Eastland Port Matawhero Logyard Sampling Report – August 2015

For Eastland Port Limited

September 2015

REPORT INFORMATION AND QUALITY CONTROL

Prepared for:	Eastland Port Limited

Author:	Christine Oakey	
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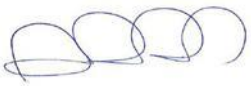
	Principal Ecologist	
Approved for Release:	Aaron Andrew	
	Managing Director	

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1 INTRODUCTION

Under consents DW-2011-104235-01, WP-2011-104234-01, and WP-2011-104292-01 stormwater and groundwater monitoring is required.

For the stormwater monitoring two monthly sampling is undertaken at three locations; the stormwater retention ponds culvert outlets, the Awapuni Drain 10 metres downstream of the confluence with the tributary drain, and 10 metres upstream of the confluence with the tributary drain. For the groundwater monitoring, six monthly sampling, during February and August, is undertaken at three locations; two groundwater monitoring bores and the sump tile drainage outlet. Refer to Appendix A for a plan of the sample sites.

Both the stormwater and groundwater sampling was undertaken on 7 August 2015. The stormwater samples represent the July/August sampling round. The groundwater samples represent the August sampling round.

Sampling was undertaken in accordance with the Sampling Protocols and Standard Operating Procedures prepared by 4Sight Consulting (formerly known as Andrew.Stewart Ltd). The sampling was undertaken by Logic Forest Solutions.

This report has been prepared for Gisborne District Council and provides the results and analysis of the Matawhero Logyard August 2015 stormwater and groundwater sampling rounds.

This is the third sampling report for stormwater sampling. The last report, titled "Eastland Port Matawhero Logyard Sampling Report – July 2015", was prepared for the May/June sampling round.

This is the second sampling report for groundwater sampling. The first report, titled "Eastland Port Sampling Results Report", was prepared for the February sampling round undertaken in March 2015. The first report also included sampling results for Southern Logyard and Wairakaia Bark Disposal site.

2 SAMPLING DETAILS

Table 1: Stormwater Sample time and dates

Location	Date	Time
Stormwater retention ponds culvert outlets on the river side of the railway track	07/08/2015	8:45am
Awapuni Drain 10m downstream	07/08/2015	8:29am
Awapuni Drain 10m upstream	07/08/2015	8:08am

Table 2: Groundwater Sample time and dates

Location	Date	Time
Monitoring Bore 1 (MLY GW01)	07/08/2015	9:40am
Monitoring Bore 2 (MLY GW02)	07/08/2015	10:32am
Sump tile drainage outlet	07/08/2015	8:59am

2.1 Relevant Site Information

Table 3: Stormwater Sample Information

Location	Rainfall event	Number of dry days prior to sampling	Discharge/water colour	Obvious or visual features
Stormwater retention ponds culvert outlets on the river side of the railway track	16.8mm	0	Clear	No debris or scums/foams present
Awapuni Drain 10m downstream	16.8mm	0	Slightly yellow	No debris or scums/foams present
Awapuni Drain 10m upstream	16.8mm	0	Slightly yellow	No debris or scums/foams present

Table 4: Groundwater Sample Information

Location	Rainfall event	Number of dry days prior to sampling	Discharge/water colour	Obvious or visual features
Monitoring Bore 1 (MLY GW01)	16.8mm	0	Clear/slightly cloudy	No debris or scums/foams present
Monitoring Bore 2 (MLY GW02)	16.8mm	0	Clear	Some sediment
Sump tile drainage outlet	16.8mm	0	Slightly cloudy	No debris or scums/foams present

3 ANALYSIS OF LABORATORY RESULTS

3.1 Stormwater Results

Table 5 shows the results of the 7 August 2015 stormwater sample round. The Awapuni Drain 10 metres downstream sample (MLYSW Site 2) is the mixing zone boundary and the compliance point. Exceedances of the consent trigger limits at this location and also the background site are highlighted in purple.

Table 5: August 2015 stormwater sample results

Parameter	Units	Consent trigger limits	Stormwater retention ponds culvert outlets (MLYSW Site 1)	Awapuni Drain 10m downstream (MLYSW Site 2)	Awapuni Drain 10m upstream (MLYSW Site 3)
pH	-LOG(H+)	6.5 – 8.5	6.52	7.41	7.29
Total Suspended Solids	g/m^3	100 g/m^3above background site[1]	9	18	18
BOD_5	g/m^3	20	8	6	5
Total Petroleum Hydrocarbons	g/m^3	15	<0.7	<0.7	<0.7
Total Nitrogen	g/m^3	0.4	1.36	3.6	4.1
Total Tannins	g/m^3	Indicator test only	<0.2	<1.0	<1.0
Dissolved Oxygen	Total saturation	Not less than 80%	36.5	54.5	64.4
Conductivity	mS/cm	0.3	0.877	9.605	9.664
Total Resin Acids	g/m^3	0.06	<0.0001	<0.0001	<0.0001

3.2 Findings on Consent Condition Compliance – Stormwater

At all locations, pH levels are within the consent range. Total petroleum hydrocarbons and total resin acids were less than detection limits. Biological oxygen demand (BOD) was below the consent trigger limits.

Total suspended solids (TSS) concentration at the downstream site is the same as the upstream site and is therefore compliant with the consent trigger limit (100g/m^3 above background site). TSS concentrations in the Awapuni Drain and the pond outlet were low (the pond outlet is 9g/m^3).

This pond outlet concentration is significantly less than the July result of 2100g/m^3. We consider that result to be anomalous and due to likely substrate disturbance during sample collection and other factors at the discharge outlet on the river side of the railway line.

This location which is shown in Figure 1 below, was inspected by Mark Poynter of 4Sight on the afternoon of 26 August 2015. This location is not an appropriate sampling point as it is beyond the site and susceptible to multiple potential influences not related to the log storage yard operation. These influences which are evident in the July photo, include backflooding into the outlet route from the Awapuni drain as well as pugging and sediment generation due to stock activity along the drain edge. Going forward, the outflow samples from the retention pond will be collected from the left hand side culvert upstand within the stormwater pond. A photograph of this location is shown in Figure 2.

[1] Background site is the Awapuni Drain 10 metres upstream

To minimise the likelihood of contamination during sample collection, debris and weed growth will be kept away from the sampling point.

Figure 1: Culvert outlets sampling point July 2015

Figure 2: Culvert upstands within stormwater pond

Dissolved oxygen concentration is low in the Awapuni Drain. At the downstream site the August sampling showed a concentration of 54.5% and an upstream concentration of 64.4%. This suggests some reduction (by 9.9%) in downstream concentration due to the influence of the discharge which was at 36.5% concentration. Given the low TSS concentration, the low discharge oxygen value may be due to seasonal die off and breakdown of vegetation within the pond rather than sourced to run off from the log storage activity per see. As noted above, other factors may also be involved and influence dissolved oxygen concentration in the outlet flow once it passes beyond the Matawhero site.

It is suggested that with the next round of sampling, if the dissolved oxygen concentration in the retention pond outlet sample is low (below 80%), and if the downstream site concentration is both below the background concentration and also below the 80% trigger threshold, then further meter readings of dissolved oxygen concentration in the Awapuni Drain should be made at 20m and 30m below the outlet confluence. This will establish the physical extent of oxygen suppression that might be attributable in whole or part to the discharge from the log yard retention pond.

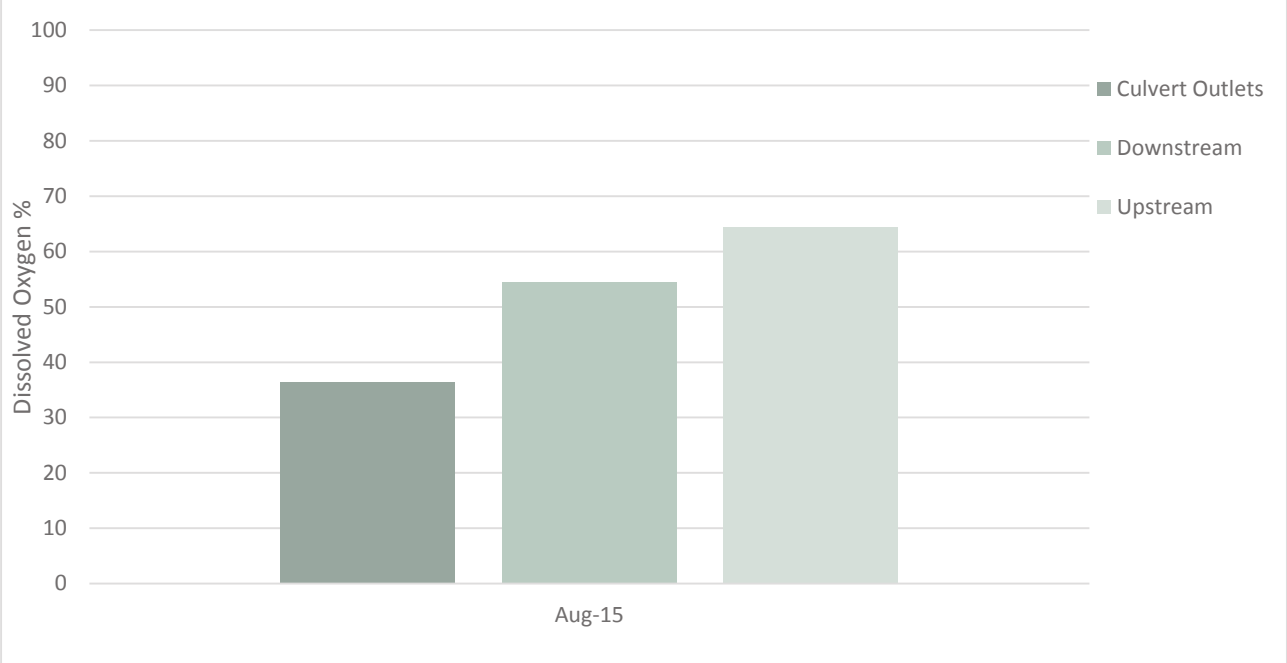

Figure 3: August 2015 Stormwater Dissolved Oxygen levels

Conductivity results confirm that the Awapuni Drain at the time of sampling is tidally influenced and the discharge is not a significant influence on the receiving environment conductivity. Specific conductivity at the Awapuni Drain sites may depend on the particular state of the tide at the time of sampling. Results of conductivity since March 2015 are shown in Figure 4.

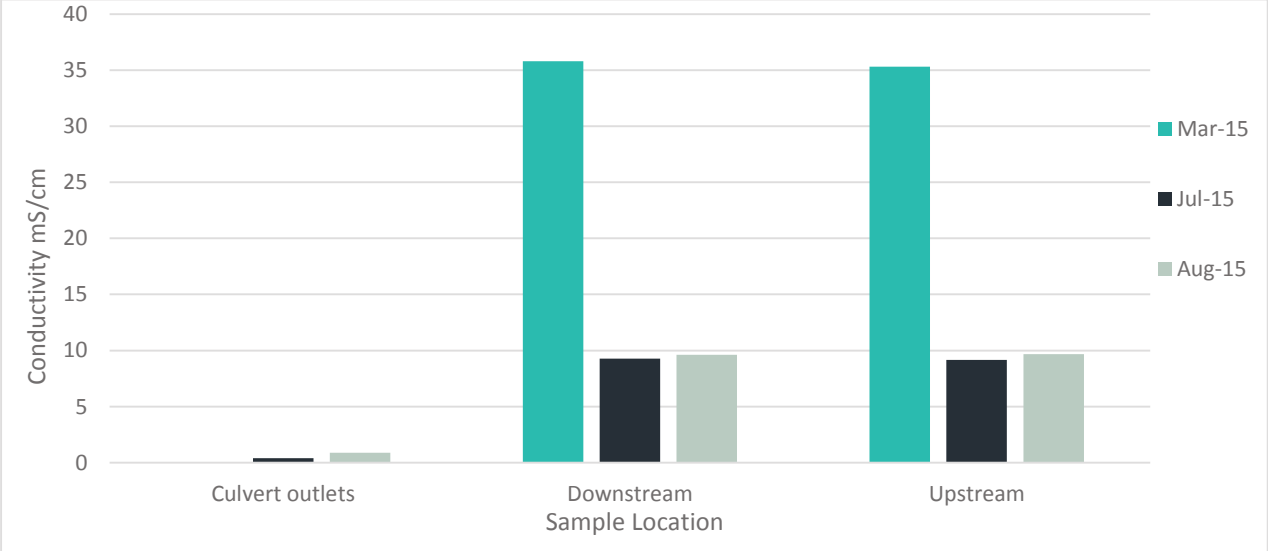

Figure 4: Conductivity results for 2015

Total nitrogen (TN) concentration at the downstream site was below the background concentration. This may be suggesting a diluting influence from the discharge in respect of TN notwithstanding that the Awapuni Drain is highly enriched and all concentrations are well above the trigger level. This is likely to be a very localised effect as it is unlikely that the downstream sampling is representative of the full body of water across the width of the river. The downstream sample is collected close to the true left bank and the discharge itself is likely to disperse close to the bank edge as it is moved downstream.

Background total nitrogen has increased compared to the previous sample rounds. This may reflect seasonal influences with greater runoff and loss of nitrogen to waterbodies as the winter progresses.

In response to the July report, Paul Murphy of GDC asked what could be contributing to the total nitrogen result. There are no significant sources of nitrogen on site that could influence surface water or subsurface drainage (tile drainage). The retention pond discharge TN concentration may also be influenced by the state of the heavy crop of emergent vegetation that has colonised the pond. Die off of this vegetation in the winter may release nutrients and decrease uptake by way of plant growth resulting in higher discharge concentrations.

The constituents of total nitrogen for the pond outlet July sample also shows that total kjeldahl nitrogen (TKN) was 3g/m^3 while nitrate-N + nitrite-N was 0.66g/m^3. TKN, which represents ammonia and protein nitrogen, also dominates at the upstream and downstream sites for all three 2015 sample rounds. A potential source of TKN in the Awapuni Drain could be dairy or stock farming. The high proportion of TKN in the pond outlet sample is potentially more difficult to understand but may also reflect other 'farming' influences at the particular sampling location used as discussed above. For example it was apparent on the field inspection carried out on the 26 August that sheep had been grazing along this bank edge.

TN results for 2015 are shown in Figure 5.

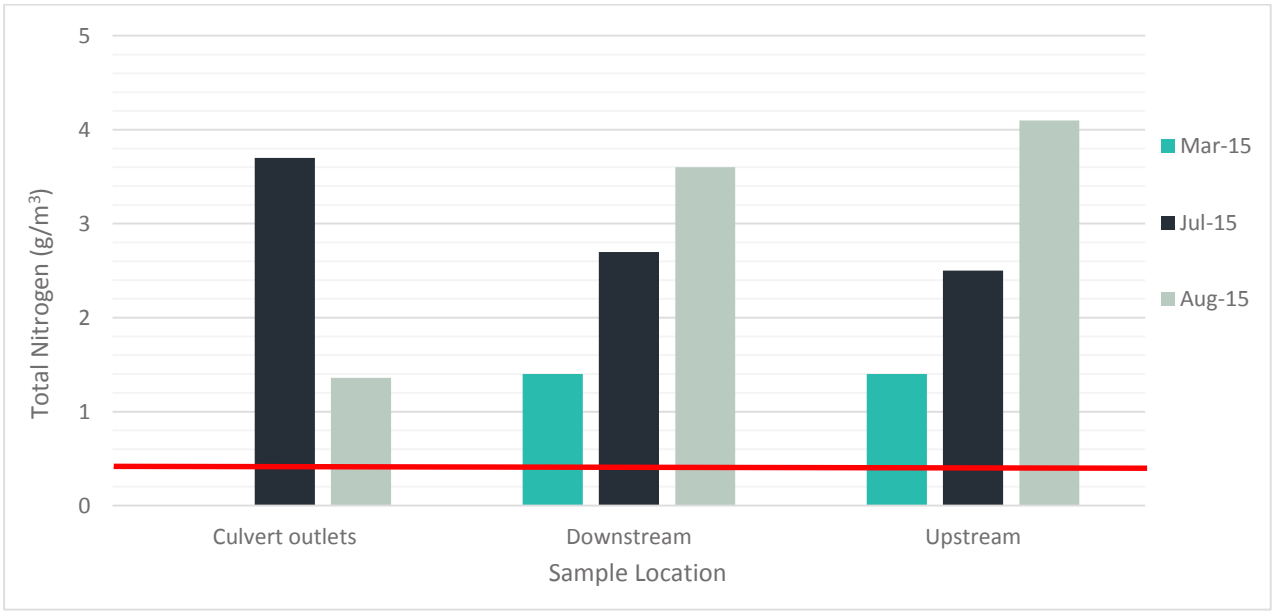

Figure 5: Total nitrogen results for 2015 – consent trigger limit shown as red line

3.3 Groundwater results

Table 6 shows the results of the 7 August 2015 groundwater sample round. The sump tile drainage outlet is the groundwater quality compliance point. Exceedances of the consent trigger limits at this location and the monitoring bores are highlighted in purple.

Table 6: August 2015 groundwater sample results

Parameter	Units	Limit from consent condition	Limit from background samples at the sump tile drainage outlet[2]	Monitoring Bore 1 (MLY GW01)	Monitoring Bore 2 (MLY GW02)	Sump tile drainage outlet
pH	-LOG(H+)	6.5 – 8.5	6.5 - 8.5	6.64	6.52	6.52
Conductivity	umho/cm	0.3 above background	866.3	891	935	804
Total Petroleum Hydrocarbons	g/m^3	15	15	<0.7	<0.7	<0.7
Total Resin Acids	g/m^3	0.06 above background	n/a[3]	<0.0001	<0.0001	<0.0001
Total Nitrogen	g/m^3	0.6 above background	1.49	0.26	3.6	1.67

3.4 Findings on Consent Condition Compliance – Groundwater

At the sump tile drainage outlet pH was within the consent range. Conductivity was below the consent trigger limit. Total petroleum hydrocarbons and total resin acids were less than detection limits.

Total nitrogen was above the consent trigger limit of $1.49 g/m^3$ by 1.1 times. This exceedance is not considered significant, especially with Monitoring Bore 2, a background bore, having a total nitrogen result of $3.6 g/m^3$. This shows that groundwater flowing into the site already has high total nitrogen level, which is not increased further by activities on the logyard.

3.5 Further Actions Required in Light of Findings

As this is the first round of sampling with an exceedance of the trigger limit for dissolved oxygen, additional in situ measurements are recommended for the next round of sampling on the basis described above.

Taking into consideration background concentrations, no significant exceedences of the consent trigger limits for other parameters occurred so no further action is required. The next round of stormwater sampling (September/October round) is scheduled to taken by the end of October if an appropriate rain event occurs. The next groundwater sampling is scheduled for February.

[2] Two samples were collected in October 2010 as background samples. The results of these samples have been used to determine the trigger limits where required, the average of the results has been used.

[3] Background samples were not tested for total resin acids.

4 CONCLUSIONS

4.1 Stormwater

- The Awapuni Drain is tidally influenced which explains high receiving environment conductivity and pre-empts any concern about discharge conductivity.
- Dissolved oxygen may be slightly suppressed close to the discharge relative to background concentration which is also low. The frequency and physical extent of this effect will be investigated further but is expected to be highly localised.
- The discharge is not adversely affecting receiving environment Total Nitrogen concentration.
- All other sample results are not notable and are were within the consent trigger limits.
- The next round of sampling is scheduled to be taken by the end of October.

4.2 Groundwater

- Total nitrogen at the sump tile drainage outlet exceeded the consent trigger level by 1.1 times. This result is not considered a significant exceedance.
- All other results were within the consent trigger limits.
- The next round of sampling is scheduled for February.

Appendix A:

Sampling Locations

N

1:2,500 @A4

0 25 50 75 100 m

AA1146 EASTLAND PORT COMPLIANCE PROGRAMME

Matawhero Logyard (Dunstan Rd) Monitoring Sites

Plan prepared for Eastland Port Ltd. by 4Sight Consulting Ltd.

Date: 01/04/2015
Version: 1.0
Author: Paul Sorensen
Checked: Christine Oakey
Approved: Christine Oakey

4SIGHT CONSULTING

Appendix B:

Laboratory Analysis Reports

Hill Laboratories
BETTER TESTING BETTER RESULTS

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

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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:**	1460366 SPv1
Contact:	Kim Wepasnick	**Date Registered:**	08-Aug-2015
	C/- 4SIGHT Consulting Limited	**Date Reported:**	14-Aug-2015
	PO Box 25356	**Quote No:**	66824
	Featherston Street	**Order No:**	
	WELLINGTON 6146	**Client Reference:**	Eastland Port-Dunstan Rd Surface Water
		Submitted By:	Kim Wepasnick

Sample Type: Aqueous

Sample Name:		MLYSW Site 1 07-Aug-2015 8:45 am	MLWSW Site 2 07-Aug-2015 8:29 am	MLYSW Site 3 07-Aug-2015 8:08 am		
Lab Number:		1460366.1	1460366.2	1460366.3		
Individual Tests						
Total Suspended Solids	g/m³	9	18	18	-	-
Total Nitrogen	g/m³	1.36	3.6	4.1	-	-
Nitrate-N + Nitrite-N	g/m³	1.01	0.157	0.182	-	-
Total Kjeldahl Nitrogen (TKN)	g/m³	0.35	3.4	3.9	-	-
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	g O_2/m³	8	6	5	-	-
Tannin	g/m³	< 0.2 #1	< 1.0 #1	< 1.0 #1	-	-
Total Petroleum Hydrocarbons in Water						
C7 - C9	g/m³	< 0.10	< 0.10	< 0.10	-	-
C10 - C14	g/m³	< 0.2	< 0.2	< 0.2	-	-
C15 - C36	g/m³	< 0.4	< 0.4	< 0.4	-	-
Total hydrocarbons (C7 - C36)	g/m³	< 0.7	< 0.7	< 0.7	-	-

Analyst's Comments

#1 Severe matrix interferences required that a dilution be performed prior to analysis of this sample, 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/m³	1-3
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3
Total Kjeldahl Digestion	Sulphuric acid digestion with copper sulphate catalyst.	-	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/m³	1-3
Total Nitrogen	Calculation: TKN + Nitrate-N + Nitrite-N. Please note: The Default Detection Limit of 0.05 g/m³ 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/m³, the Default Detection Limit for Total Nitrogen will be 0.11 g/m³.	0.05 g/m³	1-3
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/m³	1-3
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/m³	1-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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	1-3
Tannin	Colorimetric with Folin phenol reagent, tannic acid used for calibration. APHA 5550 B 22nd ed. 2012.	0.10 g/m^3	1-3

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.

Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental Division

Hill Laboratories
BETTER TESTING BETTER RESULTS

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Web www.hill-labs.co.nz

ANALYSIS REPORT

Client:	4SIGHT Consulting Limited	**Lab No:**	1460416	SPv1
Contact:	Kim Wepasnick	**Date Registered:**	08-Aug-2015	
	C/- 4SIGHT Consulting Limited	**Date Reported:**	18-Aug-2015	
	PO Box 25356	**Quote No:**	66825	
	Featherston Street	**Order No:**		
	WELLINGTON 6146	**Client Reference:**	Eastland Port - Feb & Aug	
		Submitted By:	Kim Wepasnick	

Sample Type: Aqueous

Sample Name:		MLYGW 01 07-Aug-2015 10:12 am	MLYGW 02 07-Aug-2015 11:35 am	MLY STD01 07-Aug-2015 8:59 am	WR GW01 07-Aug-2015 1:11 pm	WR GW02 07-Aug-2015 1:57 pm
Lab Number:		1460416.1	1460416.2	1460416.3	1460416.4	1460416.5
Individual Tests						
pH	pH Units	-	-	7.1	-	-
Electrical Conductivity (EC)	mS/m	-	-	88.9	-	-
Dissolved Mercury	g/m³	-	-	-	< 0.00008	< 0.00008
Total Mercury	g/m³	-	-	-	< 0.00008	< 0.00008
Total Nitrogen	g/m³	0.26	3.6	1.67	-	-
Total Ammoniacal-N	g/m³	-	-	-	0.167	< 0.010
Nitrite-N	g/m³	-	-	-	0.020	< 0.002
Nitrate-N	g/m³	-	-	-	0.016	0.22
Nitrate-N + Nitrite-N	g/m³	0.046	0.135	1.14	0.036	0.22
Total Kjeldahl Nitrogen (TKN)	g/m³	0.21	3.4	0.53	-	-
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	-	-	-	0.0082	0.0015
Dissolved Cadmium	g/m³	-	-	-	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	-	-	-	< 0.0005	< 0.0005
Dissolved Copper	g/m³	-	-	-	0.0007	0.0099
Dissolved Lead	g/m³	-	-	-	< 0.00010	< 0.00010
Dissolved Nickel	g/m³	-	-	-	< 0.0005	0.0067
Dissolved Zinc	g/m³	-	-	-	0.0113	0.063 #1
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Arsenic	g/m³	-	-	-	0.0151	0.0022
Total Cadmium	g/m³	-	-	-	< 0.000053	< 0.000053
Total Chromium	g/m³	-	-	-	0.00077	< 0.00053
Total Copper	g/m³	-	-	-	0.0116	0.0117
Total Lead	g/m³	-	-	-	0.00127	0.00039
Total Nickel	g/m³	-	-	-	0.0027	0.0074
Total Zinc	g/m³	-	-	-	0.0128	0.059 #1
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

Analyst's Comments

#1 It has been noted that the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods.

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
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.00005 - 0.0010 g/m^3	4-5
Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric acid digestion, ICP-MS, trace level	0.000053 - 0.0011 g/m^3	4-5
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, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-5
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	4-5
Total Kjeldahl Digestion	Sulphuric acid digestion with copper sulphate catalyst.	-	1-3
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	3
Electrical Conductivity (EC)	Conductivity meter, 25°C. APHA 2510 B 22nd ed. 2012.	0.1 mS/m	3
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	4-5
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	4-5
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	1-3
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	4-5
Nitrite-N	Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I 22nd ed. 2012 (modified).	0.002 g/m^3	4-5
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m^3	4-5
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	1-3

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.

Ara Heron BSc (Tech)
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SCION
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Tuesday, 25 August 2015

Kaiti Beach Road
PO Box 1048
Gisborne 4040

Attn: Martin Bayley

TRACE RESIN ACID ANALYSIS:

Resin Acids (incl. DHA) analysis for Marty Bayley (Eastland Port Ltd) – August 2015.

CLIENT'S ORDER NUMBER:	AA 1146 EPL Compliance Programme - Eastland Port
WORK PERFORMED BY:	Murray Robinson and Suzanne Gallagher
WORK CHECKED BY:	Kim McGrouther
APPROVED BY:	_____ **(SIGN)**
DATE OF ISSUE:	25 August 2015
DISTRIBUTION:	**CLIENT:** 1 copy **SCION Files:** 1 copy

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Email: murray.robinson@scionresearch.com

DATE SAMPLES RECEIVED	10.08.2015
SAMPLE DESCRIPTION	Eight samples in 1L glass bottles (450°C muffled Scion sample bottles) – samples sent by James Isaac (Logic Forest Solutions Ltd).
SAMPLE IDENTIFICATION	MLY GW01 MLY GW02 MLY STD01 MLY SW Site 1 MLY SW Site 2 MLY SW Site 3 WR GW01 WR GW02

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	12.08.2015

METHODS

In-house method, involving unfiltered pH9 liquid/liquid extraction with dichloromethane (DCM), followed by gas chromatography - mass spectrometry (GC/MS) analysis.

RESULTS:

RESIN ACIDS (µg/L)

Sample name	MLY GW 01	MLY GW 02	MLY STD 01	MLY SW Site 1	MLY SW Site 2	MLY SW Site 3	WR GW 01	WR GW 02
Pimaric acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sandaracopimaric acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Isopimaric acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Palustric acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Levopimaric Acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Abietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Neoabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Pimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Sandaracopimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Isopimarenic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
13-Abietenic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Pimaranic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Isopimaranic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Abietanic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Seco-1-dehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Seco-2-dehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
12-Chlorodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
14-Chlorodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
12,14-Dichlorodehydroabietic	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
7-Oxodehydroabietic acid	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Total Resin Acids	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**	**n.d.**

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 C:

Field Form

ANDREW. STEWART

Eastland Port

Surface Water Sampling Form

Job Information		Equipment			
Date: 7/8/15	Time: Arrive: 8am Depart: 11.40ish	Water quality equipment description:	Calibration Records Filed?	(Y)	N
Project Name: EPL Outsourced Compliance programme	Project Number:	Interface Probe Number: 13C100791	Calibration Records Filed?	(Y)	N
Site Location: MLY	Operator: James Isaac.	Sampling Equipment Type: Bucket			
Weather: Fine	Rainfall Event Start Time/Date: 6/8/15 8am.	Event Rainfall Depth: 16.8mm.	Number of Dry days Prior to Sampling: 0		
Reason for sampling: Standard Compliance Programme (Circle frequency: (2 Monthly) / Quarterly) or Additional Monitoring (describe):					

Sample Details				Water Quality Parameters				Observations				
Sample ID	Sample Time	Approx. Depth (m)	Approx. Stream Flow Rate	Temp. (°C)	DO (%)	EC (µS/cm)	pH	Water colour	Debris	Foams / scums	Sediment plumes observable?	Photos Taken?
MLY SW Site 1	8.45am	0.15	10L / 60S	11.8	36.5	877	6.52	Clear.	N	N	N	Y
MLY SW Site 2	8.29am	0.6	10L / 10S	11.8	54.5	9605	7.41	Slightly yellow	N	N	N	Y
MLY SW Site 3	8.08am	0.5	10L / 10S	11.8	64.4	9664	7.29	Slightly yellow	N	N	N	Y
MLY STD 01	8.51am	025	10L / 120S	11.7	36.0	804	6.52	Slightly cloudy	N	N	N	Y

Additional Comments:

Field Quality Control Checks										
Was pre-cleaning sampling equipment used for these samples?	(Y)	N	Were gas bubbles present in vials at time of collection?	Y	N	(NA)	Consistent with COC form?	(Y)	N
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	Was sample filtered for metals prior to preservations?	Y	(N)	NA	COC Filled out?	(Y)	N

ANDREW. STEWART

Eastland Port

Groundwater Well Sampling Form

(with criteria specific to A National Protocol for State of the Environment Groundwater Sampling in New Zealand, MfE, 2006)

Job Information	
Date: 7/8/15	**Time:** Arrive: 9:15am Depart: 10:25am
Project Name: EPL Outsourced Compliance Programme	**Project Number:** AA1146
Site Location: MLY	**Operator:** J.I, M.M.
Well ID: MLY GW01	**Weather:** Fine.

Equipment			
Water quality equipment description: 13C100791		Calibration Records Filed?	(Y) N
Interface Probe Number: 57506		Calibration Records Filed?	(Y) N
Purging Equipment Type: (Please circle)	**Bailer Type:** Plastic Teflon **Pump Type:** (Peristaltic) Submersible Micro-purge Other:		

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	50m	50mm	50mm	100mm	100mm	100mm
Bore Diameter	50mm	100mm	125mm	150mm	200mm	125mm	200mm	250mm
Conversion Factor (volume L/m)	0.93	3.73	5.06	6.68	10.8	10.8	14.2	20.2

Volume of water in a well
$V = \pi \times r^2 \times h$
V = Volume in litres
π = 3.142
r = radius in m
h = Height of water column in m

Total Well Depth (-) Water Level (=) Water Column
9.543 - 1.722 = 7.821

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
7.821 m (x) 3.73 (=) 29.17 L

Water Quality Parameters — **Low Flow Sampling**

Beginning Purging Time: 9:40am | End Purging Time: 10:12am | Fill Time: - | Discharge Time: -

Litres	Time	DO (mg/L)	Cond. (µS/cm)	pH	Redox (mV)	Temp °C	DTW (mbTOC)	Comments
0	9:42	2.60	544	6.88	226.1	15.5	1.724	Clear water
0.5	9:52	1.92	901	6.62	191.5	15.4	1.728	Slight Hy cloudy.
1	9:58	1.92	888	6.63	177.0	15.3	1.723	No odour.
1.5	10:03	1.94	887	6.64	164.6	15.3	1.725	
2	10:08	1.84	891	6.64	152	15.4	1.722	
2.5	10:12	1.92	891	6.64	157.6	15.5	1.721	

Stabilisation Criteria	±10%[1]	±3% or ±5% if <100*	± 0.1*	± 10mV[1]	± 0.1*	**Example Comments**: clear / slightly cloudy / turbid / very turbid / colour / no odour / slight odour / strong odour / describe odour (hydrocarbon/solvent/organic)

*Based on MfE National Protocol for SOE Groundwater Sampling in NZ, 2006, [1]Based on Vic EPA (Australia) 669.
Low Flow: Max flow rate = 0.5 L/min Max drawdown = 0.2 cm -- Well stable when 3 consecutive readings (either 3 min or 0.5L apart)

2.5L — **Total Well Volume** (Actual amount of water removed prior to sampling)

Did field parameters stabilise? (Y) N
Was the well dry purged? Y (N)

Field Quality Control Checks

Was pre-cleaning sampling equipment used for these samples?	(Y)	N	-	Consistent with COC form?	(Y) N
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	-	COC Filled out?	(Y) N
Were gas bubbles present in vials at time of collection?	Y	(N)	NA	Time Sample Collected:	10:12am
Was sample filtered for metals prior to preservations?	Y	N	(NA)	**Sample ID:**	MLY GW01

Analytes: Ammonia, Nitrate, Nitrite, Total Nitrogen, Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TPH, Total Resin Acids

ANDREW. STEWART

Eastland Port

Groundwater Well Sampling Form

(with criteria specific to A National Protocol for State of the Environment Groundwater Sampling in New Zealand, MfE, 2006)

Job Information			
Date: 7/8/15	**Time:** Arrive: 10:30am	Depart: 11:40am
Project Name: EPL Outsourced Compliance Programme	**Project Number:** AA1146	
Site Location: MLY	**Operator:** J.T, M.M	
Well ID: MLY GW02	**Weather:** Fine.	

Equipment			
Water quality equipment description: 13C 100791	Calibration Records Filed?	(Y)	N
Interface Probe Number: 57506	Calibration Records Filed?	(Y)	N
Purging Equipment Type: (Please circle)	**Bailer Type:** Plastic Teflon **Pump Type:** (Peristaltic) Submersible Micro-purge Other:		

Well Gauging and Purge Volume Calculations

Casing Diameter	25mm	50mm	50m	50mm	50mm	100mm	100mm	100mm
Bore Diameter	50mm	100mm	125mm	150mm	200mm	125mm	200mm	250mm
Conversion Factor (volume L/m)	0.93	3.73	5.06	6.68	10.8	10.8	14.2	20.2

Volume of water in a well
$V = \pi \times r^2 \times h$
V = Volume in litres
$\pi = 3.142$
r = radius in m
h = Height of water column in m

Total Well Depth (-) Water Level (=) Water Column
4.246 - 1.587 = 2.659

Water Column (x) Conversion Factor (=) Litres per 1 Well Volume
2.659 m (x) 3.73 (=) 9.918 L

Water Quality Parameters — **Low Flow Sampling**

Beginning Purging Time: 10:32 | End Purging Time: 11:21 | Fill Time: – | Discharge Time: –

Litres	Time	DO (mg/L)	Cond. (µS/cm)	pH	Redox (mV)	Temp °C	DTW (mbTOC)	Comments
0	10:40	7.5	928	6.52	90.1	15.2	1.587	Clear but some sediment.
0.5	10:47	2.5	930	6.52	84.1	15.2	1.921	Organic / Rotting odour.
1	10:56	3.2	929	6.52	81.6	15.5	2.02	
1.5	11:07	2.6	933	6.52	78.3	16.9	1.95	Left to recharge for 9 mins.
2	11:13	2.2	933	6.52	78.1	15.6	2.04	
2.5	11:28	2.6	935	6.52	74.2	15.6	2.140	Well recharged very slowly.

Stabilisation Criteria	±10%[1]	±3% or ±5% if <100[1]	±0.1[1]	±10mV[1]	±0.1[1]	**Example Comments**: clear / slightly cloudy / turbid / very turbid / colour / no odour / slight odour / strong odour / describe odour (hydrocarbon/solvent/organic)

[1]Based on MfE National Protocol for SOE Groundwater Sampling in NZ, 2006, [1]Based on Vic EPA (Australia) 669.
Low Flow: Max flow rate = 0.5 L/min Max drawdown = 0.2 cm -- Well stable when 3 consecutive readings (either 3 min or 0.5L apart)

2.5L	**Total Well Volume** Actual amount of water removed prior to sampling	Did field parameters stabilise?	(Y)	N
		Was the well dry purged?	Y	(N)

Field Quality Control Checks					
Was pre-cleaning sampling equipment used for these samples?	(Y)	N	-	Consistent with COC form?	(Y) N
Was pre-cleaning sampling equipment properly protected from contamination?	(Y)	N	-	COC Filled out?	(Y) N
Were gas bubbles present in vials at time of collection?	Y	(N)	NA	Time Sample Collected: 11:35am	
Was sample filtered for metals prior to preservations?	Y	N	(NA)	**Sample ID:** MLY GW02	
Analytes: Ammonia, Nitrate, Nitrite, Total Nitrogen, Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), TPH, Total Resin Acids					

Groundwater Gauging Form

Site Name:	Matauhero Lagyard	Project Number:	AA 1146
Operator:	J. I	Date:	7/8/15
Interface Probe:	S 7506	Weather Conditions:	Fair

Well ID	Time	Depth to LNAPL (mb TOC)	DTW (mb TOC)	LNAPL Thickness (m)	Well Depth (mbTOC)	Comments
MLY GW 01	9:42	NA	1.722	NA	9.543	
MLY GW 02	10:40ish	NA	1.587	NA	4.246	

Note: DTW = Depth to water, LNAPL = light non-aqueous phase liquid, mb TOC = metres below top of casing, m = metres.

Daily Summary Sheet

Site Name: Matauhero Lagoon.	Project Number: AA1146.
Operator: James Isaac / Matt Main.	Date: 7/8/15
Reason for Visit: Surface and Ground water sampling	Weather Conditions: Fine

Time	Comments
8:am	Arrived at MLY and proceeded to take surface water samples, as previous days rainfall ensured that there was discharge from MLY SW site 1 into Anapuni drain.
8:08am	Took sample for MLY SW site 3.
8:29am	Took sample for MLY SW site 2.
8:45am	Took sample for MLY SW site 1
8:59am	Took sample for MLY STD 01.
	Field analysis (using YSI meter) and photos taken at each site.
9:15am	After SW samples had been organized into a chilly bin we moved to MLYGW01. to start Ground water sampling. We encounted another well en route which could possibly be MLYGW01 (see photos) however we sampled the well that we did in March.

Eastland Port

Daily Summary Sheet

ANDREW. STEWART

Site Name: Matawhero Lagyard	Project Number: AA1146
Operator: James Isaac / Matt Main	Date: 7/8/15
Reason for Visit: Surface / Ground water sampling	Weather Conditions: Fine

Time	Comments
10:30am	After collecting samples for MLYGWO1 we moved to MLYGWO2. Field analysis and photos were taken for both sites.
11:40am	Departed MLY to take Ground water samples at Whare-Mata road.

Appendix D:

Matawhero Logyard Stormwater Results

D.1 Matawhero Logyard Stormwater Results

Summary table of results starting in March 2015. Exceedance of the consent trigger limits at the downstream site are shown in purple.

Parameter	Units	Consent trigger limits	March/April			May/June			July/August		
			2 March 2015			9 July 2015			7 August 2015		
			Stormwater retention ponds culvert outlets (MLYSW Site 1)[1]	Awapuni Drain 10m downstream (MLYSW Site 2)	Awapuni Drain 10m upstream (MLYSW Site 3)	Stormwater retention ponds culvert outlets (MLYSW Site 1)	Awapuni Drain 10m downstream (MLYSW Site 2)	Awapuni Drain 10m upstream (MLYSW Site 3)	Stormwater retention ponds culvert outlets (MLYSW Site 1)	Awapuni Drain 10m downstream (MLYSW Site 2)	Awapuni Drain 10m upstream (MLYSW Site 3)
pH	-LOG(H+)	6.5 – 8.5	n/a	8.17	8.17	7.31	7.77	7.54	6.52	7.41	7.29
Suspended Solids	g/m^3	100 mg/L above background site[2]	n/a	20	22	2100	18	19	9	18	18
BOD_5	g/m^3	20	n/a	7	7	7	7	7	8	6	5
Total Petroleum Hydrocarbons	g/m^3	15	n/a	< 0.7	< 0.7	<1.4	<0.7	<0.7	<0.7	<0.7	<0.7
Total Nitrogen	g/m^3	0.4	n/a	1.4	1.4	3.7	2.7	2.5	1.36	3.6	4.1
Total Tannins	g/m^3	Indicator test only	n/a	1.5	1.3	<5	1.2	1.1	<0.2	<1.0	<1.0
Dissolved Oxygen	Total saturation	Not less than 80%	n/a	n/a	n/a	82.4	81	53.9	36.5	54.5	64.4
Conductivity	mS/cm	0.3	n/a	35.81	35.329	0.40	9.28	9.15	0.877	9.605	9.664
Total Resin Acids	g/m^3	0.06	n/a	<0.0001	<0.0001	<0.0001	<0.0001	n/a[3]	<0.0001	<0.0001	<0.0001

1 - No sample was collected as no discharge from the ponds was occurring

2 - No sample was collected as no discharge from the ponds was occurring

3 - Sample bottle broke during transport to the lab so no analysis for this site was able to be collected

Appendix E:

Matawhero Logyard Groundwater Results

E.1 Matawhero Logyard Groundwater Results

Summary table of results starting in March 2015. Exceedance of the consent trigger limits at the sump tile drainage outlet are shown in purple.

Parameter	Units	Consent trigger limits	Limit from background samples at the sump tile drainage outlet	February			August		
				2 March 2015			7 August 2015		
				MLY GW 01	MLY GW 02	Sump Tile Drainage	MLY GW 01	MLY GW 02	Sump Tile Drainage
pH	-LOG(H+)	6.5 – 8.5	6.5 - 8.5	6.81	6.88	7.91	6.64	6.52	6.52
Conductivity	umho/cm	0.3 above background	866.3	896	942	2043	891	935	804
Total Petroleum Hydrocarbons	g/m^3	15	15	<0.1	<0.1	<0.7	<0.7	<0.7	<0.7
Total Resin Acids	g/m^3	0.06 above background	n/a	<0.0001	<0.0001	<0.0001			
Total Nitrogen	g/m^3	0.6 above background	1.49	0.35	0.23	1.46	0.26	3.6	1.67

1 - Two samples were collected in October 2010 as background samples. The results of these samples have been used to determine the trigger limits where required, the average of the results has been used.

2 - Background samples were not tested for total resin acids.