Eastland Port Upper Logyard Sampling Report – October 2016

For Eastland Port Limited

November 2016

REPORT INFORMATION AND QUALITY CONTROL

Prepared for:	Eastland Port Limited

Author:	Christine Oakey Environmental Management Consultant	
Reviewer and approved for release:	Mark Poynter Principal Ecologist	

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certified organisation

MEMBER

Telarc Q-Base Code

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1 INTRODUCTION

Under consents LR-2011-105808-00 and DW-2011-105049-00 held by Eastland Port Limited (EPL), water quality monitoring is required. Sampling is quarterly at five locations:

- Site 1 – Logyard discharge from the second settling basin.
- Site 2 – Logyard discharge below lamella clarifier (prior to point of discharge to stream).
- Site 3 – Kopuawhakapata Stream 20m downstream of discharge point to stream.
- Site 4 – Kopuawhakapata Stream 10m upstream of discharge.
- Site 5 – The inner harbour within 20m of the Kopuawhakapata Stream outlet to the marina.

Refer to Appendix A for a plan of the sample sites.

This sampling was undertaken on 10 October 2016, and represents the 2016 Quarter 3 sample. No sample was able to be collected in Quarter 2.

Sampling was undertaken in accordance with the Environmental Management Plan and the Standard Operating Procedures prepared by 4Sight Consulting. The sampling was undertaken by Logic Forest Solutions.

This report has been prepared for EPL.

2 SAMPLING DETAILS

Table 1: Sample time and dates

Location	Date	Time
ULY Site 1	10/10/2016	8:35am
ULY Site 2	10/10/2016	8:41am
ULY Site 3	10/10/2016	9:10am
ULY Site 4	10/10/2016	9:02am
ULY Site 5	10/10/2016	9:40am

2.1 Relevant Site Information

Table 2: Sample Information

Location	Rainfall event	Number of dry days prior to sampling	Clarity	Obvious or visual features
ULY Site 1	28mm	0	Lightly turbid	No debris or scums/foams present
ULY Site 2	28mm	0	Lightly turbid	No debris or scums/foams present

ULY Site 3	28mm	0	Clear	No debris or scums/foams present
ULY Site 4	28mm	0	Clear	No debris or scums/foams present
ULY Site 5	28mm	0	Clear	No debris or scums/foams present

3 ANALYSIS OF LABORATORY RESULTS

3.1 Results

Table 3 shows the results from the 10 October 2016 sample round. For Site 3 (the stream mixing zone edge) exceedances of the trigger limits are highlighted in purple. The trigger limits are from the Environmental Management Plan dated January 2015.

Table 3: October 2016 sample results

Parameter	Units	EMP trigger limits	Site 1 Clarifier	Site 2 Discharge	Site 3 Compliance Point	Site 4 Background	Site 5 Marina
pH	-log(H^+)	6.5 – 8.5	7.1	7.0	7.6	7.6	7.9
Temperature	^oC	Not more than 3^oC above background	n/a	n/a	n/a	n/a	n/a
Dissolved Oxygen	g/m^3	Not less than 4	n/a	n/a	n/a	n/a	n/a
TPH	g/m^3	15	<0.7	<0.7	<0.7	<0.7	<0.7
TSS	g/m^3	Not more than 100 g/m^3 above background	480	108	29	23	10
Settleable Solids	g/m^3	n/a	1.0	<1.0	<1.0	<1.0	<1.0
VSS	g/m^3	n/a	112	37	<10	-	-
Total Nitrogen	g/m^3	0.4	2.1	1.11	1.63	1.40	0.31
Soluble Inorganic Nitrogen	g/m^3	0.4	0.072	0.033	0.68	0.72	0.150
$cBOD_5$	g/m^3	20 above background	-	-	2	<2	-
Dehydroabeitic Acid	g/m^3	0.025	2.3668	1.7513	<0.0001	<0.0001	<0.0001
Total Phenols	g/m^3	0.72	0.07	0.15	<0.02	<0.02	<0.02
Total Tannins	g/m^3	n/a	72	39	0.65	<0.10	<5
Dissolved Cu	g/m^3	0.0025 average of 4 quarterly samples	0.0016	0.00014	0.0027	0.0024	<0.01
Dissolved Zn	g/m^3	0.031 average of 4 quarterly samples	0.0134	0.024	0.075	0.076	<0.02
Hardness	g/m^3	n/a	-	-	120	118	-
Absorbance at 440nm	AU cm^{-1}	n/a	-	-	0.027	0.025	0.007

Temperature and dissolved oxygen were unable to be measured this round as in the field samples were unable to be collected due to the availability of a meter.

3.2 Findings on Consent Condition Compliance

pH

pH levels are within the trigger limit range.

Total Petroleum Hydrocarbons (TPH)

TPH level at all sites are below detection.

Total Suspended Solids (TSS), Settleable Solids (SS), Volatile Suspended Solids (VSS)

TSS at Site 3 is 29g/m^3 and 23g/m^3 at Site 4 and is therefore well within the trigger limit of not more than 100g/m^3 above background. The results indicate effective treatment on this occasion as TSS levels decreased 78% from Site 1 to Site 2. See Figure 1 for TSS results.

SS levels are below detection at all receiving environment sites.

The levels of VSS show that 23%, 34%, and less than 34% of the TSS is organic material at Sites 1, 2 and 3 respectively.

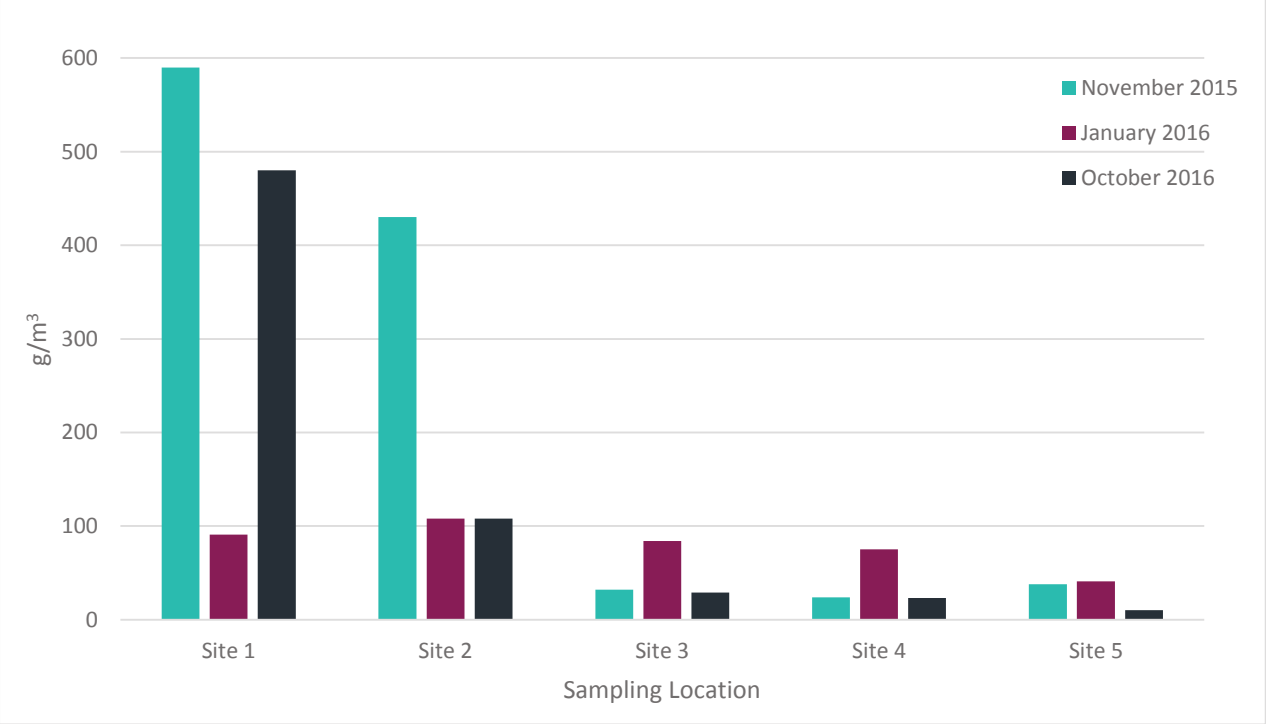


Figure 1: TSS results

Total Nitrogen (TN) and Soluble Inorganic Nitrogen

TN at the background sample (Site 4) was 1.4g/m^3 which is well above the trigger limit and reflects the high background nutrient concentration in the Kopuawhakapata Stream. The Site 3 compliance point results for TN and SIN are only marginally above background and are not significant. TN results are shown in Figure 2.

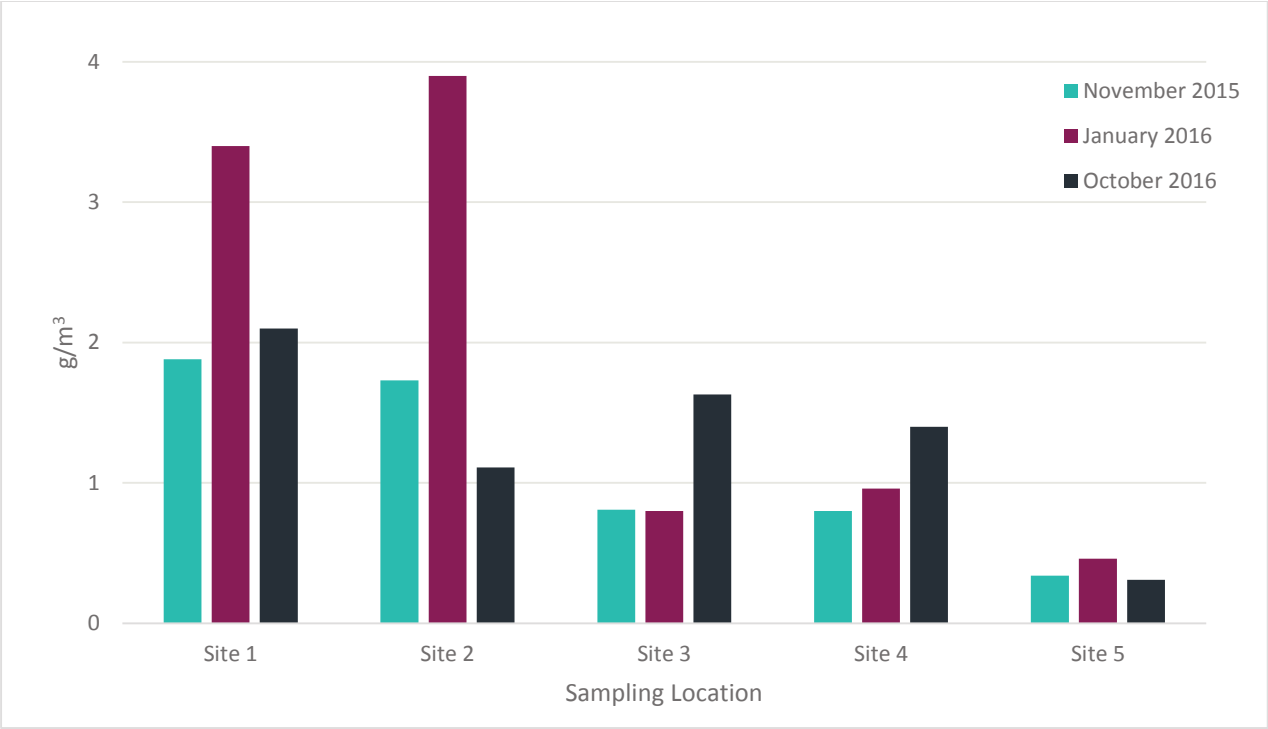


Figure 2: Total Nitrogen results

BOD

BOD at Site 3 is 2g/m^3, which is within the trigger limit of 20g/m^3 above background.

Dehydroabeitic Acid

Dehydroabeitic Acid result at Site 3 and the other receiving environment sites is below the detection limit and thus well below the trigger limit.

Total Phenols

Total Phenols at Site 3 is less than detection and below the trigger limit.

Metals

Dissolved Cu at Site 3 is 0.0027g/m^3 which is slightly above the trigger limit average of 0.0025g/m^3 (based on 4 quarterly samples which are yet to be completed and the average calculated). The two onsite dissolved CU results are well less than the receiving environment results. The three compliance point results to date average 0.0026 g/m^3 and thus appear to be on target. Discharge dissolved Cu concentration is low and is close to background concentration. Dissolved Cu results are shown in Figure 3.

Background dissolved Zn is high and more than twice the trigger limit (again to be averaged after 4 quarterly samples). The compliance point zinc concentration is not significantly above background. Dissolved Zn results are shown in Figure 4.

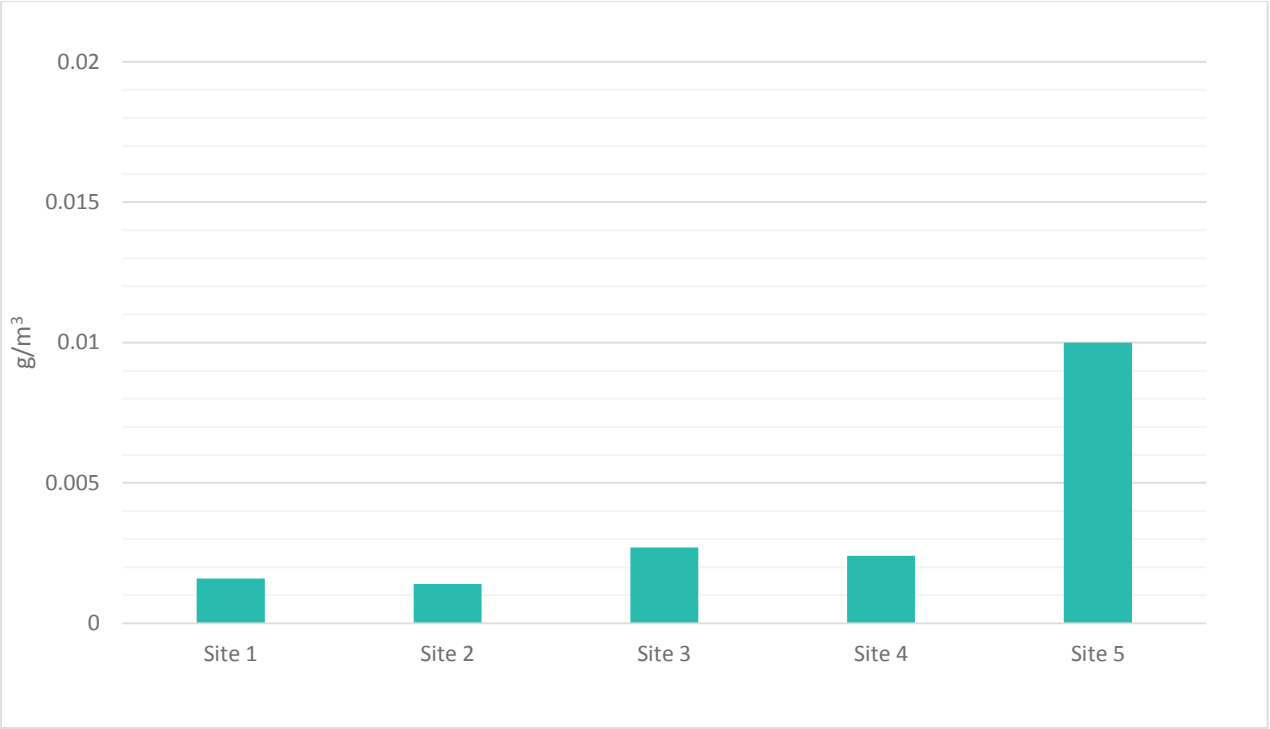


Figure 3: Dissolved Cu results October 2016

Note: The detection limit for Dissolved Copper at Site 5 was 0.01g/m^3. The site 5 result was <0.01 but appears in the graph as 0.1 g/m^3 and thus 'appears' higher than other results.

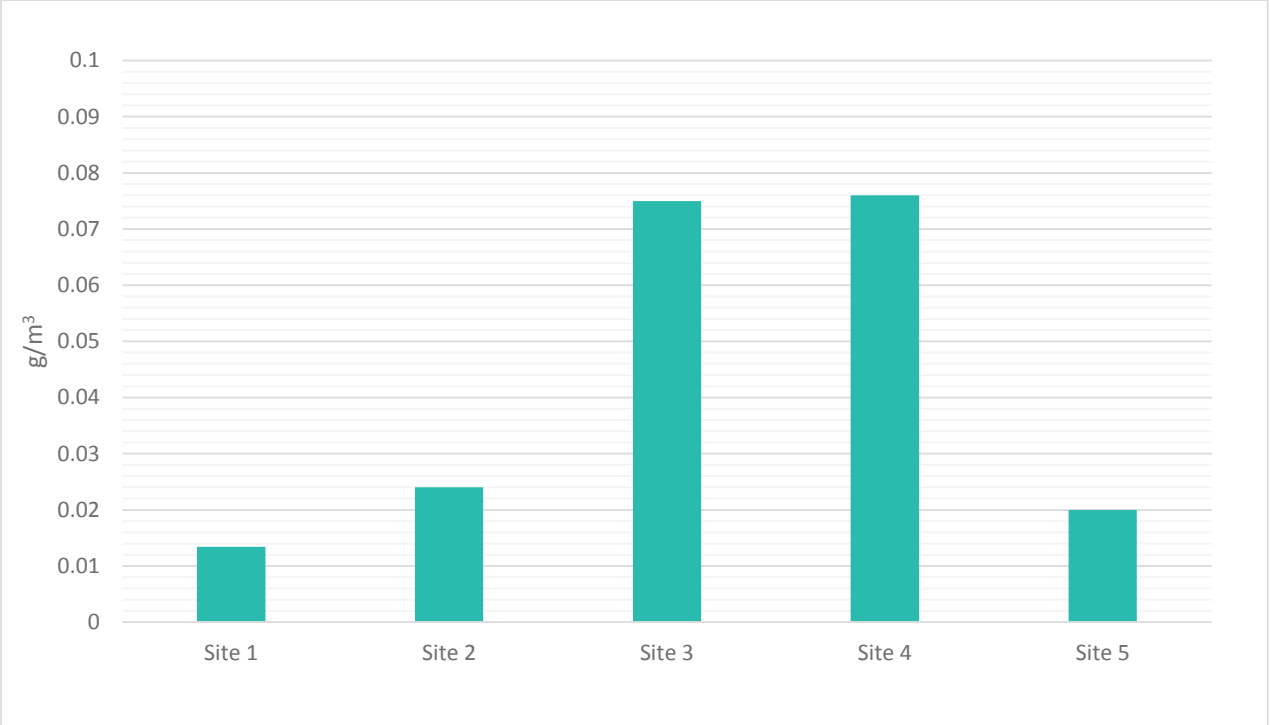


Figure 4: Dissolved Zn results October 2016

Hardness

Total hardness increased slightly from 118g/m^3 to 120g/m^3 from upstream to downstream.

Colour

Colour has been measured as absorbance at 440nm. Absorbance from upstream to downstream only slightly increased from 0.025AU cm^{-1} to 0.027AU cm^{-1}, showing that the discharge from the logyard did not have an adverse effect on colour.

3.3 Further Actions Required in Light of Findings

All results are compliant taking background values into consideration. No further actions are required based on the sampling results.

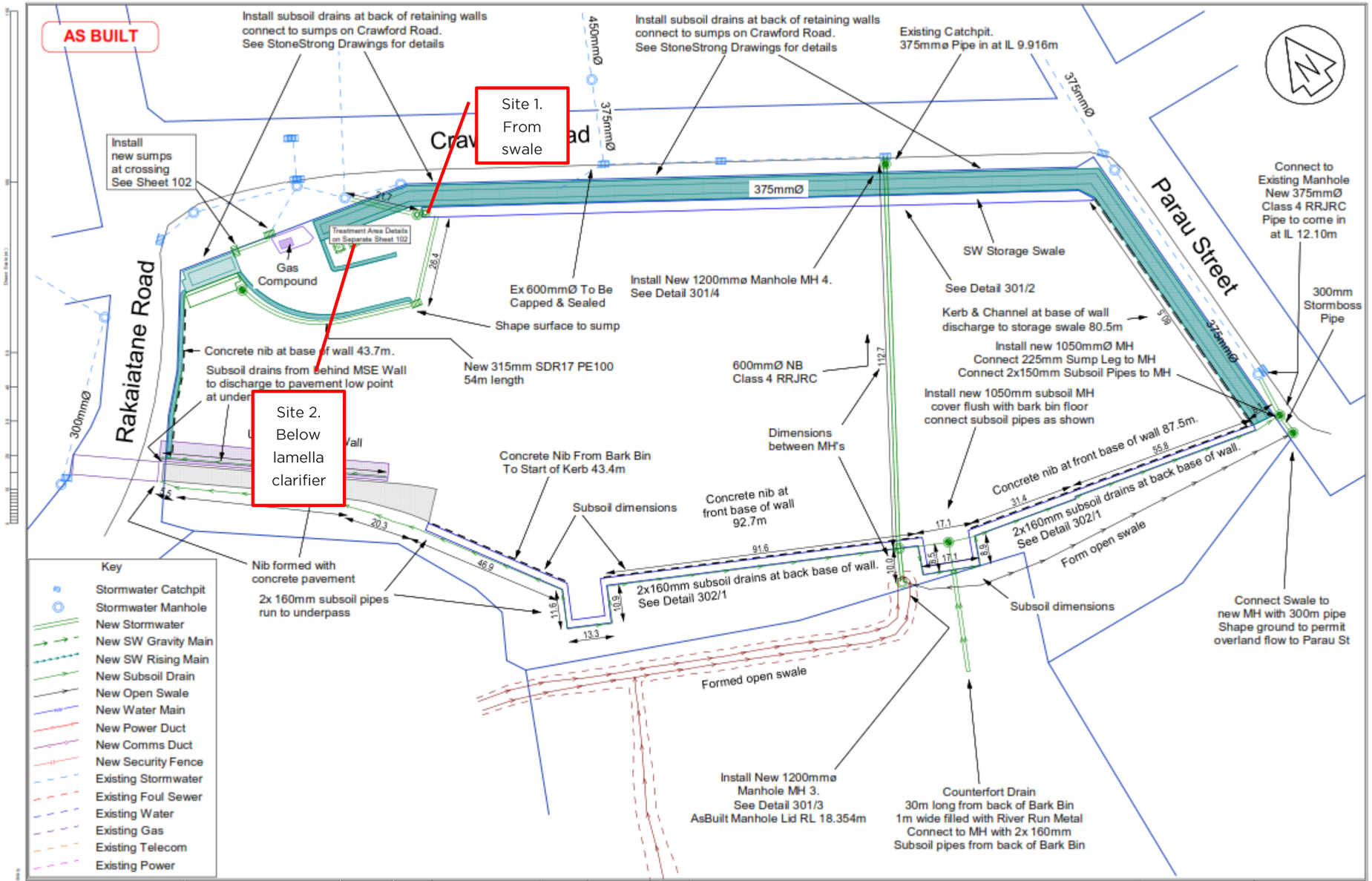
The next round of sampling is due by the end of Quarter 4 2016, if an appropriate rain event occurs.

4 CONCLUSIONS

- The results show the discharge is compliant with consent requirements and is of a high quality.
- The next round of sampling is due by the end of Quarter 4 2016.

Appendix A:

Sampling Locations



Downer

Eastland Port

Issued	Amendments
22/05/2015	1: Add Retaining Wall Subsoils
12/08/2015	2: Crawford Entrance & Notes
12/08/2015	2: Concrete Nibs to Walls
12/08/2015	2: Concrete Swale Section Change
08/10/2015	Include As Built Dimensions

	Name	Date
Design/Drawn	C Gates	28/09/2015
Checked	C Langdale	28/09/2015
Approved	R Sharpe	08/10/2015
Client Appr.		

Eastland Port
Upper Log Yard Development
Site Stormwater and Drainage Plan

SCALES	JOB #	
1:1000 @ A3	551761	
PLOT DATE	SHEET	REVISION
8 Oct 2015	005	AB


Site #5
Site #3
Site #4
Site #2
Site #1
Waiau Rd
35
Reeds Quay
Pitt St
Esplanade
Iliili St
Harris St
Paiau St
Stevenson St
Dickson St
Ropata St
Kaiti Beach Rd
Crawford Rd
Bartu St
Image © 2016 DigitalGlobe
Google Earth

Appendix B:

Hill Laboratories Analysis Report

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

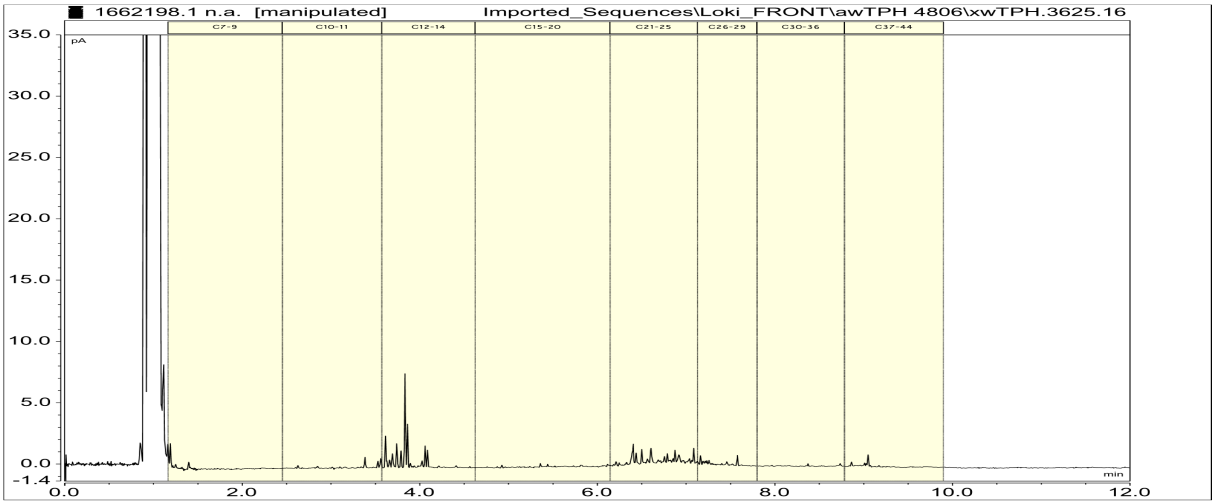
ANALYSIS REPORT

Client:	4SIGHT Consulting Limited	**Lab No:**	1662198 SPv1
Contact:	C Oakey	**Date Received:**	11-Oct-2016
	C/- 4SIGHT Consulting Limited	**Date Reported:**	21-Oct-2016
	PO Box 911310	**Quote No:**	67123
	Victoria Street West	**Order No:**	AA1146
	Auckland 1142	**Client Reference:**	AA1146 Upper Logyard Crawford Rd
		Submitted By:	James Isaac

Sample Type: Aqueous

Sample Name:		ULY SW Site 1 10-Oct-2016 8:35 am	ULY SW Site 2 10-Oct-2016 8:41 am	ULY SW Site 3 10-Oct-2016 9:10 am	ULY SW Site 4 10-Oct-2016 9:02 am	ULY SW Site 5 10-Oct-2016 9:40 am
Lab Number:		1662198.1	1662198.2	1662198.3	1662198.4	1662198.5
Individual Tests						
pH	pH Units	7.1	7.0	7.6	7.6	7.9
Total Hardness	g/m³ as $CaCO_3$	-	-	120	118	-
Volatile Suspended Solids	g/m³	112	37	< 10 #2	-	-
Total Suspended Solids	g/m³	480	108	29	23	10
Settleable Solids*	mL/L	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Calcium	g/m³	-	-	39	38	-
Dissolved Copper	g/m³	0.0016	0.0014	0.0027	0.0024	< 0.010
Total Copper	g/m³	0.0087	0.0033	0.0039	0.0037	< 0.011
Dissolved Magnesium	g/m³	-	-	5.6	5.6	-
Dissolved Zinc	g/m³	0.0134	0.024	0.075	0.076	< 0.02
Total Zinc	g/m³	0.081	0.043	0.097	0.098	< 0.021
Dissolved Inorganic Nitrogen*	g/m³	0.072	0.033	0.68	0.72	0.150
Total Nitrogen	g/m³	2.1	1.11	1.63	1.40	0.31
Total Ammoniacal-N	g/m³	0.064	0.029	< 0.010	0.023	0.023
Nitrate-N + Nitrite-N	g/m³	0.008	0.004	0.68	0.70	0.127
Total Kjeldahl Nitrogen (TKN)	g/m³	2.1	1.11	0.95	0.70	0.18
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	g O_2/m³	-	-	2	< 2	-
Total Phenols	g/m³	0.07	0.15	< 0.02	< 0.02	< 0.02
Tannin	g/m³	72	39 #1	0.65	< 0.10	< 5 #3
Absorbance at 440 nm	AU cm^{-1}	-	-	0.027	0.025	0.007
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
C10 - C14	g/m³	0.2	< 0.2	< 0.2	< 0.2	< 0.2
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7

1662198.1
ULY SW Site 1 10-Oct-2016 8:35 am
Client Chromatogram for TPH by FID



Analyst's Comments

#1 Severe matrix interferences required that a dilution be performed prior to analysis of sample 1662198/2, resulting in a detection limit higher than that normally achieved for the Tannin analysis.

#2 There was insufficient sample left to filter the usual amount for the Volatile Suspended Solids test on sample 1662198/3 so the detection limit is higher than normal.

#3 Severe matrix interferences required that a dilution be performed prior to analysis of sample 1662198/5, resulting in a detection limit higher than that normally achieved for the Tannin analysis.

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Total Petroleum Hydrocarbons in Water*	Hexane extraction, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:2803,10734]	0.10 - 0.7 g/m^3	1-5
Filtration, Glass Fibre	Sample filtration through glass fibre filter.	-	3-5
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-5
Total Digestion	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	1-5
Total Kjeldahl Digestion	Sulphuric acid digestion with copper sulphate catalyst.	-	1-5
pH	pH meter. APHA 4500-H$^+$ B 22nd ed. 2012. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field.	0.1 pH Units	1-5
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B 22nd ed. 2012.	1.0 g/m^3 as $CaCO_3$	3-4
Volatile Suspended Solids	Filtration (GF/C, 1.2 µm). Ashing 550°C, 30 min. Gravimetric. APHA 2540 E 22nd ed. 2012.	3 g/m^3	1-3
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D 22nd ed. 2012.	3 g/m^3	1-5
Settleable Solids*	Volumetric using an Imhoff cone. Settled 1 hr. APHA 2540 F 22nd ed. 2012.	0.5 mL/L	1-5
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22nd ed. 2012.	-	1-5
Dissolved Calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.05 g/m^3	3-4
Dissolved Copper	Filtered sample, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.0005 g/m^3	1-5
Total Copper	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.00053 g/m^3	1-5
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.02 g/m^3	3-4

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Dissolved Zinc	Filtered sample, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012.	0.0010 g/m^3	1-5
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22nd ed. 2012 / US EPA 200.8.	0.0011 g/m^3	1-5
Dissolved Inorganic Nitrogen*	Calculation: NH_4-N + NO_3-N + NO_2-N. In-House.	0.010 g/m^3	1-5
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m^3 is only attainable when the TKN has been determined using a trace method utilising duplicate analyses. In cases where the Detection Limit for TKN is 0.10 g/m^3, the Default Detection Limit for Total Nitrogen will be 0.11 g/m^3.	0.05 g/m^3	1-5
Total Ammoniacal-N	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH_4-N = NH_4+-N + NH_3-N). APHA 4500-NH_3 F (modified from manual analysis) 22nd ed. 2012.	0.010 g/m^3	1-5
Nitrate-N + Nitrite-N	Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I 22nd ed. 2012 (modified).	0.002 g/m^3	1-5
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D. (modified) 4500 NH_3 F (modified) 22nd ed. 2012.	0.10 g/m^3	1-5
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. Analysed at Hill Laboratories - Microbiology; 1 Clow Place, Hamilton. APHA 5210 B (modified) 22nd ed. 2012.	2 g O_2/m^3	3-4
Total Phenols	In-line distillation, segmented flow colorimetry. NB: Does not detect 4-methylphenol. Skalar Method I497-001 (modified). APHA 5530 B & D (modified) 22nd ed. 2012.	0.02 g/m^3	1-5
Tannin	Colorimetric with Folin phenol reagent, tannic acid used for calibration. APHA 5550 B 22nd ed. 2012.	0.10 g/m^3	1-5
Absorbance at 440 nm	Filtered sample. Spectrophotometry, 1cm cell. APHA 5910 B 22nd ed. 2012.	0.002 AU cm^{-1}	3-5

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

Appendix C:

Scion Laboratory Report

Te Papa Tipu Innovation Park,
49 Sala Street, Rotorua
Private Bag 3020, Rotorua 3046,
New Zealand

Telephone +64 7 343 5899
Facsimile +64 7 348 0952
Email enquiries@scionresearch.com
www.scionresearch.com

SCION
FORESTS • PRODUCTS • INNOVATION

Thursday, 27 October 2016

Eastland Port Ltd
Kaiti Beach Road
PO Box 1048
Gisborne 4040

Attn: Martin Bayley

TRACE RESIN ACID ANALYSIS – ULY SW 1-5 Samples – 10 October 2016.

CLIENT'S ORDER NUMBER:	AA 1146 EPL Compliance Programme - Eastland Port
WORK PERFORMED BY:	Murray Robinson and Katrina Martin and Suzanne Gallagher
WORK CHECKED BY:	Kim McGrouther
APPROVED BY:	_____(SIGN)
DATE OF ISSUE:	27 October 2016
DISTRIBUTION:	**CLIENT:** 1 copy **SCION Files:** 1 copy

SCION
Private Bag 3020
ROTORUA:
Fax (07) 343 5507
Phone (07) 343-5899
Email: murray.robinson@scionresearch.com

DATE SAMPLES RECEIVED 11.10.2016

SAMPLE DESCRIPTION Five samples in 1L glass bottles (450°C muffled bottles supplied by Scion) – samples sent by James Isaac (Logic Forest Solutions Ltd).

SAMPLE IDENTIFICATION

ULY SW Site 1, 10/10/2016, 08:35, 1L
Very cloudy, red-brown colour, small layer of sediment, slight sulphurous odour

ULY SW Site 2, 10/10/2016, 08:41, 1L
Cloudy, red-brown colour, small layer of sediment, slight sulphurous odour

ULY SW Site 3, 10/10/2016, 09:10, 1L
Cloudy, slight yellow colour, very small amount of sediment

ULY SW Site 4, 10/10/2016, 09:02, 1L
Cloudy, slight yellow colour, very small amount of sediment

ULY SW Site 5, 10/10/2016, 09:40, 1L
Slightly cloudy, small amount of brown algal sediment

SAMPLING PROCEDURE

This report relates only to the items tested as received and therefore does not necessarily represent the sample from which it was taken.

DATE OF TESTING 12.10.2016

METHODS

In-house method using unfiltered, pH 9-buffered liquid/liquid extraction with dichloromethane (DCM), followed by gas chromatography - mass spectrometry (GC/MS) analysis.

RESULTS:

RESIN ACIDS (µg/L)

Sample name	ULY SW Site 1 10.10.16	ULY SW Site 2 10.10.16	ULY SW Site 3 10.10.16	ULY SW Site 4 10.10.16	ULY SW Site 5 10.10.16
Pimaric acid	494.9	323.7	n.d.	n.d.	n.d.
Sandaracopimaric acid	54.3	39.3	n.d.	n.d.	n.d.
Isopimaric acid	240.6	151.8	n.d.	n.d.	n.d.
Palustric acid	418.8	236.8	n.d.	n.d.	n.d.
Levopimaric Acid	92.5	43.5	n.d.	n.d.	n.d.
Dehydroabietic acid	2,366.8	1,751.3	n.d.	n.d.	n.d.
Abietic acid	633.1	363.6	n.d.	n.d.	n.d.
Neoabietic acid	378.2	208.0	n.d.	n.d.	n.d.
Pimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.
Sandaracopimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.
Isopimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.
13-Abietenic acid	n.d.	11.4	n.d.	n.d.	n.d.
Pimaranic acid	n.d.	n.d.	n.d.	n.d.	n.d.
Isopimaranic acid	n.d.	n.d.	n.d.	n.d.	n.d.
Abietanic acid	n.d.	n.d.	n.d.	n.d.	n.d.
Seco-1-dehydroabietic acid	48.0	34.7	n.d.	n.d.	n.d.
Seco-2-dehydroabietic acid	44.7	30.6	n.d.	n.d.	n.d.
12-Chlorodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.
14-Chlorodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.
12,14-Dichlorodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.
7-Oxodehydroabietic acid	99.0	77.1	n.d.	n.d.	n.d.
Total Resin Acids	**4,871.0**	**3,271.6**	**0.0**	**0.0**	**0.0**

n.d. = not detected, method detection limit is 0.1µg/L
All results presented are from duplicate sample analysis and concentrations are in µg/L. Compounds are quantified if they have a response 2.5 times higher than the average blank.

Appendix D:

Field Sheet

Surface Water Field Sheet

conducted for

Audit Title
Upper Log yard

Site Location
Upper Logyard

Date and Time
10/10/16 8:39 am

Completed on
10/10/16 9:42 am

Score
Score 0/0 - 0%

Audit - Score (0/0) 0%

Question	Response	Details
Job Information		
Date and Time	10/10/16 7:49 am	
Site Location	Upper Logyard	
Operator	James Isaac	
Weather	Drizzling, Southerly wind	
Rainfall event start date and time	9.10.16 13.30	
Event rainfall depth	28mm	
Number of dry days before sampling	0	
Reason for sampling	2 Monthly	
Equipment		
Water quality equipment description		
Calibration records filed?	N/A	
Interface probe number		
Calibration records filed?	N/A	
Sampling equipment type		
Sample Details		
SAMPLE ID	ULY SW Site 1	
Sample info	On	
Sample time	08.35	
Approx depth (m)	5 cm	
Approx stream flow rate (l/s)	1/10	
Temperature		
Dissolved Oxygen (%)		
Electrical Conductivity (uS/cm)		
pH		
Water colour		
Debris present	No	

Audit - Score (0/0) 0%

Foams/scums	No
Clarity (Clear/Lightly Turbid/Turbid/Very Turbid)	Lightly turbid
Photos	
 Appendix 1 10/10/16 8:40 am	
SAMPLE ID	ULY SW Site 2
Sample info	On
Sample time	08.41
Approx depth (m)	1 cm
Approx stream flow rate (l/s)	1/60
Temperature	
Dissolved Oxygen (%)	
Electrical Conductivity (uS/cm)	
pH	
Water colour	
Debris present	No
Foams/scums	No
Clarity (Clear/Lightly Turbid/Turbid/Very Turbid)	Lightly Turbid
Photos	
 Appendix 2 10/10/16 8:42 am	
SAMPLE ID	ULY SW Site 3
Sample info	On
Sample time	9.10
Approx depth (m)	1

Audit - Score (0/0) 0%

Approx stream flow rate (l/s)	10/2
Temperature	
Dissolved Oxygen (%)	
Electrical Conductivity (uS/cm)	
pH	
Water colour	Discolored
Debris present	No
Foams/scums	No
Clarity (Clear/Lightly Turbid/Turbid/Very Turbid)	Clear
Photos	
 Appendix 3 10/10/16 9:17 am	
SAMPLE ID	ULY SW Site 4
Sample info	On
Sample time	9.02
Approx depth (m)	0.4
Approx stream flow rate (l/s)	10/s
Temperature	
Dissolved Oxygen (%)	
Electrical Conductivity (uS/cm)	
pH	
Water colour	Discolored
Debris present	No
Foams/scums	No
Clarity (Clear/Lightly Turbid/Turbid/Very Turbid)	Clear
Photos	

Audit - Score (0/0) 0%

Appendix 4

10/10/16 9:06 am

SAMPLE ID	ULY SW Site 5
Sample info	On
Sample time	9.40
Approx depth (m)	3
Approx stream flow rate (l/s)	1/10
Temperature	
Dissolved Oxygen (%)	
Electrical Conductivity (uS/cm)	
pH	
Water colour	Discolored sea water
Debris present	No
Foams/scums	No
Clarity (Clear/Lightly Turbid/Turbid/Very Turbid)	Clear
Photos	

Appendix 5

10/10/16 9:42 am

SAMPLE ID	
Sample info	Off
SAMPLE ID	
Sample info	Off
SAMPLE ID	
Sample info	Off
SAMPLE ID	

Audit - Score (0/0) 0%

Sample info	Off	
Additional Comments	Unable to obtain a YSI Meter for field checks	
Field Quality Control Checks		
Was pre-cleaning sampling equipment used for these samples?	Yes	
Was pre-cleaning sampling equipment properly protected from contamination?	Yes	
Consistent with COC form?	Yes	
COC Filled out?	Yes	

Media

Appendix 1
10/10/16 8:40 am

Appendix 2
10/10/16 8:42 am

Appendix 3
10/10/16 9:17 am

Appendix 4
10/10/16 9:06 am

Appendix 5
10/10/16 9:42 am

Appendix E:

Upper Logyard Results

E.1 Upper Logyard Results

Summary table of results. For Site 3 (the stream mixing zone edge) exceedances of the trigger limits are highlighted in purple. The trigger limits are from the Environmental Management Plan dated January 2015.

			Quarter 4 (Oct, Nov, Dec)					Quarter 1 (Jan, Feb, Mar)				
			12 November 2015					28 January 2016				
Parameter	**Units**	**EMP trigger limits**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**
pH	-log(H^+)	6.5 – 8.5	7.6	7.2	7.6	7.6	7.9	5.5	5.5	7.1	7.2	7.4
Temperature	^oC	Not more than 3^{o}C above background	14.8	14.6	14.5	14.6	14.8	19	18.9	18.7	18.6	17.9
Dissolved Oxygen	g/m^3	Not less than 4	926,000	1,034,000	1,092,000	1,061,000	1,100,000	5.1	5.5	7	6.8	7.5
TPH	g/m^3	15	<0.7	<0.7	<0.7	<0.7	<0.7	1.0	1.0	<0.7	<0.7	<0.7
TSS	g/m^3	100 above background	590	430	32	24	38	91	108	84	75	41
Settleable Solids	g/m^3	n/a	1.6	<1.0	<1.2	<1.3	<1.4	<1.0	<1.0	<1.0	<1.0	<1.0
VSS	g/m^3	n/a	177	126	9	-	-	46	51	19	-	-
Total Nitrogen	g/m^3	0.4	1.88	1.73	0.81	0.8	0.34	3.4	3.9	0.80	0.96	0.46
Soluble Inorganic Nitrogen	g/m^3	0.4	0.035	0.057	0.25	0.27	0.14	0.052	0.060	0.122	0.36	0.147
$cBOD_5$	g/m^3	20 above background	-	-	5	3	-	-	-	11	3	-
Dehydroabeitic Acid	g/m^3	0.025	2.5899	2.6087	0.003	<0.0001	0.0166	0.4412	0.4802	<0.0001	<0.0001	<0.0001
Total Phenols	g/m^3	0.72	0.4	0.5	<0.02	<0.02	<0.2	1.2	1.4	0.06	<0.02	<0.02
Total Tannins	g/m^3	n/a	54	62	1.11	0.62	<1.0	146	125	3.4	1.0	1.7
Dissolved Cu	g/m^3	0.0025 average of 4 quarterly samples	0.0018	0.0027	0.0028	0.0025	<0.010	0.0079	0.0028	0.0023	0.0020	<0.010
Dissolved Zn	g/m^3	0.031 average of 4 quarterly samples	0.0085	0.036	0.062	0.072	0.03	0.070	0.081	0.039	0.030	0.02
Hardness	g/m^3	n/a	-	-	66	69	-	-	-	27	25	-
Absorbance at 440nm	AU cm^{-1}	n/a	-	-	0.018	0.016	0.006	-	-	0.013	0.012	0.005

			Quarter 3 (July, August, September)				
			10 October 2016				
Parameter	**Units**	**EMP trigger limits**	**Site 1**	**Site 2**	**Site 3**	**Site 4**	**Site 5**
pH	-log(H^+)	6.5 – 8.5	7.1	7.0	7.6	7.6	7.9
Temperature	^oC	Not more than 3^{o}C above background	n/a	n/a	n/a	n/a	n/a
Dissolved Oxygen	g/m^3	Not less than 4	n/a	n/a	n/a	n/a	n/a
TPH	g/m^3	15	<0.7	<0.7	<0.7	<0.7	<0.7
TSS	g/m^3	100 above background	480	108	29	23	10
Settleable Solids	g/m^3	n/a	1.0	<1.0	<1.0	<1.0	<1.0
VSS	g/m^3	n/a	112	37	<10	-	-
Total Nitrogen	g/m^3	0.4	2.1	1.11	1.63	1.40	0.31
Soluble Inorganic Nitrogen	g/m^3	0.4	0.072	0.033	0.68	0.72	0.150
$cBOD_5$	g/m^3	20 above background	-	-	2	<2	-
Dehydroabeitic Acid	g/m^3	0.025	2.3668	1.7513	<0.0001	<0.0001	<0.0001
Total Phenols	g/m^3	0.72	0.07	0.15	<0.02	<0.02	<0.02
Total Tannins	g/m^3	n/a	72	39	0.65	<0.10	<5
Dissolved Cu	g/m^3	0.0025 average of 4 quarterly samples	0.0016	0.00014	0.0027	0.0024	<0.01
Dissolved Zn	g/m^3	0.031 average of 4 quarterly samples	0.0134	0.024	0.075	0.076	<0.02
Hardness	g/m^3	n/a	-	-	120	118	-
Absorbance at 440nm	AU cm^{-1}	n/a	-	-	0.027	0.025	0.007