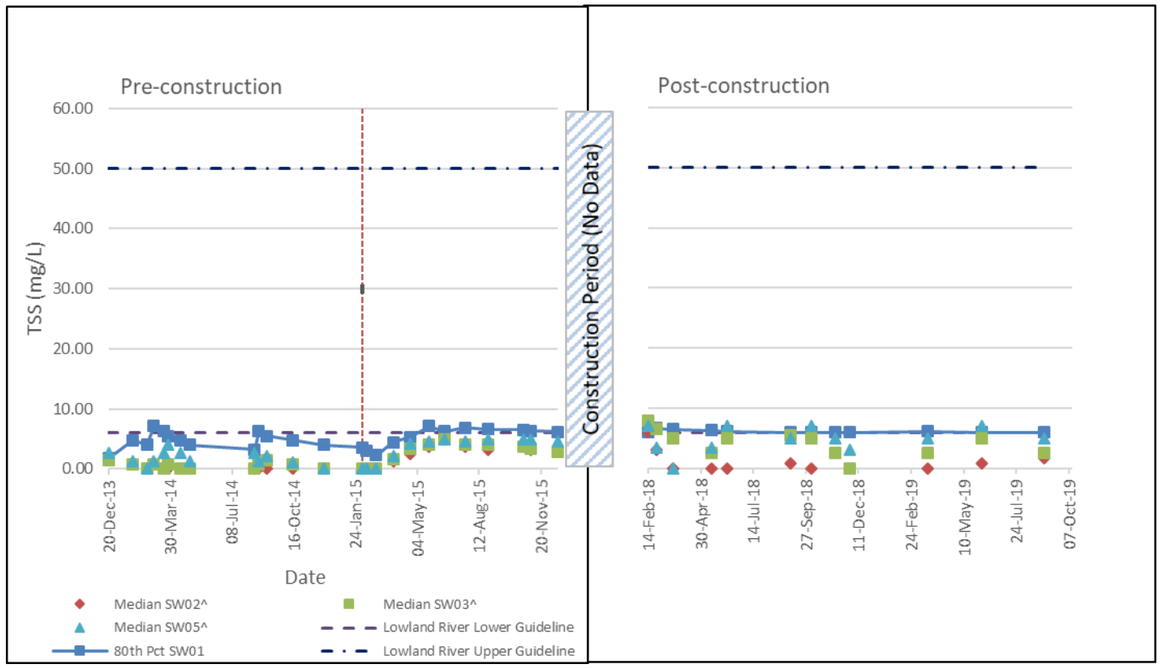


Start of construction period monitoring

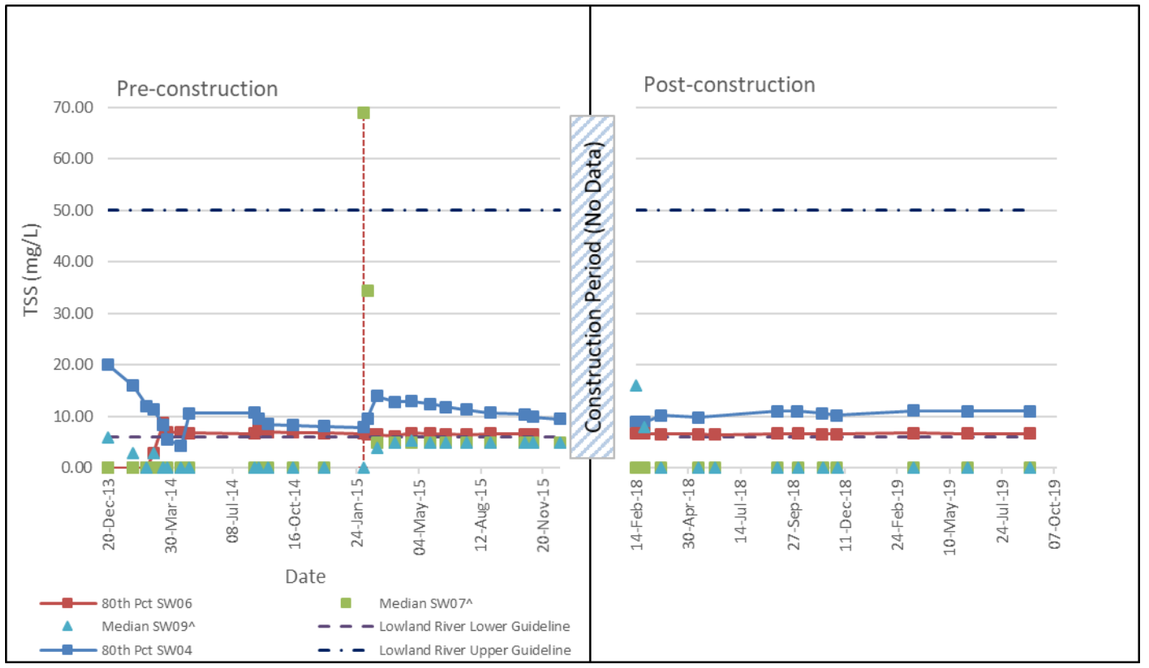
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – Total Suspended Solids
Exceedances against the 80th Percentile
Event 12

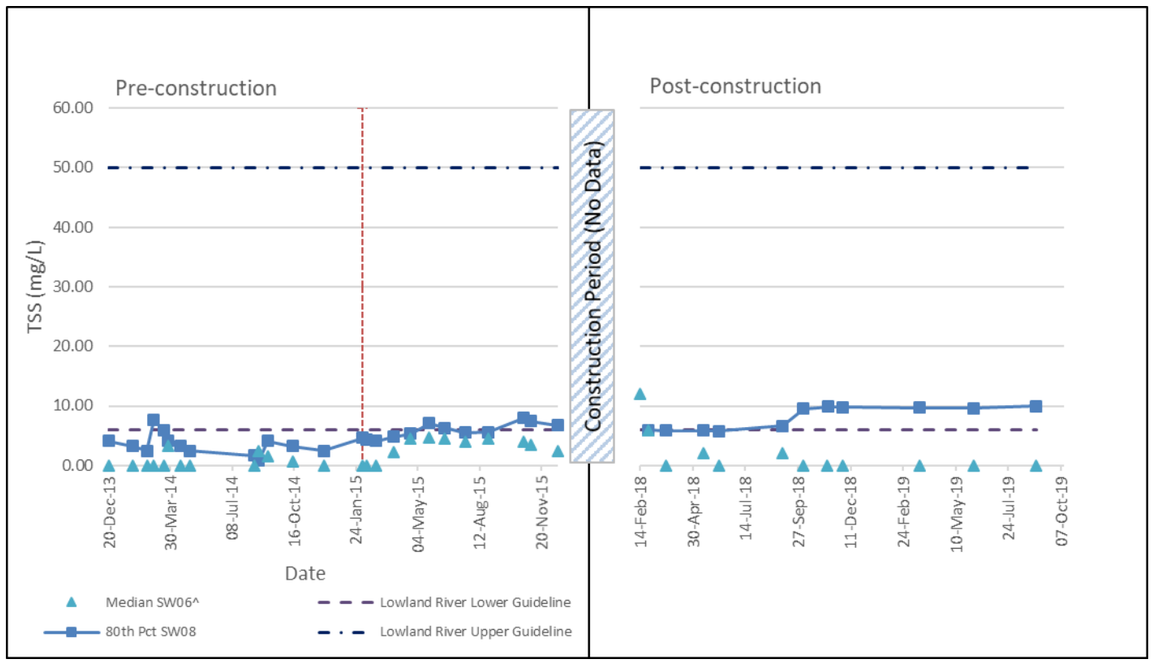
Broughton Creek



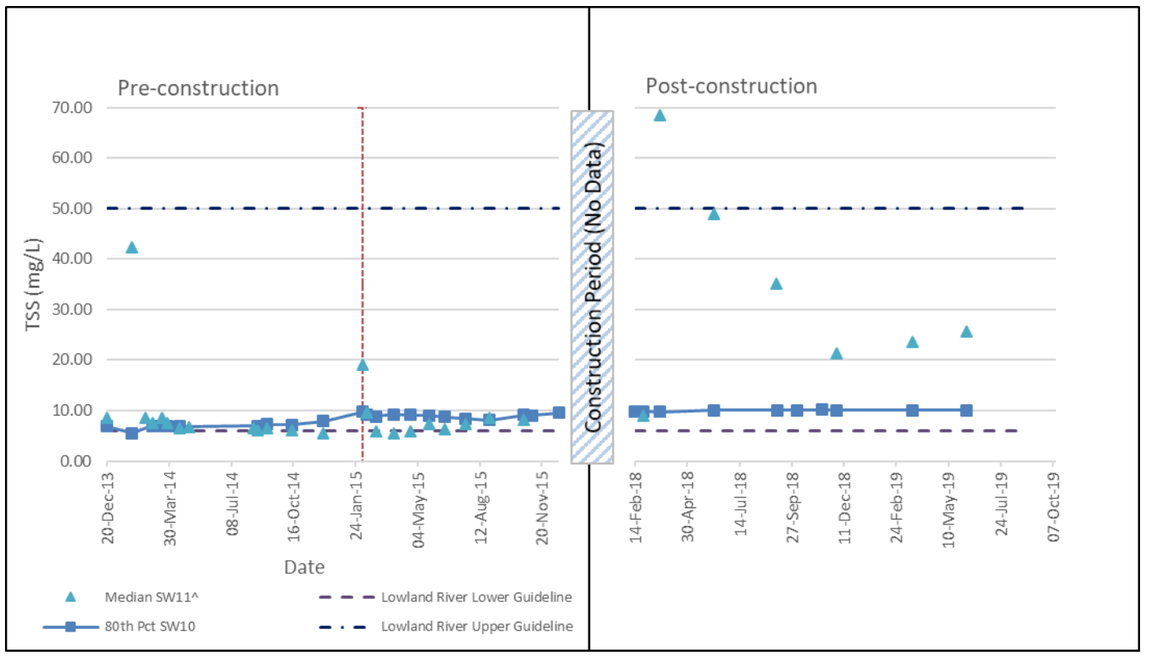
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

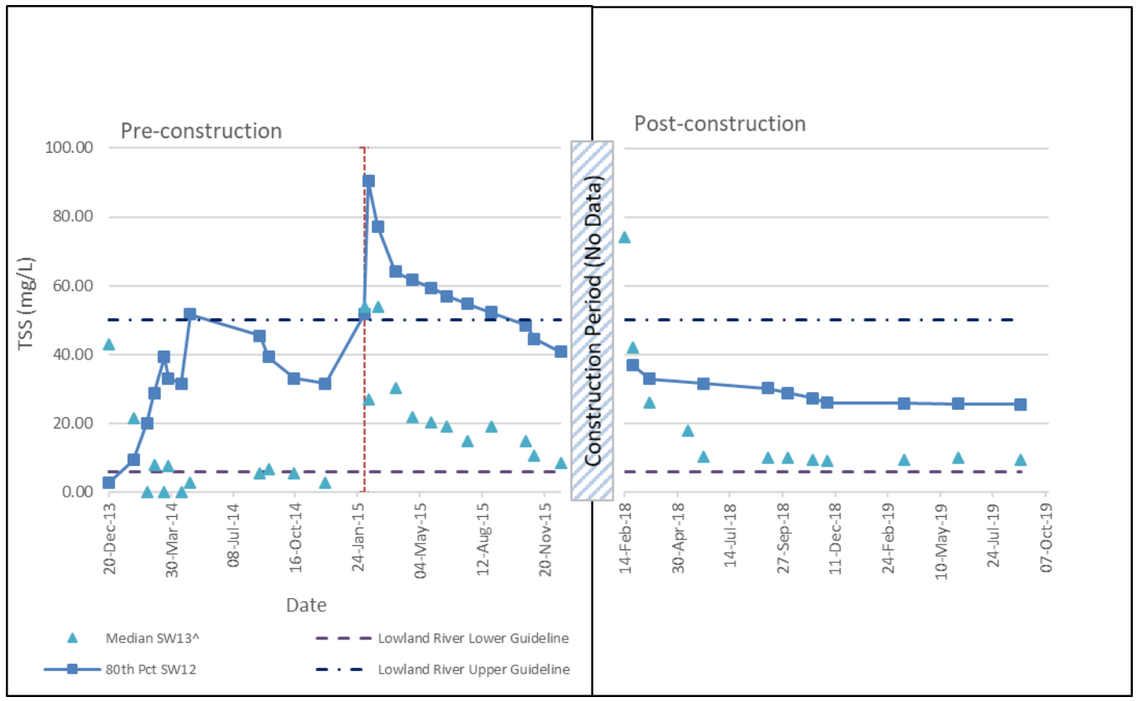


Town Creek

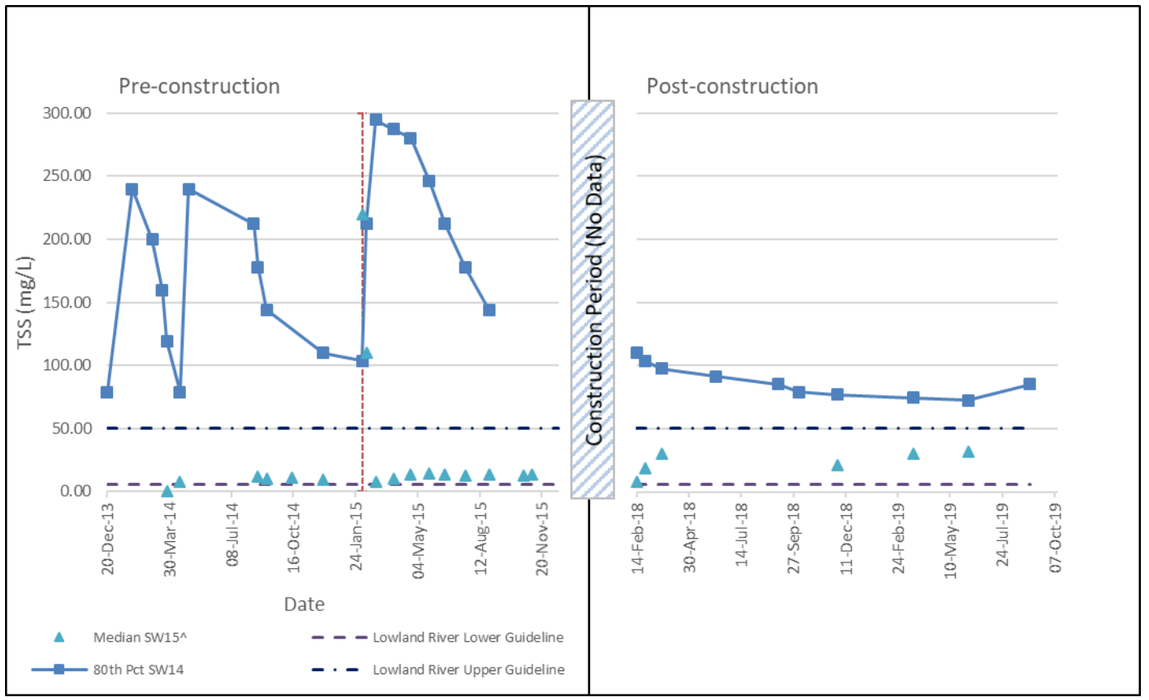


Attachment C
Control Charts – Total Suspended Solids
Exceedances against the 80th Percentile
Event 12

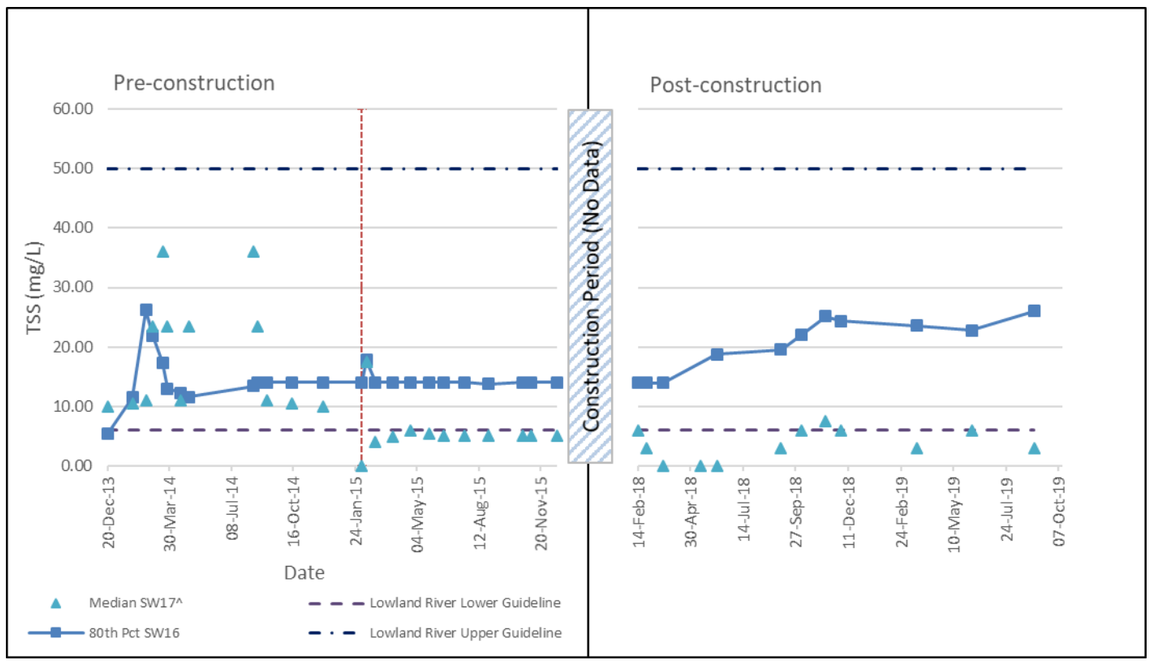
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary

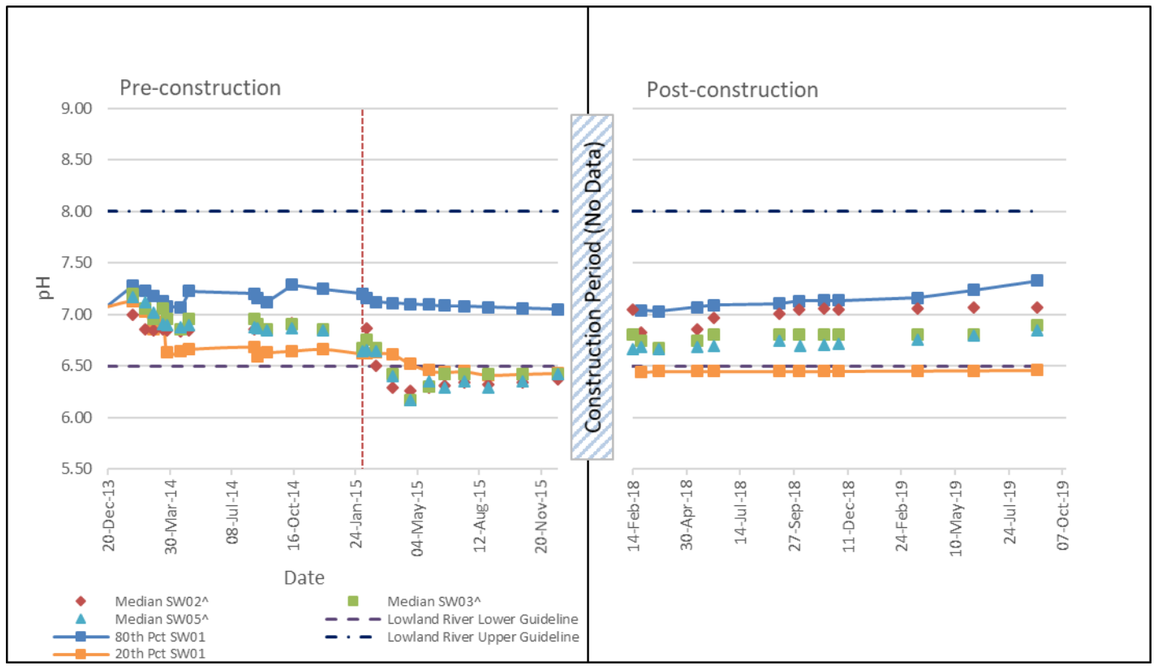


Start of construction period monitoring

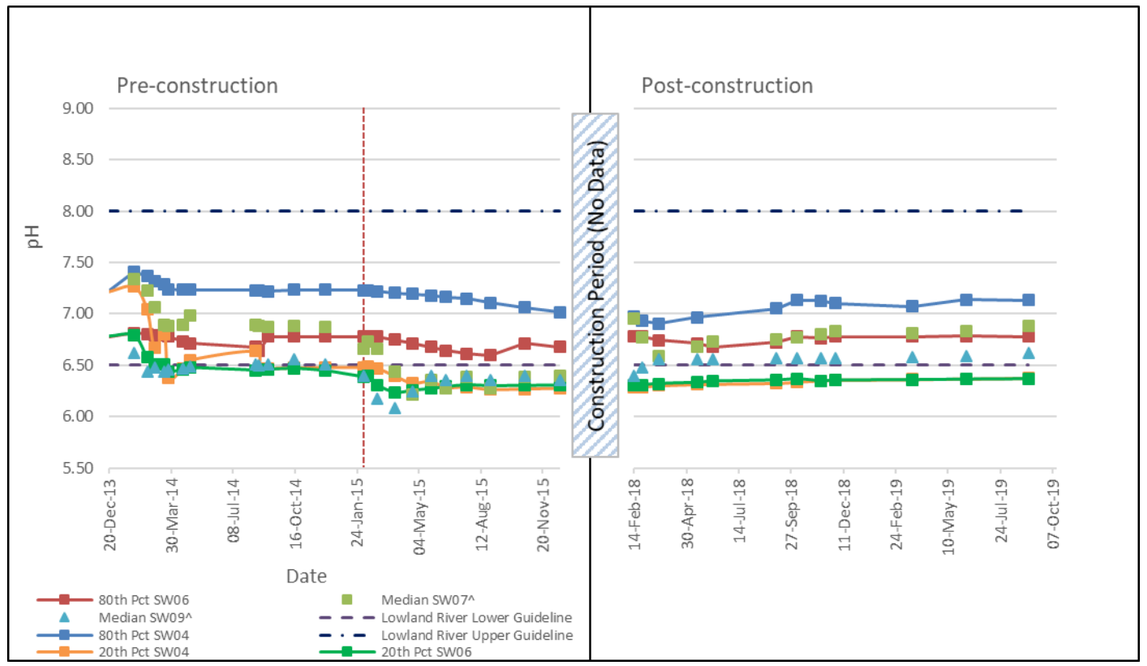
^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th percentile has been calculated using all available data.

Attachment C
Control Charts – pH
Exceedances against the 80th Percentile
Event 12

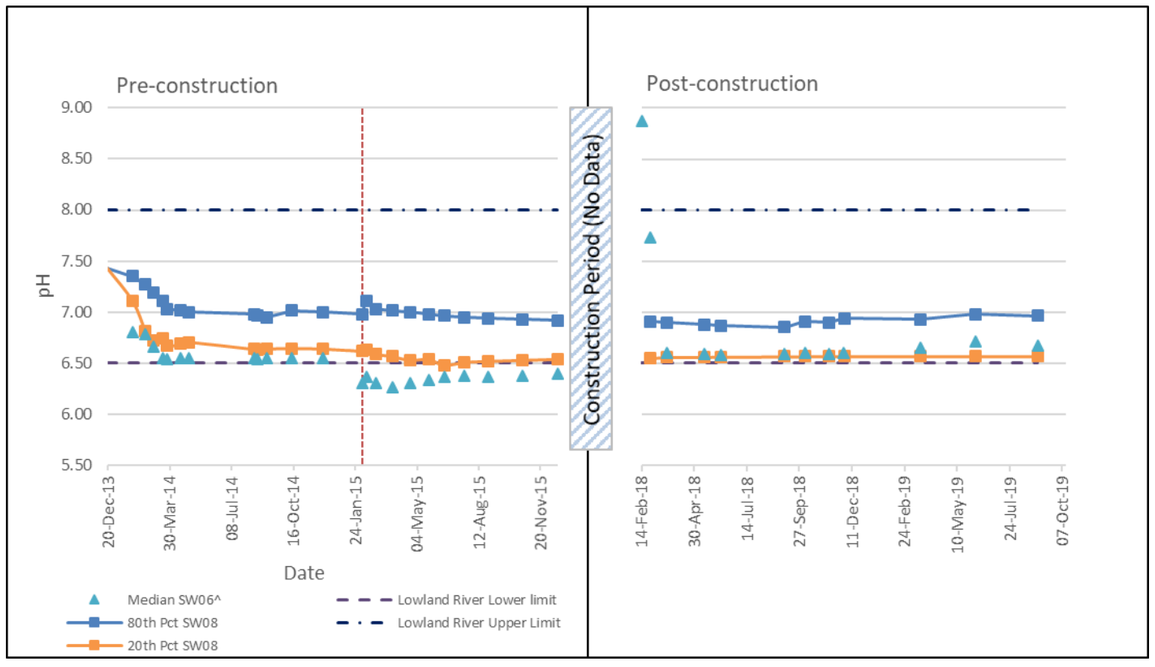
Broughton Creek



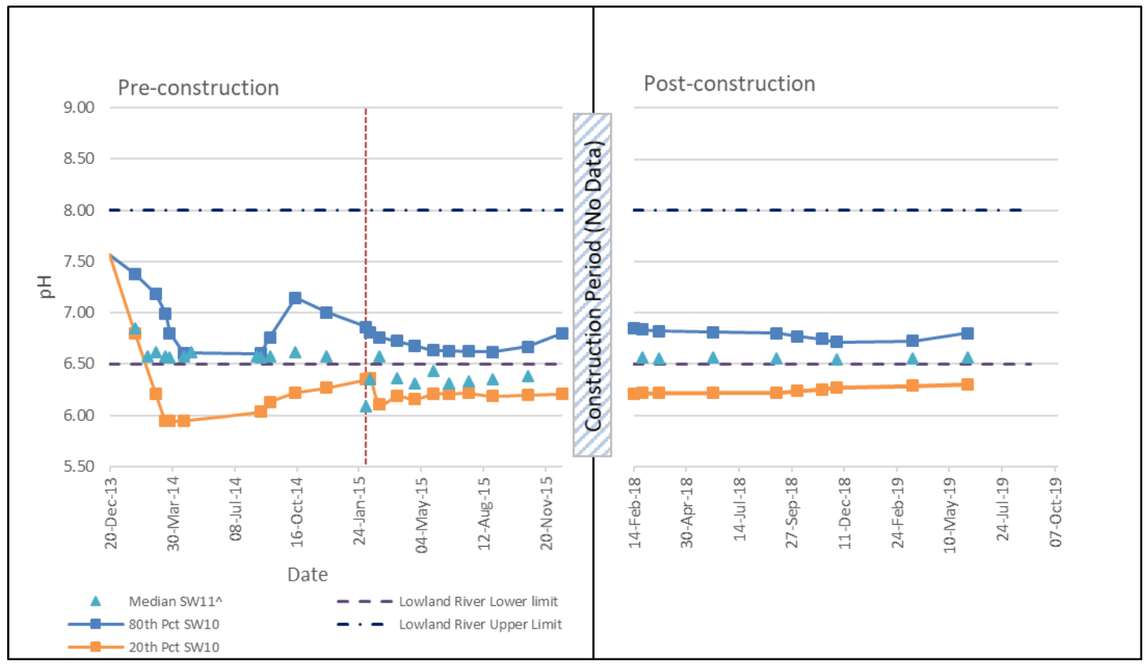
Connelly's Creek, Broughton Mill Creek and Bundewallah Creek



Bundewallah Creek and Connelly's Creek

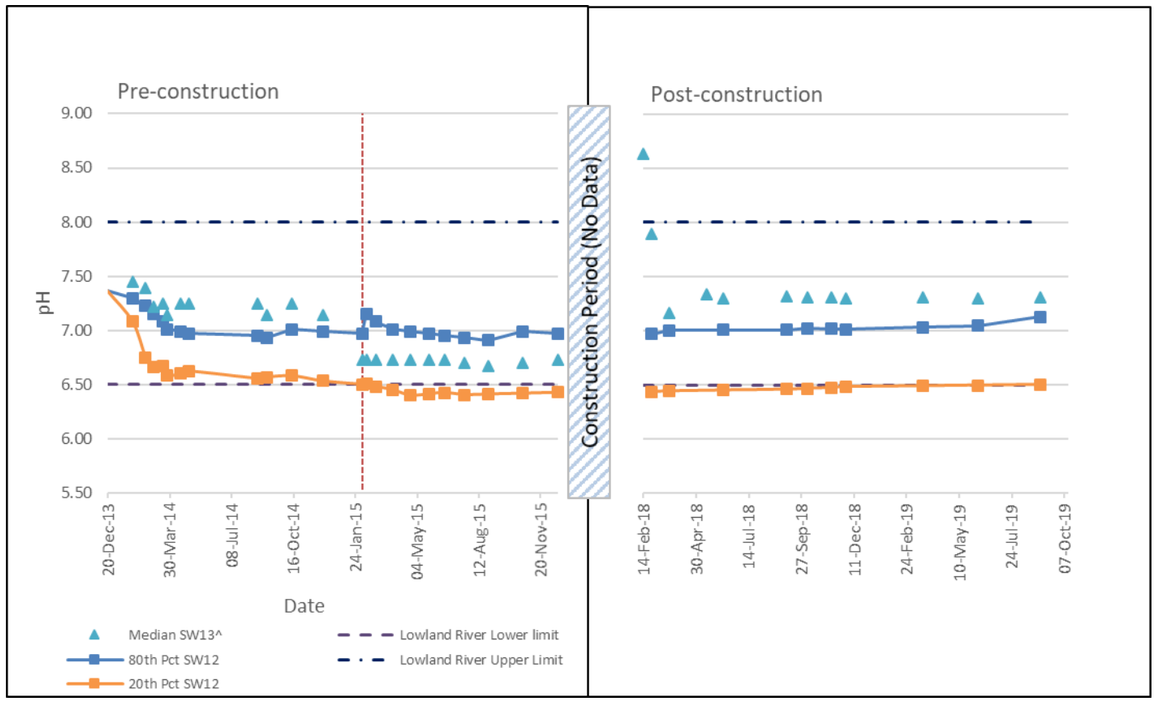


Town Creek

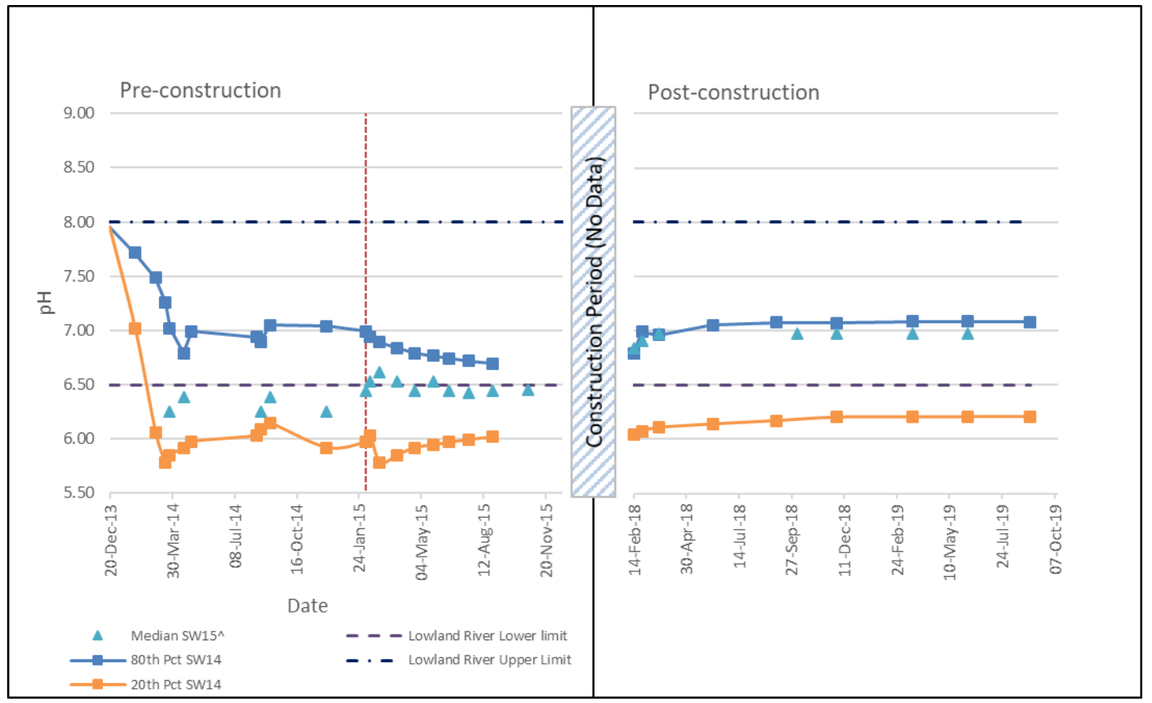


Attachment C
Control Charts – pH
Exceedances against the 80th Percentile
Event 12

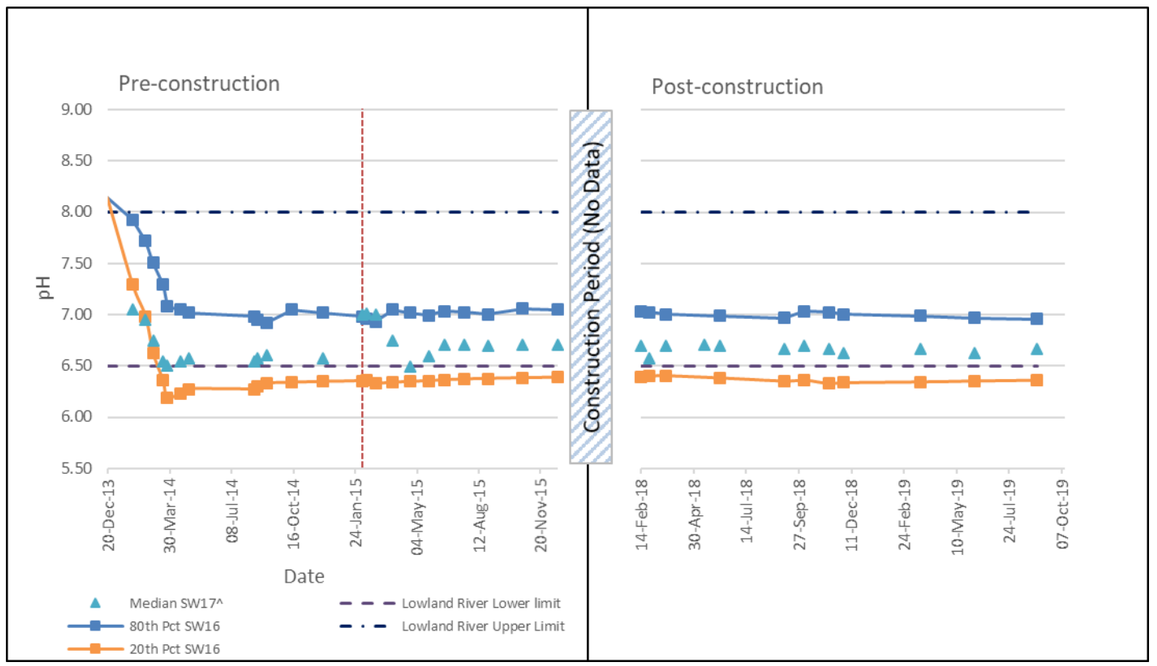
Hitchcocks Lane Creek Tributary



Hitchcocks Lane Creek



Unnamed Tributary



Start of construction period monitoring

^ Median's have been calculated seperately for 'pre-construction', 'construction' and 'post-construction'. The 80th and 20th percentile has been calculated using all available data.

Attachment D - Summary of exceedances during post-construction monitoring

Event (m =minor, M=major)		Upstream								Downstream									
		SW01	*SW04*	*SW06*	*SW08*	*SW10*	*SW12*	*SW14*	*SW16*	*SW02*	*SW03*	*SW05*	*SW06*	*SW07*	*SW09*	*SW11*	*SW13*	*SW15*	*SW17*
	1 (m)	TN	Zn	pH, Turb, TP	No flow	TSS, Turb, Cu, TN, TP	No flow	EC, Cu, Zn, TN	Turb	Turb, Cu, TN	Turb, Cu, TN, TP	Turb, Cu, Zn, TN, TP	pH, Turb, TP	**ND**	pH, Turb, TP	No flow	EC, pH, TSS, Turb, Cu	EC, TP	EC, Turb
	2 (M)	Turb, Cu, Zn, TP, TN	Turb, Cr, Zn, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cr, Cu, Zn, TP, TN	Turb, Cr, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	pH, Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, Zn, TP, TN	Turb, Cu, TP, TN	Turb, Cu, Zn, TP, TN	EC, Turb, Cr, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	pH, Turb, Cu, Zn, TP, TN
	3 (m)	NE	TN	Turb, Zn, TP, TN	Zn, TP, TN	Turb, Cu, Zn, TP, TN	EC, Turb, Cu, TP, TN	EC, Turb, Cu, TN	Turb, TP, TN	Turb, Cu	Turb, Cu, TP	Turb	Turb, Zn, TP, TN	Zn, TP, TN	Turb, TP, TN	EC, Turb, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	EC, Turb, Cu, Zn, TP, TN	Turb, TP, TN
	4 (m)	TP	NE	pH, Zn	TP, TN, Cu, Zn	No flow	No flow	No flow	No flow	Zn	Zn	EC, Cu	pH, Zn	Cu	pH, Zn	No flow	EC, TN, Zn	No flow	EC, Zn
	5 (m)	Turb, TN	No access	pH, Turb, TP, TN	Turb, TP, TN, Cu	pH, Turb, TP, TN, Cu	Turb, TP, TN	EC, Turb, TN, Cu, Zn	pH, TP	Turb, TP, TN	Turb, TP, TN, Cu	Turb, TP, TN	pH, Turb, TP, TN	Turb, TP, TN	TP, TN	EC, TSS Turb, TP, TN, Cu, Zn	EC, Turb, TN, Cu	No flow	pH, Zn
	6 (m)	NE	Turb, TP	Turb	Turb, TN, TP, Cu	pH, Turb, TN, TP, Cu, Zn	Turb, Zn	pH, EC, Cu, Zn	pH	TN, Zn	NE	EC	Turb	NE	Turb, TP	pH, Turb, EC, TN, TP Cu, Zn	pH, EC, Cu	No flow	Turb, TN, TP
	7 (M)	NE	Turb, TN	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu	pH, Turb, TN, TP, Cu	Turb, TN, TP, Cu, Zn	No flow	Turb	Zn	Turb, Zn	pH, Turb, EC, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP	Turb, TN, TP	No flow	Turb, TN, Cu	Turb, EC, TN, TP, Cu	Turb
	8 (m)	NE	NE	pH, Zn	Turb, TN, TP	pH, Turb, TN, TP, Cu	Turb, TN, TP, Cu	No flow	pH, Turb, TN, TP	Zn	NE	TP, Zn	pH, Zn	NE	pH	No flow	EC, TN, Cu	No flow	Turb, TN, TP, Zn
	9 (M)	TN, Cu	Turb, TN, Zn	Turb, TN, TP, Cu, Zn	TN, Cu, Zn,	Turb, TN, TP, Cu, Zn	EC, Turb, Cu, Zn	EC, Turb, TN, TP, Cu, Zn	Turb, Cu, Zn	Cu	Turb, TN, Cu	Turb, TN, Cu	Turb, Cu, Zn	TN	Turb, TN, TP	EC, TN, Cu, Zn,	EC, Turb, TN, Cu, Zn	EC, Turb, TN, TP, Cu, Zn	Turb, Cu, Zn
	10 (M)	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	TN, Cu, Zn	TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, EC	Turb, TN, TP, Cu, Zn	Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, Cu, Zn	Turb, TN, TP, EC, Cd, Cu, Zn	EC, Turb, TN, Cu, Zn	EC, TSS, Turb, TP, Cu, Zn	Cu, Zn
	11 (M)	Turb, pH, TN, TP, Cu, Zn	Turb, TN, TP, Cu	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn, Pb	Turb, EC, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn	Turb, pH TN, TP, Cu, Zn	Turb, TN, TP, Cu	Turb, TN, TP, Cu, Pb, Zn	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, Cu, Zn	Turb, TN, TP, Cu, Zn, Pb, Ni	Turb, TN, TP, TSS, Cu, Zn	Turb, TN, TP, Cu	Turb, EC, TSS, TN, TP, Cu, Zn	Turb, TN, pH, TP, Cu, Zn
	12 (m)	Cu, Zn	TP, Cu, Zn	Cu, Zn	Turb, TN, TP, Cu, Ni, Zn	No flow	Turbidity, TP, Cu, Zn	EC, Turb, TSS, TP, TP, Cu, Zn	Turb, TP, Cu, Zn	Turb, TP, Cu, Zn	TP, Cu	TP, Cu, Zn	Cu, Zn	TP, Cu, Zn	TP, Cu, Zn	No flow	Turb, EC, Cu, Zn	No flow	Cu, Zn

Key: EC = Electrical Conductivity, pH = pH, Turb = Turbidity, TSS = Total Suspended Solids, Cr = Chromium, Cd = Cadmium, Cu = Copper Zn = Zinc, TP = Phosphorus (Total), TN = Nitrogen (Total), **ND** = No detects, NE = No exceedances

	ADWG 2011 Aesthetic (v3.4 updated 2017)
	ANZECC 2000 FW 95%
	ANZECC 2000 - Lowland Rivers (NSW rivers)

Attachment E - Laboratory Certificates

GHD Pty Ltd ABN 39 008 488 373
Level 11 Crown Tower 200 Crown Street Wollongong NSW 2500 PO Box 5047 Wollongong New South Wales 2520 Australia
T +61 2 4222 2300 F +61 2 4222 2301 E wolmail@ghd.com W www.ghd.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW1903806**	Page	: 1 of 15
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: DANIEL DEEN	Contact	: Glenn Davies
Address	: Level 11, 200 Crown Street, Wollongong, NSW 2500 2500	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: 02 42253125
Project	: 2316261 - FBB PC	Date Samples Received	: 03-Sep-2019 14:08
Order number	: 2316261	Date Analysis Commenced	: 04-Sep-2019
C-O-C number	: ----	Issue Date	: 10-Sep-2019 14:31
Sampler	: Christie Allen, DANIEL DEEN		
Site	: ----		
Quote number	: SY/603/17 A		
No. of samples received	: 30		
No. of samples analysed	: 30		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW01_1	SW01_2	SW01_3	SW02_1	SW02_2
			Client sampling date / time	02-Sep-2019 10:20	02-Sep-2019 10:20	02-Sep-2019 10:20	02-Sep-2019 10:45	02-Sep-2019 10:45
Compound	CAS Number	LOR	Unit	EW1903806-001	EW1903806-002	EW1903806-003	EW1903806-004	EW1903806-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	**6**	**12**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**2.1**	**1.9**	**2.0**	**5.6**	**7.5**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.004**	**0.001**	**0.001**	**0.002**	**0.003**
Nickel	7440-02-0	0.001	mg/L	**0.003**	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.014**	<0.005	<0.005	**0.005**	**0.011**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.09**	**0.05**	**0.05**	**0.05**	**0.08**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.2**	**0.2**	**0.3**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.3**	**0.2**	**0.2**	**0.4**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.04**	**0.05**	**0.04**	**0.06**	**0.05**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01_1	SW01_2	SW01_3	SW02_1	SW02_2
				Client sampling date / time	02-Sep-2019 10:20	02-Sep-2019 10:20	02-Sep-2019 10:20	02-Sep-2019 10:45	02-Sep-2019 10:45
Compound	CAS Number	LOR	Unit		EW1903806-001	EW1903806-002	EW1903806-003	EW1903806-004	EW1903806-005
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**92.2**	**95.6**	**83.6**	**90.6**	**92.8**
Toluene-D8	2037-26-5	2	%		**100**	**98.9**	**89.7**	**102**	**103**
4-Bromofluorobenzene	460-00-4	2	%		**99.4**	**100**	**89.6**	**99.5**	**100**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW02_3	SW03_1	SW03_2	SW03_3	SW04_1
			Client sampling date / time	02-Sep-2019 10:45	02-Sep-2019 11:30	02-Sep-2019 11:30	02-Sep-2019 11:30	02-Sep-2019 12:09
Compound	CAS Number	LOR	Unit	EW1903806-006	EW1903806-007	EW1903806-008	EW1903806-009	EW1903806-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	**5.8**	**2.6**	**2.9**	**2.7**	**2.1**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.002**	**0.002**	**0.002**	**0.006**
Nickel	7440-02-0	0.001	mg/L	<0.001	**0.001**	<0.001	<0.001	**0.005**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.006**	**0.007**	**0.007**	<0.005	**0.027**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.05**	**0.13**	**0.11**	**0.14**	**0.06**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.2**	**0.3**	**0.3**	**0.3**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.4**	**0.4**	**0.4**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.05**	**0.04**	**0.07**	**0.05**	**0.04**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW02_3	SW03_1	SW03_2	SW03_3	SW04_1
				Client sampling date / time	02-Sep-2019 10:45	02-Sep-2019 11:30	02-Sep-2019 11:30	02-Sep-2019 11:30	02-Sep-2019 12:09
Compound	CAS Number	LOR	Unit		EW1903806-006	EW1903806-007	EW1903806-008	EW1903806-009	EW1903806-010
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**93.0**	**92.8**	**93.2**	**94.3**	**94.1**
Toluene-D8	2037-26-5	2	%		**102**	**101**	**102**	**100**	**97.8**
4-Bromofluorobenzene	460-00-4	2	%		**101**	**99.4**	**99.1**	**98.7**	**96.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW04_2	SW04_3	SW05_01	SW05_2	SW05_3
			Client sampling date / time	02-Sep-2019 12:09	02-Sep-2019 12:09	02-Sep-2019 12:55	02-Sep-2019 13:30	02-Sep-2019 13:30
Compound	CAS Number	LOR	Unit	EW1903806-011	EW1903806-012	EW1903806-013	EW1903806-014	EW1903806-015
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	<5	<5	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	**2.0**	**2.8**	**2.5**	**3.9**	**3.3**
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.004**	**0.006**	**0.013**	<0.001	**0.001**
Nickel	7440-02-0	0.001	mg/L	**0.004**	**0.004**	**0.011**	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.015**	**0.021**	**0.069**	<0.005	<0.005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.06**	**0.06**	**0.07**	**0.06**	**0.06**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.2**	**0.3**	**0.2**	**0.3**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.3**	**0.4**	**0.3**	**0.4**	**0.3**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.10**	**0.06**	**0.06**	**0.05**	**0.05**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW04_2	SW04_3	SW05_01	SW05_2	SW05_3
				Client sampling date / time	02-Sep-2019 12:09	02-Sep-2019 12:09	02-Sep-2019 12:55	02-Sep-2019 13:30	02-Sep-2019 13:30
Compound	CAS Number	LOR	Unit		EW1903806-011	EW1903806-012	EW1903806-013	EW1903806-014	EW1903806-015
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**78.2**	**93.4**	**95.3**	**90.4**	**90.6**
Toluene-D8	2037-26-5	2	%		**85.7**	**98.1**	**99.7**	**102**	**104**
4-Bromofluorobenzene	460-00-4	2	%		**81.6**	**97.9**	**97.0**	**97.6**	**96.6**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW06	SW07_1	SW07_2	SW07_3	SW08
				Client sampling date / time	02-Sep-2019 14:55	02-Sep-2019 09:31	02-Sep-2019 09:31	02-Sep-2019 09:31	02-Sep-2019 15:30
Compound	CAS Number	LOR	Unit		EW1903806-016	EW1903806-017	EW1903806-018	EW1903806-019	EW1903806-020
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		<5	<5	<5	<5	**10**
EA045: Turbidity									
Turbidity	----	0.1	NTU		**1.4**	**2.0**	**2.2**	**2.4**	**6.6**
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		**0.017**	**0.006**	**0.010**	**0.009**	**0.018**
Nickel	7440-02-0	0.001	mg/L		**0.011**	**0.002**	**0.002**	**0.002**	**0.012**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	**0.001**	<0.001	**0.001**
Zinc	7440-66-6	0.005	mg/L		**0.065**	**0.019**	**0.023**	**0.025**	**0.094**
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.02**	**0.05**	**0.05**	**0.05**	**0.32**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		<0.1	**0.2**	**0.3**	**0.2**	**1.6**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		<0.1	**0.2**	**0.4**	**0.2**	**1.9**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	**0.04**	**0.03**	**0.08**	**0.81**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW06	SW07_1	SW07_2	SW07_3	SW08
				Client sampling date / time	02-Sep-2019 14:55	02-Sep-2019 09:31	02-Sep-2019 09:31	02-Sep-2019 09:31	02-Sep-2019 15:30
Compound	CAS Number	LOR	Unit		EW1903806-016	EW1903806-017	EW1903806-018	EW1903806-019	EW1903806-020
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	----	2	µg/L		<2	<2	<2	<2	<2
^ **Sum of BTEX**	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**85.2**	**91.7**	**91.4**	**92.2**	**90.4**
Toluene-D8	2037-26-5	2	%		**93.4**	**104**	**104**	**103**	**104**
4-Bromofluorobenzene	460-00-4	2	%		**89.9**	**97.7**	**99.3**	**98.0**	**97.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	SW09	SW12	SW13_1	SW13_2	SW13_3
			Client sampling date / time	02-Sep-2019 14:20	02-Sep-2019 16:30	03-Sep-2019 08:10	03-Sep-2019 08:10	03-Sep-2019 08:10
Compound	CAS Number	LOR	Unit	EW1903806-021	EW1903806-022	EW1903806-023	EW1903806-024	EW1903806-025
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	<5	16	8	<5	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	0.7	13.5	2.2	1.6	1.9
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.014	0.006	0.010	0.008	0.008
Nickel	7440-02-0	0.001	mg/L	0.003	0.001	0.006	0.005	0.004
Lead	7439-92-1	0.001	mg/L	0.002	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.026	0.011	0.030	0.023	0.023
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	<0.01	0.06	0.05	0.06
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	0.6	0.2	0.1	0.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	<0.1	0.6	0.3	0.2	0.2
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.10	0.09	0.04	0.03	0.04
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW09	SW12	SW13_1	SW13_2	SW13_3
				Client sampling date / time	02-Sep-2019 14:20	02-Sep-2019 16:30	03-Sep-2019 08:10	03-Sep-2019 08:10	03-Sep-2019 08:10
Compound	CAS Number	LOR	Unit		EW1903806-021	EW1903806-022	EW1903806-023	EW1903806-024	EW1903806-025
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**92.7**	**95.0**	**97.9**	**95.4**	**91.3**
Toluene-D8	2037-26-5	2	%		**90.6**	**88.2**	**88.1**	**89.8**	**86.6**
4-Bromofluorobenzene	460-00-4	2	%		**93.0**	**86.9**	**95.7**	**93.2**	**86.1**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW14_1	SW14_2	SW16	SW17	QC1
				Client sampling date / time	03-Sep-2019 10:05	03-Sep-2019 10:05	03-Sep-2019 09:25	03-Sep-2019 08:55	03-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		EW1903806-026	EW1903806-027	EW1903806-028	EW1903806-029	EW1903806-030
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		108	192	27	<5	144
EA045: Turbidity									
Turbidity	----	0.1	NTU		45.2	78.8	6.0	1.0	63.7
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L		0.008	0.019	0.009	0.008	0.009
Nickel	7440-02-0	0.001	mg/L		0.002	0.016	0.003	0.002	0.003
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		0.040	0.073	0.024	0.021	0.030
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		<0.01	<0.01	0.02	0.03	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		1.5	1.7	0.3	0.2	1.7
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		1.5	1.7	0.3	0.2	1.7
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	0.25	0.12	0.03	0.24
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW14_1	SW14_2	SW16	SW17	QC1
				Client sampling date / time	03-Sep-2019 10:05	03-Sep-2019 10:05	03-Sep-2019 09:25	03-Sep-2019 08:55	03-Sep-2019 00:00
Compound	CAS Number	LOR	Unit		EW1903806-026	EW1903806-027	EW1903806-028	EW1903806-029	EW1903806-030
					Result	Result	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L		<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L		<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	2	%		**98.2**	**94.6**	**97.0**	**84.5**	**81.0**
Toluene-D8	2037-26-5	2	%		**98.6**	**95.1**	**92.6**	**80.0**	**87.6**
4-Bromofluorobenzene	460-00-4	2	%		**95.0**	**97.3**	**89.8**	**78.1**	**85.9**

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EW1903806**	Page	: 1 of 10
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: DANIEL DEEN	Contact	: Glenn Davies
Address	: Level 11, 200 Crown Street, Wollongong, NSW 2500 2500	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: ----	Telephone	: 02 42253125
Project	: 2316261 - FBB PC	Date Samples Received	: 03-Sep-2019
Order number	: 2316261	Date Analysis Commenced	: 04-Sep-2019
C-O-C number	: ----	Issue Date	: 10-Sep-2019
Sampler	: Christie Allen, DANIEL DEEN		
Site	: ----		
Quote number	: SY/603/17 A		
No. of samples received	: 30		
No. of samples analysed	: 30		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2571098)									
EW1903798-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	24	24	0.00	No Limit
EW1903806-010	SW04_1	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 2571494)									
ES1928695-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	56	51	9.79	0% - 50%
EW1903806-028	SW16	EA025H: Suspended Solids (SS)	----	5	mg/L	27	22	21.3	No Limit
EA045: Turbidity (QC Lot: 2562511)									
ES1928060-001	Anonymous	EA045: Turbidity	----	0.1	NTU	0.4	0.3	0.00	No Limit
EW1903806-003	SW01_3	EA045: Turbidity	----	0.1	NTU	2.0	1.9	6.72	0% - 20%
EA045: Turbidity (QC Lot: 2562512)									
EW1903806-014	SW05_2	EA045: Turbidity	----	0.1	NTU	3.9	3.4	15.1	0% - 20%
EW1903806-023	SW13_1	EA045: Turbidity	----	0.1	NTU	2.2	2.3	5.84	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2562558)									
EW1903806-002	SW01_2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ES1928181-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.087	0.088	0.00	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2562558) - continued									
ES1928181-001	Anonymous	EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.008	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2562561)									
EW1903806-011	SW04_2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.015	0.014	11.9	No Limit
EW1903806-021	SW09	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.014	0.015	0.00	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.026	0.027	5.18	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2562560)									
EW1903806-003	SW01_3	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EW1903806-010	SW04_1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 2562562)									
EW1903806-022	SW12	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EW1903806-030	QC1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2566548)									
EW1903806-002	SW01_2	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.05	0.00	No Limit
ES1928457-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 2566549)									
EW1903806-013	SW05_01	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.07	0.07	0.00	No Limit
EW1903848-007	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.31	0.30	5.28	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2566544)									
ES1928457-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EW1903806-003	SW01_3	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 2566546)									
EW1903806-013	SW05_01	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.00	No Limit
EW1903806-023	SW13_1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.1	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2566543)									
ES1928457-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.08	0.09	0.00	No Limit
EW1903806-003	SW01_3	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.05	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 2566545)									
EW1903806-013	SW05_01	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.06	0.06	0.00	No Limit
EW1903806-023	SW13_1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.08	69.4	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2563309)									
EW1903806-001	SW01_1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EW1903806-011	SW04_2	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2563311)									
EB1922804-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EW1903806-021	SW09	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2563309)									
EW1903806-001	SW01_1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EW1903806-011	SW04_2	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 2563311)									
EB1922804-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EW1903806-021	SW09	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 2563309)									
EW1903806-001	SW01_1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EW1903806-011	SW04_2	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EP080: BTEXN (QC Lot: 2563311)									
EB1922804-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EW1903806-021	SW09	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 2563311) - continued									
EW1903806-021	SW09	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2571098)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	92.3	83	129
				<5	1000 mg/L	98.4	82	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 2571494)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	83	129
				<5	1000 mg/L	98.0	82	110
EA045: Turbidity (QCLot: 2562511)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	102	91	105
EA045: Turbidity (QCLot: 2562512)								
EA045: Turbidity	----	0.1	NTU	<0.1	40 NTU	102	91	105
EG020F: Dissolved Metals by ICP-MS (QCLot: 2562558)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	91.8	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	95.8	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	95.6	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	93.0	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.4	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.3	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.6	81	117
EG020F: Dissolved Metals by ICP-MS (QCLot: 2562561)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.8	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.2	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	92.7	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.1	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	94.7	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.3	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.0	81	117
EG035F: Dissolved Mercury by FIMS (QCLot: 2562560)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	91.0	83	105
EG035F: Dissolved Mercury by FIMS (QCLot: 2562562)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.8	83	105
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2566548)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	91	113
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2566549)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	105	91	113

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2566544)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	91.4	69	101
				<0.1	1 mg/L	94.8	70	118
				<0.1	5 mg/L	105	74	118
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2566546)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	87.1	69	101
				<0.1	1 mg/L	84.4	70	118
				<0.1	5 mg/L	89.2	74	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2566543)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	88.9	71	101
				<0.01	0.442 mg/L	96.6	72	108
				<0.01	1 mg/L	108	78	118
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2566545)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	85.6	71	101
				<0.01	0.442 mg/L	88.7	72	108
				<0.01	1 mg/L	94.3	78	118
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563028)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	79.0	56	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	92.4	72	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	89.2	56	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563029)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	63.2	56	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	77.7	72	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	80.7	56	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563309)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	103	75	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563311)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	98.4	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563028)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	60.7	58	119
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	93.7	63	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	79.4	62	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563029)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	74.2	58	119
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	80.2	63	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	81.4	62	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563309)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	108	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563311)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563311) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	97.5	75	127
EP080: BTEXN (QCLot: 2563309)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	106	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	111	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	118	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	118	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	115	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	104	70	120
EP080: BTEXN (QCLot: 2563311)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	92.2	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	98.8	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	96.9	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	98.8	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	94.4	70	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2562558)							
ES1928181-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	90.3	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	94.6	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	92.4	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	91.3	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	101	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	94.2	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	92.4	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 2562561)							
EW1903806-012	SW04_3	EG020A-F: Arsenic	7440-38-2	1 mg/L	91.1	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.9	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	96.1	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	92.7	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2562561) - continued							
EW1903806-012	SW04_3	EG020A-F: Lead	7439-92-1	1 mg/L	102	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	96.0	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	93.7	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2562560)							
EW1903806-001	SW01_1	EG035F: Mercury	7439-97-6	0.01 mg/L	93.4	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 2562562)							
EW1903806-021	SW09	EG035F: Mercury	7439-97-6	0.01 mg/L	89.6	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2566548)							
ES1928457-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	102	70	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 2566549)							
EW1903806-013	SW05_01	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	100	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2566544)							
ES1928457-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	85.9	70	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 2566546)							
EW1903806-014	SW05_2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.0	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2566543)							
ES1928457-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	85.9	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 2566545)							
EW1903806-014	SW05_2	EK067G: Total Phosphorus as P	----	1 mg/L	97.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563309)							
EW1903806-001	SW01_1	EP080: C6 - C9 Fraction	----	325 µg/L	118	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2563311)							
EB1922804-003	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	91.5	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563309)							
EW1903806-001	SW01_1	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	116	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2563311)							
EB1922804-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	91.6	70	130
EP080: BTEXN (QCLot: 2563309)							
EW1903806-001	SW01_1	EP080: Benzene	71-43-2	25 µg/L	97.3	70	130
		EP080: Toluene	108-88-3	25 µg/L	105	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	112	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	111	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	110	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EP080: BTEXN (QCLot: 2563309) - continued							
EW1903806-001	SW01_1	EP080: Naphthalene	91-20-3	25 µg/L	95.0	70	130
EP080: BTEXN (QCLot: 2563311)							
EB1922804-003	Anonymous	EP080: Benzene	71-43-2	25 µg/L	82.9	70	130
		EP080: Toluene	108-88-3	25 µg/L	90.5	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	94.2	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	92.5	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	94.1	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	96.8	70	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EW1903806**	Page	: 1 of 12
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: DANIEL DEEN	Telephone	: 02 42253125
Project	: 2316261 - FBB PC	Date Samples Received	: 03-Sep-2019
Site	: ----	Issue Date	: 10-Sep-2019
Sampler	: Christie Allen, DANIEL DEEN	No. of samples received	: 30
Order number	: 2316261	No. of samples analysed	: 30

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	30	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	30	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / ***Container*** / Client Sample ID(s)		***Sample Date***	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
SW01_1,	SW01_2,	**02-Sep-2019**	**----**	----	----	**09-Sep-2019**	09-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Clear Plastic Bottle - Natural (EA025H)								
SW13_1,	SW13_2,	**03-Sep-2019**	**----**	----	----	**09-Sep-2019**	10-Sep-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA045: Turbidity								
Clear Plastic Bottle - Natural (EA045)								
SW01_1,	SW01_2,	**02-Sep-2019**	**----**	----	----	**04-Sep-2019**	04-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Clear Plastic Bottle - Natural (EA045)								
SW13_1,	SW13_2,	**03-Sep-2019**	**----**	----	----	**04-Sep-2019**	05-Sep-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
SW01_1,	SW01_2,	**02-Sep-2019**	**----**	----	----	**04-Sep-2019**	29-Feb-2020	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
SW13_1,	SW13_2,	**03-Sep-2019**	**----**	----	----	**04-Sep-2019**	01-Mar-2020	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
SW01_1,	SW01_2,	**02-Sep-2019**	**----**	----	----	**04-Sep-2019**	30-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
SW13_1,	SW13_2,	**03-Sep-2019**	**----**	----	----	**04-Sep-2019**	01-Oct-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
SW01_1,	SW01_2,	**02-Sep-2019**	**----**	----	----	**05-Sep-2019**	30-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Clear Plastic Bottle - Sulfuric Acid (EK059G)								
SW13_1,	SW13_2,	**03-Sep-2019**	**----**	----	----	**05-Sep-2019**	01-Oct-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05_01, SW05_2, SW05_3, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW12	**02-Sep-2019**	**05-Sep-2019**	30-Sep-2019	✓	**05-Sep-2019**	30-Sep-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G)							
SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW16, SW17, QC1	**03-Sep-2019**	**05-Sep-2019**	01-Oct-2019	✓	**05-Sep-2019**	01-Oct-2019	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05_01, SW05_2, SW05_3, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW12	**02-Sep-2019**	**05-Sep-2019**	30-Sep-2019	✓	**05-Sep-2019**	30-Sep-2019	✓
Clear Plastic Bottle - Sulfuric Acid (EK067G)							
SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW16, SW17, QC1	**03-Sep-2019**	**05-Sep-2019**	01-Oct-2019	✓	**05-Sep-2019**	01-Oct-2019	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
SW01_1,	SW01_2,	**02-Sep-2019**	**06-Sep-2019**	09-Sep-2019	✓	**09-Sep-2019**	16-Oct-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08							
Amber Glass Bottle - Unpreserved (EP071)								
SW09,	SW12	**02-Sep-2019**	**09-Sep-2019**	09-Sep-2019	✓	**09-Sep-2019**	19-Oct-2019	✓
Amber Glass Bottle - Unpreserved (EP071)								
SW13_1,	SW13_2,	**03-Sep-2019**	**09-Sep-2019**	10-Sep-2019	✓	**09-Sep-2019**	19-Oct-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							
Amber VOC Vial - Sulfuric Acid (EP080)								
SW01_1,	SW01_2,	**02-Sep-2019**	**05-Sep-2019**	16-Sep-2019	✓	**05-Sep-2019**	16-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Amber VOC Vial - Sulfuric Acid (EP080)								
SW13_1,	SW13_2,	**03-Sep-2019**	**05-Sep-2019**	17-Sep-2019	✓	**05-Sep-2019**	17-Sep-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)								
SW01_1,	SW01_2,	**02-Sep-2019**	**06-Sep-2019**	09-Sep-2019	✓	**09-Sep-2019**	16-Oct-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08							
Amber Glass Bottle - Unpreserved (EP071)								
SW09,	SW12	**02-Sep-2019**	**09-Sep-2019**	09-Sep-2019	✓	**09-Sep-2019**	19-Oct-2019	✓
Amber Glass Bottle - Unpreserved (EP071)								
SW13_1,	SW13_2,	**03-Sep-2019**	**09-Sep-2019**	10-Sep-2019	✓	**09-Sep-2019**	19-Oct-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							
Amber VOC Vial - Sulfuric Acid (EP080)								
SW01_1,	SW01_2,	**02-Sep-2019**	**05-Sep-2019**	16-Sep-2019	✓	**05-Sep-2019**	16-Sep-2019	✓
SW01_3,	SW02_1,							
SW02_2,	SW02_3,							
SW03_1,	SW03_2,							
SW03_3,	SW04_1,							
SW04_2,	SW04_3,							
SW05_01,	SW05_2,							
SW05_3,	SW06,							
SW07_1,	SW07_2,							
SW07_3,	SW08,							
SW09,	SW12							
Amber VOC Vial - Sulfuric Acid (EP080)								
SW13_1,	SW13_2,	**03-Sep-2019**	**05-Sep-2019**	17-Sep-2019	✓	**05-Sep-2019**	17-Sep-2019	✓
SW13_3,	SW14_1,							
SW14_2,	SW16,							
SW17,	QC1							

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
SW01_1, SW01_2, SW01_3, SW02_1, SW02_2, SW02_3, SW03_1, SW03_2, SW03_3, SW04_1, SW04_2, SW04_3, SW05_01, SW05_2, SW05_3, SW06, SW07_1, SW07_2, SW07_3, SW08, SW09, SW12	**02-Sep-2019**	**05-Sep-2019**	16-Sep-2019	✓	**05-Sep-2019**	16-Sep-2019	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
SW13_1, SW13_2, SW13_3, SW14_1, SW14_2, SW16, SW17, QC1	**03-Sep-2019**	**05-Sep-2019**	17-Sep-2019	✓	**05-Sep-2019**	17-Sep-2019	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Dissolved Mercury by FIMS	EG035F	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	30	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	38	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	30	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Dissolved Mercury by FIMS	EG035F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	6	40	**15.00**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	6	38	**15.79**	**15.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Dissolved Mercury by FIMS	EG035F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Turbidity	EA045	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Dissolved Mercury by FIMS	EG035F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	30	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	38	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	30	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM (2013) Schedule B(3)
Turbidity	EA045	WATER	In house: Referenced to APHA 2130 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions

Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EW1903806**

Client	: **GHD PTY LTD**	Laboratory	: Environmental Division NSW South Coast
Contact	: DANIEL DEEN	Contact	: Glenn Davies
Address	: Level 11, 200 Crown Street, Wollongong, NSW 2500 2500	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
E-mail	: daniel.deen@ghd.com	E-mail	: Glenn.Davies@ALSGlobal.com
Telephone	: ----	Telephone	: 02 42253125
Facsimile	: ----	Facsimile	: W 02 42253128 N 02 44232083
Project	: 2316261 - FBB PC	Page	: 1 of 3
Order number	: 2316261	Quote number	: ES2017GHDSER0038 (SY/603/17 A)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Christie Allen, DANIEL DEEN		

Dates

Date Samples Received	: 03-Sep-2019 14:08	Issue Date	: 03-Sep-2019
Client Requested Due Date	: 10-Sep-2019	Scheduled Reporting Date	: **10-Sep-2019**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: ----	Temperature	: 4.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 30 / 30

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Analytical work for this work order will be conducted at ALS Sydney.**
- **Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.**
- **Please direct any queries you have regarding this work order to the above ALS laboratory contact.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EA045 Turbidity	WATER - NT-11 Total Nitrogen and Total Phosphorus	WATER - TPH TRH (C6-C40)	WATER - W-02 8 Metals
EW1903806-001	02-Sep-2019 10:20	SW01_1	✓	✓	✓	✓	✓
EW1903806-002	02-Sep-2019 10:20	SW01_2	✓	✓	✓	✓	✓
EW1903806-003	02-Sep-2019 10:20	SW01_3	✓	✓	✓	✓	✓
EW1903806-004	02-Sep-2019 10:45	SW02_1	✓	✓	✓	✓	✓
EW1903806-005	02-Sep-2019 10:45	SW02_2	✓	✓	✓	✓	✓
EW1903806-006	02-Sep-2019 10:45	SW02_3	✓	✓	✓	✓	✓
EW1903806-007	02-Sep-2019 11:30	SW03_1	✓	✓	✓	✓	✓
EW1903806-008	02-Sep-2019 11:30	SW03_2	✓	✓	✓	✓	✓
EW1903806-009	02-Sep-2019 11:30	SW03_3	✓	✓	✓	✓	✓
EW1903806-010	02-Sep-2019 12:09	SW04_1	✓	✓	✓	✓	✓
EW1903806-011	02-Sep-2019 12:09	SW04_2	✓	✓	✓	✓	✓
EW1903806-012	02-Sep-2019 12:09	SW04_3	✓	✓	✓	✓	✓
EW1903806-013	02-Sep-2019 12:55	SW05_01	✓	✓	✓	✓	✓
EW1903806-014	02-Sep-2019 13:30	SW05_2	✓	✓	✓	✓	✓
EW1903806-015	02-Sep-2019 13:30	SW05_3	✓	✓	✓	✓	✓
EW1903806-016	02-Sep-2019 14:55	SW06	✓	✓	✓	✓	✓
EW1903806-017	02-Sep-2019 09:31	SW07_1	✓	✓	✓	✓	✓
EW1903806-018	02-Sep-2019 09:31	SW07_2	✓	✓	✓	✓	✓
EW1903806-019	02-Sep-2019 09:31	SW07_3	✓	✓	✓	✓	✓
EW1903806-020	02-Sep-2019 15:30	SW08	✓	✓	✓	✓	✓
EW1903806-021	02-Sep-2019 14:20	SW09	✓	✓	✓	✓	✓
EW1903806-022	02-Sep-2019 16:30	SW12	✓	✓	✓	✓	✓
EW1903806-023	03-Sep-2019 08:10	SW13_1	✓	✓	✓	✓	✓
EW1903806-024	03-Sep-2019 08:10	SW13_2	✓	✓	✓	✓	✓
EW1903806-025	03-Sep-2019 08:10	SW13_3	✓	✓	✓	✓	✓
EW1903806-026	03-Sep-2019 10:05	SW14_1	✓	✓	✓	✓	✓
EW1903806-027	03-Sep-2019 10:05	SW14_2	✓	✓	✓	✓	✓
EW1903806-028	03-Sep-2019 09:25	SW16	✓	✓	✓	✓	✓
EW1903806-029	03-Sep-2019 08:55	SW17	✓	✓	✓	✓	✓
EW1903806-030	03-Sep-2019 00:00	QC1	✓	✓	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

Accounts Payable Australia

- A4 - AU Tax Invoice (INV)	Email	accountspayableAU@ghd.com

Colee Quayle

- *AU Certificate of Analysis - NATA (COA)	Email	colee.quayle@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	colee.quayle@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	colee.quayle@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	colee.quayle@ghd.com
- Chain of Custody (CoC) (COC)	Email	colee.quayle@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	colee.quayle@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	colee.quayle@ghd.com

DANIEL DEEN

- *AU Certificate of Analysis - NATA (COA)	Email	daniel.deen@ghd.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	daniel.deen@ghd.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	daniel.deen@ghd.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	daniel.deen@ghd.com
- A4 - AU Tax Invoice (INV)	Email	daniel.deen@ghd.com
- Chain of Custody (CoC) (COC)	Email	daniel.deen@ghd.com
- EDI Format - ENMRG (ENMRG)	Email	daniel.deen@ghd.com
- EDI Format - ESDAT (ESDAT)	Email	daniel.deen@ghd.com

CHAIN OF CUSTODY

ALS Environmental

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 32 Shand Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 024423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: portkembla@alsglobal.com

CLIENT: GHD	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	5 Day TAT
OFFICE: Nowra/Wollongong		☐ Non Standard or urgent TAT (List due date):	
PROJECT: FBB PC	ALS QUOTE NO.:	SY/603/17A	
ORDER NUMBER: 2316261			
PROJECT MANAGER: Daniel Deen	CONTACT PH: 0403 242 431		
SAMPLER: Daniel Deen, Christie Allen	SAMPLER MOBILE: 0476 019 212		
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com			

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:		°C	
Other comment:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Daniel Deen	*ALS Wollongong*		
DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
03/09/2019 /	03/09/2019 / -13:34		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SW01_1	2/09/2019 10:20:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
2	SW01_2	2/09/2019 10:20:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
3	SW01_3	2/09/2019 10:20:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				
4	SW02_1	2/09/2019 10:45:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				
5	SW02_2	2/09/2019 10:45:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				
6	SW02_3	2/09/2019 10:45:00 AM	w	P, N, AG, V, H	6	X	X	X	X	X				
7	SW03_1	02/09/2019 11:30	w	P, N, AG, V, H	6	X	X	X	X	X				
8	SW03_2	02/09/2019 11:30	w	P, N, AG, V, H	6	X	X	X	X	X				
9	SW03_3	02/09/2019 11:30	w	P, N, AG, V, H	6	X	X	X	X	X				
10	SW04_1	2/09/2019 12:09	w	P, N, AG, V, H	6	X	X	X	X	X				
11	SW04_2	2/09/2019 12:09	w	P, N, AG, V, H	6	X	X	X	X	X				
12	SW04_3	2/09/2019 12:09	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	72	12	12	12	12	12				

Environmental Division
Wollongong
Work Order Reference
EW1903806

Telephone : 02 42253125

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GHD	TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date): 5 Day TAT	FOR LABORATORY USE ONLY (Circle)	
OFFICE:	(Standard TAT may be longer for some tests e.g. Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT: FBB PC	ALS QUOTE NO.: SY/603/17A	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: 2316261	COC SEQUENCE NUMBER (Circle) COC: 1 [2] 3 4 5 6 7	Random Sample Temperature on Receipt:	C
PROJECT MANAGER: Daniel Deen CONTACT PH: 0403 242 431	OF: 1 2 3 [4] 5 6 7	Other comment:	
SAMPLER: Daniel Deen, Christie Allen SAMPLER MOBILE: 0476 019 212	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO) EDD FORMAT (or default):	*Daniel Deen*	*ALS Wollongong*		
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com	DATE/TIME:	DATE/TIME:	DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com	03/09/2019 /	03/09/2019 /		

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	SW05_01	02/09/2019 12:55	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
14	SW05_2	02/09/2019 13:30	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
15	SW05_3	02/09/2019 13:30	w	P, N, AG, V, H	6	X	X	X	X	X				
16	SW06	02/09/2019 14:55	w	P, N, AG, V, H	6	X	X	X	X	X				
17	SW07_1	02/09/2019 09:31	w	P, N, AG, V, H	6	X	X	X	X	X				
18	SW07_2	02/09/2019 09:31	w	P, N, AG, V, H	6	X	X	X	X	X				
19	SW07_3	02/09/2019 09:31	w	P, N, AG, V, H	6	X	X	X	X	X				
20	SW08	02/09/2019 15:30	w	P, N, AG, V, H	6	X	X	X	X	X				
21	SW09	02/09/2019 14:20	w	P, N, AG, V, H	6	X	X	X	X	X				
22	SW12	02/09/2019 16:30	w	P, N, AG, V, H	6	X	X	X	X	X				
23	SW13_1	03/09/2019 08:10	w	P, N, AG, V, H	6	X	X	X	X	X				
24	SW13_2	03/09/2019 08:10	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	72	12	12	12	12	12				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

CLIENT: GHD	TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date): 5 Day TAT		FOR LABORATORY USE ONLY (Circle)
OFFICE:	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):		Custody Seal Intact? Yes No N/A
PROJECT: FBB PC	ALS QUOTE NO.: SY/603/17A	COC SEQUENCE NUMBER (Circle)	Free Ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: 2316261		COC: 1 2 **3** 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Daniel Deen	CONTACT PH: 0403 242 431	OF: 1 2 3 **4** 5 6 7	Other comment:

SAMPLER: Daniel Deen, Christie Allen	SAMPLER MOBILE: 0476 019 212	RELINQUISHED BY:	RECEIVED BY:
COC emailed to ALS? (YES / NO)	EDD FORMAT (or default):	*Daniel Deen*	*ALS Wollongong*
Email Reports to (will default to PM if no other addresses are listed): colee.quayle@ghd.com		DATE/TIME:	DATE/TIME:
Email Invoice to (will default to PM if no other addresses are listed): colee.quayle@ghd.com		03/09/2019 /	03/09/2019 /

RELINQUISHED BY:	RECEIVED BY:
DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL CONTAINERS	W-02 (Dissolved Metals)	EA045 (Turbidity)	TPH (TRH C6-C40)	NT-11 (Total Nitrogen, Total Phosphorus)	EA025H (Suspended Solids)				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
25	SW13_3	03/09/2019 08:10	w	P, N, AG, V, H	6	X	X	X	X	X				Metals are field filtered
26	SW14_1	03/09/2019 10:05	w	P, N, AG, V, H	6	X	X	X	X	X				Please note turbidity holding times
27	SW14_2	03/09/2019 10:05	w	P, N, AG, V, H	6	X	X	X	X	X				
28	SW16	03/09/2019 09:25	w	P, N, AG, V, H	6	X	X	X	X	X				
29	SW17	03/09/2019 08:55	w	P, N, AG, V, H	6	X	X	X	X	X				
30	QC1	03/09/2019 [redacted]	w	P, N, AG, V, H	6	X	X	X	X	X				
				TOTAL	36	6	6	6	6	6				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

Attachment F - Calibration Certificates

Multi Parameter Water Meter

Instrument **YSI Pro DSS**
Serial No. **15J100066**

airmet

Air-Met Scientific Pty Ltd
1300 137 067

Item	Test	Pass	Comments
Battery	Charge Condition	✓	
	Fuses	✓	
	Capacity	✓	
	Recharge OK?	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
Grill Filter	Condition	✓	
	Seal	✓	
PCB	Condition	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. Turbidity	✓	
	3. Conductivity	✓	
	4. D.O	✓	
	5. Temp	✓	
	6. Depth	✓	
Alarms	Beeper		
	Settings		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

This is to certify that the above instrument has been calibrated to the following specifications:

Sensor	Serial no	Standard Solutions	Certified	Solution Bottle Number	Instrument Reading
1. EC		2.76mS		329027	2.76mS
2. Temp		22.4°C		Testo	20.9°C
3. pH 4		pH 4.00		324985	pH 3.82
4. pH 7		pH 7.00		330737	pH 7.01
5. pH 10		pH 10.00		324189	pH 9.94
6. DO		0.00ppm		329994	0.06ppm
7.Turbidity		20 NTU		335947	20.5NTU
8. mV		231.8mV		325420/325421	230.8mV

Calibrated by: **Sen Philip**

Calibration date: **28/08/2019**

Next calibration due: **27/09/2019**

Attachment G - Laboratory Quality Assurance and Quality Control Results

Field Program surface water

Intra- laboratory duplicate samples were collected and analysed as part of the surface water sampling program and the relative percentage differences (RPD) were calculated. Intra-laboratory measures the reproducibility of measurements under a given set of conditions. The precision of the data is assessed by calculating the Relative Percent Difference (RPD) between duplicate sample pairs.

$$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where Co = Analyte concentration of the original sample
Cd = Analyte concentration of the duplicate sample

GHD adopts a nominal acceptance criterion of 30% RPD. Where a sample concentration is ten times the limit of report (LOR) the RPD must be below 30%. Where a sample concentration is less than ten times the LOR the RPD has no limit. Surface water QA/QC results are presented as Table B2, Attachment B. RPD of turbidity and total phosphorus between duplicate pairs SW14_1 and QC1, of 34% and 184%, respectively, which is above the acceptance criteria. However, concentrations reported for QC1 were similar to SW14_2, which was collected at the same time as the duplicate sample. The RPD's for QC1 and SW14_2 were also less than 30%.

This result indicates some variability in these concentrations which will need to be considered in this assessment. However, turbidity and total phosphorus concentrations have historically exceeded the assessment criteria at this location, therefore the variability observed in concentrations for this monitoring round are unlikely to material affect the conclusions of the report.

The remaining RPD's recorded were within the adopted control limits.

Sample Receipt

The laboratory measured samples temperatures at 4.3°C upon receipt to the laboratory, which is below the recommended 6°C.

Laboratory Program

The NATA accredited laboratories utilised for this assessment (ALS) undertook their own quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are attached in the laboratory reports as Attachment E.

The laboratory provided the following summary of QA/QC compliance assessment:

- No method blank value outliers occur.
- No duplicate outliers occur.
- No laboratory control outliers occur.
- No matrix spike outliers occur.
- For all regular sample matrices, no surrogate recovery outliers occur
- No analysis holding time outliers exist.
- Quality control sample frequency outliers exist for TRH duplicate and matrix spike. The laboratory indicated the frequency was zero, which was lower than the recommended frequency of ten and five, respectively. The laboratory indicated that there was insufficient sample to carry out this quality control test. This is not considered significant as TRH concentrations have historically been below the laboratory reporting limits and field duplicate results were within adopted control limits.
- All samples were noted to be correctly preserved.

Summary of Quality Assurance / Quality Control Results

QA/QC results show that the samples collected, have met the appropriate standards and therefore, the data was considered to be valid and of sufficient quality to meet the data quality objectives for the assessment.

Attachment H - Field sheets

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	10:20
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:	SW01		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	underneath bridge		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Sunny, patchy cloud, no rainfall
VEGETATION	As previous, bare rock creek bed, scattered trees shrubs
SLOPE	-
EROSION	Not evident
OTHER	Underneath bridge

FIELD MEASUREMENTS

SAMPLE	SW01		
TEMPERATURE (°C)	12.3		
CONDUCTIVITY (uS/cm)	129.5 | 94.8		
pH	7.37		
DO (ppm)	5.18		
REDOX (mV)	117.0		

Turbidity ~1.4 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low to moderate flow
CROSS SECTION WIDTH (m)	~ 5-7m wide
DEPTH (m)	~ 0.5-1.0m in centre
OTHER	No change in site conditions, water level slightly lower, clear, brown tinge, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW01_1	6		SW01_2	
			SW01_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	02/09/19
PROJECT NAME:	FBB PC	**TIME:**	1045
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW02		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Sunny, some cloud and light rain
VEGETATION	vegetated and rocky banks
SLOPE	relatively flat
EROSION	N/A
OTHER	Not flowing over road crossing but fast flow underneath

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	12.6		
CONDUCTIVITY (uS/cm)	137.4 / 104.8		
pH	7.33		
DO (ppm)	5.09		
REDOX (mV)	126.5		

Turb: ~1.0 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Fast flow underneath weir, low flow once past weir downstream where we sampled
CROSS SECTION WIDTH (m)	5-10m
DEPTH (m)	~1m
OTHER	Brown tinge, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW02_1	6		~~SW02~~ SW02_2	
			SW02_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	02/09/19
PROJECT NAME:	FBB PC	**TIME:**	11:30
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW03		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy, some sun
VEGETATION	Grassy vegetation on banks
SLOPE	Relatively flat
EROSION	None observed
OTHER	Farmland upslope of banks with shrubs, trees and grass uprooted tree down from sampling site

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.9°		
CONDUCTIVITY (uS/cm)	144.0 src / 108.0		
pH	7.33		
DO (ppm)	5.45		
REDOX (mV)	131.0		

Turb - 0.9 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Mod- Fast flow
CROSS SECTION WIDTH (m)	~5m
DEPTH (m)	~0.5m
OTHER	Clear to slighty brown, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW03_1	6		SW03_2	
			SW03_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	02/09/2019
PROJECT NAME:	FBB PC	**TIME:**	1209
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW04		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy with sun
VEGETATION	Grassy banks, some trees, cow pats around creekside
SLOPE	flat, undulating to north
EROSION	some erosion at banks, mainly on north side
OTHER	Cows in paddock beside creek - cows also cleaning car looking for food

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	12.5°		
CONDUCTIVITY (uS/cm)	103.1 / 78.6		
pH	7.02		
DO (ppm)	5.07		
REDOX (mV)	121.3		

Turb : 1.7 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Mod-high flow at sample location, low up and downstream
CROSS SECTION WIDTH (m)	~ 1-3m
DEPTH (m)	~1.0m
OTHER	brown tinge, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW04_1	6		SW04_2	
			SW04_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	1255 SWOS_1 / 1330 SWOS_2 / SWOS_3
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SWOS		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy
VEGETATION	vegetated banks - shrubs, some trees
SLOPE	Steep slope down to banks
EROSION	Erosion of soil alongbanks - possibly from runoff
OTHER	underneath bridge

FIELD MEASUREMENTS 1255 SWOS_1 1330 SWOS_2 SWOS_3

SAMPLE	From sample container	From creek	
TEMPERATURE (°C)	13.2°	12.6°	12.8°
CONDUCTIVITY (uS/cm)	303.8/235.5	376.9/287.6	289.9/221.8
pH	7.13	7.06	7.20
DO (ppm)	~~5.48~~ 5.17	5.15	5.18
REDOX (mV)	136.1	111.1	130.4
	Turb - 2.8NTU	Turb - 2.8NTU	Turb: 13.7 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	20-25m
DEPTH (m)	150mm less than previous time
OTHER	brown tinge, turbid, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SWOS_1	6		SWOS_2	
			SWOS_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	~ 1455
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW06 - northern side of creek		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy
VEGETATION	highly vegetated - shrubs, grass, debris from trees on banks
SLOPE	relatively flat
EROSION	Not evident
OTHER	

FIELD MEASUREMENTS

SAMPLE	Taken from sample container	Taken from creek	
TEMPERATURE (°C)	13.9°	13.3	
CONDUCTIVITY (uS/cm)	213.5/168.8	210.1 / 163.3	
pH	6.58	6.63	
DO (ppm)	4.98	5.02	
REDOX (mV)	118.9	111.3	
	Turb - 1.5 NTU	Turb - 1.4 NTU	

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	~5 m
DEPTH (m)	~1-2m
OTHER	Looks like less water than last time, browny-green, very turbid and cloudy - algae and moss on bank - clump in middle of creek

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW06	6	—	—	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	02/09/2019
PROJECT NAME:	FBB PC	**TIME:**	~~0830~~ 0930
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:	SW07		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	Approx. 10m south of white in-flow pipes		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Clear, Sunny
VEGETATION	Grassed banks either side + vegetation (including ducks, water dragon)
SLOPE	Slightly sloped
EROSION	Not present
OTHER	water level looks lower than last time

FIELD MEASUREMENTS ~~0954~~ 0954

SAMPLE	with cover	without cover	
TEMPERATURE (°C)	14.7°	12.3°	
CONDUCTIVITY (uS/cm)	3.8 spc / 3.0 c	120.1 spc / 91.0 c	
pH	7.87	7.63	
DO (ppm)	4.85	5.04	
REDOX (mV)	139.6	106.3	

HYDROLOGICAL DATA Turbidity - 21.2 NTU Turb - 1.8 NTU

FLOW MEASUREMENT (or stream height if rating table available)	low flow
CROSS SECTION WIDTH (m)	10-15m ~~sq~~
DEPTH (m)	~1m
OTHER	slight brown tinge, slightly turbid, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW07-1	6	-	SW07_2	
			SW07_3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	1530
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW08		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy
VEGETATION	vegetated along banks - shrubs, grass, trees
SLOPE	medium - ~~slope~~ low slope
EROSION	Not evident
OTHER	

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	14.9		
CONDUCTIVITY (uS/cm)	279.8 / 225.8		
pH	6.64		
DO (ppm)	4.93		
REDOX (mV)	127.9		

Turb - 9.1 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	~1-10 m
DEPTH (m)	~1 m
OTHER	Brown tinge, slightly turbid, no odour or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW08	6	—	—	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	1420 / 1435
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW09 - Below bridge where 2 small creeks meet		

* ~~southern~~ ~~northern~~ - orange sludge
~~southern~~ northern - debris + algae

ENVIRONMENTAL OBSERVATIONS

WEATHER	Cloudy
VEGETATION	highly vegetated banks - shrubs, grass, trees, rocks
SLOPE	Relatively flat
EROSION	Not visible
OTHER	Algae underneath bridge on concrete support and on river banks, depth 100s 100ml lower than last

FIELD MEASUREMENTS

	1420	1435	
SAMPLE	in mossy area	upstream 1 metre on rocks	
TEMPERATURE (°C)	14.1°	13.9	
CONDUCTIVITY (uS/cm)	216.7 / 171.3	214.3 / 168.9	
pH	6.90	6.80	
DO (ppm)	5.00	4.89	
REDOX (mV)	49.6	62.9	

Turb - ~~96~~ 961.3 Turb - 1.0

HYDROLOGICAL DATA

* On southern side of bridge - orange sediment / sludge on northern side - as previous, some debris build up and some algae

FLOW MEASUREMENT (or stream height if rating table available)	Mod. flow
CROSS SECTION WIDTH (m)	~1-2m
DEPTH (m)	~0.5m
OTHER	Brown tinge, slightly turbid, no sheen, mossy banks, slight smelly odour - organic

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW09	6	—	—	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	**FBB PC**	**TIME:**	~~1600~~ 1600
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:			
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW10 - no sample collected		

ENVIRONMENTAL OBSERVATIONS

WEATHER	sunny, partly cloudy
VEGETATION	Grassed banks, paddocks on north, road to east + south
SLOPE	relatively flat
EROSION	small amount
OTHER	

FIELD MEASUREMENTS Did not sample

SAMPLE			
TEMPERATURE (°C)			
CONDUCTIVITY (uS/cm)			
pH	N/A		
DO (ppm)			
REDOX (mV)			

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	No water in creek bed
CROSS SECTION WIDTH (m)	~~0.5~~ ~0.5m
DEPTH (m)	
OTHER	some water in dam

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/9/19
PROJECT NAME:	**FBB PC**	**TIME:**	16:00
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: SW11

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)* Grab

DETAILED SAMPLE LOCATION DESCRIPTION Same as previous ~ No sample collected

ENVIRONMENTAL OBSERVATIONS

WEATHER	Blue sky, sunny, patchy cloud
VEGETATION	Slightly vegetated banks, trees, grass, shrubs → as previous
SLOPE	Flat either side
EROSION	Not evident
OTHER	Landscaped slopes along bank

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)			
CONDUCTIVITY (uS/cm)	N/A		
pH			
DO (ppm)			
REDOX (mV)			

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	No water in creek
CROSS SECTION WIDTH (m)	1-1.5m
DEPTH (m)	–
OTHER	Patchy of orange brown sludge in creek bed. No flow from stw drainage pipes

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	2/09/19
PROJECT NAME:	FBB PC	**TIME:**	1630
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA
SITE:	SW12		
COORDINATES/GPS *(If Applicable)*			
SAMPLING METHOD *(ie grab, bucket)*	Grab		
DETAILED SAMPLE LOCATION DESCRIPTION	SW12 - Creek dried up, sampled from concrete well		

ENVIRONMENTAL OBSERVATIONS

WEATHER	Sunny
VEGETATION	Grassed and rocky area around culvert
SLOPE	Flat
EROSION	Not evident
OTHER	

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	10.8°		
CONDUCTIVITY (uS/cm)	335.1/244.2		
pH	7.54		
DO (ppm)	5.33		
REDOX (mV)	124.8		

Turb: 7.1 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	None
CROSS SECTION WIDTH (m)	<1m - well diameter
DEPTH (m)	unclear
OTHER	unclear - slightly turbid, brown-green tinge, no odour or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW12	6	—	—	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	3/09/19
PROJECT NAME:	FBB PC	**TIME:**	0810
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: SW13

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)* Grab

DETAILED SAMPLE LOCATION DESCRIPTION SW13 - southern side of creek, near bridge

ENVIRONMENTAL OBSERVATIONS

WEATHER	Sunny, clear
VEGETATION	Banks are exposed soil, patchy grass, trees further east
SLOPE	Creek slopes are steep, flat grassed areas either side of creek
EROSION	No further erosion since previous event, exposed creek banks
OTHER	

FIELD MEASUREMENTS

SAMPLE	SW13_1		
TEMPERATURE (°C)	12.0		
CONDUCTIVITY (uS/cm)	516 | 388.3		
pH	7.43		
DO (ppm)	5.41		
REDOX (mV)	110.1		
Turbidity (NTU)	40.4		

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	Low flow
CROSS SECTION WIDTH (m)	0.5-1.0m
DEPTH (m)	~150mm- lower than previous 50-250mm
OTHER	Clear, no odor or sheen

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW13-1	6		SW13-2	
			SW13-3	

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	3/09/19
PROJECT NAME:	FBB PC	**TIME:**	1005
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: SW14

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)*: Grab

DETAILED SAMPLE LOCATION DESCRIPTION: Pool of water near culvert

ENVIRONMENTAL OBSERVATIONS

WEATHER: sunny, clear

VEGETATION: dense reeds around culvert opening

SLOPE: Relatively flat

EROSION: None evident

OTHER:

FIELD MEASUREMENTS • samples taken by moving sludge away from surface

SAMPLE			
TEMPERATURE (°C)	11.8		
CONDUCTIVITY (uS/cm)	734 / 549		
pH	6.94		
DO (ppm)	6.65		
REDOX (mV)	145.1		

Turb. 33.2

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available): No flow

CROSS SECTION WIDTH (m): ~1-2m

DEPTH (m): ~50-100mm

OTHER: Brown, green algae sludge on surface of water, no sheen or odour

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW14_1	6		SW14_2	
			~~SW14_3~~ QC1	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	3/09/19
PROJECT NAME:	FBB PC	**TIME:**	0830
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: SW1S

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)*: Grab

DETAILED SAMPLE LOCATION DESCRIPTION: SW1S - No samples taken
Northern side of creek

ENVIRONMENTAL OBSERVATIONS

WEATHER	sunny, clear
VEGETATION	Heavily vegetated around and in creek - reeds, grass, shrubs
SLOPE	slight slope
EROSION	none evident
OTHER	

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)			
CONDUCTIVITY (uS/cm)			
pH	N/A		
DO (ppm)			
REDOX (mV)			

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available)	–
CROSS SECTION WIDTH (m)	<0.5m
DEPTH (m)	–
OTHER	Heavy vegetation covered any remaining water left in the creek

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	~~0[illegible]~~ 3/09/19
PROJECT NAME:	FBB PC	**TIME:**	~~0[illegible]~~ 0925
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: ~~[illegible]~~ SW16

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)* Grab

DETAILED SAMPLE LOCATION DESCRIPTION western side of bridge

ENVIRONMENTAL OBSERVATIONS

WEATHER: sunny, clear

VEGETATION: Heavily vegetated with reeds

SLOPE: Relatively flat

EROSION: None evident

OTHER: Vegetation occupying and covering most of remaining water in creek

FIELD MEASUREMENTS • Samples collected by moving algael sludge away from surface

SAMPLE	~~Taken at 0925~~		
TEMPERATURE (°C)	12.4°		
CONDUCTIVITY (uS/cm)	297.7 / 227.2		
pH	6.94		
DO (ppm)	5.47		
REDOX (mV)	112.2		

TURB - 2067.0

HYDROLOGICAL DATA significantly less water in creek than previous

FLOW MEASUREMENT (or stream height if rating table available): No flow

CROSS SECTION WIDTH (m): ~1-2m

DEPTH (m): Underneath sludge quite clear water ~200mm

OTHER: Green, grey, brown algael sludge within remaining water - on surface ~~and submerged into it~~

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
~~[illegible]~~ SW16	6			

FIELD SUPERVISOR **CHECKED** (SIGN & DATE)

SURFACE WATER SAMPLING RECORD

PROJECT NO.	23-16261-01	**DATE:**	3/09/19
PROJECT NAME:	FBB PC	**TIME:**	0855
CLIENT:	RMS	**SAMPLING OFFICERS:**	DJD/CA

SITE: SW17

COORDINATES/GPS *(If Applicable)*

SAMPLING METHOD *(ie grab, bucket)*: Grab

DETAILED SAMPLE LOCATION DESCRIPTION: underneath / Eastern side of bridge

ENVIRONMENTAL OBSERVATIONS

WEATHER: Sunny, clear

VEGETATION: Grassed reeds in previous sample location. Shrubs + rocky banks

SLOPE: Relatively flat

EROSION: Not evident

OTHER: Sampled ~~more~~ closer under bridge as vegetation covered previous sample location. frogs

FIELD MEASUREMENTS

SAMPLE			
TEMPERATURE (°C)	11.4		
CONDUCTIVITY (uS/cm)	341.0 | 252.2		
pH	6.92		
DO (ppm)	5.48		
REDOX (mV)	111.4		

Turb: 2.8 NTU

HYDROLOGICAL DATA

FLOW MEASUREMENT (or stream height if rating table available): No flow

CROSS SECTION WIDTH (m): 1-2 m

DEPTH (m): <0.5m

OTHER: Algae and moss on top of water and in it, no odour, scaly sheen on surface, green-grey tinge

SAMPLE NO.	NO. OF CONTAINERS	PRESERVATIVE	DUPLICATE	COMMENTS
SW17	6	—	—	

FIELD SUPERVISOR

CHECKED (SIGN & DATE)

Sample	*Type of Sample*	*Conditional triple: (Compare water parameters +/-10%)*
SW01	Triple	
SW02	Triple	
SW03	Triple	
SW04	Triple	
SW05	Single	SW03
SW06	Not specified	
SW07	Triple	
SW08	Single	SW09
SW09	Not specified	
SW10	Single	SW11
SW11	Triple	
SW12	Not specified	
SW13	Single	SW12
SW14	Single	SW15
SW15	Triple	
SW16	Single	
SW17	Single