

Thursday 10th October 2019

To: ██████████
Site Engineer, LendLease
New Tweed Valley Hospital Project

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

Reporting period: 16th August 2019 to 10th October 2019

1.0 INTRODUCTION

Ecoteam are engaged to undertake monthly and event-based surface water monitoring on behalf of Lendlease Building as part of the early works for the Tweed Valley Hospital Project. This report presents results from the third round of monthly sampling. No controlled or uncontrolled releases from the Sediment Basins occurred during the reporting period.

2.0 PROJECT AIMS AND SAMPLING OBJECTIVES

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

3.0 WEATHER CONDITIONS

Total rainfall in the reporting period was 34.3 mm with the highest rainfall occurring on 27th of August, being 9.6 mm (Kingscliff Station 058137).

4.0 SAMPLING LOCATIONS

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

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

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

SITE: Tweed Valley Hospital Project - Kingscliff		Lendlease Building CLIENT.	SMC009 PROJECT NO.	29/7/19 DATE.
TITLE: Monthly Surface Water Sampling Sites		1:8000 SCALE AT A4.	SS DRAWN.	LB CHECKED.
			A REVISION.	

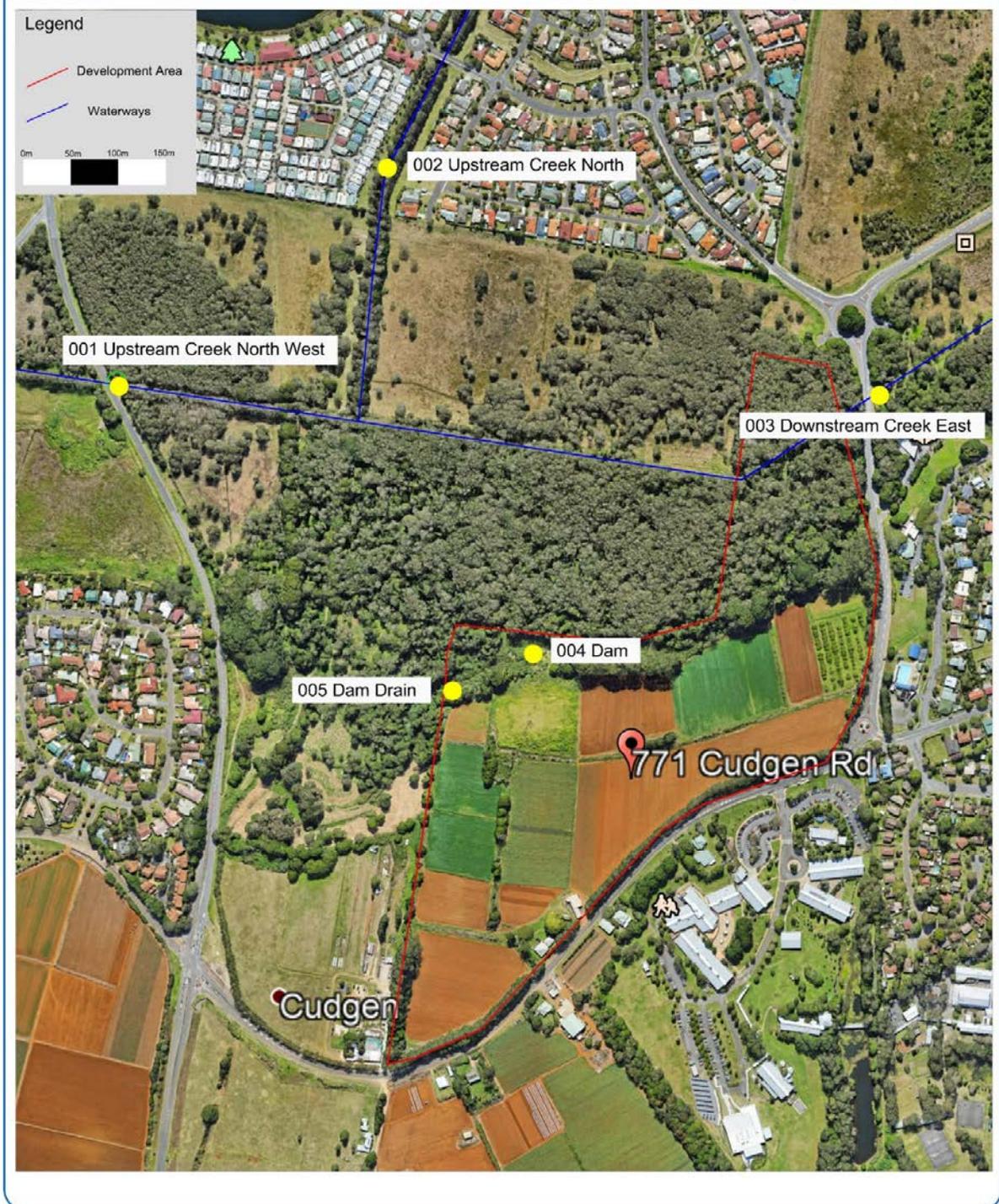


Figure 1. Map of monthly sampling sites (Source: Google Earth)

5.0 SAMPLING METHODOLOGY

Sampling was undertaken by Ecoteam Senior Environmental Scientist, Stefanie Stanley, on Tuesday 17th September. In situ physico-chemical measurements were collected using a SmarTROLL multi-parameter probe and TSS was measured using a Turbimeter Plus. Oil and Grease was visually assessed. The calibration certificate for the SmarTROLL is included as **Appendix B**. The Turbimeter Plus is self-calibrating and calibrated before each sampling round. Water quality samples were collected at 300 mm below the surface where possible. Samples were collected from the bank using an extension pole.

Samples were filtered and preserved on site where necessary, stored on ice and couriered over night to NATA accredited EnviroLab in Sydney. A Trip Blank was sent from EnviroLab and transported to all sites and sent back with the field samples. The Field Blank and Duplicate samples were collected at Site 001 and filtered and preserved as required. 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 odours or surface sheens visible at any site to indicate presence of Oil and Grease.

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

		Water Quality Objectives (WQOs)		Sample Codes & Results					
Analyte	Units	Fresh Water	Estuary	USW 001	USNW 002	DSE 003	Dam 004	DD 005	Blank 014
pH		6.5-8.5	7.0-8.5	7.48	7.47	6.82	6.92	6.62	7.89
Turbidity	NTU	6.0-50	0.5-10	4.37	2.99	1.89	25.4	3.14	NA
Electrical Conductivity (EC)	µS/cm	125-2200	125-2200	3512.2	338.7	170.6	341.7	156.9	48.8
Dissolved Oxygen (DO)	% Saturation	85-110	80-110	9.5	51.1	12.5	17.1	7.6	101.4
Temperature	°C	N/A	N/A	15.91	19.45	16.79	18.52	18.44	20.12
Oxidation Reduction Potential (ORP)		N/A	N/A	-49.4	-19.9	39.9	82.4	27.1	94.8

When compared to the WQOs for Freshwater and Estuaries:

- pH was within range for both criteria this sampling round.
- Turbidity was within range for both criteria this sampling round.
- Electrical Conductivity (EC) was outside the Estuarine criteria at Site 001 (Upstream Creek West) this sampling round, similar to last sampling round.
- Dissolved oxygen (DO) concentrations at all sampling sites were outside the range for both criteria. DO concentrations were within the range in the Field Blank. DO was outside the range at comparison sites in background sampling.

7.2 Laboratory Results

Ammonia, Chlorophyll-a, FRP, NO_x, Total Nitrogen and Total Phosphorus were above the WQOs as per previous month. Only the criteria exceeding the WQOs are shown in **Table 3**. Water quality was consistent with previous month sampling and has improved at Site 002 (Upstream Creek (North West)).

The Chain of Custody Form is included as **Appendix D**. A full copy of the laboratory results is included as **Appendix E**. A summary of all lab results with comparison to WQOs is included as **Appendix F**.

Table 3. Parameters in exceedance of the trigger criteria for sampling conducted 17th September 2019. Results above guidelines are highlighted.

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	Unit	Fresh Water	Estuary	USW 001	USNW 002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate
Nutrients											
Ammonia	µg/L	20	15	24	<5	37	67	120	<5	<5	42
Chlorophyll-a	µg/L	5	4	20	20	<5	8	<5	<5	<5	20
Filterable Reactive Phosphorus	µg/L	20	5	<5	<5	32	12	19	<5	<5	<5
Oxides of Nitrogen	µg/L	40	15	70	20	7	200	800	<5	<5	70
Total Nitrogen	µg/L	350	300	1000	400	400	900	1200	<100	<100	1,100
Total Phosphorus	µg/L	25	30	50	<50	60	500	100	<50	<50	<50

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs for both criteria at all sampling locations, except for Site 002 (Upstream Creek (North West)). Ammonia was above the WQOs at comparison sites in background sampling.
- Chlorophyll-a was above the WQOs for both criteria at Site 001 (Upstream Creek West), Site 002 (Upstream Creek (North West)) and Site 004 (Dam). Chlorophyll-a results were varied across comparison sites in background sampling.

- FRP was above the Freshwater criteria at Site 003 (Downstream Creek East) similar to the previous month. FRP results varied across comparison sites in background sampling though were lowest at Site 005 (Dam Drain).
- NOx was above the WQOs for both criteria at Site 001 (Upstream Creek West), Site 002 (Upstream Creek North West), Site 004 (Dam) and Site 005 (Dam Drain). NOx results are similar to previous month sampling and comparable to baseline monitoring, though significantly lower at Site 002 this month.
- Total Nitrogen was above the WQOs for both criteria at all sampling locations, though significantly lower at Site 002 (Upstream Creek West) and Site 005 (Dam Drain) this month. Total Nitrogen was above the WQOs at comparison sites in baseline sampling.
- Total Phosphorus was above the WQOs for estuarine criteria at Site 001 (Upstream Creek West) and freshwater criteria at Site 003 (Downstream Creek East), Site 004 (Dam) and Site 005 (Dam Drain). Total Phosphorus was above the WQOs at comparison sites in baseline sampling.
- All metals were within estuarine and freshwater criteria this month.
- Demeton and Lindane were analysed and returned non-detectable results.

8.0 Quality Assurance and Quality Control

A Trip Blank and Field Blank sample were analysed.

- All results for the Field Blank and Trip Blank were well within WQOs.
- Parameters analysed in the Trip Blank (013) were below laboratory detection limits.
- Parameters analysed in the Field Blank (014) are all below detectable limits.
- The Duplicate Sample (015) was collected at Site 001 and is within acceptable limits for all analytes.

The laboratory QA/QC is included in the results in **Appendix E**. 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

- Water quality was consistent with previous month sampling.
- Water quality at Site 002 (Upstream Creek (North West)) has improved.
- All metals were within estuarine and freshwater criteria this month.

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

Kind regards,

[Redacted]
[Redacted]
Senior Environmental Scientist & Business Manager
[Redacted]

mob: [Redacted]
office: [Redacted]
fax: (02) 66-218-123

Appendix A. Site Photos



Site 001 – Upstream Creek West



Site 002 – Upstream Creek North West



Site 003 – Downstream Creek East



Site 004 – Dam



Site 005 – Dam Drain

Appendix B. Calibration certificate for SmarTROLL

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: ██████████	

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

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

Calibration/ Accuracy Tests

Standard Type	Serial Number (if applicable)	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Standard Value ± Variation	Displayed Value	Pass/ Fail
✓ pH		7.00 ± 0.02	7.02	4.00 ± 0.02	4.00			Pass
✓ mV (pH)		0.0 +/- 30	-11.0	175.5 +/- 30	157.2			Pass
✓ Slope (pH)		-59.1 +/- 3	-56.16					Pass
✓ DO		8.8mg/L @21.5oC	8.83mg/L @21.26oC	0.0	0.08			Pass
ISE								
✓ ORP		218mV	218mV					Pass
✓ Conductivity		1413us/cm	1414us/cm					Pass
TDS								
✓ Temp C		21.27	21.28					Pass

Reference Instruments Used			
Make	Model / Part Number	Serial / Batch Number	Expiry / Reference #
Thermo Scientific	Temp360	4006227	Jan 2020
Thermo Scientific	ECBU4BTC1LIT	099/01	Feb 2022
Thermo Scientific	ECBU7BTC1LIT	099/01	Feb 2022
Thermo Scientific	ECCON1413BT	099/01	Feb 2022
TPS	Sodium Sulphite for Zero DO	5928	Mar 2020
Thermo Scientific	ORP Standard 967901	VR1	Sept 2019

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

Issue 1

Oct 06
This document must not be reproduced except in full

G0232
Page 1 of 1

Appendix C. Full List of Sampling Analytes

3.7 Proposed Surface Water Quality Sampling Parameters

A summary of the proposed sampling analytes is provided below:

Field

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

Laboratory

- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Major Cations & Hardness
- Ammonia
- Chlorophyll-a
- Filterable Reactive Phosphorus
- Nitrate
- Oxides of Nitrogen
- Total Nitrogen
- Total Phosphorus
- Aluminium (pH > 6.5) filtered
- Arsenic (filtered)
- Boron (filtered)
- Cadmium (filtered)
- Chromium (filtered)
- Copper (filtered)
- Cobalt (filtered)
- Lead (filtered)
- Manganese (filtered)
- Mercury (filtered)

- Nickel (filtered)
- Selenium (filtered)
- Silver (filtered)
- Zinc (filtered)
- Benzene
- Toluene
- Ethylbenzene
- Xylene - Total
- Naphthalene
- Total Recoverable Hydrocarbons (TRH)
- Organochlorine Pesticides (OCP)
 - 4,4'-DDE
 - 4,4'-DDT
 - Aldrin
 - g-BHC (Lindane)
 - Chlordane
 - Dieldrin
 - Endosulfan
 - Endrin
 - Heptachlor
 - Toxaphene
- Organophosphorus Pesticides (OPP)
 - Azinphos-methyl
 - Chlorpyrifos
 - Demeton-S
 - Diazinon
 - Dimethoate
 - Fenitrothion
 - Malathion

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

Table 1 Additional Analysis Requirements

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



Appendix D. Chain of Custody Form

[Copyright and Confidential]		CHAIN OF CUSTODY - Client										Sydney Lab - EnviroLab Services 12 Ashley St, Chatswood, NSW 2067 Ph: 02 9910 6200 / sydney@envirolab.com.au Perth Lab - MPL Laboratories 16-18 Hayden Crt, Myaree, WA 6154 Ph: 08 9317 2505 / lab@mpl.com.au Melbourne Lab - EnviroLab Services 25 Research Drive, Croydon South, VIC 3136 Ph: 03 9763 2500 / melbourne@envirolab.com.au Adelaide Office - EnviroLab Services 7a The Parade, Norwood, SA 5067 Ph: 08 7087 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								
		ENVIROLAB GROUP - National phone number 1300 424 344																		
Client: Ecoteam				Client Project Name / Number / Site etc (ie report title): SMC009 - Tweed Valley Hospital																
Contact Person: [REDACTED]				PO No.:																
Project Mgr: [REDACTED]				EnviroLab Quote No. : 19SY228																
Address: 13 Ewing Street Lismore NSW 2480				Date results required: Or choose: <u>standard</u> / same day / 1 day / 2 day / 3 day <i>Note: Inform lab in advance if urgent turnaround is required - surcharges apply</i>																
Phone: [REDACTED] Mob: [REDACTED]				Additional report format: esdat / equis /																
Email: stefanie@ecoteam.com.au				Lab Comments: Metals: :Al, As, B, Cd, Cr, Cu, Co, Pb, Mn, Hg, Ni, Se, Ag, Z. Cations: Na/K/Ca/Mg. Please hold Cr6 and AsIII/V until initial dissolved metals results are back.																
Sample information					Tests Required										Comments					
EnviroLab Sample ID	Client Sample ID or information	Depth	Date sampled	Type of sample	TRH/BTEXN	Dissolved Metals	OC/OP + toxaphene + dieldrin	TSS	TDS	Cations + Hardness	Ammonia	Chlorophyll-a	Phosphate (FRP)	Nitrate	Nox	Total N	Total P	Cr6+ - HOLD	AsIII & V - HOLD	Provide as much information about the sample as you can
1	001 - USW	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
2	002 - USNW	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
3	003 - DSE	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
4	004 - Dam	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
5	005 - Dam Drain	150 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
6	013	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
7	014	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
8	015	300 mm		Water	X	X	X	X	X	X	X	X	X	X	X	X	X			
<input type="checkbox"/> Please tick the box if observed settled sediment present in water samples is to be included in the extraction and/or analysis																				
Relinquished by (Company): Ecoteam					Received by (Company): ELS					Lab Use Only										
Print Name: [REDACTED]					Print Name: [REDACTED]					Job number: 226979					Cooling: Ice Ice pack / None					
Date & Time: 14.09.11 3pm					Date & Time: 18/9/11 10:47					Temperature: 7.4°C					Security seal: Intact / Broken / None					
Signature: [REDACTED]					Signature: [REDACTED]					TAT Req - SAME day / 1 / 2 / 3 / 4 <u>(STD)</u>										

Appendix E. Full Laboratory Results



CERTIFICATE OF ANALYSIS 226379

Client Details

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

Sample Details

Your Reference	SMC009 - Tweed Valley Hospital
Number of Samples	8 water
Date samples received	18/09/2019
Date completed instructions received	18/09/2019

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.

Report Details

Date results requested by	25/09/2019
Date of Issue	25/09/2019
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

[REDACTED], Team Leader, Inorganics
[REDACTED], Group Technical Manager
[REDACTED], Operations Manager, Sydney
[REDACTED], Chemist
[REDACTED], Senior Chemist
[REDACTED], Organics Supervisor

Authorised By

[REDACTED]
[REDACTED], Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date extracted	-	20/09/2019	20/09/2019	20/09/2019	20/09/2019	20/09/2019
Date analysed	-	22/09/2019	22/09/2019	22/09/2019	22/09/2019	22/09/2019
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	3
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	%	109	110	108	81	108
Surrogate toluene-d8	%	97	98	97	98	98
Surrogate 4-BFB	%	104	93	100	102	102

vTRH(C6-C10)/BTEXN in Water				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	20/09/2019	20/09/2019	20/09/2019
Date analysed	-	22/09/2019	22/09/2019	22/09/2019
TRH C ₆ - C ₉	µg/L	<10	<10	<10
TRH C ₆ - C ₁₀	µg/L	<10	<10	<10
TRH C ₆ - C ₁₀ less BTEX (F1)	µg/L	<10	<10	<10
Benzene	µg/L	<1	<1	<1
Toluene	µg/L	<1	<1	<1
Ethylbenzene	µg/L	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2
o-xylene	µg/L	<1	<1	<1
Naphthalene	µg/L	<1	<1	<1
Surrogate Dibromofluoromethane	%	109	108	107
Surrogate toluene-d8	%	98	98	99
Surrogate 4-BFB	%	100	93	98

svTRH (C10-C40) in Water						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	20/09/2019	20/09/2019	20/09/2019	20/09/2019	20/09/2019
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	%	92	96	96	100	91

svTRH (C10-C40) in Water				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	20/09/2019	20/09/2019	20/09/2019
TRH C ₁₀ - C ₁₄	µg/L	<50	<50	<50
TRH C ₁₅ - C ₂₈	µg/L	<100	<100	<100
TRH C ₂₉ - C ₃₆	µg/L	<100	<100	<100
TRH >C ₁₀ - C ₁₆	µg/L	<50	<50	<50
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	<50	<50	<50
TRH >C ₁₆ - C ₃₄	µg/L	<100	<100	<100
TRH >C ₃₄ - C ₄₀	µg/L	<100	<100	<100
Surrogate o-Terphenyl	%	95	90	62

Client Reference: SMC009 - Tweed Valley Hospital

OCP in water						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019	21/09/2019	21/09/2019
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	93	95	101	111	100

OCP in water				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019
HCB	µg/L	<0.2	<0.2	<0.2
alpha-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	100	79	65

OP Pesticides in water						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019	21/09/2019	21/09/2019
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dichlorvos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
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
Surrogate TCMX	%	93	95	101	111	100

OP Pesticides in water				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Chlorpyrifos	µg/L	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Dichlorvos	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	100	79	65

Client Reference: SMC009 - Tweed Valley Hospital

Miscellaneous Organics - water						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019	21/09/2019	21/09/2019
Toxaphene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton S	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Demeton O	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d14	%	110	93	96	86	92

Miscellaneous Organics - water				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	21/09/2019	21/09/2019	21/09/2019
Toxaphene	µg/L	<0.2	<0.2	<0.2
Demeton S	µg/L	<0.2	<0.2	<0.2
Demeton O	µg/L	<0.2	<0.2	<0.2
Surrogate p-Terphenyl-d14	%	91	77	69

Client Reference: SMC009 - Tweed Valley Hospital

Metals in Waters - Acid extractable						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Phosphorus - Total	mg/L	0.05	<0.05	0.06	0.5	0.1

Metals in Waters - Acid extractable				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019
Phosphorus - Total	mg/L	<0.05	<0.05	<0.05

Client Reference: SMC009 - Tweed Valley Hospital

HM in water - dissolved						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Aluminium-Dissolved	µg/L	<10	20	50	<10	<10
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Boron-Dissolved	µg/L	410	90	20	200	50
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Manganese-Dissolved	µg/L	280	66	42	200	68
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	<1	<1	<1	<1	<1
Zinc-Dissolved	µg/L	2	2	2	4	3

HM in water - dissolved				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019
Aluminium-Dissolved	µg/L	<10	<10	10
Arsenic-Dissolved	µg/L	<1	<1	<1
Boron-Dissolved	µg/L	<20	<20	400
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Cobalt-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Manganese-Dissolved	µg/L	<5	<5	280
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	<1	1
Selenium-Dissolved	µg/L	<1	<1	<1
Silver-Dissolved	µg/L	<1	<1	1
Zinc-Dissolved	µg/L	<1	1	12

Client Reference: SMC009 - Tweed Valley Hospital

Cations in water Dissolved						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date digested	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Sodium - Dissolved	mg/L	530	33	18	47	18
Potassium - Dissolved	mg/L	21	2.8	0.7	7.1	1.9
Calcium - Dissolved	mg/L	320	26	11	18	5.6
Magnesium - Dissolved	mg/L	170	9.5	4.3	10	5.2
Hardness	mgCaCO ₃ /L	1,500	100	45	86	36

Cations in water Dissolved				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date digested	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019
Sodium - Dissolved	mg/L	<0.5	<0.5	530
Potassium - Dissolved	mg/L	<0.5	<0.5	21
Calcium - Dissolved	mg/L	<0.5	<0.5	330
Magnesium - Dissolved	mg/L	<0.5	<0.5	170
Hardness	mgCaCO ₃ /L	<3	<3	1,500

Miscellaneous Inorganics						
Our Reference		226379-1	226379-2	226379-3	226379-4	226379-5
Your Reference	UNITS	001 USW	002 USNW	003 DSE	004 DAM	005 DAM DRAIN
Depth		300	150	300	300	150
Type of sample		water	water	water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019	19/09/2019	19/09/2019
Total Suspended Solids	mg/L	6	<5	<5	59	12
Total Dissolved Solids (grav)	mg/L	3,500	240	120	250	120
Ammonia as N in water	mg/L	0.024	<0.005	0.037	0.067	0.12
Chlorophyll a	mg/m ³	20	20	<5	8	<5
Phosphate as P in water	mg/L	<0.005	<0.005	0.032	0.012	0.019
Nitrate as N in water	mg/L	0.066	0.02	0.005	0.17	0.77
NOx as N in water	mg/L	0.07	0.02	0.007	0.2	0.80
Total Nitrogen in water	mg/L	1.0	0.4	0.4	0.9	1.2

Miscellaneous Inorganics				
Our Reference		226379-6	226379-7	226379-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	19/09/2019	19/09/2019	19/09/2019
Date analysed	-	19/09/2019	19/09/2019	19/09/2019
Total Suspended Solids	mg/L	<5	<5	6
Total Dissolved Solids (grav)	mg/L	<5	<5	3,700
Ammonia as N in water	mg/L	<0.005	<0.005	0.042
Chlorophyll a	mg/m ³	<5	<5	20
Phosphate as P in water	mg/L	<0.005	<0.005	<0.005
Nitrate as N in water	mg/L	<0.005	<0.005	0.064
NOx as N in water	mg/L	<0.005	<0.005	0.07
Total Nitrogen in water	mg/L	<0.1	<0.1	1.1

Client Reference: SMC009 - Tweed Valley Hospital

Method ID	Methodology Summary
Ext-061	Analysed by Envirolab Melbourne
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C.
Inorg-019	Suspended Solids - determined gravimetrically by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
INORG-119	Chlorophyll A based on APHA 10200 H latest edition.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-015	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
SEO-005	OC/OP/PCB - Determination of a suite of Organchlorine Pesticides, Chlorinated Organo-phosphorus Pesticides and Polychlorinated Biphenyls (PCB's) by sonication extraction using dichloromethane for waters or acetone / hexane for soils followed by Gas Chromatographic separation with Electron Capture Detection (GC/ECD). The surrogate spike used is 2,4,5,6-Tetrachloro-m-xylene.

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date extracted	-			20/09/2019	1	20/09/2019	23/09/2019		20/09/2019	[NT]
Date analysed	-			22/09/2019	1	22/09/2019	24/09/2019		22/09/2019	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	<10	1	<10	<10	0	119	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	<10	1	<10	<10	0	119	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	112	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	120	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	120	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	121	[NT]
o-xylene	µg/L	1	Org-016	<1	1	<1	<1	0	122	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	94	1	109	104	5	82	[NT]
Surrogate toluene-d8	%		Org-016	99	1	97	99	2	99	[NT]
Surrogate 4-BFB	%		Org-016	97	1	104	99	5	98	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	5	20/09/2019	23/09/2019		[NT]	[NT]
Date analysed	-			[NT]	5	22/09/2019	24/09/2019		[NT]	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	[NT]	5	<10	<10	0	[NT]	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	[NT]	5	<10	<10	0	[NT]	[NT]
Benzene	µg/L	1	Org-016	[NT]	5	<1	<1	0	[NT]	[NT]
Toluene	µg/L	1	Org-016	[NT]	5	3	3	0	[NT]	[NT]
Ethylbenzene	µg/L	1	Org-016	[NT]	5	<1	<1	0	[NT]	[NT]
m+p-xylene	µg/L	2	Org-016	[NT]	5	<2	<2	0	[NT]	[NT]
o-xylene	µg/L	1	Org-016	[NT]	5	<1	<1	0	[NT]	[NT]
Naphthalene	µg/L	1	Org-013	[NT]	5	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	[NT]	5	108	101	7	[NT]	[NT]
Surrogate toluene-d8	%		Org-016	[NT]	5	98	99	1	[NT]	[NT]
Surrogate 4-BFB	%		Org-016	[NT]	5	102	103	1	[NT]	[NT]

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	226379-2
Date extracted	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			20/09/2019	1	20/09/2019	20/09/2019		20/09/2019	20/09/2019
TRH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	1	<50	<50	0	94	94
TRH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	1	<100	<100	0	80	81
TRH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	1	<100	<100	0	92	115
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	1	<50	<50	0	94	94
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	1	<100	<100	0	80	81
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	1	<100	<100	0	92	115
Surrogate o-Terphenyl	%		Org-003	94	1	92	83	10	112	109

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: OCP in water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	226379-2
Date extracted	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			21/09/2019	1	21/09/2019	21/09/2019		21/09/2019	21/09/2019
HCB	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	98	100
gamma-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	104	106
Heptachlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	102	106
delta-BHC	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	102	104
Heptachlor Epoxide	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	106	108
gamma-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	114	114
Dieldrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	116	120
Endrin	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	112	120
pp-DDD	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	112	116
Endosulfan II	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endrin Aldehyde	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	122	126
Methoxychlor	µg/L	0.2	Org-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	88	1	93	89	4	91	102

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: OP Pesticides in water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	226379-3
Date extracted	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			21/09/2019	1	21/09/2019	21/09/2019		21/09/2019	21/09/2019
Azinphos-methyl (Guthion)	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Bromophos ethyl	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyriphos	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	78	118
Chlorpyriphos-methyl	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Dichlorvos	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	77	71
Dimethoate	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	76	72
Fenitrothion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	71	88
Malathion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	93	82
Parathion	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	126	124
Ronnel	µg/L	0.2	Org-008	<0.2	1	<0.2	<0.2	0	88	87
Surrogate TCMX	%		Org-008	88	1	93	89	4	91	96

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: Miscellaneous Organics - water				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	226379-2
Date prepared	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			21/09/2019	1	21/09/2019	21/09/2019		21/09/2019	21/09/2019
Toxaphene	µg/L	0.2	SEO-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton S	µg/L	0.2	Org-015	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton O	µg/L	0.2	Org-015	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Ext-061	76	1	110	87	23	73	99

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: Metals in Waters - Acid extractable					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	226379-2
Date prepared	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	0.05	0.06	18	100	101

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W6	226379-2
Date prepared	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	93	90
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	94	95
Boron-Dissolved	µg/L	20	Metals-022	<20	1	410	420	2	94	88
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	96	96
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	91	90
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	97	96
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	102	98
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	96	97
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	280	280	0	93	92
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	104	100
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	1	1	0	92	91
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	95	97
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	104	102
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	93	93

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: Cations in water Dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	226379-2
Date digested	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	530	530	0	80	81
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	21	22	5	92	93
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	320	330	3	93	89
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	170	170	0	96	95
Hardness	mgCaCO ₃ /L	3		[NT]	1	1500	1500	0	[NT]	[NT]

Client Reference: SMC009 - Tweed Valley Hospital

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	226379-2
Date prepared	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Date analysed	-			19/09/2019	1	19/09/2019	19/09/2019		19/09/2019	19/09/2019
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	6	8	29	111	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	3500	3500	0	98	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.024	[NT]		98	100
Chlorophyll a	mg/m ³	5	INORG-119	<5	1	20	[NT]		103	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	[NT]		113	111
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.066	[NT]		99	97
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.07	[NT]		102	98
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	1.0	[NT]		98	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	6	19/09/2019	19/09/2019		[NT]	[NT]
Date analysed	-			[NT]	6	19/09/2019	19/09/2019		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	6	<5	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	6	<5	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	6	<0.005	0.005	0	[NT]	[NT]
Chlorophyll a	mg/m ³	5	INORG-119	[NT]	6	<5	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	6	<0.005	<0.005	0	[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	6	<0.005	<0.005	0	[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	6	<0.005	<0.005	0	[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	6	<0.1	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	7	19/09/2019	19/09/2019		[NT]	[NT]
Date analysed	-			[NT]	7	19/09/2019	19/09/2019		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	7	<5	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	7	<5	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	7	<0.005	[NT]		[NT]	[NT]
Chlorophyll a	mg/m ³	5	INORG-119	[NT]	7	<5	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	7	<0.005	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	7	<0.005	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	7	<0.005	[NT]		[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	7	<0.1	<0.1	0	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

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; 60-140% for organics (+/-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.

Appendix F. Summary of Lab Results compared to WQOs

		Water Quality Objectives (WQOs)		Sample Codes							
Analyte	Unit	Fresh Water	Estuary	USW 001	USNW 002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate
Total Suspended Solids (TSS)	mg/L	N/A	N/A	6	<5	<5	59	12	<5	<5	6
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	3,500	240	120	250	120	<5	<5	3,700
Major Cations (dissolved) & Hardness											
Sodium	mg/L	NA	NA	530	33	18	47	18	<0.5	<0.5	530
Potassium	mg/L	NA	NA	21	2.8	0.7	7.1	1.9	<0.5	<0.5	21
Calcium	mg/L	NA	NA	320	26	11	18	5.6	<0.5	<0.5	330
Magnesium	mg/L	NA	NA	170	9.5	4.3	10	5.2	<0.5	<0.5	170
Hardness mgCaCO ₃ /L		NA	NA	1,500	100	45	86	36	<3	<3	1,500
Nutrients											
Ammonia	µg/L	20	15	24	<5	37	67	120	<5	<5	42
Chlorophyll-a	µg/L	5	4	20	20	<5	8	<5	<5	<5	20
Filterable Reactive Phosphorus	µg/L	20	5	<5	<5	32	12	19	<5	<5	<5
Nitrate	µg/L	N/A	N/A	66	20	5	170	770	<5	<5	64
Oxides of Nitrogen	µg/L	40	15	70	20	7	200	800	<5	<5	70
Total Nitrogen	µg/L	350	300	1000	400	400	900	1200	<100	<100	1,100
Total Phosphorus	µg/L	25	30	50	<50	60	500	100	<50	<50	<50
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	55	N/A	<10	20	50	<10	<10	<10	<10	10
Arsenic	µg/L	13	N/A	<1	<1	<1	<1	<1	<1	<1	<1
Boron	µg/L	370	N/A	410	90	20	200	50	<20	<20	400
Cadmium	µg/L	0.2	5.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	1.0	4.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	µg/L	N/A	1.0	<1	<1	<1	<1	<1	<1	<1	<1
Copper	µg/L	1.4	1.3	<1	<1	<1	<1	<1	<1	<1	<1
Lead	µg/L	3.4	4.4	<1	<1	<1	<1	<1	<1	<1	<1
Manganese	µg/L	1,900	N/A	280	66	42	200	68	<5	<5	280
Mercury	µg/L	0.6	0.4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel	µg/L	11	70	1	<1	<1	<1	<1	<1	<1	2
Selenium	µg/L	11	N/A	<1	<1	<1	<1	<1	<1	<1	<1
Silver	µg/L	0.05	1.4	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	µg/L	8.0	15	2	2	2	4	3	<1	1	12
Hydrocarbons											

		Water Quality Objectives (WQOs)		Sample Codes								
Analyte	Unit	Fresh Water	Estuary	USW 001	USNW 002	DSE 003	Dam 004	DD 005	013 Trip	014 Field	015 Duplicate	
Benzene	µg/L	950	700	<1	<1	<1	<1	<1	<1	<1	<1	
Toluene	µg/L	N/A	N/A	<1	<1	<1	<1	<1	<1	<1	<1	
Ethylbenzene	µg/L	N/A	N/A	<1	<1	<1	<1	<1	<1	<1	<1	
Xylene	µg/L	550	N/A	<1	<1	<1	<1	<1	<1	<1	<1	
Naphthalene	µg/L	16	70	<1	<1	<1	<1	<1	<1	<1	<1	
Total Recoverable Hydrocarbons (TRH)	µg/L	N/A	N/A	<50	<50	<50	<50	<50	<50	<50	<50	
Organochlorine Pesticides (OCP)												
4,4'-DDE	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
4,4'-DDT	µg/L	0.01	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Aldrin	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
γ-BHC Lindane	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Chlordane	µg/L	0.08	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Dieldrin	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Endosulfan	µg/L	0.2	0.01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Endrin	µg/L	0.008	0.02	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Heptachlor	µg/L	0.09	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Toxaphene	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Organophosphorus Pesticides (OPP)												
Azinphos-methyl	µg/L	0.02	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Chlorpyrifos	µg/L	0.01	0.009	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Demeton-S	µg/L	N/A	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Diazinon	µg/L	0.01	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Dimethoate	µg/L	0.15	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Fenitrothion	µg/L	0.2	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Malathion	µg/L	0.05	N/A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	