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ABN: 82 106 758 123

Wednesday 8th February 2023

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

Re: Surface Water Quality Monitoring Results and Report for the Tweed Valley Hospital Project
Reporting period: 15 December 2022 to 16 January 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 43rd 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 (*15 December 2022 to 16 January 2023*) was 98.8 mm with the highest 24-hour rainfall occurring on 16 December, being 34.6 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

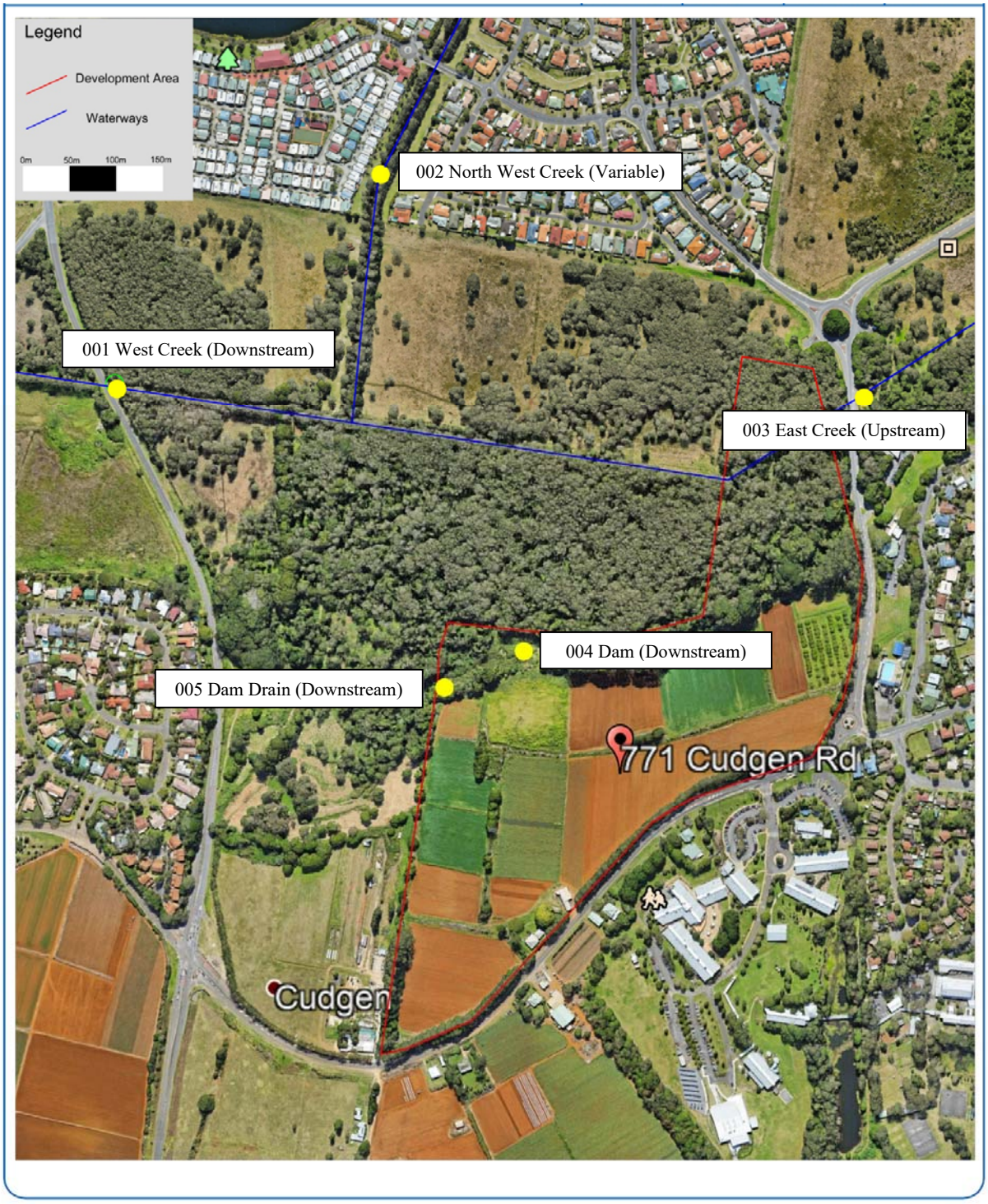

Figure 1. Map of monthly sampling sites (Source: Google Earth).

5.0 SAMPLING METHODOLOGY `

Sampling was undertaken by [redacted] on Tuesday 17 January 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 005. Duplicate samples (015) were collected at Site 001 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 (Up)**	**EC 003 (Up)**	**DD 005 (Down)**
pH		7.0-8.5	6.5-8.5	7.4	7.18	6.39	6.12
Turbidity	*NTU*	0.5-10	6.0-50	4.64	4.28	4.28	2.83
Electrical Conductivity (EC)	*µS/cm*	125-2,200	125-2,200	804.97	368.43	192.39	150.50
Dissolved Oxygen (DO)	*% Saturation*	80-110	85-110	12.24	57.48	31.77	13.06
Temperature	*°C*	N/A	N/A	23.64	24.66	24.85	22.5
Oxidation-Reduction Potential (ORP)	*mV*	N/A	N/A	59.6	5.5	135.8	34.8

When compared to the WQOs for freshwater and estuaries:

- pH was outside the WQO range at sample Sites 003 and 005 this sampling round.
- Turbidity was outside of the WQO ranges at sample Sites 003 and 005 this sampling round.
- EC concentrations were inside of the expected range at all sampling sites 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 (NOx), and Total Nitrogen, 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	0.075	0.021	0.01	0.015	<0.005	<0.005	0.078
Chlorophyll-a	mg/m^3	4	5	2	38	45	7	<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.01	<0.005	0.062	<0.005	<0.005	<0.005	0.009
Oxides of Nitrogen	mg/L	0.015	0.040	0.03	0.07	0.05	3.2	<0.005	0.01	0.03
Total Nitrogen	mg/L	0.30	0.35	0.5	0.6	0.6	3.3	<0.1	<0.1	0.6
Total Phosphorus	mg/L	0.030	0.025	0.05	0.07	0.22	<0.02	<0.02	<0.02	<0.02

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs at sample Sites 001 and 002 this sampling round. Ammonia was above the WQOs at comparison sites in background sampling. Ammonia has decreased at all sites when compared to the previous month.
- Chlorophyll-a was above the WQOs at sample Sites 002, 003, and 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 and 003 this sampling round. Filterable Reactive Phosphorus has increased at Site 001, decreased at Sites 002 and 003, and has remained the same at Site 005 when compared to the previous month.
- NOx was above the WQOs criteria at all sample sites this sampling round. NOx has increased Sites 001, 003 and 005 and decreased at Site 002 when compared to the previous month.
- TN was above the WQOs criteria at all sites this sampling round. TN has increased at Sites 003 and 005 and remained the same at Sites 001 and 002 when compared to last month. TN was above the WQOs at comparison sites in baseline sampling.

- TP was above the WQOs criteria at sample Sites 001, 002 and 003 this sampling round. TP has increased at Site 003 and decreased at Sites 001, 002, 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 (C_{10}-C_{40}) 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 silver which was found in the trip and field blank. Silver 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 001 and is within acceptable limits for all analytes.
- 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 low rainfall.
- Nutrients (Ammonia, NOx, 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.
- 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 December/January 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]
Environmental Engineer & Director
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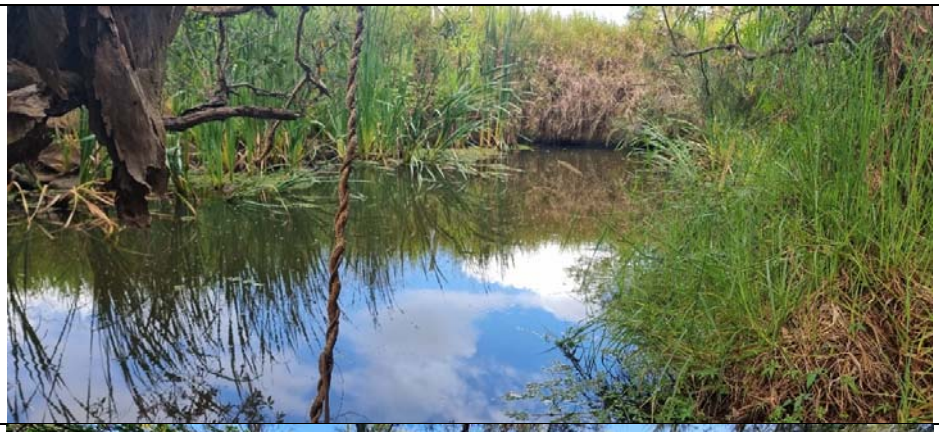
fax: (02) 66-218-123
ABN: 82 106 758 123

Appendix A. Site Photos

		**Site 001 – West Creek (Downstream) (17/01/2023)**
		**Site 002 – North-west Creek (Upstream) (17/01/2023)**
		**Site 003 – East Creek (Upstream) (17/01/2023)**
		**Site 005 – Dam Drain (Downstream) (17/01/2023)**

Appendix B. Calibration certificate for Aqua troll

Calibration Report

Instrument	Aqua TROLL 500
Serial Number	757823
Created	21/11/2022

Sensor	**Turbidity**
Serial Number	754060
Last Calibrated	Factory Defaults

Sensor	**RDO**
Serial Number	754373
Last Calibrated	10/07/2022

Calibration Details

Slope	1
Offset	-0.10 mg/L

Pre Measurement

RDO Concentration	8.74 mg/L

Post Measurement

RDO Concentration	8.75 mg/L

Sensor	**pH/ORP**
Serial Number	742301
Last Calibrated	21/11/2022

Calibration Details

Calibration Point 1

pH of Buffer	4.01 pH
pH mV	96.0 mV
Temperature	29.11 °C

Pre Measurement

pH	4.22 pH
pH mV	96.0 mV

Post Measurement

pH	4.01 pH
pH mV	97.4 mV

Calibration Point 2

pH of Buffer	6.99 pH
pH mV	-71.3 mV
Temperature	30.21 °C

Pre Measurement

pH	7.11 pH
pH mV	-71.6 mV

Post Measurement

pH	6.99 pH
pH mV	-72.6 mV

Slope and Offset 1

Slope	-56.17 mV/pH
Offset	-71.9 mV

ORP

ORP Solution	Zobell's
Offset	55.0 mV
Temperature	30.27 °C
Pre Measurement	167.7 mV
Post Measurement	222.2 mV

Sensor	**Conductivity**
Serial Number	756927
Last Calibrated	10/07/2022

Calibration Details

TDS Conversion Factor (ppm)	0.65
Cell Constant	0.873
Reference Temperature	20.00 °C

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

ENVIROLAB GROUP - National phone number 1300 424 344

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 6800 / 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

Client: Ecoteam
Contact Person: [redacted]
Project Mgr: [redacted]
Sampler: [redacted]
Address: 13 Ewing Street
Lismore NSW 2480
Phone: 02 6621 5123 Mob: [redacted]
Email: [redacted]

Client Project Name / Number / Site etc (ie report title): SMC009.43 - 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.

Testing requirements - Chlorophyll-a <4 mg/m3, Total Phosphorus <0.025 mg/L, Silver <0.05 ug/L, Low level OCPs and OPPs

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 + demeton	TSS	TDS	Cations + Hardness	Ammonia	Cholorphyll-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	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	002 - USNW	150 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - DSE	300 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	005 - Dam Drain	150 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	013	300 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	014	300 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	015	300 mm	17-Jan	Water	X	X	X	X	X	X	X	X	X	X	X	X	X			

ENVIROLAB Envirolab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200
Job No: 314659
Date Received: 18/1/23
Time Received: 10:00
Received By: HTC
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

☐ *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):	ELS SYD
Print Name:	[redacted]	Print Name:	HTC
Date & Time:	17/01/2023	Date & Time:	18/1 1020am
Signature:	[redacted]	Signature:	

Lab Use Only

Job number: 314659	Cooling: Ice / Ice pack / None
Temperature: 4C	Security seal: Intact / Broken / None
TAT Req - SAME day / 1 / 2 / 3 / 4 / STD	

Form 302_V004 Issue date: 21 May 2019 Page 1 of 1

Appendix E. Summary of Lab Results compared to WQOs

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	**Unit**	**Estuary**	**Fresh Water**	WC 001	NW C002	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Total Suspended Solids (TSS)	mg/L	N/A	N/A	6	10	11	5		<5	<5	5
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	580	280	180	120		<5	<5	570
Major Cations (dissolved) and Hardness											
Sodium	mg/L	N/A	N/A	52	36	23	19		<0.5	<0.5	52
Potassium	mg/L	N/A	N/A	4	3	2	1		<0.5	<0.5	4
Calcium	mg/L	N/A	N/A	92	31	12	4		<0.5	<0.5	91
Magnesium	mg/L	N/A	N/A	21	10	4	5		<0.5	<0.5	21
Hardness mg$CaCO_3$/L		N/A	N/A	310	120	48	31		<3	<3	310
Nutrients											
Ammonia	mg/L	0.015	0.02	0.075	0.021	0.01	0.015		<0.005	<0.005	0.078
Chlorophyll-a	mg/m^3	4	5	2	38	45	7		<1	<1	2
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.01	<0.005	0.062	<0.005		<0.005	<0.005	0.009
Nitrate	mg/L	N/A	N/A	0.02	0.068	0.04	3.2		<0.005	0.008	0.02
Oxides of Nitrogen	mg/L	0.015	0.040	0.03	0.07	0.05	3.2		<0.005	0.01	0.03
Total Nitrogen	mg/L	0.30	0.35	0.5	0.6	0.6	3.3		<0.1	<0.1	0.6
Total Phosphorus	mg/L	0.030	0.025	0.05	0.07	0.22	<0.02		<0.02	<0.02	<0.02
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	N/A	55	<10	10	40	<10		<10	<10	<10
Arsenic	µg/L	N/A	13	1	<1	<1	<1		<1	<1	1
Boron	µg/L	N/A	370	100	70	<20	50		<20	<20	100
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	280	110	75	25		<1	<1	290
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	3
Selenium	µg/L	N/A	11	<1	<1	<1	<1		<1	<1	<1
Zinc	µg/L	15	8.0	2	2	2	6		<1	<1	3
Silver	µg/L	1.4	0.05	<0.05	<0.05	<0.05	<0.05		0.58	0.56	<0.05

Analyte	Unit	Water Quality Objectives (WQOs)		Sample Codes							
		Estuary	Fresh Water	WC001	NWC002	EC003	DD005		013 Trip	014 Field	015 Duplicate
Hydrocarbons											
Toluene	mg/L	0.70	0.95	<1	<1	<1	<1		<1	<1	<1
Ethylbenzene	mg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Xylene	mg/L	N/A	N/A	<1	<1	<1	<1		<1	<1	<1
Naphthalene	mg/L	N/A	0.55	<1	<1	<1	<1		<1	<1	<1
TRH C_6 - C_{10}	mg/L	0.07	0.016	<10	<10	<10	<10		<10	<10	<10
TRH C_{10} - C_{16}	mg/L	N/A	N/A	<50	<50	<50	<50		<50	<50	<50
TRH C_{16} - C_{34}	mg/L	N/A	N/A	<100	<100	<100	<100		<100	<100	<100
TRH >C_{34} - C_{40}	mg/L	N/A	N/A	<100	<100	<100	<100		<100	<100	<100
TRH C_6-C_{10} less BTEX (F1)	mg/L	N/A	N/A	<10	<10	<10	<10		<10	<10	<10
TRH >C_{10}-C_{16} less Naphthalene (F2)	mg/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
Chlorpyriphos	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

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CERTIFICATE OF ANALYSIS 314659

Client Details

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

Sample Details

Your Reference	**SMC009.43 - Tweed Valley Hospital Project**
Number of Samples	7 Water
Date samples received	18/01/2023
Date completed instructions received	18/01/2023

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	03/02/2023
Date of Issue	03/02/2023

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By

[redacted], Metals Supervisor
[redacted], Organics Supervisor
[redacted], Senior Chemist
[redacted], Organic Instruments Team Leader
[redacted], Development Chemist
[redacted], Assistant Operation Manager

Authorised By

[redacted], Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023
Date analysed	-	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023
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	%	108	107	108	98	108
Surrogate toluene-d8	%	102	100	101	100	102
Surrogate 4-BFB	%	96	97	97	97	97

vTRH(C6-C10)/BTEXN in Water			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date extracted	-	19/01/2023	19/01/2023
Date analysed	-	20/01/2023	20/01/2023
TRH C_6 - C_9	µg/L	<10	<10
TRH C_6 - C_{10}	µg/L	<10	<10
TRH C_6 - 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	%	100	109
Surrogate toluene-d8	%	99	100
Surrogate 4-BFB	%	97	96

svTRH (C10-C40) in Water						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Date analysed	-	24/01/2023	25/01/2023	25/01/2023	24/01/2023	24/01/2023
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_{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	%	80	81	96	83	80

svTRH (C10-C40) in Water			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date extracted	-	24/01/2023	24/01/2023
Date analysed	-	24/01/2023	24/01/2023
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	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	%	80	68

OCPs in Water - Low Level						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023	25/01/2023	25/01/2023	25/01/2023
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	%	64	66	64	68	64

OCPs in Water - Low Level			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date extracted	-	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023
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	%	61	61

OP in water LL ANZECCF/ADWG						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023	25/01/2023	25/01/2023	25/01/2023
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	%	64	66	64	68	64

OP in water LL ANZECCF/ADWG			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date extracted	-	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023
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	%	61	61

Miscellaneous Organics - water						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023	25/01/2023	25/01/2023	25/01/2023
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 p-Terphenyl-d_{14}	%	66	65	67	68	64

Miscellaneous Organics - water			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date prepared	-	24/01/2023	24/01/2023
Date analysed	-	25/01/2023	25/01/2023
Toxaphene*	µg/L	<2	<2
Demeton-O	µg/L	<0.2	<0.2
Demeton-S	µg/L	<5	<5
Surrogate p-Terphenyl-d_{14}	%	66	63

HM in water - dissolved						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023
Date analysed	-	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023
Aluminium-Dissolved	µg/L	<10	10	40	<10	<10
Arsenic-Dissolved	µg/L	1	<1	<1	<1	<1
Boron-Dissolved	µg/L	100	70	<20	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	280	110	75	25	<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	0.58
Zinc-Dissolved	µg/L	2	2	2	6	<1

HM in water - dissolved			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date prepared	-	19/01/2023	19/01/2023
Date analysed	-	19/01/2023	19/01/2023
Aluminium-Dissolved	µg/L	<10	<10
Arsenic-Dissolved	µg/L	<1	1
Boron-Dissolved	µg/L	<20	100
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	290
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	3
Selenium-Dissolved	µg/L	<1	<1
Silver-Dissolved	µg/L	0.56	<0.05
Zinc-Dissolved	µg/L	<1	3

Metals in Waters - Acid extractable						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023
Date analysed	-	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023
Phosphorus - Total	mg/L	0.05	0.07	0.22	<0.02	<0.02

Metals in Waters - Acid extractable			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date prepared	-	19/01/2023	19/01/2023
Date analysed	-	19/01/2023	19/01/2023
Phosphorus - Total	mg/L	<0.02	<0.02

Cations in water Dissolved						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date digested	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Date analysed	-	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
Sodium - Dissolved	mg/L	52	36	23	19	<0.5
Potassium - Dissolved	mg/L	4	3	2	1	<0.5
Calcium - Dissolved	mg/L	92	31	12	4	<0.5
Magnesium - Dissolved	mg/L	21	10	4	5.0	<0.5
Hardness	mgCaCO 3 /L	310	120	48	31	<3

Cations in water Dissolved			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date digested	-	24/01/2023	24/01/2023
Date analysed	-	24/01/2023	24/01/2023
Sodium - Dissolved	mg/L	<0.5	52
Potassium - Dissolved	mg/L	<0.5	4
Calcium - Dissolved	mg/L	<0.5	91
Magnesium - Dissolved	mg/L	<0.5	21
Hardness	mgCaCO 3 /L	<3	310

Miscellaneous Inorganics						
Our Reference		314659-1	314659-2	314659-3	314659-4	314659-5
Your Reference	UNITS	001-USW	002 - USNW	003 - DSE	005 - Dam Drain	013
Depth		300mm	150mm	300mm	150mm	300mm
Date Sampled		17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
Date analysed	-	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
Total Suspended Solids	mg/L	6	10	11	5	<5
Total Dissolved Solids (grav)	mg/L	580	280	180	120	<5
Ammonia as N in water	mg/L	0.075	0.021	0.01	0.015	<0.005
Chlorophyll a	mg/m^3	2	38	45	7	<1
Phosphate as P in water	mg/L	0.01	<0.005	0.062	<0.005	<0.005
Nitrate as N in water	mg/L	0.02	0.068	0.04	3.2	<0.005
NOx as N in water	mg/L	0.03	0.07	0.05	3.2	<0.005
Total Nitrogen in water	mg/L	0.5	0.6	0.6	3.3	<0.1

Miscellaneous Inorganics			
Our Reference		314659-6	314659-7
Your Reference	UNITS	014	015
Depth		300mm	300mm
Date Sampled		17/01/2023	17/01/2023
Type of sample		Water	Water
Date prepared	-	18/01/2023	18/01/2023
Date analysed	-	18/01/2023	18/01/2023
Total Suspended Solids	mg/L	<5	5
Total Dissolved Solids (grav)	mg/L	<5	570
Ammonia as N in water	mg/L	<0.005	0.078
Chlorophyll a	mg/m^3	<1	2
Phosphate as P in water	mg/L	<0.005	0.009
Nitrate as N in water	mg/L	0.008	0.02
NOx as N in water	mg/L	0.01	0.03
Total Nitrogen in water	mg/L	<0.1	0.6

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 gravimetricially 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.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W4	[NT]
Date extracted	-			19/01/2023	[NT]	[NT]	[NT]	[NT]	19/01/2023	[NT]
Date analysed	-			20/01/2023	[NT]	[NT]	[NT]	[NT]	20/01/2023	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	107	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	[NT]	[NT]	[NT]	[NT]	107	[NT]
Benzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Toluene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
m+p-xylene	µg/L	2	Org-023	<2	[NT]	[NT]	[NT]	[NT]	107	[NT]
o-xylene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	108	[NT]
Naphthalene	µg/L	1	Org-023	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	110	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate toluene-d8	%		Org-023	99	[NT]	[NT]	[NT]	[NT]	100	[NT]
Surrogate 4-BFB	%		Org-023	95	[NT]	[NT]	[NT]	[NT]	109	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			24/01/2023	[NT]	[NT]	[NT]	[NT]	24/01/2023	[NT]
Date analysed	-			24/01/2023	[NT]	[NT]	[NT]	[NT]	24/01/2023	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	85	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	114	[NT]
Surrogate o-Terphenyl	%		Org-020	91	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: OCPs in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			24/01/2023	[NT]	[NT]	[NT]	[NT]	24/01/2023	[NT]
Date analysed	-			25/01/2023	[NT]	[NT]	[NT]	[NT]	25/01/2023	[NT]
alpha-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	64	[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]	60	[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]	60	[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]	64	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	64	[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]	74	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	70	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	60	[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]	68	[NT]
Methoxychlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	66	[NT]	[NT]	[NT]	[NT]	70	[NT]

QUALITY CONTROL: OP in water LL ANZECCF/ADWG						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			24/01/2023	[NT]	[NT]	[NT]	[NT]	24/01/2023	[NT]
Date analysed	-			25/01/2023	[NT]	[NT]	[NT]	[NT]	25/01/2023	[NT]
Dichlorovos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	74	[NT]
Dimethoate	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 Parathion	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]	62	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	60	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	72	[NT]
Chlorpyriphos	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	70	[NT]
Parathion	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	66	[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]	60	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	66	[NT]	[NT]	[NT]	[NT]	70	[NT]

QUALITY CONTROL: Miscellaneous Organics - water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/01/2023	[NT]	[NT]	[NT]	[NT]	24/01/2023	[NT]
Date analysed	-			25/01/2023	[NT]	[NT]	[NT]	[NT]	25/01/2023	[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-d_{14}	%		Org-022/025	65	[NT]	[NT]	[NT]	[NT]	65	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W6	314659-2
Date prepared	-			19/01/2023	1	19/01/2023	19/01/2023		19/01/2023	19/01/2023
Date analysed	-			19/01/2023	1	19/01/2023	19/01/2023		19/01/2023	19/01/2023
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	90	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	93	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	100	100	0	108	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	94	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	89	[NT]
Copper-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	91	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	[NT]
Manganese-Dissolved	µg/L	1	Metals-022	<1	1	280	290	4	86	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	87	85
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	89	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	[NT]
Silver-Dissolved	µg/L	0.05	Metals-022	<0.05	1	<0.05	<0.05	0	99	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	92	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	314659-2
Date prepared	-			19/01/2023	1	19/01/2023	19/01/2023		19/01/2023	19/01/2023
Date analysed	-			19/01/2023	1	19/01/2023	19/01/2023		19/01/2023	19/01/2023
Phosphorus - Total	mg/L	0.02	Metals-020	<0.02	1	0.05	0.05	0	108	101

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	314659-2
Date digested	-			24/01/2023	1	24/01/2023	24/01/2023		24/01/2023	24/01/2023
Date analysed	-			24/01/2023	1	24/01/2023	24/01/2023		24/01/2023	24/01/2023
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	52	52	0	93	79
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	4	4	0	94	91
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	92	92	0	105	101
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	21	21	0	106	103
Hardness	mgCaCO 3 /L	3	Metals-020	[NT]	1	310	310	0	[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			18/01/2023	1	18/01/2023	18/01/2023		18/01/2023	[NT]
Date analysed	-			18/01/2023	1	18/01/2023	18/01/2023		18/01/2023	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	6	[NT]		105	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	580	540	7	113	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.075	0.080	6	110	[NT]
Chlorophyll a	mg/m^3	1	INORG-119	<1	1	2	[NT]		91	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.01	0.01	0	90	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.02	0.02	0	114	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.03	0.03	0	114	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.5	0.5	0	96	[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.