

Friday 14th April 2023

Environmental Engineer & Director

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

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Re: Surface Water Quality Monitoring Results and Report for the Tweed Valley Hospital Project
Reporting period: 15 February 2023 to 14 March 2023

1.0 INTRODUCTION

Ecoteam is engaged to undertake monthly and event-based surface water monitoring on behalf of Lendlease Building as part of the main works for the Tweed Valley Hospital Project. This report presents results from the 45th round of monthly sampling. This report satisfies the requirements of the SSD2 conditions. 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. Stormwater discharges potentially contain increased sediment loads, nutrients, total and dissolved metals, hydrocarbons, or other contaminants such as pesticides. Baseline water quality data was performed on 19 and 26 November and 19 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 (17 January 2023 to 14 February 2023) was 114.9 mm with the highest 24-hour rainfall occurring on 42nd February, being 42.0 mm (Kingscliff BOM Station 058137).

4.0 SAMPLING LOCATIONS

Samples were collected from four of the five monthly sampling Sites (001 – 003 and 005). Site 004 has been infilled and has been removed from ongoing sampling rounds. 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**. During sampling, Site 002 was noted to be flowing South. Therefore, Site 002 will be assessed as an upstream sample site.

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

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

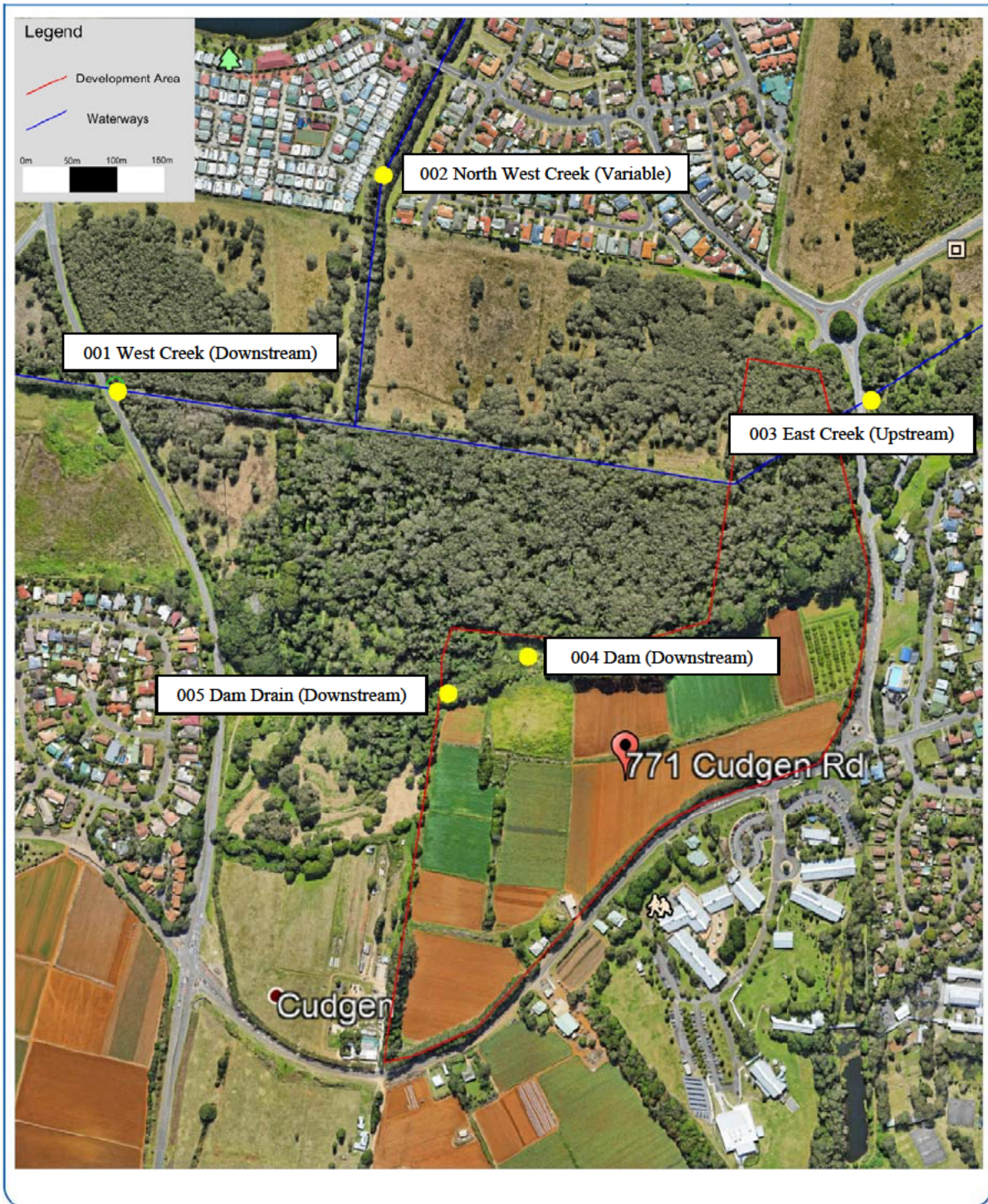


Figure 1. Map of monthly sampling sites (Source: Google Earth).

5.0 SAMPLING METHODOLOGY

Sampling was undertaken by [REDACTED] on Wednesday 15 March 2023. The weather was overcast. In situ, physico-chemical measurements were collected using a AquaTROLL multi-parameter probe, and Turbidity was measured using a Turbimeter Plus turbidity meter. Oil and grease were visually assessed. The calibration certificate for the AquaTROLL is included in **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 overnight to the NATA-accredited Envirolab in Sydney. Trip blank samples (013) were sent from Envirolab and transported to all sites, then returned to Envirolab with the field samples. The field blank samples (014) were assessed at Site 003. Duplicate samples (015) were collected at Site 005 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 is 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.

Table 2. Results of physico-chemical parameters. The results above guidelines are highlighted.

		Water Quality Objectives (WQOs)		Sample Codes and Results			
Analyte	Units	Estuary	Fresh Water	WC 001 (Down)	NWC 002 (Down)	EC 003 (Up)	DD 005 (Down)
<i>pH</i>		7.0-8.5	6.5-8.5	7.07	7.00	6.75	5.98
<i>Turbidity</i>	<i>NTU</i>	0.5-10	6.0-50	4.87	46.3	1.73	25.9
<i>Electrical Conductivity (EC)</i>	<i>µS/cm</i>	125-2,200	125-2,200	823.85	66.10	201.14	167.09
<i>Dissolved Oxygen (DO)</i>	<i>% Saturation</i>	80-110	85-110	13.71	6.72	13.36	25.01
<i>Temperature</i>	<i>°C</i>	N/A	N/A	23.98	24.88	24.78	24.62
<i>Oxidation-Reduction Potential (ORP)</i>	<i>mV</i>	N/A	N/A	54.5	75.3	145.5	135

When compared to the WQOs for freshwater and estuaries:

- pH was outside the WQO range at sample Site 005 this sampling round.
- Turbidity was outside of the WQO ranges at sample Sites 002 and 003 this sampling round.
- EC concentrations outside of the WQO ranges at sample Site 002 this sampling round.
- DO concentrations were outside of 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 Phosphorous (FRP), Oxides of Nitrogen (NO_x), Total Nitrogen, Total Phosphorus, Aluminium, Lead and Zinc were above the WQOs for some sample sites 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. Results above guidelines are highlighted.

		Water Quality Objectives (WQOs)								
Analyte	Unit	Estuary	Fresh Water	WC 001 (Down)	NWC 002 (Down)	EC 003 (Up)	DD 005 (Down)	013 Trip	014 Field	015 Duplicate
Ammonia	mg/L	0.015	0.02	0.082	0.25	0.064	0.009	<0.005	<0.005	0.024
Chlorophyll-a	mg/m ³	4	5	3	45	4	7	<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.01	0.006	0.086	<0.005	<0.005	<0.005	<0.005
Oxides of Nitrogen	mg/L	0.015	0.040	0.08	<0.005	<0.005	1.8	<0.005	<0.005	2.1
Total Nitrogen	mg/L	0.30	0.35	0.6	0.7	0.5	2.3	<0.1	<0.1	2.3
Total Phosphorus	mg/L	0.030	0.025	0.04	0.1	0.1	0.1	<0.02	<0.02	0.08
Aluminium	µg/L	N/A	55	<10	40	100	10	<10	<10	<10

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs at sample Sites 001, 002, 003, and duplicate sample taken from site 005 this sampling round. Ammonia was above the WQOs at comparison sites in background sampling. Ammonia has decreased at sample Sites 003, and 005 and decreased at all other sites when compared to the previous month.
- Chlorophyll-a was above the WQOs at sample Sites 002, 005 this sampling round. Chlorophyll-a has increased at all sample sites when compared to the previous month.
- Filterable Reactive Phosphorus was above WQOs at sample Sites 001, 002, and 003 this sampling round. Filterable Reactive Phosphorus has decreased at sample Site 005 and increased at all other sites when compared to the previous month.
- NO_x was above the WQOs criteria at sample Sites 001, 005. NO_x has increased at sample Site 005 and decreased at all other sample Sites when compared to the previous month.

- TN was above the WQOs criteria at all sites this sampling round. TN has increased at all sample sites when compared to last month. TN was above the WQOs at comparison sites in baseline sampling.
- TP was above the WQOs criteria at all sample sites this sampling round. TP has increased at Site 002 and decreased at all other sample Sites when compared to the previous month.
- Aluminium was above the WQOs criteria at sample Site 003 this sampling round. Aluminium has increased at sample Site 002 and decreased at sample Sites 001, and 005 when compared to the previous month.
- All other metals were within estuarine and freshwater criteria this month.
- Demeton was analysed and returned non-detectable results.
- TRH (C₁₀-C₄₀) was not detected at any sample site.

8.0 Quality Assurance and Quality Control

- Parameters analysed in the Trip Blank (013) and Field Blank (014) were below the laboratory detection limits for all analytes except for zinc which was found in the trip blank. Zinc is used to make demineralised water and the laboratory has confirmed this is due to laboratory procedures and not a result of contamination.
- The Duplicate Sample (015) was collected at Site 005 and is within acceptable limits for all analytes except for Ammonia and Chlorophyll-a which are within typically variation.
- The laboratory QA/QC is included in the results in **Appendix F**. All laboratory QA/QC was within acceptance criteria.

9.0 Summary of Results and Recommendations

- The month had moderate rainfall.
- Nutrients (Ammonia, NO_x, TN, and TP) and Chlorophyll-a were high and exceeded some water quality parameters for some sites. This includes upstream and downstream sites in past sampling events. Exceedances in nutrients are therefore considered of natural occurrence.
- Aluminium exceeded WQOs at Site 003 during the month. Metals have been present in upstream and downstream sampling sites in previous sampling rounds. Elevation in metals may be due to pH and redox changes, microbial mineralisation, and naturally occurring sediment transportation. Changes in metal concentrations are also likely following heavy rainfall events. Lead present at
- Elevated nutrients and metals have been observed at all sampling locations including upstream and downstream sites in previous months and during baseline sampling. Therefore, based on the assessment of the February/March water quality data, the Tweed Valley Hospital Project construction activities are unlikely to be adversely impacting the downstream water quality. As such, the current soil and erosion controls implemented on site are considered to be effective.

Kind regards,

[Redacted Signature]

Environmental Engineer & Director

[Redacted Name]





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Appendix A. Site Photos

		<p>Site 001 – West Creek (Downstream) (15/03/2023))</p>
		<p>Site 002 – North-west Creek (Upstream) (15/03/2023))</p>
		<p>Site 003 – East Creek (Upstream) (15/03/2023))</p>
		<p>Site 005 – Dam Drain (Downstream) (15/03/2023))</p>

Appendix B. Calibration certificate for Aqua troll


Innovations in Water Monitoring

Calibration Report

Instrument Details:

Instrument Model:	Aqua TROLL® 400
Full Scale Pressure Range:	0 - 250 ft (0 - 76 m)
Serial Number:	1008667
Manufacture Date:	2023-02-17

Calibration Details:

Calibration Result:	PASS
Calibration Date:	2023-01-16
Nominal Range of Applied Temperature:	0 C to +50 C
Temperature Accuracy Specification:	+/-0.1 C from 0 C to +50 C
Nominal Range of Applied Pressure:	0 - 250 feet
Pressure Accuracy Specification:	+/-0.3% FS
Conductivity Calibration:	Pass with a cell constant of 1.00.
Rugged Dissolved Oxygen Calibration:	Pass with an optical phase difference of +/- 2 degrees.
pH/ORP Check:	Pass with mV readings of +/- 5 mV.

Post-Calibration Check:

Parameter	Applied (PSI)	Reported (PSI)	Deviation (PSI)
Pressure	7	6.979	0.021
Pressure	65	65.008	-0.008
Pressure	122.995	122.991	0.004
Pressure	84.333	84.341	-0.008
Pressure	45.667	45.692	-0.025
Pressure	7	6.992	0.008

Calibration Procedures and Equipment Used:

Automated calibration procedures used.
 Calibrated in 900, 9000, & 90000 µS/cm conductivity standards.
 Manu MENSOR Model 600 Serial No 610915
 Manu HART Model 1504 Serial No B42917
 Manu Instrulab Model 406 Serial No 4-31139

Notes:

1. Standards used in the calibration are traceable to the National Institute of Standards and Technology.
2. This calibration report shall not be reproduced, except in full, without the written approval of In-Situ, Inc.
3. A calibration interval of 12 to 18 months is recommended.
4. The post-calibration data is collected at nominal +15C.
5. 1.0 PSI = 6.894757 kPa.

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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

- pH
- Turbidity
- Electrical Conductivity (EC)
- Dissolved Oxygen (DO)
- Temperature
- Oxidation Reduction Potential (ORP)
- Oil and grease

Laboratory

- 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)

- Nickel (filtered)
- Selenium (filtered)
- Silver (filtered)
- Zinc (filtered)
- Benzene
- Toluene
- Ethylbenzene
- Xylene - Total
- Naphthalene
- Total Recoverable Hydrocarbons (TRH)
- Organochlorine Pesticides (OCP)
 - 4,4'-DDE
 - 4,4'-DDT
 - Aldrin
 - g-BHC (Lindane)
 - Chlordane
 - Dieldrin
 - Endosulfan
 - Endrin
 - Heptachlor
 - Toxaphene
- Organophosphorus Pesticides (OPP)
 - Azinphos-methyl
 - Chlorpyrifos
 - 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				Sydney Lab - EnviroLab Services 12 Ashley St, Chatswood, NSW 2067 Ph: 02 9910 6200 / sydney@envirolab.com.au Perth Lab - MPL Laboratories 16-18 Hayden Crt, Myaree, WA 6154 Ph: 08 9317 2505 / lab@mpl.com.au Melbourne Lab - EnviroLab Services 25 Research Drive, Croydon South, VIC 3136 Ph: 03 9763 2500 / melbourne@envirolab.com.au Adelaide Office - EnviroLab Services 7a The Parade, Norwood, SA 5067 Ph: 08 7087 6900 / adelaide@envirolab.com.au Brisbane Office - EnviroLab Services 20a, 10-20 Depot St, Banyo, QLD 4014 Ph: 07 3266 9532 / brisbane@envirolab.com.au Darwin Office - EnviroLab Services Unit 7, 17 Willes Rd, Berrimah, NT 0820 Ph: 08 8967 1201 / darwin@envirolab.com.au														
ENVIROLAB GROUP - National phone number 1300 424 344 Client: Ecoteam Contact Person: ██████████ Project M: ██████████ Sampler: ██████████ Address: 13 Ewing Street Lismore NSW 2480 Phone: 02 6621 5123 Mob: ██████████ Email: ██████████ Testing requirements - Chlorophyll-a <4 mg/m3, Total Phosphorus <0.025 mg/L, Silver <0.05 ug/L, Low level OCPs and OPPs		Client Project Name / Number / Site etc (ie report title): SMC009.45 - Tweed Valley Hospital Project PO No.: EnviroLab Quote No. : 19SY228_Rev 1 Date results required: Or choose: standard / same day / 1 day / 2 day / 3 day Note: Inform lab in advance if urgent turnaround is required - surcharges apply Additional report format: esdat / equis / 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 + dieldrin	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	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	002 - USNW	150 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - DSE	300 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	005 - Dam Drain	150 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	013	300 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	014	300 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	015	300 mm	15-Mar	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
318751																				
<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): <u>ELS</u>				Lab Use Only												
Print Name: ██████████				Print Name: <u>CEO #</u>				Job number: <u>318751</u>				Cooling: Ice / Ice pack / None								
Date & Time: 15/03/2023				Date & Time: <u>16323 1000</u>				Temperature:				Security seal: Intact / Broken / None								
Signature: ██████████				Signature: <u>[Signature]</u>				TAT Req - SAME day / 1 / 2 / 3 / 4				<input checked="" type="checkbox"/> STD								

Appendix E. Summary of Lab Results compared to WQOs

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	Unit	Estuary	Fresh Water	WC 001	NW C00 2	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Total Suspended Solids (TSS)	mg/L	N/A	N/A	<5	29	<5	13		<5	<5	10
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	550	240	110	96		<5	<5	96
Major Cations (dissolved) and Hardness											
Sodium	mg/L	N/A	N/A	50	34	19	18		<0.5	<0.5	18
Potassium	mg/L	N/A	N/A	5	3	1	1		<0.5	<0.5	1
Calcium	mg/L	N/A	N/A	85	35	10	4		<0.5	<0.5	4
Magnesium	mg/L	N/A	N/A	20	10	4	5		<0.5	<0.5	5
Hardness mgCaCO ₃ /L		N/A	N/A	300	130	40	28		<3	<3	28
Nutrients											
Ammonia	mg/L	0.015	0.02	0.082	0.25	0.064	0.009		<0.005	<0.005	0.024
Chlorophyll-a	mg/m ³	4	5	3	45	4	7		<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.01	0.006	0.086	<0.005		<0.005	<0.005	<0.005
Nitrate	mg/L	N/A	N/A	0.071	<0.005	<0.005	1.8		<0.005	<0.005	2
Oxides of Nitrogen	mg/L	0.015	0.040	0.08	<0.005	<0.005	1.8		<0.005	<0.005	2.1
Total Nitrogen	mg/L	0.30	0.35	0.6	0.7	0.5	2.3		<0.1	<0.1	2.3
Total Phosphorus	mg/L	0.030	0.025	0.04	0.1	0.1	0.1		<0.02	<0.02	0.08
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	N/A	55	<10	40	100	10		<10	<10	<10
Arsenic	µg/L	N/A	13	1	<1	<1	<1		<1	<1	<1
Boron	µg/L	N/A	370	100	100	40	50		<20	<20	50
Cadmium	µg/L	5.5	0.2	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1
Chromium	µg/L	4.4	1.0	<1	<1	<1	<1		<1	<1	<1
Copper	µg/L	1.3	1.4	<1	<1	<1	<1		<1	<1	<1
Cobalt	µg/L	1.0	N/A	<1	<1	<1	<1		<1	<1	<1
Lead	µg/L	4.4	3.4	<1	1	<1	<1		<1	<1	<1
Manganese	µg/L	N/A	1,900	190	530	55	48		<1	<1	46
Mercury	µg/L	0.4	0.6	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05
Nickel	µg/L	70	11	<1	<1	<1	<1		<1	<1	<1
Selenium	µg/L	N/A	11	<1	<1	<1	<1		<1	<1	<1
Zinc	µg/L	15	8.0	4	2	6	5		1	<1	4
Silver	µg/L	1.4	0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	Unit	Estuary	Fresh Water	WC 001	NW C00 2	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Hydrocarbons											
Benzene	µg/L	950	700	<1	<1	<1	<1		<1	<1	<1
Toluene	µg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Ethylbenzene	µg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Xylene	µg/L	N/A	550	<1	<1	<1	<1		<1	<1	<1
Naphthalene	µg/L	70	16	<1	<1	<1	<1		<1	<1	<1
TRH C ₆ - C ₁₀	µg/L	N/A	N/A	<10	<10	<10	<10		<10	<10	<10
TRH C ₁₀ - C ₁₆	µg/L	N/A	N/A	<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
TRH >C ₃₄ - C ₄₀	µg/L	N/A	N/A	<100	<100	<100	<100		<100	<100	<100
TRH C ₆ -C ₁₀ less BTEX (F1)	µg/L	N/A	N/A	<10	<10	<10	<10		<10	<10	<10
TRH >C ₁₀ -C ₁₆ less Naphthalene (F2)	µg/L	N/A	N/A	<50	<50	<50	<50		<50	<50	<50
Organochlorine Pesticides (OCP)											
4,4'-DDE	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
4,4'-DDT	µg/L	N/A	0.01	<0.006	<0.006	<0.006	<0.006		<0.006	<0.006	<0.006
Aldrin	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
g-BHC	µg/L	N/A	0.2	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Chlordane	µg/L	N/A	0.08	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Dieldrin	µg/L	N/A	N/A	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Endosulfan	µg/L	0.01	0.2	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Endrin	µg/L	0.02	0.008	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Heptachlor	µg/L	N/A	0.09	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Toxaphene	µg/L	N/A	0.2	<2	<2	<2	<2		<2	<2	<2
Organophosphorus Pesticides (OPP)											
Azinphos-methyl	µg/L	N/A	0.02	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02	<0.02
Chlorpyrifos	µg/L	0.009	0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Demeton-S	µg/L	N/A	N/A	<5	<5	<5	<5		<5	<5	<5
Diazinon	µg/L	N/A	0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01
Dimethoate	µg/L	N/A	0.15	<0.15	<0.15	<0.15	<0.15		<0.15	<0.15	<0.15
Fenitrothion	µg/L	N/A	0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2
Malathion	µg/L	N/A	0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05

Appendix F. Full Laboratory Results



CERTIFICATE OF ANALYSIS 318751

Client Details

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

Sample Details

Your Reference	SMC009.45 - Tweed Valley Hospital Project
Number of Samples	7 Water
Date samples received	16/03/2023
Date completed instructions received	16/03/2023

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

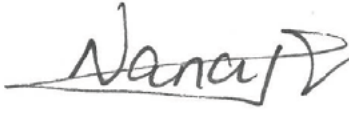
Date results requested by	23/03/2023
Date of Issue	23/03/2023

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Results Approved By

[REDACTED], Inorganics Supervisor
[REDACTED], Metals Supervisor
[REDACTED], Senior Chemist
[REDACTED], Organics Supervisor
[REDACTED], Development Chemist

Authorised By


[REDACTED], Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	19/03/2023	19/03/2023	19/03/2023	19/03/2023	19/03/2023
TRH C ₈ - C ₉	µg/L	<10	<10	<10	<10	<10
TRH C ₈ - C ₁₀	µg/L	<10	<10	<10	<10	<10
TRH C ₈ - 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	%	107	111	111	107	120
Surrogate toluene-d8	%	98	103	103	100	108
Surrogate 4-BFB	%	97	97	98	96	97

vTRH(C6-C10)/BTEXN in Water			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date extracted	-	17/03/2023	17/03/2023
Date analysed	-	19/03/2023	19/03/2023
TRH C ₈ - C ₉	µg/L	<10	<10
TRH C ₈ - C ₁₀	µg/L	<10	<10
TRH C ₈ - C ₁₀ less BTEX (F1)	µg/L	<10	<10
Benzene	µg/L	<1	<1
Toluene	µg/L	<1	<1
Ethylbenzene	µg/L	<1	<1
m+p-xylene	µg/L	<2	<2
o-xylene	µg/L	<1	<1
Naphthalene	µg/L	<1	<1
Surrogate Dibromofluoromethane	%	116	93
Surrogate toluene-d8	%	104	88
Surrogate 4-BFB	%	97	96

svTRH (C10-C40) in Water						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023	22/03/2023	22/03/2023	22/03/2023
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 ₃₈	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	%	86	85	89	75	79

svTRH (C10-C40) in Water			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date extracted	-	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023
TRH C ₁₀ - C ₁₄	µg/L	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100
TRH C ₂₉ - C ₃₈	µg/L	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100
Surrogate o-Terphenyl	%	81	86

OCPs in Water - Low Level						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023	22/03/2023	22/03/2023	22/03/2023
alpha-BHC	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
HCB	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
beta-BHC	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-BHC	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDE	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan II	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDD	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin Aldehyde	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006	<0.006	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Surrogate TCMX	%	81	83	84	88	90

OCPs in Water - Low Level			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date extracted	-	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023
alpha-BHC	µg/L	<0.01	<0.01
HCB	µg/L	<0.01	<0.01
beta-BHC	µg/L	<0.01	<0.01
gamma-BHC	µg/L	<0.01	<0.01
Heptachlor	µg/L	<0.01	<0.01
delta-BHC	µg/L	<0.01	<0.01
Aldrin	µg/L	<0.01	<0.01
Heptachlor Epoxide	µg/L	<0.01	<0.01
gamma-Chlordane	µg/L	<0.01	<0.01
alpha-Chlordane	µg/L	<0.01	<0.01
Endosulfan I	µg/L	<0.01	<0.01
pp-DDE	µg/L	<0.01	<0.01
Dieldrin	µg/L	<0.01	<0.01
Endrin	µg/L	<0.01	<0.01
Endosulfan II	µg/L	<0.01	<0.01
pp-DDD	µg/L	<0.01	<0.01
Endrin Aldehyde	µg/L	<0.01	<0.01
pp-DDT	µg/L	<0.006	<0.006
Endosulfan Sulphate	µg/L	<0.01	<0.01
Methoxychlor	µg/L	<0.01	<0.01
Surrogate TCMX	%	95	86

OP in water LL ANZECCF/ADWG						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023	22/03/2023	22/03/2023	22/03/2023
Dichlorovos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Diazinon	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methyl Parathion	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	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyriphos	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Parathion	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
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	<0.02	<0.02	<0.02	<0.02	<0.02
Surrogate TCMX	%	81	83	84	88	90

OP in water LL ANZECCF/ADWG			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date extracted	-	21/03/2023	21/03/2023
Date analysed	-	22/03/2023	22/03/2023
Dichlorovos	µg/L	<0.2	<0.2
Dimethoate	µg/L	<0.15	<0.15
Diazinon	µg/L	<0.01	<0.01
Chlorpyriphos-methyl	µg/L	<0.2	<0.2
Methyl Parathion	µg/L	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2
Malathion	µg/L	<0.05	<0.05
Chlorpyriphos	µg/L	<0.01	<0.01
Parathion	µg/L	<0.01	<0.01
Bromophos ethyl	µg/L	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.02	<0.02
Surrogate TCMX	%	95	86

Client Reference: SMC009.45 - Tweed Valley Hospital Project

Miscellaneous Organics - water						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
Date analysed	-	21/03/2023	21/03/2023	21/03/2023	21/03/2023	21/03/2023
Toxaphene*	µg/L	<2	<2	<2	<2	<2
Demeton-O	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-S	µg/L	<5	<5	<5	<5	<5
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	98	101	104	100	99

Miscellaneous Organics - water			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date prepared	-	21/03/2023	21/03/2023
Date analysed	-	21/03/2023	21/03/2023
Toxaphene*	µg/L	<2	<2
Demeton-O	µg/L	<0.2	<0.2
Demeton-S	µg/L	<5	<5
Surrogate <i>p</i> -Terphenyl-d ₁₄	%	96	102

Client Reference: SMC009.45 - Tweed Valley Hospital Project

HM in water - dissolved						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Aluminium-Dissolved	µg/L	<10	40	100	10	<10
Arsenic-Dissolved	µg/L	1	<1	<1	<1	<1
Boron-Dissolved	µg/L	100	100	40	50	<20
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	1	<1	<1	<1
Manganese-Dissolved	µg/L	190	530	55	48	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1	<1	<1	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Silver-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc-Dissolved	µg/L	4	2	6	5	1

HM in water - dissolved			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date prepared	-	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023
Aluminium-Dissolved	µg/L	<10	<10
Arsenic-Dissolved	µg/L	<1	<1
Boron-Dissolved	µg/L	<20	50
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	<1	<1
Cobalt-Dissolved	µg/L	<1	<1
Lead-Dissolved	µg/L	<1	<1
Manganese-Dissolved	µg/L	<1	46
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1
Selenium-Dissolved	µg/L	<1	<1
Silver-Dissolved	µg/L	<0.05	<0.05
Zinc-Dissolved	µg/L	<1	4

Metals in Waters - Acid extractable						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Phosphorus - Total	mg/L	0.04	0.1	0.1	0.1	<0.02

Metals in Waters - Acid extractable			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date prepared	-	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023
Phosphorus - Total	mg/L	<0.02	0.08

Client Reference: SMC009.45 - Tweed Valley Hospital Project

Cations in water Dissolved						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date digested	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023	17/03/2023	17/03/2023	17/03/2023
Sodium - Dissolved	mg/L	50	34	19	18	<0.5
Potassium - Dissolved	mg/L	5	3	1	1	<0.5
Calcium - Dissolved	mg/L	85	35	10	4	<0.5
Magnesium - Dissolved	mg/L	20	10	4	5	<0.5
Hardness	mgCaCO ₃ /L	300	130	40	28	<3

Cations in water Dissolved			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date digested	-	17/03/2023	17/03/2023
Date analysed	-	17/03/2023	17/03/2023
Sodium - Dissolved	mg/L	<0.5	18
Potassium - Dissolved	mg/L	<0.5	1
Calcium - Dissolved	mg/L	<0.5	4
Magnesium - Dissolved	mg/L	<0.5	5
Hardness	mgCaCO ₃ /L	<3	28

Miscellaneous Inorganics						
Our Reference		318751-1	318751-2	318751-3	318751-4	318751-5
Your Reference	UNITS	001-USW	002-USNW	003-DSE	005-Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		15/03/2023	15/03/2023	15/03/2023	15/03/2023	15/03/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Date analysed	-	16/03/2023	16/03/2023	16/03/2023	16/03/2023	16/03/2023
Total Suspended Solids	mg/L	<5	29	<5	13	<5
Total Dissolved Solids (grav)	mg/L	550	240	110	96	<5
Ammonia as N in water	mg/L	0.082	0.25	0.064	0.009	<0.005
Chlorophyll a	mg/m ³	3	45	4	7	<1
Phosphate as P in water	mg/L	0.01	0.006	0.086	<0.005	<0.005
Nitrate as N in water	mg/L	0.071	<0.005	<0.005	1.8	<0.005
NOx as N in water	mg/L	0.08	<0.005	<0.005	1.8	<0.005
Total Nitrogen in water	mg/L	0.6	0.7	0.5	2.3	<0.1

Miscellaneous Inorganics			
Our Reference		318751-6	318751-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		15/03/2023	15/03/2023
Type of sample		Water	Water
Date prepared	-	16/03/2023	16/03/2023
Date analysed	-	16/03/2023	16/03/2023
Total Suspended Solids	mg/L	<5	10
Total Dissolved Solids (grav)	mg/L	<5	96
Ammonia as N in water	mg/L	<0.005	0.024
Chlorophyll a	mg/m ³	<1	2
Phosphate as P in water	mg/L	<0.005	<0.005
Nitrate as N in water	mg/L	<0.005	2.0
NOx as N in water	mg/L	<0.005	2.1
Total Nitrogen in water	mg/L	<0.1	2.3

Client Reference: SMC009.45 - Tweed Valley Hospital Project

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
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-020	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-022	Determination of VOCs sampled onto coconut shell charcoal sorbent tubes, that can be desorbed using carbon disulphide, and analysed by GC-MS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	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.

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W5	[NT]
Date extracted	-			17/03/2023	1	17/03/2023	20/03/2023		17/03/2023	[NT]
Date analysed	-			19/03/2023	1	19/03/2023	21/03/2023		19/03/2023	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-023	<10	1	<10	<10	0	100	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-023	<10	1	<10	<10	0	100	[NT]
Benzene	µg/L	1	Org-023	<1	1	<1	<1	0	93	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	110	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	97	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	100	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	102	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	113	1	107	125	16	99	[NT]
Surrogate toluene-d8	%		Org-023	108	1	98	108	10	98	[NT]
Surrogate 4-BFB	%		Org-023	100	1	97	104	7	97	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
Date analysed	-			22/03/2023	[NT]	[NT]	[NT]	[NT]	22/03/2023	[NT]
TRH C ₁₀ - C ₁₄	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH C ₁₅ - C ₂₈	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH C ₂₉ - C ₃₆	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	105	[NT]
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	118	[NT]
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	86	[NT]
Surrogate o-Terphenyl	%		Org-020	87	[NT]	[NT]	[NT]	[NT]	90	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: OCPs in Water - Low Level					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
Date analysed	-			22/03/2023	[NT]	[NT]	[NT]	[NT]	22/03/2023	[NT]
alpha-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	90	[NT]
HCB	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
beta-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	91	[NT]
gamma-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Heptachlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	92	[NT]
delta-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Aldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	90	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	88	[NT]
gamma-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
alpha-Chlordane	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan I	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDE	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	97	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	99	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	87	[NT]
Endosulfan II	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDD	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	91	[NT]
Endrin Aldehyde	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
pp-DDT	µg/L	0.006	Org-022	<0.006	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	90	[NT]
Methoxychlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	90	[NT]	[NT]	[NT]	[NT]	93	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: OP in water LL ANZECCF/ADWG				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
Date analysed	-			22/03/2023	[NT]	[NT]	[NT]	[NT]	22/03/2023	[NT]
Dichlorovos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	103	[NT]
Dime hoate	µg/L	0.15	Org-022/025	<0.15	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Diazinon	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chlorpyriphos-methyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Methyl Para hion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ronnel	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	83	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	79	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Chlorpyriphos	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	94	[NT]
Parathion	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	79	[NT]
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	90	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	90	[NT]	[NT]	[NT]	[NT]	93	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: Miscellaneous Organics - water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
Date analysed	-			21/03/2023	[NT]	[NT]	[NT]	[NT]	21/03/2023	[NT]
Toxaphene*	µg/L	2	Org-022/025	<2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Demeton-O	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Demeton-S	µg/L	5	Org-022/025	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	108	[NT]	[NT]	[NT]	[NT]	109	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Date analysed	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	100	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	96	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	100	100	0	87	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	98	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	[NT]
Manganese-Dissolved	µg/L	1	Metals-022	<1	1	190	200	5	98	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	112	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Silver-Dissolved	µg/L	0.05	Metals-022	<0.05	1	<0.05	<0.05	0	110	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	4	4	0	96	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: Metals in Waters - Acid extractable				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	318751-2
Date prepared	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	17/03/2023
Date analysed	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	17/03/2023
Phosphorus - Total	mg/L	0.02	Metals-020	<0.02	1	0.04	0.04	0	87	82

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: Cations in water Dissolved				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Date analysed	-			17/03/2023	1	17/03/2023	17/03/2023		17/03/2023	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	50	49	2	88	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	5	5	0	85	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	85	84	1	106	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	20	20	0	104	[NT]
Hardness	mgCaCO ₃ /L	3	Metals-020	[NT]	1	300	290	3	[NT]	[NT]

Client Reference: SMC009.45 - Tweed Valley Hospital Project

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	318751-2
Date prepared	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Date analysed	-			16/03/2023	1	16/03/2023	16/03/2023		16/03/2023	16/03/2023
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	<5	[NT]		112	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	550	[NT]		107	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.082	0.079	4	97	100
Chlorophyll a	mg/m ³	1	INORG-119	<1	1	3	[NT]		82	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.01	0.01	0	109	110
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.071	0.071	0	101	96
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.08	0.08	0	101	96
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.6	0.6	0	103	83

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	2	16/03/2023	16/03/2023		[NT]	[NT]
Date analysed	-			[NT]	2	16/03/2023	16/03/2023		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	2	29	34	16	[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	2	240	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	2	0.25	[NT]		[NT]	[NT]
Chlorophyll a	mg/m ³	1	INORG-119	[NT]	2	45	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	2	0.006	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	2	<0.005	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	2	<0.005	[NT]		[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	2	0.7	[NT]		[NT]	[NT]

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 AIOH 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.

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

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

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.