[redacted]
Environmental Engineer & Director
[redacted]
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office: (02) 66-215-123
fax: (02) 66-218-123
ABN: 82 106 758 123

Tuesday 7 November 2021

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: 18 October 2021 to 17 November 2021

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 29th 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 the 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 (*16 October 2021 to 17 November 2021*) was 93.6 mm with the highest 24-hour rainfall occurring on 3 November, being 26.4 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

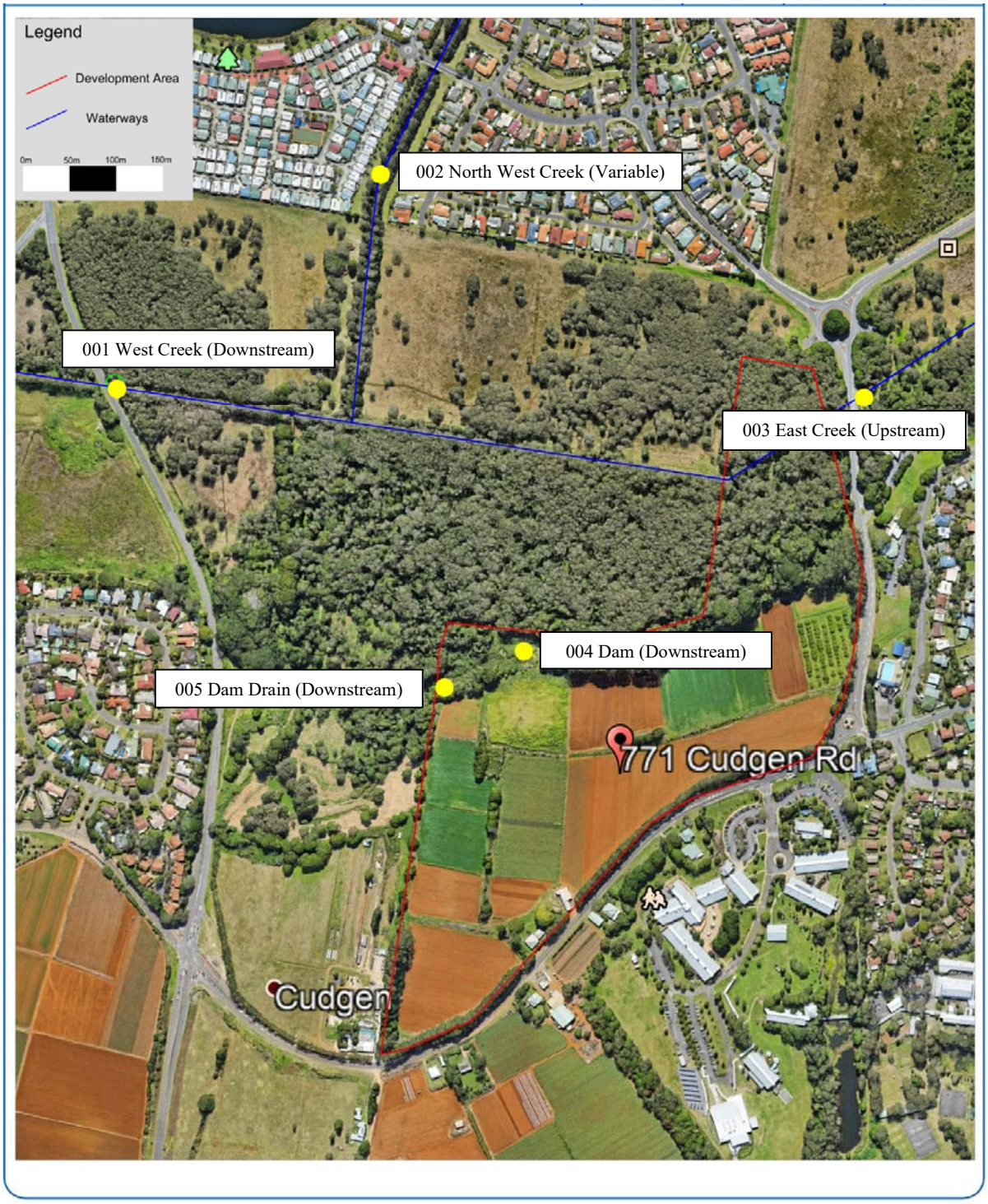

Figure 1. Map of monthly sampling sites **(Source: Google Earth).**

5.0 SAMPLING METHODOLOGY

Sampling was undertaken by [redacted] on Monday 18 November 2021. Weather was fine and sunny. In situ physico-chemical measurements were collected using an 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 SmarTROLL is included as **Appendix B**. The Turbimeter Plus is calibrated before each sampling round. Water quality samples were collected at 300 mm below the surface where possible. Samples were collected from the bank using an extension pole.

Samples were filtered and preserved on site where necessary, stored on ice and couriered over night to 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 002. Duplicate samples (015) were collected at Site 003 and were filtered and preserved as required. Field and trip blanks were filled with deionized water and do not represent water quality from the site. A full list of analytes for the project are included in **Appendix C**.

6.0 ASSESSMENT CRITERIA

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

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

7.0 RESULTS

7.1 Physico-chemical Results

In situ physico-chemical sampling results with comparison to WQOs are shown in **Table 2**. There were no surface sheens visible at any sites, therefore oil and grease were not present.

Table 2. Results of physico-chemical parameters. 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	5.68	5.94	5.93	5.68
Turbidity	*NTU*	0.5-10	6.0-50	5.06	5.02	7.64	1.22
Electrical Conductivity (EC)	*µS/cm*	125-2,200	125-2,200	2030.7	768.97	235.16	1352.4
Dissolved Oxygen (DO)	*% Saturation*	80-110	85-110	4.52	43.06	3.49	9.53
Temperature	*°C*	N/A	N/A	21.86	21.64	21.46	20.5
Oxidation Reduction Potential (ORP)	*mV*	N/A	N/A	1229.9	1273.9	1363.2	1352.4

When compared to the WQOs for freshwater and estuaries:

- pH was outside of the WQO ranges at all sampling sites this sampling round.
- Turbidity was outside of the WQO ranges at Site 005 this sampling round.
- EC was within the WQO ranges 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), Total Nitrogen and Total Phosphorus (TP) were above the WQOs for some sample sites. Aluminium was also outside WQOs. Parameters which exceeded the WQOs are shown in **Table 3**.

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

Table 3. Parameters in exceedance of the trigger criteria during sampling. Results above guidelines are highlighted.

		Water Quality Objectives (WQOs)								
Analyte	**Unit**	**Estuary**	**Fresh Water**	**WC 001 (Down)**	**NWC 002 (Up)**	**EC 003 (Up)**	**DD 005 (Down)**	**013 Trip**	**014 Field**	**015 Duplicate**
Ammonia	mg/L	0.015	0.02	2.2	0.040	<0.005	0.027	<0.005	<0.005	<0.005
Chlorophyll-a	mg/m^3	4	5	2	10	3	<2	<2	<2	4
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.02	0.009	0.18	<0.005	<0.005	<0.005	0.19
Oxides of Nitrogen	mg/L	0.015	0.040	0.1	0.1	<0.005	2.9	<0.005	<0.005	<0.005
Total Nitrogen	mg/L	0.30	0.35	3.3	0.9	0.6	3.6	<0.1	<0.1	0.7
Total Phosphorus	mg/L	0.030	0.025	0.06	0.06	0.23	0.03	<0.02	<0.02	0.23
Aluminium	µg/L	N/A	55	30	20	110	<10	<10	<10	110

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs at Sites 001, 002 and 005. Ammonia was above the WQOs at comparison sites in background sampling. Ammonia has increased at Site 001 and decreased at Sites 002, 003 and 005 when compared to the previous month.
- Chlorophyll-a was above the WQOs criteria at Site 002. Chlorophyll-a results were varied across comparison sites in background sampling. Chlorophyll-a has increases at Site 002, remained the same at Site 005 and decreased at Sites 001 and 003 when compared to last month.
- FRP was above the WQOs at Sites 001, 002 and 003. FRP concentrations increased at Site 003, remained the same at Site 005 and decreased at Sites 001 and 002 when compared to last month. FRP results varied across comparison sites in background sampling though were lowest at Site 005.
- NOx was above the WQOs criteria at Sites 001, 002 and 005. NOx has decreased at Sites 001 and 005 and remained the same at Sites 002 and 003 when compared to the previous month.

- TN was above the WQOs criteria at all sites. TN has increased at Site 001 and decreased at Site 002, 003 and 005 when compared to the previous month. TN was above the WQOs at comparison sites in baseline sampling.
- TP was above the WQOs at all sites. TP has decreased at all sites when compared to the previous month. TP was above the WQOs at comparison sites in baseline sampling.
- Aluminium was above the WQO at Site 003. This is similar to the previous month. Aluminium has decreased at all sites when compared to the previous month. Aluminium has been observed at both upstream and downstream sampling sites during past sampling rounds.
- All other metals were within estuarine and freshwater criteria this month.
- Demeton 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.
- The Duplicate Sample (015) was collected at Site 003 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 moderate rainfall.
- Chlorophyll-a was present above WQOs at Site 002. Algal blooms are naturally occurring and are not considered a result of construction activities.
- Nutrients (Ammonia, NOx, TN, TP and FRP) 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.
- 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 October/November 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.

ecoteam
natural solutions for environmental challenges

Kind regards,

[redacted]
Environmental Engineer & Director
[redacted]
mob: [redacted]
office: (02) 66-215-123
fax: (02) 66-218-123
ABN: 82 106 758 123

Appendix A. Site Photos

	**Site 001 – West Creek (Downstream) (18/11/2021)**
	**Site 002 – North West Creek (Downstream) (18/11/2021)**
	**Site 003 – East Creek (Upstream) (18/11/2021)**
	**Site 005 – Dam Drain (Downstream) (18/11/2021)**

Appendix B. Calibration certificate for AquaTROLL

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific Australia Pty Ltd
ABN 52 058 390 917
5 Caribbean Drive
Scoresby VIC 3179
Phone: 1 300 735 295
Fax: 03 9763 1169

ELECTROCHEMICAL INSTRUMENT MAINTENANCE & CALIBRATION REPORT

Customer: Ecotechnology Australia PTY Ltd
Address: 13 Ewing st
Lismore NSW 2480

Attention: [redacted]

Make:	In-Situ	Lab.ID/Assett No.	NA	Calibration Date:	27-05-2021
Model:	AquaTroll 400	Customer O/No.	PO-0063	Next Calibration:	05-2022
Serial No:	741219 / 746352	Location:	NA	Call Number:	SV2105240050

Service and Safety Checks	Pass/Fail
Consult operator regarding performance/problems	Pass
Check general operation, note additional problems	Pass
Electrical safety if applicable to AS/NZS 3760:2003	N/A
Initialization Procedure	Pass
Instrument Condition	Pass

Check and Adjust	Pass/Fail
Probes, leads and connectors	Pass
Keypad / user controls	Pass
Power supply / battery voltage and condition	Pass
Probe(s) performance (response slow or acceptable)	Acceptable
Internal and external cleaning	Pass

Calibration/ Accuracy Tests

	Standard Type	Serial Number (if applicable)	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Pass/ Fail
✔	pH	20945	7.00 ± 0.02	7.00	4.00 ± 0.02	4.00			Pass
✔	mV (pH)		0.0 +/- 30	-7.7	175.5 +/- 30	163.1			Pass
✔	Slope (pH)		-59.1 +/- 3	-56.93					Pass
✔	DO	745063	8.3mg/L @21.5oC	8.27mg/L @21.66oC	0.0	0.03			Pass
	ISE								
✔	ORP	20945	234.5mV @22.0oC	234.5 @22.1oC					Pass
✔	Conductivity	746352	1413us/cm	1413us/cm					Pass
	TDS								
✔	Temp C	746352	22.5	22.47					Pass

Reference Instruments Used

Make	Model / Part Number	Serial / Batch Number	Expiry / Reference #
Thermo Scientific	ECBU4BTC1LIT	450/01	Nov 2023
Thermo Scientific	ECBU7BTC1LIT	450/02	Nov 2023
FLUKE	179 True RMS multimeter	91610338	Feb 2022
Thermo Scientific	ECCON1413BT	270/01	Jun 2023
ACR	Zobell A & B (0608/0609)	362211 (A) & 357174 (B)	Oct 2021 (A & B)
TPS	Sodium Sulphite for Zero DO	10640	Aug 2021

General Comments and Recommendations on Instrument Condition, Location Details and Parts Used in Service

Instrument inspected and noted operation. Refilled pH reference filling solution and replaced reference junction.
Cleaned sensors and instrument. Calibrated individual sensor parameters. DO Sensor slope of 1.070123. ORP sensor offset of 5.5mV.
Conductivity cell constant:0.979

Issued Maintenance Kit and Reference junction kit.

Engineer's Name [redacted]

Date 27th May 2021

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 P [redacted]
Project M
Sampler: [redacted]
Address: 13 Ewing Street
Lismore NSW 2480
Phone: 02 6621 5123 Mob: [redacted]
Email: [redacted]

Testing rquirements - 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):
SMC009.29 - 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 + low level silver (0.00005 mg/L)	OC/OP + toxaphene + demeton LOW LEVEL	TSS	TDS	Cations + Hardness	Ammonia	Cholorphyll-a	Phosphate (FRP)	Nitrate	Nox	Total N	Total P	Cr6+- AsIII & V HOLD		Provide as much information about the sample as you can
1	001 - WC	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	002 - NWC	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - EC	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	005 - Dam Drain	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	013	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	014	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	015	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			

☐ *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	*Lab Use Only*
Print Name:	[redacted]	Print Name: [redacted]	Job number: 283311 — Cooling: Ice / Ice pack / None
Date & Time:	18-Nov	Date & Time: 19/11/21 1110	Temperature: 16° — Security seal: Intact / Broken / None
Signature:		Signature:	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	NWC 002	EC 003	DD 005		013 Trip	014 Field	015 Duplicate
Total Suspended Solids (TSS)	mg/L	N/A	N/A	5	6	<5	48		<5	<5	6
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	1,400	650	160	160		<5	<5	150
Major Cations (dissolved) and Hardness											
Sodium	mg/L	N/A	N/A	150	77	20	20		<0.5	<0.5	21
Potassium	mg/L	N/A	N/A	8.0	4	2	1		<0.5	<0.5	2
Calcium	mg/L	N/A	N/A	110	45	11	4		<0.5	<0.5	11
Magnesium	mg/L	N/A	N/A	31	16	4	5		<0.5	<0.5	5
Hardness mg$CaCO_3$/L		N/A	N/A	400	180	45	30		<3	<3	46
Nutrients											
Ammonia	mg/L	0.015	0.02	2.2	0.040	<0.005	0.027		<0.005	<0.005	<0.005
Chlorophyll-a	mg/m^3	4	5	2	10	3	<2		<2	<2	4
Filterable Reactive Phosphorus	mg/L	0.005	0.02	0.02	0.009	0.18	<0.005		<0.005	<0.005	0.19
Nitrate	mg/L	N/A	N/A	0.063	0.13	<0.005	2.9		<0.005	<0.005	<0.005
Oxides of Nitrogen	mg/L	0.015	0.040	0.1	0.1	<0.005	2.9		<0.005	<0.005	<0.005
Total Nitrogen	mg/L	0.30	0.35	3.3	0.9	0.6	3.6		<0.1	<0.1	0.7
Total Phosphorus	mg/L	0.030	0.025	0.06	0.06	0.23	0.03		<0.02	<0.02	0.23
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	N/A	55	30	20	110	<10		<10	<10	110
Arsenic	µg/L	N/A	13	<1	<1	<1	<1		<1	<1	<1
Boron	µg/L	N/A	370	200	100	40	50		<20	<20	40
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	460	160	95	53		<1	<1	94
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	1	2	4	4		<1	<1	4
Silver	µg/L	1.4	0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05

Analyte	Unit	Water Quality Objectives (WQOs)		Sample Codes							
		Estuary	Fresh Water	WC 001	NWC 002	EC 003	DD 005		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	64	<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	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2
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	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2
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 283311

Client Details

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

Sample Details

Your Reference	**SMC009.29 - Tweed Valley Hospital**
Number of Samples	7 water
Date samples received	19/11/2021
Date completed instructions received	19/11/2021

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	29/11/2021
Date of Issue	29/11/2021

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Results Approved By

[redacted] Senior Chemist
Metals Supervisor
[redacted] Senior Chemist
Organics Supervisor
[redacted] Chemist

Authorised By

[redacted]

[redacted] Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date extracted	-	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021
Date analysed	-	22/11/2021	22/11/2021	22/11/2021	22/11/2021	22/11/2021
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	%	105	106	107	105	106
Surrogate toluene-d8	%	100	99	101	101	101
Surrogate 4-BFB	%	91	91	93	93	93

vTRH(C6-C10)/BTEXN in Water			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date extracted	-	19/11/2021	19/11/2021
Date analysed	-	22/11/2021	22/11/2021
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	%	103	106
Surrogate toluene-d8	%	101	99
Surrogate 4-BFB	%	91	91

svTRH (C10-C40) in Water						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date extracted	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021	24/11/2021	24/11/2021	24/11/2021
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	%	91	99	68	95	96

svTRH (C10-C40) in Water			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date extracted	-	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021
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	%	97	83

OCPs in Water - Low Level						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date extracted	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021	24/11/2021	24/11/2021	24/11/2021
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	%	100	103	68	113	105

OCPs in Water - Low Level			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date extracted	-	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021
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	%	106	88

OP in water LL ANZECCF/ADWG						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date extracted	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021	24/11/2021	24/11/2021	24/11/2021
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	%	100	103	68	113	105

OP in water LL ANZECCF/ADWG			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date extracted	-	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021
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	%	106	88

Miscellaneous Organics - water						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date prepared	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021	24/11/2021	24/11/2021	24/11/2021
Toxaphene*	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-O	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton-S	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d_{14}	%	116	106	94	78	124

Miscellaneous Organics - water			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date prepared	-	23/11/2021	23/11/2021
Date analysed	-	24/11/2021	24/11/2021
Toxaphene*	µg/L	<0.2	<0.2
Demeton-O	µg/L	<0.2	<0.2
Demeton-S	µg/L	<0.2	<0.2
Surrogate p-Terphenyl-d_{14}	%	122	109

HM in water - dissolved						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date prepared	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Aluminium-Dissolved	µg/L	30	20	110	<10	<10
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Boron-Dissolved	µg/L	200	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	460	160	95	53	<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
Zinc-Dissolved	µg/L	1	2	4	4	<1
Silver-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05

HM in water - dissolved			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date prepared	-	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021
Aluminium-Dissolved	µg/L	<10	110
Arsenic-Dissolved	µg/L	<1	<1
Boron-Dissolved	µg/L	<20	40
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	94
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1
Selenium-Dissolved	µg/L	<1	<1
Zinc-Dissolved	µg/L	<1	4
Silver-Dissolved	µg/L	<0.05	<0.05

Metals in Waters - Acid extractable						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date prepared	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Phosphorus - Total	mg/L	0.06	0.06	0.23	0.03	<0.02

Metals in Waters - Acid extractable			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date prepared	-	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021
Phosphorus - Total	mg/L	<0.02	0.23

Cations in water Dissolved						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date digested	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021	23/11/2021	23/11/2021	23/11/2021
Sodium - Dissolved	mg/L	150	77	20	20	<0.5
Potassium - Dissolved	mg/L	8.0	4	2	1	<0.5
Calcium - Dissolved	mg/L	110	45	11	4	<0.5
Magnesium - Dissolved	mg/L	31	16	4	5	<0.5
Hardness	mgCaCO 3 /L	400	180	45	30	<3

Cations in water Dissolved			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date digested	-	23/11/2021	23/11/2021
Date analysed	-	23/11/2021	23/11/2021
Sodium - Dissolved	mg/L	<0.5	21
Potassium - Dissolved	mg/L	<0.5	2
Calcium - Dissolved	mg/L	<0.5	11
Magnesium - Dissolved	mg/L	<0.5	5
Hardness	mgCaCO 3 /L	<3	46

Miscellaneous Inorganics						
Our Reference		283311-1	283311-2	283311-3	283311-4	283311-5
Your Reference	UNITS	001 - WC	002 - NWC	003 - EC	005 - Dam Drain	013
Depth		300	150	300	150	300
Type of sample		water	water	water	water	water
Date prepared	-	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021
Date analysed	-	19/11/2021	19/11/2021	19/11/2021	19/11/2021	19/11/2021
Total Suspended Solids	mg/L	5	6	<5	48	<5
Total Dissolved Solids (grav)	mg/L	1,400	650	160	160	<5
Ammonia as N in water	mg/L	2.2	0.040	<0.005	0.027	<0.005
Chlorophyll a	mg/m^3	2	10	3	<2	<2
Phosphate as P in water	mg/L	0.02	0.009	0.18	<0.005	<0.005
Nitrate as N in water	mg/L	0.063	0.13	<0.005	2.9	<0.005
NOx as N in water	mg/L	0.1	0.1	<0.005	2.9	<0.005
Total Nitrogen in water	mg/L	3.3	0.9	0.6	3.6	<0.1

Miscellaneous Inorganics			
Our Reference		283311-6	283311-7
Your Reference	UNITS	014	015
Depth		300	300
Type of sample		water	water
Date prepared	-	19/11/2021	19/11/2021
Date analysed	-	19/11/2021	19/11/2021
Total Suspended Solids	mg/L	<5	6
Total Dissolved Solids (grav)	mg/L	<5	150
Ammonia as N in water	mg/L	<0.005	<0.005
Chlorophyll a	mg/m^3	<2	4
Phosphate as P in water	mg/L	<0.005	0.19
Nitrate as N in water	mg/L	<0.005	<0.005
NOx as N in water	mg/L	<0.005	<0.005
Total Nitrogen in water	mg/L	<0.1	0.7

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
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-W1	[NT]
Date extracted	-			19/11/2021	1	19/11/2021	22/11/2021		19/11/2021	[NT]
Date analysed	-			22/11/2021	1	22/11/2021	23/11/2021		22/11/2021	[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	97	[NT]
Toluene	µg/L	1	Org-023	<1	1	<1	<1	0	104	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	1	<1	<1	0	107	[NT]
m+p-xylene	µg/L	2	Org-023	<2	1	<2	<2	0	95	[NT]
o-xylene	µg/L	1	Org-023	<1	1	<1	<1	0	90	[NT]
Naphthalene	µg/L	1	Org-023	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	1	105	101	4	103	[NT]
Surrogate toluene-d8	%		Org-023	101	1	100	98	2	103	[NT]
Surrogate 4-BFB	%		Org-023	91	1	91	91	0	98	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			23/11/2021	[NT]	[NT]	[NT]	[NT]	23/11/2021	[NT]
Date analysed	-			24/11/2021	[NT]	[NT]	[NT]	[NT]	23/11/2021	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	98	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	78	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	[NT]	[NT]	[NT]	[NT]	108	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	98	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	[NT]	[NT]	[NT]	[NT]	78	[NT]
Surrogate o-Terphenyl	%		Org-020	129	[NT]	[NT]	[NT]	[NT]	73	[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	-			23/11/2021	[NT]	[NT]	[NT]	[NT]	23/11/2021	[NT]
Date analysed	-			24/11/2021	[NT]	[NT]	[NT]	[NT]	24/11/2021	[NT]
alpha-BHC	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	105	[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]	96	[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]	95	[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]	97	[NT]
Heptachlor Epoxide	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	103	[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]	102	[NT]
Dieldrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	115	[NT]
Endrin	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	100	[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]	101	[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]	104	[NT]
Methoxychlor	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	67	[NT]	[NT]	[NT]	[NT]	66	[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	-			23/11/2021	[NT]	[NT]	[NT]	[NT]	23/11/2021	[NT]
Date analysed	-			24/11/2021	[NT]	[NT]	[NT]	[NT]	24/11/2021	[NT]
Dichlorovos	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	88	[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]	104	[NT]
Fenitrothion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	102	[NT]
Malathion	µg/L	0.05	Org-022/025	<0.05	[NT]	[NT]	[NT]	[NT]	113	[NT]
Chlorpyriphos	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	104	[NT]
Parathion	µg/L	0.01	Org-022/025	<0.01	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	96	[NT]
Ethion	µg/L	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Azinphos-methyl (Guthion)	µg/L	0.02	Org-022/025	<0.02	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate TCMX	%		Org-022/025	67	[NT]	[NT]	[NT]	[NT]	66	[NT]

QUALITY CONTROL: Miscellaneous Organics - water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	
Date prepared	-			23/11/2021	[NT]	[NT]	[NT]	[NT]	23/11/2021	[NT]
Date analysed	-			24/11/2021	[NT]	[NT]	[NT]	[NT]	24/11/2021	[NT]
Toxaphene*	µg/L	0.2	Org-022/025	<0.2	[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	0.2	Org-022/025	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d_{14}	%		Org-022/025	120	[NT]	[NT]	[NT]	[NT]	116	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	283311-2
Date prepared	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	23/11/2021
Date analysed	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	23/11/2021
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	30	30	0	107	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	200	210	5	101	[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	91	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	88	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	88	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	91	[NT]
Manganese-Dissolved	µg/L	1	Metals-022	<1	1	460	450	2	92	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	101	100
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	91	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	92	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	1	<1	0	90	[NT]
Silver-Dissolved	µg/L	0.05	Metals-022	<0.05	1	<0.05	<0.05	0	96	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	283311-2
Date prepared	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	23/11/2021
Date analysed	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	23/11/2021
Phosphorus - Total	mg/L	0.02	Metals-020	<0.02	1	0.06	0.07	15	100	93

QUALITY CONTROL: Cations in water Dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date digested	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	[NT]
Date analysed	-			23/11/2021	1	23/11/2021	23/11/2021		23/11/2021	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	150	150	0	113	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	8.0	7.9	1	115	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	110	110	0	117	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	31	31	0	120	[NT]
Hardness	mgCaCO 3 /L	3		<3	1	400	390	3	[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	283311-2
Date prepared	-			19/11/2021	1	19/11/2021	19/11/2021		19/11/2021	19/11/2021
Date analysed	-			19/11/2021	1	19/11/2021	19/11/2021		19/11/2021	19/11/2021
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	5	<5	0	91	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	1400	1200	15	108	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	2.2	2.2	0	89	91
Chlorophyll a	mg/m^3	2	INORG-119	<2	1	2	[NT]		83	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.02	0.02	0	91	113
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.063	0.062	2	105	92
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.1	0.1	0	105	92
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	3.3	3.4	3	107	105

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.

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 cannot be reported due to the fact they are not in the list of analytes requested. However, the non-reported analytes within the LCS had acceptable recoveries.