

Friday 3rd April 2020

To: [REDACTED]
Site Engineer, LendLease
New Tweed Valley Hospital Project

Re: Surface Water Quality Monitoring Results & Report for the Tweed Valley Hospital Project

Reporting period: 12th February 2020 to 16th March 2020

1.0 INTRODUCTION

Ecoteam is engaged to undertake monthly and event-based surface water monitoring on behalf of Lendlease Building as part of the early works for the Tweed Valley Hospital Project. This report presents results from the ninth round of monthly sampling. This report satisfies requirements of the SSD condition C34. No controlled or uncontrolled releases from the sediment basins occurred during the reporting period.

2.0 PROJECT AIMS AND SAMPLING OBJECTIVES

The surface water monitoring objectives for the site are to detect changes during construction in receiving water quality resulting from the project, with stormwater discharges potentially containing increased sediment loads, nutrients, total and dissolved metals, hydrocarbons or other contaminants such as pesticides. Baseline water quality data was performed on the 19th & 26th November and 19th December 2018 to record water quality conditions under the existing land use prior to construction (Lendlease Building, 2019).

3.0 WEATHER CONDITIONS

Total rainfall in the period prior to sampling (12th February 2020 to 16th March 2020) was 447.4 mm with the highest 24-hour rainfall occurring on 13th of February, being 135.4 mm (Kingscliff BOM Station 058137).

4.0 SAMPLING LOCATIONS

Samples were collected from all five monthly sampling sites (001 – 005). Control samples were also collected and analysed (013 – 015). Sample codes and corresponding sampling locations are shown in **Table 1** and **Figure 1**. Site photos taken on the day of sampling are included in **Appendix A**

Table 1. Monthly sampling sites, control samples, sample codes and applicable WQOs.

Sample Codes	Sampling Site Name	Short Name	WQOs
001	Upstream Creek (West)	USW	Estuarine
002	Upstream Creek (North West)	USNW	Estuarine
003	Downstream Creek (East)	DSE	Freshwater
004	Dam	Dam	Freshwater
005	Dam Drain	DD	Freshwater
013	Trip Blank	Trip	NA
014	Field Blank	Field	NA
015	Field Duplicate	Duplicate	NA



Figure 1. Map of monthly sampling sites (Source: Google Earth)

5.0 SAMPLING METHODOLOGY

Sampling was undertaken by [REDACTED] on Monday 16th March 2020. In situ physico-chemical measurements were collected using a SmarTROLL multi-parameter probe and Turbidity was measured using a Turbimeter Plus. Oil and Grease was visually assessed. The calibration certificate for the SmarTROLL is included as **Appendix B**. The Turbimeter Plus is calibrated before each sampling round. Water quality samples were collected at 300 mm below the surface where possible. Samples were collected from the bank using an extension pole.

Samples were filtered and preserved on site where necessary, stored on ice and couriered over night to NATA accredited EnviroLab in Sydney. Trip blank samples (013) were sent from EnviroLab and transported to all sites and sent back with the field samples. The field blank samples (014) were assessed at Site 002 and duplicate samples (015) were collected at Site 003 and were filtered and preserved as required. Field and trip blanks were filled with deionized water and do not represent water quality from the site. A full list of analytes for the project are included in **Appendix C**.

6.0 ASSESSMENT CRITERIA

Water quality results were compared against the Water Quality Objectives (WQO) in the following guidelines.

- NSW Water Quality Objectives for the Tweed River Catchment for Aquatic Ecosystems (Tweed 2006) - Trigger criteria for estuaries.
- Australian and New Zealand guidelines for fresh and marine water quality (ANZECC 2000) – Trigger values for freshwater (level of protection 95% species).

7.0 RESULTS

7.1 Physico-chemical Results

In situ physico-chemical sampling results with comparison to WQOs are shown in **Table 2**. There were no surface sheens visible at any sites, therefore Oil and Grease were not present. Water was visibly turbid in all sites except for Site 005 and due to high rainfall in the previous month.

Table 2. Results of physico-chemical parameters collected in situ at monthly sampling sites and in the field blank. Results above guidelines are highlighted.

Analyte	Units	Water Quality Objectives (WQOs)		Sample Codes & Results				
		Fresh Water	Estuary	USW 001	USNW 002	DSE 003	Dam 004	DD 005
pH		6.5-8.5	7.0-8.5	6.73	6.92	6.96	6.63	6.29
Turbidity	NTU	6.0-50	0.5-10	8.39	25.8	30.0	17.5	5.91
Electrical Conductivity (EC)	µS/cm	125-2,200	125-2,200	452.2	386.9	220.4	392.0	210.3
Dissolved Oxygen (DO)	% Saturation	85-110	80-110	91.7	94.4	91.8	105	91.5
Temperature	°C	N/A	N/A	19.90	20.59	20.88	20.31	20.79
Oxidation Reduction Potential (ORP)		N/A	N/A	73.0	81.6	7.9	65.8	88.5

When compared to the WQOs for freshwater and estuaries:

- pH was out of the WQO ranges for sites 001, 002 and 005 this sampling round.
- Turbidity was out of the WQO ranges within sites 002 and 005 this sampling round.
- EC was within the WQO ranges at all sites this sampling round
- DO concentrations were within the expected range at all sampling sites this sampling round. DO was outside the range at comparison sites in background sampling.

7.2 Laboratory Results

Ammonia, Chlorophyll-a, Filterable Reactive Phosphorus (FRP), Oxides of Nitrogen (NOx), Total Nitrogen and Total Phosphorus (TP) were above the WQOs for some sample sites. Some metals (aluminium, cobalt and zinc) were also outside WQOs. Parameters which exceeded the WQOs are shown in **Table 3**.

The chain of custody form is included in **Appendix D**. A summary of all lab results with comparison to WQOs is included as **Appendix E**. A full copy of the laboratory results is included as **Appendix F**.

Table 3. Parameters in exceedance of the trigger criteria for sampling conducted 16th March 2020. Results above guidelines are highlighted.

		Water Quality Objectives (WQOs)		Sample Codes								
Analyte	Units	Fresh Water	Estuary	USW 001	USNW0 002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate	
Nutrients												
Ammonia	mg/L	0.02	0.015	0.052	0.16	0.051	0.51	0.083	<0.005	<0.005	0.054	
Chlorophyll-a	mg/m ³	5	4	4	<1	150	3	<1	<1	<1	81	
Filterable Reactive Phosphorus	mg/L	0.02	0.005	0.024	0.017	0.018	0.026	<0.005	<0.005	<0.005	0.017	
Oxides of Nitrogen	mg/L	0.040	0.015	0.03	0.30	<0.005	0.2	5.0	<0.005	<0.005	<0.005	
Total Nitrogen	mg/L	0.35	0.30	0.9	2.1	1.5	1.3	5.9	<0.1	<0.1	1.5	
Total Phosphorus	mg/L	0.025	0.030	0.07	0.07	1.4	0.09	<0.05	<0.05	<0.05	0.5	
Aluminium	µg/L	55	N/A	50	300	400	210	30	<10	<10	380	
Cobalt	µg/L	N/A	1.0	1	3	1	11	<1	<1	<1	1	
Zinc	µg/L	8.0	15	4	8	9	20	9	<1	<1	10	

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs at all sampling locations, ammonia was above the WQOs at comparison sites in background sampling.
- Chlorophyll-a above the WQOs criteria at Site 003. Chlorophyll-a results were varied across comparison sites in background sampling. Chlorophyll-a has increased at site 001, 003 and 004 when compared to last month.

- FRP was above the WQOs criteria at Sites 001, 002 and 004, FRP has increased at Site 001 and reduced at Site 002 and 004. FRP results varied across comparison sites in background sampling though were lowest at Site 005.
- NOx was above the WQOs criteria at Sites 001, 002, 004 and 005. NOx has increased at Site 004 and reduced at Site 001, 002 and 005 when compared to the previous month.
- TN was above the WQOs at all sampling locations. TN has increased at Site 002, 003 and 004. TN has reduced at Site 001 and 005 when compared to the previous month. Total nitrogen was above the WQOs at comparison sites in baseline sampling.
- TP was above the WQOs at all sampling locations. TP was above the WQOs at comparison sites in baseline sampling. TP has increased at Site 004 and decreased at all other sites when compared to the previous month.
- Aluminium was above the WQO at sites 003 and 004. The estuary sites were also high. Cobalt was above the WQOs at Site 002. Zinc was above the WQO at site 003, 004 and 005. These metals have been observed at both upstream and downstream sampling sites during past sampling rounds.
- All other metals were within estuarine and freshwater criteria this month.
- Demeton and Lindane were analysed and returned non-detectable results.
- TRH (C₁₀-C₄₀) was not detected at any sample site.

8.0 Quality Assurance and Quality Control

Trip blank and field blank samples were analysed.

- All results for the Field Blank and Trip Blank were well within WQOs.
- Parameters analysed in the Trip Blank (013) were below laboratory detection limits.
- Parameters analysed in the Field Blank (014) are all below detectable limits.
- The Duplicate Sample (015) was collected at Site 003 and is within acceptable limits for all analytes.
- The laboratory Limit of Reporting (LOR) for Total Phosphorus (TP) was above the WQOs. The LOR limit does not affect the quality of reporting and analysis as TP was above this limit for all sample sites except for Site 005. Site 005 has typically had TP concentrations above this LOR which has decreased over the past 3 months. The TP LOR will be reduced for future reporting.

The laboratory QA/QC is included in the results in **Appendix F**. All laboratory QA/QC was within acceptance criteria. Based on the above, the results are considered acceptable for the purposes of the project.

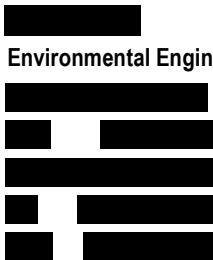
9.0 Summary of Results and Recommendations

- The month had moderate rainfall, which followed a period of very high rainfall. Most sites were noticeably turbid. Site 005 was very clear with low turbidity.
- Nutrients (Ammonia, NOx, TN, TP and FRP) and chlorophyll-a were high and exceeded some water quality parameters for some sites. This includes upstream and downstream sites. Exceedances in these analytes are therefore of natural occurrence.
- Aluminium, cobalt and zinc exceeded WQOs at some sites during the month. These metals are present in both upstream and downstream sites and have been present in previous sampling rounds. Changes in these metals may be due to pH and redox changes, microbial mineralisation and naturally occurring sediment transportation.

- Based on the aforementioned increases to nutrients and metals at all sampling sites, including sites 001 and 002 in the previous month which are not downstream of the construction activities, the Tweed Valley Hospital Development construction activities are not adversely impacting the downstream water system. As such, the current soil and erosion controls implemented on site are effective.

If you require additional information, please do not hesitate to ask.

Kind regards,



Environmental Engineer & Director

Appendix A. Site Photos



**Site 001 – Upstream Creek West
(16/03/2020)**



**Site 002 – Upstream Creek North
West
(16/03/2020)**



**Site 003 – Downstream Creek East
(16/03/2020)**



Site 004 – Dam
(16/03/2020)



Site 005 – Dam Drain
(16/03/2020)

Appendix B. Calibration certificate for Smart Troll

ThermoFisher SCIENTIFIC Thermo Fisher Scientific Australia Pty Ltd ABN 52 058 390 917 5 Caribbean Drive Scoresby VIC 3179 Phone: 1 300 735 295 Fax: 03 9763 1169	ELECTROCHEMICAL INSTRUMENT MAINTENANCE & CALIBRATION REPORT
Customer: Ecotechnology Australia PTY Ltd Address: 13 Ewing st Lismore NSW 2480	
Attention: [REDACTED]	

Make:	In-Situ	Lab.ID/Assett No.	NA	Calibration Date:	16-08-2019
Model:	smarTROLL	Customer O/No.	[REDACTED]	Next Calibration:	08-2020
Serial No:	371986	Location:	NA	Call Number:	SV1907240018

Service and Safety Checks		Pass/Fail	Check and Adjust		Pass/Fail
Consult operator regarding performance/problems		Pass	Probes, leads and connectors		Pass
Check general operation, note additional problems		Pass	Keypad / user controls		Pass
Electrical safety if applicable to AS/NZS 3760:2003		N/A	Power supply / battery voltage and condition		Pass
Initialization Procedure		Pass	Probe(s) performance (response slow or acceptable)		Acceptable
Instrument Condition		Pass	Internal and external cleaning		Pass

Calibration/ Accuracy Tests

Standard Type	Serial Number (if applicable)	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Pass/ Fail
✓ pH		7.00 ± 0.02	7.02	4.00 ± 0.02	4.00			Pass
✓ mV (pH)		0.0 +/- 30	-11.0	175.5 +/- 30	157.2			Pass
✓ Slope (pH)		-59.1 +/- 3	-56.16					Pass
✓ DO		8.8mg/L @21.5oC	8.83mg/L @21.28oC	0.0	0.08			Pass
ISE								
✓ ORP		218mV	218mV					Pass
✓ Conductivity		1413us/cm	1414us/cm					Pass
TDS								
✓ Temp C		21.27	21.28					Pass

Reference Instruments Used			
Make	Model / Part Number	Serial / Batch Number	Expiry / Reference #
Thermo Scientific	Temp360	4006227	Jan 2020
Thermo Scientific	EBCU4BTC1LIT	099/01	Feb 2022
Thermo Scientific	EBCU7BTC1LIT	099/01	Feb 2022
Thermo Scientific	ECCON1413BT	099/01	Feb 2022
TPS	Sodium Sulphite for Zero DO	5928	Mar 2020
Thermo Scientific	ORP Standard 967901	VR1	Sept 2019

General Comments and Recommendations on Instrument Condition, Location Details and Parts Used in Service			
Instrument inspected and noted operation. Noted corrosion on pH/ORP connection pins on probe and meter. Cleaned and installed new pH/ORP probe. Instrument calibrated and confirmed operation. DO cap expires in 201 days. Sensor calibrated and achieved slope of 1.0304 ORP sensor calibrated and achieved offset of 3.6 Conductivity cell constant after calibration :0.8786.			
Engineer's Name [REDACTED]		Date 16 th Aug 2019	

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Appendix C. Full List of Sampling Analytes

3.7 Proposed Surface Water Quality Sampling Parameters

A summary of the proposed sampling analytes is provided below:

- | | |
|-------------------|--|
| Field | <ul style="list-style-type: none"> • pH • Turbidity • Electrical Conductivity (EC) • Dissolved Oxygen (DO) • Temperature • Oxidation Reduction Potential (ORP) • Oil and grease |
| Laboratory | <ul style="list-style-type: none"> • Total Suspended Solids (TSS) • Total Dissolved Solids (TDS) • Major Cations & Hardness • Ammonia • Chlorophyll-a • Filterable Reactive Phosphorus • Nitrate • Oxides of Nitrogen • Total Nitrogen • Total Phosphorus • Aluminium (pH > 6.5) filtered • Arsenic (filtered) • Boron (filtered) • Cadmium (filtered) • Chromium (filtered) • Copper (filtered) • Cobalt (filtered) • Lead (filtered) • Manganese (filtered) • Mercury (filtered) |
| | <ul style="list-style-type: none"> • Nickel (filtered) • Selenium (filtered) • Silver (filtered) • Zinc (filtered) • Benzene • Toluene • Ethylbenzene • Xylene - Total • Naphthalene • Total Recoverable Hydrocarbons (TRH) • Organochlorine Pesticides (OCP) <ul style="list-style-type: none"> ○ 4,4'-DDE ○ 4,4'-DDT ○ Aldrin ○ g-BHC (Lindane) ○ Chlordane ○ Dieldrin ○ Endosulfan ○ Endrin ○ Heptachlor ○ Toxaphene • Organophosphorus Pesticides (OPP) <ul style="list-style-type: none"> ○ Azinphos-methyl ○ Chloryrifos ○ Demeton-S ○ Diazinon ○ Dimethoate ○ Fenitrothion ○ Malathion |

If a sample returns detectable concentrations of the analytes presented in Table 1, additional analyses may be required to enable comparison against additional trigger criteria or trace potential sources of contaminants. It is cost prohibitive to analyse these parameters unless required.

Table 1 Additional Analysis Requirements

Analyte	Additional Analysis
Total Recoverable Hydrocarbons	TRH Silica-gel Clean-up
Arsenic (filtered)	Arsenic (III) (filtered) Arsenic (V) (filtered)
Chromium (filtered)	Chromium (CrVI) (filtered)

Appendix D. Chain of Custody Form

[Copyright and Confidential]																				
CHAIN OF CUSTODY - Client																				
ENVIROLAB GROUP - National phone number 1300 424 344																				
Client: Ecoteam				Client Project Name / Number / Site etc (ie report title): SMC009 - Tweed Valley Hospital- 9.9																
Contact Person: [REDACTED]				PO No.:																
Project Mgr: [REDACTED]				Envirolab Quote No.: 19SY228																
Sampler:				Date results required:																
Address: 13 Ewing Street Lismore NSW 2480				Or choose: standard / same day / 1 day / 2 day / 3 day Note: Inform lab in advance if urgent turnaround is required - surcharges apply																
Phone: [REDACTED] Mob: [REDACTED]				Additional report format: esdat / equis /																
Email: [REDACTED]				Lab Comments: Metals: :Al, As, B, Cd, Cr, Cu, Co, Pb, Mn, Hg, Ni, Se, Ag, Z. Cations: Na/K/Ca/Mg. Please hold Cr6 and AsIII/V until initial dissolved metals results are back.																
Sample information					Tests Required							Comments								
Envirolab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	TRH/BTEXN	Dissolved Metals	OC/OP + toxaphene + dennaton	TSS	TDS	Cations + Hardness	Ammonia	Chlorophyll-a	Phosphate (FRP)	Nitrate	Nox	Total N	Total P	Cr6+ HOLD	AsIII & V - HOLD	Provide as much information about the sample as you can
1	001 - USW	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X				
2	002 - USNW	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - DSE	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	004 - Dam	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	005 - Dam Drain	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	013	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	014	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
8	015	300-mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
<input type="checkbox"/> Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis																				
Relinquished by (Company):		Ecoteam		Received by (Company):		[Signature]										Lab Use Only				
Print Name:				Print Name:		[REDACTED]						Job number:		739006		Cooling: Ice / Ice pack / None				
Date & Time:		16/03/20 15:30		Date & Time:		17/3/20 1026						Temperature:		15.8		Security seal: Intact / Broken / None				
Signature:				Signature:		[REDACTED]						TAT Req - SAME day / 1 / 2 / 3 / 4 / STD								

Appendix E. Summary of Lab Results compared to WQOs

		Water Quality Objectives (WQOs)		Sample Codes								
Analyte	Unit	Fresh Water	Estuary	USW 001	USN W002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate	
Total Suspended Solids (TSS)	mg/L	N/A	N/A	18	<10	190	16	<5	<5	<5	140	
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	340	300	160	230	120	<5	<5	150	
Major Cations (dissolved) & Hardness												
Sodium	mg/L	NA	NA	29	36	26	110	26	<0.5	<0.5	26	
Potassium	mg/L	NA	NA	3.5	3.4	1.8	9.5	1.3	<0.5	<0.5	1.9	
Calcium	mg/L	NA	NA	46	25	9.5	19	5.0	<0.5	<0.5	9.2	
Magnesium	mg/L	NA	NA	12	8.8	3.9	13	5.3	<0.5	<0.5	3.8	
Hardness mgCaCO ₃ /L	NA	NA	NA	160	99	40	99	34	<0.5	<3	39	
Nutrients												
Ammonia	mg/L	0.02	0.015	0.052	0.16	0.051	0.51	0.083	<0.005	<0.005	0.054	
Chlorophyll-a	mg/m ³	5	4	4	<1	150	3	<1	<1	<1	81	
Filterable Reactive Phosphorus	mg/L	0.02	0.005	0.024	0.017	0.018	0.026	<0.005	<0.005	<0.005	0.017	
Nitrate	mg/L	N/A	N/A	0.03	0.30	<0.050	0.14	5.0	<0.005	<0.005	<0.050	
Oxides of Nitrogen	mg/L	0.040	0.015	0.03	0.30	<0.05	0.2	5.0	<0.005	<0.005	<0.05	
Total Nitrogen	mg/L	0.35	0.30	0.9	2.1	1.5	1.3	5.9	<0.1	<0.1	1.5	
Total Phosphorus	mg/L	0.025	0.030	0.07	0.07	1.4	0.09	<0.05	<0.05	<0.05	0.5	
Metals – All metals are Dissolved Metals												
Aluminium	µg/L	55	N/A	50	300	400	210	30	<10	<10	380	
Arsenic	µg/L	13	N/A	<1	1	1	<1	<1	<1	<1	1	
Boron	µg/L	370	N/A	60	50	30	100	50	<20	<20	20	
Cadmium	µg/L	0.2	5.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium	µg/L	1.0	4.4	<1	<1	<1	<1	<1	<1	<1	<1	
Cobalt	µg/L	N/A	1.0	1	3	1	11	<1	<1	<1	1	
Copper	µg/L	1.4	1.3	<1	<1	1	<1	<1	<1	<1	<1	
Lead	µg/L	3.4	4.4	<1	<1	<1	<1	<1	<1	<1	<1	
Manganese	µg/L	1,900	N/A	260	250	60	960	120	<5	<5	57	
Mercury	µg/L	0.6	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Nickel	µg/L	11	70	<1	2	2	5	<1	<1	<1	2	
Selenium	µg/L	11	N/A	<1	<1	<1	<1	<1	<1	<1	<1	
Silver	µg/L	0.05	1.4	<1	<1	<1	<1	<1	<1	<1	<1	
Zinc	µg/L	8.0	15	4	8	9	20	9	<1	<1	10	

		Water Quality Objectives (WQOs)		Sample Codes								
Analyte	Unit	Fresh Water	Estuary	USW 001	USN W002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate	
Hydrocarbons												
Benzene	µg/L	950	700	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	N/A	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	N/A	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylene	µg/L	550	N/A	<2	<2	<2	<2	<2	<2	<2	<2	<2
Naphthalene	µg/L	16	70	<1	<1	<1	<1	<1	<1	<1	<1	<1
TRH C ₁₀ - C ₁₄	µg/L	N/A	N/A	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	N/A	N/A	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	N/A	N/A	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	N/A	N/A	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	N/A	N/A	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	N/A	N/A	<100	100	<100	<100	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	N/A	N/A	<100	<100	<100	<100	<100	<100	<100	<100	<100
Organochlorine Pesticides (OCP)												
4,4'-DDE	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
4,4'-DDT	µg/L	0.01	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
g-BHC	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Lindane												
Chlordane	µg/L	0.08	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan	µg/L	0.2	0.01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	0.008	0.02	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	0.09	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toxaphene	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Organophosphorus Pesticides (OPP)												
Azinphos-methyl	µg/L	0.02	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	0.01	0.009	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-S	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	µg/L	0.01	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	0.15	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	0.05	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Appendix F. Full Laboratory Results

CERTIFICATE OF ANALYSIS 239006

Client Details

Client	Ecoteam
Attention	[REDACTED]
Address	13 Ewing Street, Lismore, NSW, 2480

Sample Details

Your Reference	<u>SMC009 - Tweed Valley Hospital - 9.9</u>
Number of Samples	8 water
Date samples received	17/03/2020
Date completed instructions received	17/03/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	24/03/2020
Date of Issue	24/03/2020
Reissue Details	This report replaces R00 created on 24/03/2020 due to: extra information requested (report comment).
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Results Approved By

[REDACTED], Metals Supervisor
 [REDACTED], Senior Chemist
 [REDACTED], Reporting Supervisor
 [REDACTED], Senior Chemist
 [REDACTED], Organics Supervisor

Authorised By

[REDACTED]
 [REDACTED], Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm water	150 mm water	300 mm water	300 mm water	150 mm water
Type of sample						
Date extracted	-	20/03/2020	20/03/2020	20/03/2020	20/03/2020	20/03/2020
Date analysed	-	20/03/2020	20/03/2020	20/03/2020	20/03/2020	20/03/2020
TRH C ₆ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10	<10	<10
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	<2	<2
o-xylene	µg/L	<1	<1	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%	90	117	119	120	120
Surrogate toluene-d8	%	98	99	98	99	98
Surrogate 4-BFB	%	98	98	98	99	99

vTRH(C6-C10)/BTEXN in Water				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm water	300 mm water	300 mm water
Type of sample				
Date extracted	-	20/03/2020	20/03/2020	20/03/2020
Date analysed	-	20/03/2020	20/03/2020	20/03/2020
TRH C ₆ - C ₉	µg/L	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	119	118	123
Surrogate toluene-d8	%	99	98	99
Surrogate 4-BFB	%	97	98	98

svTRH (C10-C40) in Water						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	20/03/2020	20/03/2020	20/03/2020	20/03/2020	20/03/2020
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	83	72	89	74	103

svTRH (C10-C40) in Water				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	20/03/2020	20/03/2020	20/03/2020
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	92	95	84

Organochlorine Pesticides in Water						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	19/03/2020	19/03/2020	19/03/2020	19/03/2020	19/03/2020
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	72	71	83	73	87

Organochlorine Pesticides in Water				
Our Reference		239006-6	239006-7	239006-8
Your Reference	UNITS	013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	19/03/2020	19/03/2020	19/03/2020
alpha-BHC	µg/L	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	89	96	79

OP Pesticides in Water						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	19/03/2020	19/03/2020	19/03/2020	19/03/2020	19/03/2020
Dichlorvos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	72	71	83	73	87

OP Pesticides in Water				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date extracted	-	19/03/2020	19/03/2020	19/03/2020
Date analysed	-	19/03/2020	19/03/2020	19/03/2020
Dichlorvos	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Chlorpyriphos	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	89	96	79

Miscellaneous Organics - water						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date prepared	-	17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Date analysed	-	17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Toxaphene*	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton S	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton O	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d14	%	84	72	72	84	101

Miscellaneous Organics - water				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date prepared	-	17/03/2020	17/03/2020	17/03/2020
Date analysed	-	17/03/2020	17/03/2020	17/03/2020
Toxaphene*	µg/L	<0.2	<0.2	<0.2
Demeton S	µg/L	<0.2	<0.2	<0.2
Demeton O	µg/L	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d14	%	108	101	79

HM in water - dissolved						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date prepared	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Aluminium-Dissolved	µg/L	50	300	400	210	30
Arsenic-Dissolved	µg/L	<1	1	1	<1	<1
Boron-Dissolved	µg/L	60	50	30	100	50
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Cobalt-Dissolved	µg/L	1	3	1	11	<1
Copper-Dissolved	µg/L	<1	<1	1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Manganese-Dissolved	µg/L	260	250	60	960	120
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	2	2	5	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Zinc-Dissolved	µg/L	4	8	9	20	9

HM in water - dissolved				
Our Reference		239006-6	239006-7	239006-8
Your Reference	UNITS	013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date prepared	-	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020
Aluminium-Dissolved	µg/L	<10	<10	380
Arsenic-Dissolved	µg/L	<1	<1	1
Boron-Dissolved	µg/L	<20	<20	20
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Cobalt-Dissolved	µg/L	<1	<1	1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Manganese-Dissolved	µg/L	<5	<5	57
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1	2
Selenium-Dissolved	µg/L	<1	<1	<1
Silver-Dissolved	µg/L	<1	<1	<1
Zinc-Dissolved	µg/L	<1	<1	10

Metals in Waters - Acid extractable						
Our Reference		239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference	UNITS	001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date prepared	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Phosphorus - Total	mg/L	0.07	0.07	1.4	0.09	<0.05

Metals in Waters - Acid extractable				
Our Reference		239006-6	239006-7	239006-8
Your Reference	UNITS	013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date prepared	-	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020
Phosphorus - Total	mg/L	<0.05	<0.05	0.5

Cations in water Dissolved						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date digested	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020	18/03/2020	18/03/2020
Sodium - Dissolved	mg/L	29	36	26	110	26
Potassium - Dissolved	mg/L	3.5	3.4	1.8	9.5	1.3
Calcium - Dissolved	mg/L	46	25	9.5	19	5.0
Magnesium - Dissolved	mg/L	12	8.8	3.9	13	5.3
Hardness	mgCaCO ₃ /L	160	99	40	99	34

Cations in water Dissolved				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date digested	-	18/03/2020	18/03/2020	18/03/2020
Date analysed	-	18/03/2020	18/03/2020	18/03/2020
Sodium - Dissolved	mg/L	<0.5	<0.5	26
Potassium - Dissolved	mg/L	<0.5	<0.5	1.9
Calcium - Dissolved	mg/L	<0.5	<0.5	9.2
Magnesium - Dissolved	mg/L	<0.5	<0.5	3.8
Hardness	mgCaCO ₃ /L	<3	<3	39

Miscellaneous Inorganics						
Our Reference	UNITS	239006-1	239006-2	239006-3	239006-4	239006-5
Your Reference		001 - USW	002 - USNW	003- DSE	004 - Dam	005 - Dam Drain
Depth		300 mm	150 mm	300 mm	300 mm	150 mm
Type of sample		water	water	water	water	water
Date prepared	-	17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Date analysed	-	17/03/2020	17/03/2020	17/03/2020	17/03/2020	17/03/2020
Total Suspended Solids	mg/L	18	<10	190	16	<5
Total Dissolved Solids (grav)	mg/L	340	300	160	230	120
Ammonia as N in water	mg/L	0.052	0.16	0.051	0.51	0.083
Chlorophyll a	mg/m³	4	<1	150	3	<1
Phosphate as P in water	mg/L	0.024	0.017	0.018	0.026	<0.005
Nitrate as N in water	mg/L	0.03	0.30	<0.050	0.14	5.0
NOx as N in water	mg/L	0.03	0.3	<0.05	0.2	5.0
Total Nitrogen in water	mg/L	0.9	2.1	1.5	1.3	5.9

Miscellaneous Inorganics				
Our Reference	UNITS	239006-6	239006-7	239006-8
Your Reference		013	014	015
Depth		300 mm	300 mm	300 mm
Type of sample		water	water	water
Date prepared	-	17/03/2020	17/03/2020	17/03/2020
Date analysed	-	17/03/2020	17/03/2020	17/03/2020
Total Suspended Solids	mg/L	<5	<5	140
Total Dissolved Solids (grav)	mg/L	<5	<5	150
Ammonia as N in water	mg/L	<0.005	<0.005	0.054
Chlorophyll a	mg/m³	<1	<1	81
Phosphate as P in water	mg/L	<0.005	<0.005	0.017
Nitrate as N in water	mg/L	<0.005	<0.005	<0.050
NOx as N in water	mg/L	<0.005	<0.005	<0.05
Total Nitrogen in water	mg/L	<0.1	<0.1	1.5

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
INORG-119	Chlorophyll A based on APHA 10200 H latest edition.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012/017	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS and/or GC-MS/MS.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
SEO-005	OC/OP/PCB - Determination of a suite of Organochlorine Pesticides, Chlorinated Organo-phosphorus Pesticides and Polychlorinated Biphenyls (PCB's) by sonication extraction using dichloromethane for waters or acetone / hexane for soils followed by Gas Chromatographic separation with Electron Capture Detection (GC/ECD). The surrogate spike used is 2,4,5,6-Tetrachloro-m-xylene.

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

Test Description	Units	PQL	Method	Blank	#	Duplicate		Spike Recovery %		
						Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			20/03/2020	1	20/03/2020	23/03/2020		20/03/2020	[NT]
Date analysed	-			20/03/2020	1	20/03/2020	23/03/2020		20/03/2020	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	<10	1	<10	<10	0	109	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	<10	1	<10	<10	0	109	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	112	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	112	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	105	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	109	[NT]
o-xylene	µg/L	1	Org-016	<1	1	<1	<1	0	106	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	120	1	90	111	21	110	[NT]
Surrogate toluene-d8	%		Org-016	99	1	98	99	1	99	[NT]
Surrogate 4-BFB	%		Org-016	98	1	98	95	3	102	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

Test Description	Units	PQL	Method	Blank	#	Duplicate		Spike Recovery %		
						Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			19/03/2020	1	19/03/2020	19/03/2020		19/03/2020	[NT]
Date analysed	-			19/03/2020	1	20/03/2020	20/03/2020		19/03/2020	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	1	<50	<50	0	94	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	1	<100	<100	0	74	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	1	<100	<100	0	96	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	1	<50	<50	0	94	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	1	<100	<100	0	74	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	1	<100	<100	0	96	[NT]
Surrogate o-Terphenyl	%		Org-003	87	1	83	103	22	105	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			19/03/2020	1	19/03/2020	19/03/2020		19/03/2020	[NT]
Date analysed	-			19/03/2020	1	19/03/2020	19/03/2020		19/03/2020	[NT]
alpha-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	124	[NT]
HCB	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	124	[NT]
gamma-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	112	[NT]
delta-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	122	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	118	[NT]
gamma-Chlordane	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	110	[NT]
Dieldrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	112	[NT]
Endrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	84	[NT]
Endosulfan II	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	118	[NT]
Endrin Aldehyde	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	124	[NT]
Methoxychlor	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	80	1	72	76	5	98	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

QUALITY CONTROL: OP Pesticides in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			19/03/2020	1	19/03/2020	19/03/2020		19/03/2020	[NT]
Date analysed	-			19/03/2020	1	19/03/2020	19/03/2020		19/03/2020	[NT]
Dichlorvos	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	114	[NT]
Dime hoate	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	108	[NT]
Fenitrothion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	98	[NT]
Malathion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	106	[NT]
Chlorpyriphos	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	116	[NT]
Parathion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	114	[NT]
Bromophos ethyl	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	114	[NT]
Azinphos-methyl (Guthion)	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	80	1	72	76	5	98	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

QUALITY CONTROL: Miscellaneous Organics - water							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			19-03-2020	1	17/03/2020	17/03/2020		19-03-2020	[NT]
Date analysed	-			20-03-2020	1	17/03/2020	17/03/2020		20-03-2020	[NT]
Toxaphene*	µg/L	0.2	SEO-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton S	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton O	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	80	1	84	95	12	101	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

Test Description	Units	QUALITY CONTROL: HM in water - dissolved				Duplicate			Spike Recovery %	
		PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	[NT]
Date analysed	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	50	50	0	107	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	1	0	92	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	60	60	0	102	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	0.1	0	103	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	104	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	260	260	0	94	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	94	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	100	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	101	[NT]
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	106	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	97	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable							Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	239006-2	
Date prepared	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	18/03/2020	
Date analysed	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	18/03/2020	
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	0.07	0.07	0	101	107	

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	[NT]
Date analysed	-			18/03/2020	1	18/03/2020	18/03/2020		18/03/2020	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	29	29	0	103	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	3.5	3.5	0	108	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	46	46	0	97	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	12	12	0	95	[NT]
Hardness	mgCaCO ₃ /L	3		[NT]	1	160	170	6	[NT]	[NT]

Client Reference: SMC009 - Tweed Valley Hospital - 9.9

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	239006-2
Date prepared	-			17/03/2020	1	17/03/2020	17/03/2020		17/03/2020	17/03/2020
Date analysed	-			17/03/2020	1	17/03/2020	17/03/2020		17/03/2020	17/03/2020
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	18	15	18	90	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	340	310	9	108	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.052	0.050	4	111	91
Chlorophyll a	mg/m³	1	INORG-119	<1	1	4	[NT]		111	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.024	0.025	4	117	101
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.03	0.02	40	98	95
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.03	0.03	0	99	97
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.9	0.9	0	97	93

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOP Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

MISC_INORG: Nitrate, NOx as N PQL has been raised due to matrix interferences. Samples were diluted and reanalysed however same results were achieved.

MISC_INORG: The PQL has been raised due to the limited amount of sample/s available for testing.

Miscellaneous Organics - water - The recovery of LCS and matrix spike cannot be reported due to the fact they are not in the list of analytes requested. However, the non-reported analytes within the LCS and matrix spike had acceptable recoveries.

Heavy Metals in water - dissolved - Silver for samples #6 and 7 has been reported as <PQL due to the supplied laboratory water contamination for the rinsate samples.