

Monday 11th November 2019

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

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ABN: 82 106 758 123

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

Reporting period: 17th September 2019 to 16th October 2019

1.0 INTRODUCTION

Ecoteam is engaged to undertake monthly and event-based surface water monitoring on behalf of Lendlease Building as part of the early works for the Tweed Valley Hospital Project. This report presents results from the fourth 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 was performed on the 19th & 26th November and 19th December 2018 to record water quality conditions under the existing land use prior to construction (Lendlease Building, 2019).

3.0 WEATHER CONDITIONS

Total rainfall in the month prior to sampling (17th September to 16th October) was 36.4 mm with the highest rainfall occurring on 12th of November, being 14.4 mm (Kingscliff BOM Station 058137).

4.0 SAMPLING LOCATIONS

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

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

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

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 Stefanie Stanley and Lise Bolton on Tuesday 16th October 2019. 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 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 002 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 which may indicate presence of Oil and Grease. A surface sheen was visible at Site 001 which was potentially of microbial origin. Water was visibly stagnant due to low rainfall.

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	USNW0 02	DSE 003	Dam 004	DD 005
pH		6.5-8.5	7.0-8.5	7.51	6.92	6.91	7.18	6.89
Turbidity	NTU	6.0-50	0.5-10	10.1	3.72	2.18	17.3	13.2
Electrical Conductivity (EC)	µS/cm	125-2200	125-2200	4282.72	348.5	202.69	425.23	162.67
Dissolved Oxygen (DO)	% Saturation	85-110	80-110	3.8	74.7	35.4	5.5	80.7
Temperature	°C	N/A	N/A	19.58	23.46	21.41	18.34	21.15
Oxidation Reduction Potential (ORP)		N/A	N/A	31.5	78.9	-1.2	-28.4	83.1

When compared to the WQOs for freshwater and estuaries:

- pH was just outside the estuarine criteria at Site 002 (Upstream Creek North West) this sampling round,
- Turbidity was within range for both criteria this sampling round.
- EC was outside the estuarine criteria at Site 001 (Upstream Creek West) this sampling round, similar to last sampling round.
- 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, Filterable Reactive Phosphorus (FRP), Oxides of Nitrogen (NO_x), Total Nitrogen (TN) and Total Phosphorus (TP) were above the WQOs for some sample sites as per the previous month. Parameters which exceeded the WQOs are shown in **Table 3**.

The chain of custody form is included in **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 16th October 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	190	97	86	130	82	<5	<5	84
Chlorophyll-a	µg/L	5	4	50	10	<5	<5	<5	<5	<5	8
Filterable Reactive Phosphorus (FRP)	µg/L	20	5	<5	11	170	27	<5	<5	<5	11
Oxides of Nitrogen(NO _x)	µg/L	40	15	30	10	<5	<5	400	<5	<5	10
Total Nitrogen (TN)	µg/L	350	300	1300	500	500	400	900	<100	<100	500
Total Phosphorus (TP)	µg/L	25	30	60	<50	200	300	400	<50	<50	<50

When compared to the WQOs for Freshwater and Estuaries:

- Ammonia was above the WQOs for both criteria at all sampling locations, 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) and Site 004 (Dam). Site 004 was below the freshwater criteria in 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) and Site 005 (Dam Drain). NOx results are similar to previous month sampling and comparable to baseline monitoring, though significantly lower at Site 002 and 003 this month.
- TN was above the WQOs for both criteria at all sampling locations. Total Nitrogen was higher at Site 001 (Upstream Creek West), Site 002 (Upstream Creek West) and Site 003 (Downstream Creek East) when compared to the previous months, but lower at Site 004 (Dam) and Site 005 (Dam Drain) this month. Total Nitrogen was above the WQOs at comparison sites in baseline sampling.
- TP 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). TP 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.
- TRH (C₁₀-C₄₀) was detected at Site 001 (Upstream Creek West) and Site 005 (Dam Drain). These samples were retested using silica gel clean-up. The results from TRH with silica gel clean-up exhibited undetectable concentrations of TRH. Therefore, the TRH detected during the initial sampling is of natural occurrence which is consistent with the sheen which was observed on the water surface during sampling. This also correlates with a dry period with no flow and potential microbial activity.

8.0 Quality Assurance and Quality Control

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,

██████████
Environmental Engineer & Director

██████████
mob: ██████████
office: ██████████
fax: ██████████
ABN: 82 106 758 123

Appendix A. Site Photos



**Site 001 – Upstream Creek West
(16/10/2019)**



**Site 002 – Upstream Creek North West
(16/10/2019)**



**Site 003 – Downstream Creek East
(16/10/2019)**



**Site 004 – Dam
(16/10/2019)**



**Site 005 – Dam Drain
(16/10/2019)**

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: Address: Attention:	Ecotechnology Australia PTY Ltd 13 Ewing st Lismore NSW 2480 Stefanie Stanley

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 @21.28oC	0.0	0.08			Pass
ISE								
✓ ORP		218mV	218mV					Pass
✓ Conductivity		1413us/cm	1414us/cm					Pass
TDS								
✓ Temp C		21.27	21.28					Pass

Reference Instruments Used			
Make	Model / Part Number	Serial / Batch Number	Expiry / Reference #
Thermo Scientific	Temp360	4006227	Jan 2020
Thermo Scientific	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

16th Aug 2019

Issue 1

Oct 06

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

CERTIFICATE OF ANALYSIS 228555

Client Details

Client	Ecoteam
Attention	
Address	13 Ewing Street, Lismore, NSW, 2480

Sample Details

Your Reference	<u>SMC009 - Tweed Valley Hospital 9.4</u>
Number of Samples	8 water
Date samples received	17/10/2019
Date completed instructions received	17/10/2019

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.


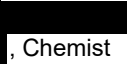
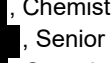
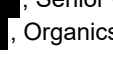

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

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

Report Details

Date results requested by	24/10/2019
Date of Issue	24/10/2019
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Results Approved By

 , Team Leader, Inorganics
 , Metals Supervisor
 , Chemist
 , Senior Chemist
 , Organics Supervisor

Authorised By


 , Laboratory Manager

vTRH(C6-C10)/BTEXN in Water

Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	19/10/2019	19/10/2019	19/10/2019	19/10/2019	19/10/2019
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	4
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	%	103	104	105	111	102
Surrogate toluene-d8	%	98	98	98	97	98
Surrogate 4-BFB	%	106	103	103	103	104

vTRH(C6-C10)/BTEXN in Water

Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	19/10/2019	19/10/2019	19/10/2019
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	%	102	104	105
Surrogate toluene-d8	%	98	98	99
Surrogate 4-BFB	%	105	105	103

svTRH (C10-C40) in Water

Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	19/10/2019	19/10/2019	19/10/2019	19/10/2019	19/10/2019
TRH C ₁₀ - C ₁₄	µg/L	64	<50	<50	<50	57
TRH C ₁₅ - C ₂₈	µg/L	290	<100	<100	<100	170
TRH C ₂₉ - C ₃₆	µg/L	210	<100	<100	<100	650
TRH >C ₁₀ - C ₁₆	µg/L	69	<50	<50	<50	52
TRH >C ₁₀ - C ₁₆ less Naphthalene (F2)	µg/L	69	<50	<50	<50	52
TRH >C ₁₆ - C ₃₄	µg/L	410	<100	<100	<100	640
TRH >C ₃₄ - C ₄₀	µg/L	110	<100	<100	<100	260
Surrogate o-Terphenyl	%	#	115	117	76	125

svTRH (C10-C40) in Water

Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	19/10/2019	19/10/2019	19/10/2019
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	%	124	126	131

Organochlorine Pesticides in Water						
Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	20/10/2019	20/10/2019	20/10/2019	20/10/2019	20/10/2019
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	84	72	69	82	70

Organochlorine Pesticides in Water				
Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	20/10/2019	20/10/2019	20/10/2019
alpha-BHC	µg/L	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	73	90	74

OP Pesticides in Water						
Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	20/10/2019	20/10/2019	20/10/2019	20/10/2019	20/10/2019
Dichlorvos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate TCMX	%	84	72	69	82	70

OP Pesticides in Water				
Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date extracted	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	20/10/2019	20/10/2019	20/10/2019
Dichlorvos	µg/L	<0.2	<0.2	<0.2
Dimethoate	µg/L	<0.2	<0.2	<0.2
Diazinon	µg/L	<0.2	<0.2	<0.2
Chlorpyrifos-methyl	µg/L	<0.2	<0.2	<0.2
Ronnel	µg/L	<0.2	<0.2	<0.2
Fenitrothion	µg/L	<0.2	<0.2	<0.2
Malathion	µg/L	<0.2	<0.2	<0.2
Chlorpyrifos	µg/L	<0.2	<0.2	<0.2
Parathion	µg/L	<0.2	<0.2	<0.2
Bromophos ethyl	µg/L	<0.2	<0.2	<0.2
Ethion	µg/L	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	µg/L	<0.2	<0.2	<0.2
Surrogate TCMX	%	73	90	74

Miscellaneous Organics - water

Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	17/10/2019	17/10/2019	17/10/2019	17/10/2019	17/10/2019
Date analysed	-	23/10/2019	23/10/2019	23/10/2019	23/10/2019	23/10/2019
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	%	98	99	98	97	97

Miscellaneous Organics - water

Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	17/10/2019	17/10/2019	17/10/2019
Date analysed	-	23/10/2019	23/10/2019	23/10/2019
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	%	97	98	100

HM in water - dissolved						
Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Aluminium-Dissolved	µg/L	<10	10	70	<10	<10
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Boron-Dissolved	µg/L	540	100	30	200	60
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	1,000	41	130	850	110
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	1	2	5	3	3

HM in water - dissolved				
Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019
Aluminium-Dissolved	µg/L	<10	<10	10
Arsenic-Dissolved	µg/L	<1	<1	<1
Boron-Dissolved	µg/L	<20	<20	100
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	41
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	5

Metals in Waters - Acid extractable

Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Phosphorus - Total	mg/L	0.06	<0.05	0.2	0.3	0.4

Metals in Waters - Acid extractable

Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019
Phosphorus - Total	mg/L	<0.05	<0.05	<0.05

Cations in water Dissolved

Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Sodium - Dissolved	mg/L	570	37	27	51	25
Potassium - Dissolved	mg/L	27	2.9	5.5	7.4	2.2
Calcium - Dissolved	mg/L	330	27	9.6	17	4.7
Magnesium - Dissolved	mg/L	180	8.3	3.6	10	4.4
Hardness	mgCaCO ₃ /L	1,600	100	39	84	30

Cations in water Dissolved

Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date digested	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019
Sodium - Dissolved	mg/L	<0.5	<0.5	37
Potassium - Dissolved	mg/L	<0.5	<0.5	2.9
Calcium - Dissolved	mg/L	<0.5	<0.5	26
Magnesium - Dissolved	mg/L	<0.5	<0.5	8.1
Hardness	mgCaCO ₃ /L	<3	<3	98

Miscellaneous Inorganics						
Our Reference		228555-1	228555-2	228555-3	228555-4	228555-5
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	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019	18/10/2019	18/10/2019
Total Suspended Solids	mg/L	22	<5	<5	44	120
Total Dissolved Solids (grav)	mg/L	3,700	220	140	280	100
Ammonia as N in water	mg/L	0.19	0.097	0.086	0.13	0.082
Chlorophyll a	mg/m ³	50	10	<5	<5	<5
Phosphate as P in water	mg/L	<0.005	0.011	0.17	0.027	<0.005
Nitrate as N in water	mg/L	0.02	0.009	<0.005	<0.005	0.34
NOx as N in water	mg/L	0.03	0.01	<0.005	<0.005	0.4
Total Nitrogen in water	mg/L	1.3	0.5	0.5	0.4	0.9

Miscellaneous Inorganics				
Our Reference		228555-6	228555-7	228555-8
Your Reference	UNITS	013	014	015
Depth		300	300	300
Type of sample		water	water	water
Date prepared	-	18/10/2019	18/10/2019	18/10/2019
Date analysed	-	18/10/2019	18/10/2019	18/10/2019
Total Suspended Solids	mg/L	<5	<5	<5
Total Dissolved Solids (grav)	mg/L	<5	<5	230
Ammonia as N in water	mg/L	<0.005	<0.005	0.084
Chlorophyll a	mg/m ³	<5	<5	8
Phosphate as P in water	mg/L	<0.005	<0.005	0.011
Nitrate as N in water	mg/L	<0.005	<0.005	0.007
NOx as N in water	mg/L	<0.005	<0.005	0.01
Total Nitrogen in water	mg/L	<0.1	<0.1	0.5

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

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			18/10/2019	1	18/10/2019	21/10/2019		18/10/2019	[NT]
Date analysed	-			19/10/2019	1	19/10/2019	22/10/2019		19/10/2019	[NT]
TRH C ₆ - C ₉	µg/L	10	Org-016	<10	1	<10	<10	0	97	[NT]
TRH C ₆ - C ₁₀	µg/L	10	Org-016	<10	1	<10	<10	0	97	[NT]
Benzene	µg/L	1	Org-016	<1	1	<1	<1	0	98	[NT]
Toluene	µg/L	1	Org-016	<1	1	<1	<1	0	97	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	1	<1	<1	0	96	[NT]
m+p-xylene	µg/L	2	Org-016	<2	1	<2	<2	0	97	[NT]
o-xylene	µg/L	1	Org-016	<1	1	<1	<1	0	97	[NT]
Naphthalene	µg/L	1	Org-013	<1	1	<1	<1	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	101	1	103	108	5	102	[NT]
Surrogate toluene-d8	%		Org-016	97	1	98	101	3	99	[NT]
Surrogate 4-BFB	%		Org-016	101	1	106	108	2	97	[NT]

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: svTRH (C10-C40) in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	228555-2
Date extracted	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	18/10/2019
Date analysed	-			19/10/2019	1	19/10/2019	19/10/2019		19/10/2019	19/10/2019
TRH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	1	64	53	19	129	118
TRH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	1	290	230	23	106	98
TRH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	1	210	170	21	108	125
TRH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	1	69	<50	32	129	118
TRH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	1	410	320	25	106	98
TRH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	1	110	<100	10	108	125
Surrogate o-Terphenyl	%		Org-003	130	1	#	111		130	115

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	228555-2
Date extracted	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	18/10/2019
Date analysed	-			20/10/2019	1	20/10/2019	20/10/2019		20/10/2019	20/10/2019
alpha-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	108	98
HCB	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	101	87
gamma-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	99	85
delta-BHC	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	113	91
Heptachlor Epoxide	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	110	91
gamma-Chlordane	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	119	94
Dieldrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	123	94
Endrin	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	111	91
Endosulfan II	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	123	90
Endrin Aldehyde	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	115	98
Methoxychlor	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	78	1	84	74	13	97	78

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: OP Pesticides in Water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	228555-2
Date extracted	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	18/10/2019
Date analysed	-			20/10/2019	1	20/10/2019	20/10/2019		20/10/2019	20/10/2019
Dichlorvos	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	123	113
Dimethoate	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Diazinon	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Chlorpyrifos-methyl	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ronnel	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	102	92
Fenitrothion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	102	104
Malathion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	109	92
Chlorpyrifos	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	73	101
Parathion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	105	118
Bromophos ethyl	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Ethion	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	104	117
Azinphos-methyl (Guthion)	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate TCMX	%		Org-012/017	78	1	84	74	13	80	77

QUALITY CONTROL: Miscellaneous Organics - water					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	228555-2
Date prepared	-			17/10/2019	1	17/10/2019	17/10/2019		17/10/2019	17/10/2019
Date analysed	-			23/10/2019	1	23/10/2019	23/10/2019		23/10/2019	23/10/2019
Toxaphene	µg/L	0.2	SEO-005	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton S	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Demeton O	µg/L	0.2	Org-012/017	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012/017	99	1	98	97	1	96	99

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: HM in water - dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Date analysed	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	111	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	106	[NT]
Boron-Dissolved	µg/L	20	Metals-022	<20	1	540	540	0	113	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	106	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	106	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	109	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	105	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	110	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	1000	1000	0	107	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	102	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	105	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	105	[NT]
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	108	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	1	2	67	107	[NT]

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: Metals in Waters - Acid extractable					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Date analysed	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	0.06	0.06	0	99	[NT]

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: Cations in water Dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date digested	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Date analysed	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	570	580	2	103	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	27	27	0	96	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	330	330	0	92	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	1	180	180	0	96	[NT]
Hardness	mgCaCO ₃ /L	3		[NT]	1	1600	1600	0	[NT]	[NT]

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	228555-2
Date prepared	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	18/10/2019
Date analysed	-			18/10/2019	1	18/10/2019	18/10/2019		18/10/2019	18/10/2019
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	22	20	10	91	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	3700	3700	0	98	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	0.19	0.19	0	113	106
Chlorophyll a	mg/m ³	5	INORG-119	<5	1	50	[NT]		99	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	<0.005	<0.005	0	114	126
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.02	0.02	0	102	99
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.03	0.03	0	103	100
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	1.3	1.4	7	94	[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.

Report Comments

TRH Water(C10-C40) NEPM - # Percent recovery for the surrogate/matrix spike is not possible to report due to interference from analytes (other than those being tested) in sample 228555-1.

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

CERTIFICATE OF ANALYSIS 228555-A

Client Details

Client	Ecoteam
Attention	
Address	13 Ewing Street, Lismore, NSW, 2480

Sample Details

Your Reference	<u>SMC009 - Tweed Valley Hospital 9.4</u>
Number of Samples	8 water
Date samples received	17/10/2019
Date completed instructions received	25/10/2019

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.

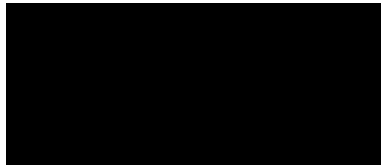

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	01/11/2019
Date of Issue	30/10/2019
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

, Chemist


, Laboratory Manager

sTPH in Water (C10-C40) NEPM Silica gel			
Our Reference		228555-A-1	228555-A-5
Your Reference	UNITS	001 USW	005 DAM DRAIN
Type of sample		water	water
Date extracted	-	28/10/2019	28/10/2019
Date analysed	-	29/10/2019	29/10/2019
TPH C ₁₀ - C ₁₄	µg/L	<50	<50
TPH C ₁₅ - C ₂₈	µg/L	<100	<100
TPH C ₂₉ - C ₃₆	µg/L	<100	<100
TPH >C ₁₀ - C ₁₆	µg/L	<50	<50
TPH >C ₁₆ - C ₃₄	µg/L	<100	<100
TPH >C ₃₄ - C ₄₀	µg/L	<100	<100
Surrogate o-Terphenyl	%	76	74

Method ID	Methodology Summary
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.

Client Reference: SMC009 - Tweed Valley Hospital 9.4

QUALITY CONTROL: sTPH in Water (C10-C40) NEPM Silica gel						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			28/10/2019	[NT]	[NT]	[NT]	[NT]	28/10/2019	[NT]
Date analysed	-			29/10/2019	[NT]	[NT]	[NT]	[NT]	29/10/2019	[NT]
TPH C ₁₀ - C ₁₄	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TPH C ₁₅ - C ₂₈	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	118	[NT]
TPH C ₂₉ - C ₃₆	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
TPH >C ₁₀ - C ₁₆	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	115	[NT]
TPH >C ₁₆ - C ₃₄	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	118	[NT]
TPH >C ₃₄ - C ₄₀	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	102	[NT]
Surrogate o-Terphenyl	%		Org-003	88	[NT]	[NT]	[NT]	[NT]	122	[NT]

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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	22	<5	<5	44	120	<5	<5	<5
Total Dissolved Solids (TDS)	mg/L	N/A	N/A	3,700	220	140	280	100	<5	<5	230
Major Cations (dissolved) & Hardness											
Sodium	mg/L	NA	NA	570	37	27	51	25	<0.5	<0.5	37
Potassium	mg/L	NA	NA	27	2.9	5.5	7.4	2.2	<0.5	<0.5	2.9
Calcium	mg/L	NA	NA	330	27	9.6	17	4.7	<0.5	<0.5	4.7
Magnesium	mg/L	NA	NA	180	8.3	3.6	10	4.4	<0.5	<0.5	4.4
Hardness mgCaCO ₃ /L		NA	NA	1,600	100	39	84	30	<3	<3	30
Nutrients											
Ammonia	µg/L	20	15	190	97	86	130	82	<5	<5	84
Chlorophyll-a	µg/L	5	4	50	10	<5	<5	<5	<5	<5	8
Filterable Reactive Phosphorus	µg/L	20	5	<5	11	170	27	<5	<5	<5	11
Nitrate	µg/L	N/A	N/A	30	10	<5	<5	400	<5	<5	10
Oxides of Nitrogen	µg/L	40	15	1300	500	500	400	900	<100	<100	500
Total Nitrogen	µg/L	350	300	60	<50	200	300	400	<50	<50	<50
Total Phosphorus	µg/L	25	30	190	97	86	130	82	<5	<5	84
Metals – All metals are Dissolved Metals											
Aluminium	µg/L	55	N/A	<10	10	70	<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	540	100	30	200	60	<20	<20	100
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	1000	41	130	850	110	<5	<5	41
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	<1
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	1	2	5	3	3	<1	<1	5

		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
Hydrocarbons											
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
g-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