

Attachment 7: Soil Contamination



New Zealand Environmental Technologies Ltd

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Gabites Block – Contamination Assessment

History:

The “Gabites Block” currently under consideration for a Private Plan Change is identified on the UHCC xplorer database as street number 1135 Maymorn Road, and comprises Lot 2 DP356697, (14.7Ha), and Pt Section 299 Hutt District, (59.7 Ha). There is an adjoining section numbered 175 Maymorn Road, Lot 1 DP33009, (0.4Ha), which has always been, and will remain, separate to the Private Plan Change Block and is currently owned by Mrs. Deanna Gabites. These 3 lots are shown in Figure 1 below.

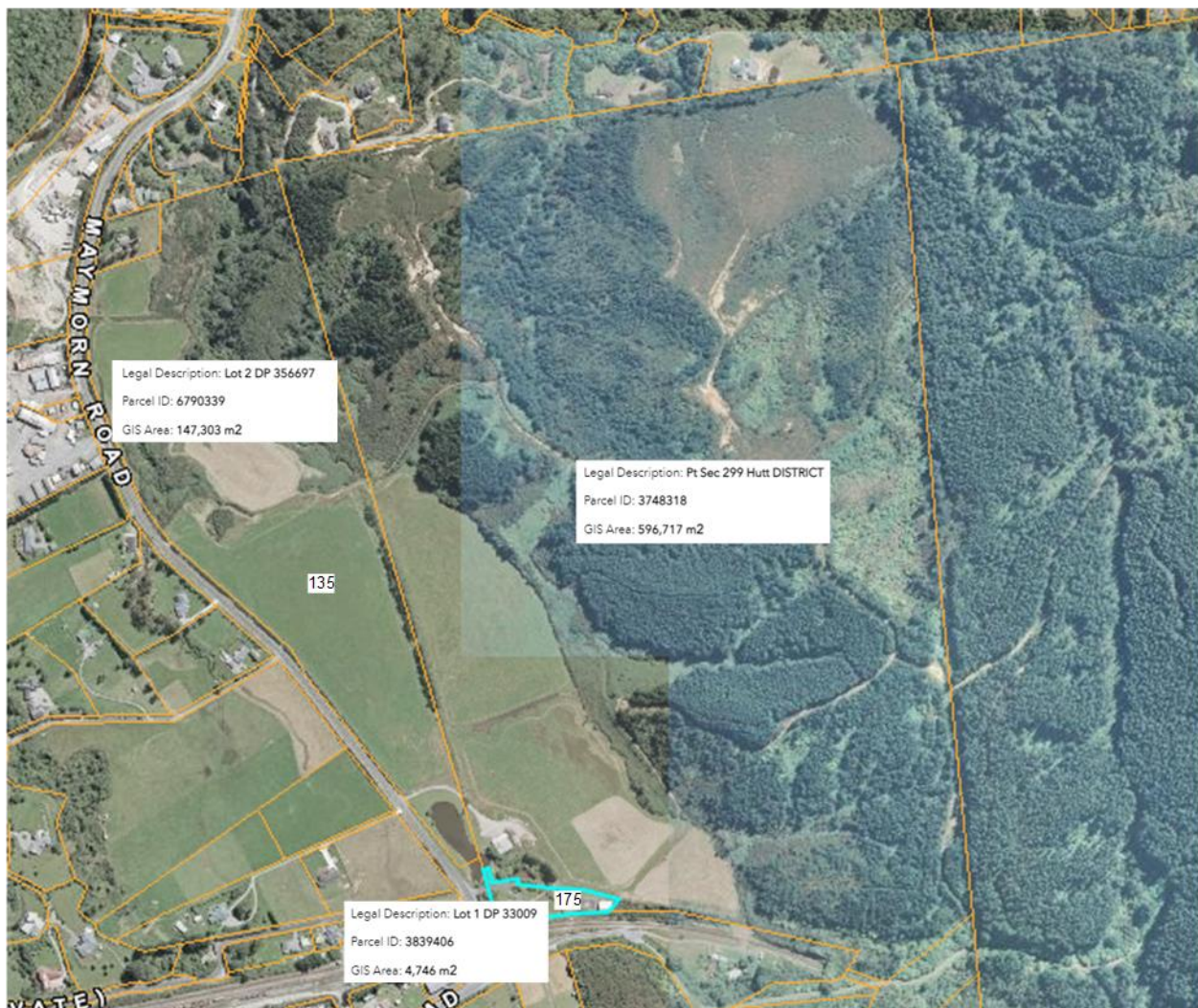


Figure 1. Legal Boundaries and Descriptions of Proposed Plan Change and Adjoining (highlighted), Blocks.

Parts of the overall site are listed as a contaminated site on Greater Wellington's Selected Land Use Register, (Figure 2). The proposed Private Plan Change Block is listed as ref SN/04/150/02 for the HAIL activity of "intentional or accidental release of a hazardous substances in sufficient quantity that it could be a risk to human health or the environment". This relates to an incident where the sludge from the then decommissioned piggery ponds was spread into the surrounding ground; primarily the land in which the ponds were located and the area between that and Maymorn Road, (lower flats). This incident resulted in an environment court case, with the final resolution listed by GW as Contamination Acceptable Managed / Remediated.

The 1135 Maymorn Road site was also the subject of a filling operation, involving depositing approx 15-20m depth of cleanfill materials to fill in an old stream gully which bisected the western flats. Greater Wellington has previously noted that the filling operation was covered by a consent, supervised, and there has been no expressed contamination concern as the result of those works.

There was previously an underground diesel fuel storage tank (UST), on the 1135 Maymorn Road site, which was removed, and the site clearance report produced in 2009. The adjoining site 1175 Maymorn Road, which is not part of the proposed Private Plan Change block, has a different SLUR number (SN/04/018/02), in the GW records, related to historical landfilling.

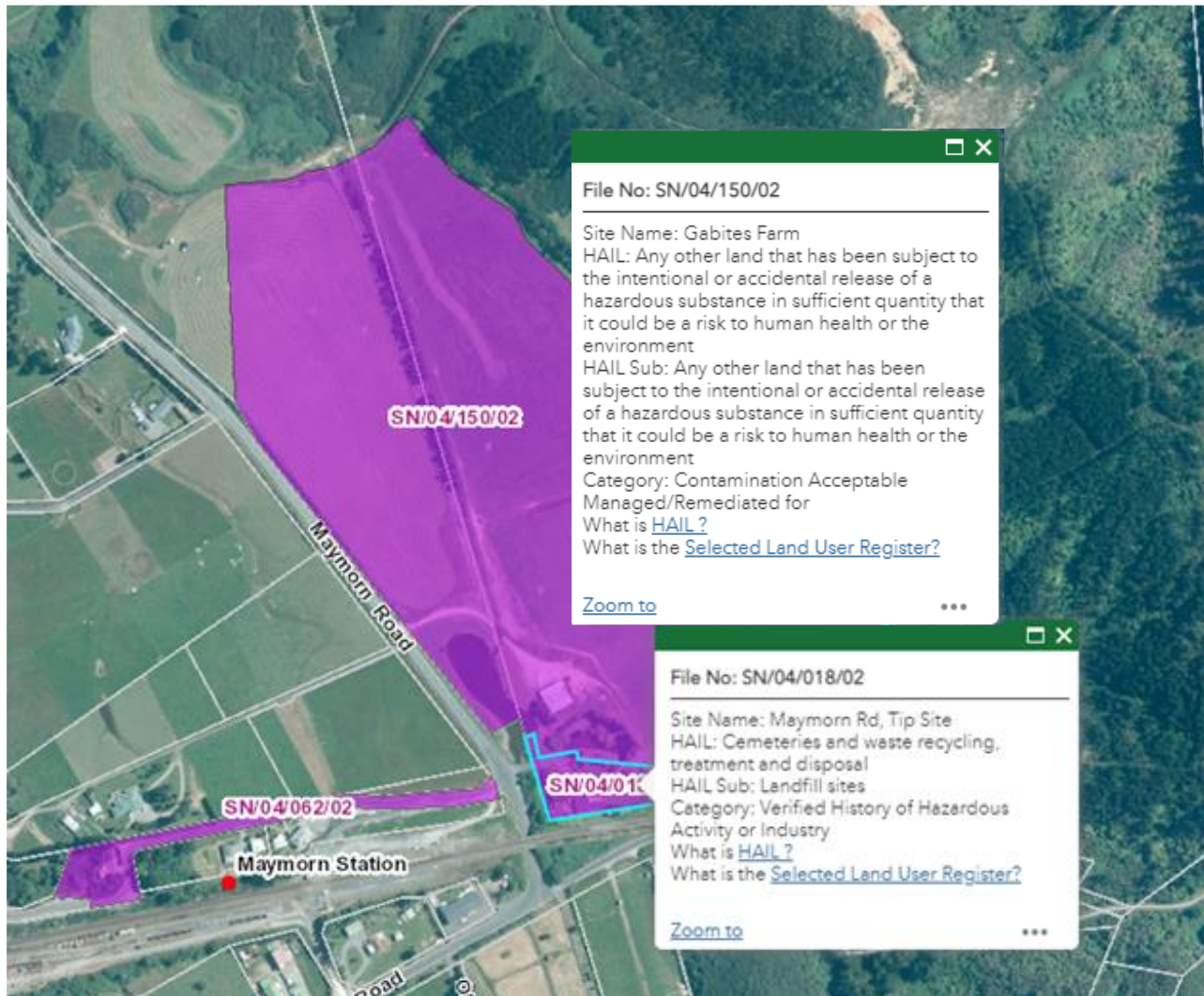


Figure 2. SLUR listings for the proposed Private Plan Change site (SN/04/150/02), and the adjoining property (SN/04/018/02), which is not part of the Private Plan Change.

As can be seen in Figure 2 above, the contaminated site designation is shown covering part only of the two blocks which are the subject of the Private Plan Change application, and which approximately correspond to the areas that the piggery pond sludge was spread over.

Communications with GW

In respect of previous land use activities at the site, Greater Wellington Regional Council (GWRC) records show that a previous underground diesel fuel storage tank at 1135 Maymorn Road was removed with the site clearance report produced in 2009; the former old stream gully which bisected the western flats was the subject of a cleanfill operation which was covered by a consent and supervised with no expressed contamination concerns; and an incident of sludge from the decommissioned piggery ponds being spread to the surrounding ground on the site was the subject of enforcement proceedings with the final resolution listed by the GWRC SLUR as Contamination Acceptable Managed/Remediated.

Because of the site's previous use and its identification on the SLUR, NZET Ltd arranged further site investigations. The analytical results are attached in Annex A and discussed below. The results do not exceed the standards in the NES (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health). In summary, there are no contaminants that present any concern in respect of the Private Plan Change site and its subsequent subdivision.

Human Health Assessment:

The primary contaminants present from the piggery sludge are copper and zinc. It should be noted that residential land use is not the most demanding land use with respect to these contaminants.

Considering the human health end point, copper is readily dismissed under the National Environmental Standard for Assessing and Managing Contaminants in Soil¹, (NES). The NES lists 12 priority contaminants and specifies maximum "guideline" values for these for different land uses. The land uses proposed for the Private Plan Change will likely comprise; rural residential / lifestyle block (10% produce consumed), and low density residential (10% produce consumed). The guideline values for copper under these land uses is 10,000 mg/kg. The average surface copper value found in the current sampling was 190mg/kg, with sludge samples from a stockpile of raw pond sludge not mixed with any soil historically tested at 460mg/kg, so around 500mg/kg represents the maximum level which could be found anywhere on site but given the soil mixing undertaken this is very unlikely. This maximum possible level is .5% of the maximum acceptable value for human health, and the maximum level found on site is 1.9% of the maximum acceptable value. therefore, copper toxicity effects on human health are of no concern.

Zinc is not one of the 12 priority contaminants specified in the NES, which is in recognition of its relatively benign impact on human health. NZ therefore has no statutorily defined acceptable level for zinc in soils. Soil samples from the site tested in 2007 and later gave an average value of 290mg/kg, with the highest value tested in historical sampling 495mg/kg and the raw sludge at 600mg/kg. If a human health level were to be set for zinc, it would be, as copper, in the thousands of mg/kg, and well above any level which is currently present on site, so human health effects from zinc are also not of concern.

Current Monitoring:

During investigations for the proposed Private Plan Change, NZET took further water and soil samples from the site to check for current status and any changes since previous testing was undertaken. The streams through the property were sampled at 6 locations, (Figure 3), and a composite soil sample from the lower terrace (10 locations spread over the terrace with sample plugs from near surface 0-50mm), were tested by two methods (ICPMS following digestion and the previously used Xray Fluorescence), the latter method having a higher detection limit but covering a greater range of elements.

Stream sediment concentrations were not retested but samples taken in 2007 varied from Zinc levels of 90mg/kg above the property to 140mg/kg in the centre of the sludge amended area), and back to 90mg/kg below the property, and copper levels were; 40mg/kg, 80mg/kg and 60mg/kg respectively in the same locations. Of these only the 80mg/kg copper level exceeded the ANZECC ISQG- Low trigger value for sediments relevant at the time of the testing.

The results of the 2021 testing are presented in Annex A to this report. Soil sampling was consistent with previous results at around 150mg/kg copper, and 250mg/kg zinc. Soil pH was measured slightly acidic at 6.3. No other metallic or elemental contaminants at levels of concern were identified in either analysis for the soil samples.

For the water samples, taken under summer “low flow” conditions, where the influence of leached contaminant loads can be expected to be least diluted and therefore at a maximum, there was no significant increase between samples taken up and downstream of the site, (1 and 2 upstream and 6 downstream), and samples taken within the site, (3,4,and 5), indeed one of the upstream samples, sample 1 which is fed from the Rimutaka Tunnel drainage and possible flows from a nearby fill area being worked on by Trans rail, showed a substantially higher level of zinc, and a higher level of copper than any of the other samples, in spite of this site being approximately 100m upstream of any of the piggery waste disposal areas . Copper levels through and below the site were below the detection limit for the test at < 2ppb, and the highest zinc level within the site was 7ppb with the water leaving the site being below the detection limit at <5ppb.

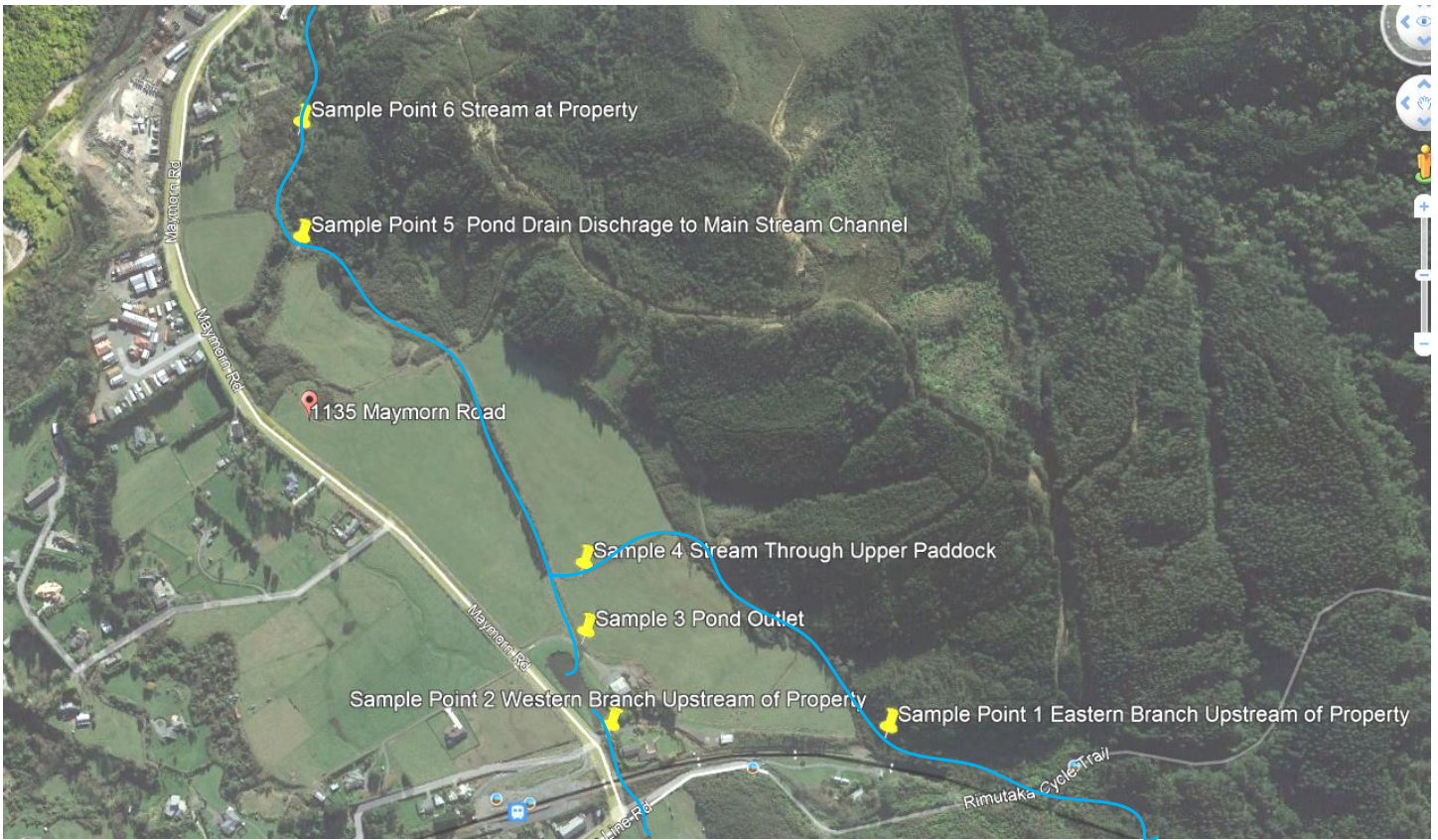


Figure 3. Stream Sample Locations Sampled 17 Feb 2021.

None of these measurements are indicative of any significant environmental impacts and the results should not preclude the proposed rezoning and subsequent Private Plan Change.

Stu Clark CP Eng 58384

18 October 2021

Annex A: 2021 Analytical Results

Water Samples- refer Figure 3 for locations.



NZET Ltd.
P O Box 40-339
Upper Hutt 5140
Attention: Stu Clark

Eurofins ELS Limited
Analytical Report

Report Number: 21/7312
Issue: 2
26 February 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-01	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 1					
Test	Result	Units	Test Date	Signatory	
0001 pH	8.2		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	12	g/m ³	22/02/2021	Gordon McArthur KTP	
0084 Turbidity	12.2	NTU	20/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	0.075	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	0.01	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.061	g/m ³	24/02/2021	Divina Lagazon KTP	
2088 Dissolved Reactive Phosphorus	0.036	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.17	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	0.005	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	0.050	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	12	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoa .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-02	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 2					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.4		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	< 3	g/m ³	22/02/2021	Gordon McArthur KTP	
0084 Turbidity	1.33	NTU	20/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	0.065	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.014	g/m ³	24/02/2021	Divina Lagazon KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.19	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	< 0.005	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	110	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoa .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-03	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 3					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.3		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	7	g/m ³	20/02/2021	Jennifer Mont KTP	
0084 Turbidity	10.3	NTU	19/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	< 0.005	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.071	g/m ³	24/02/2021	Divina Lagazon KTP	



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Report Number: 21/7312-2 ELS
26 February 2021 16:01:04

Email: reports@eurofins.com Website: <http://www.eurofins.co.nz>

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-03	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 3					
Test	Result	Units	Test Date	Signatory	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.60	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	0.006	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	2,000	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoo .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-04	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 4					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.6		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	26	g/m ³	20/02/2021	Jennifer Mont KTP	
0084 Turbidity	16.8	NTU	19/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	< 0.005	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	0.04	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.083	g/m ³	24/02/2021	Divina Lagazon KTP	
2088 Dissolved Reactive Phosphorus	0.011	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.29	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	0.003	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	0.007	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	1,040	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoo .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-05	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 5					
Test	Result	Units	Test Date	Signatory	
0001 pH	8.0		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	< 6	g/m ³	22/02/2021	Gordon McArthur KTP	
0084 Turbidity	2.11	NTU	20/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	0.013	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.032	g/m ³	24/02/2021	Divina Lagazon KTP	
2088 Dissolved Reactive Phosphorus	0.012	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.21	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	< 0.005	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	330	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoo .	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7312-06	NZET Sample		18/02/2021 09:55	18/02/2021 13:00	0
Notes: 6					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		19/02/2021	Jennifer Mont KTP	
0002 Suspended Solids - Total	< 5	g/m ³	22/02/2021	Gordon McArthur KTP	
0084 Turbidity	1.97	NTU	20/02/2021	Jennifer Mont KTP	
0085 BOD5 - Total	< 6	g/m ³	19/02/2021	Gordon McArthur KTP	
0515 Nitrite Nitrate Nitrogen	0.015	g/m ³	22/02/2021	Divina Lagazon KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	22/02/2021	Divina Lagazon KTP	
2080 Total Phosphorus	0.038	g/m ³	24/02/2021	Divina Lagazon KTP	
2088 Dissolved Reactive Phosphorus	0.016	g/m ³	22/02/2021	Divina Lagazon KTP	
2127 Total Nitrogen	0.21	g/m ³	24/02/2021	Divina Lagazon KTP	
6603 Arsenic - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6608 Cadmium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6611 Chromium - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6613 Copper - Total	< 0.002	g/m ³	23/02/2021	Sharon van Soest KTP	
6618 Lead - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6624 Nickel - Total	< 0.001	g/m ³	23/02/2021	Sharon van Soest KTP	
6638 Zinc - Total	< 0.005	g/m ³	23/02/2021	Sharon van Soest KTP	
M0102 Faecal Coliforms	170	cfu/100ml	19/02/2021	Maria Norris KTP	
P1855 Aqueous Total Metal Digestion	Completed		22/02/2021	Stephen Hutton Analyst	
P1859 Sample Filtration	Completed		19/02/2021	Harsimran Dhanoa	

Comments:

Sampled by customer using ELS approved containers.

All samples analysed as we receive them. Delivery was within the correct time and temperature conditions.

This report cancels and replaces report 21/7312-1. Please dispose of all previous versions.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Turbidity	Turbidity Meter following APHA Online Edition Method 2130 B.	0.01 NTU
BOD5 - Total	APHA Online Edition Method 5210 B.	1 g/m ³
Nitrite Nitrate Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I.	0.005 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NH3-H.	0.01 g/m ³
Total Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G. Persulphate digestion based on APHA Online Edition 4500-P B & Wat, Res., 17 (1983).	0.005 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Total Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I. Persulphate digestion based on APHA Online Edition 4500-N C & Wat, Res., 17 (1983)	0.05 g/m ³
Arsenic - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.002 g/m ³
Cadmium - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.001 g/m ³
Chromium - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.001 g/m ³
Copper - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.002 g/m ³
Lead - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.001 g/m ³
Nickel - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.001 g/m ³
Zinc - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.005 g/m ³
Faecal Coliforms	APHA 9222D Online Edition	1 cfu/100ml
Aqueous Total Metal Digestion	Follows APHA Online Edition Method 3030E (modified) using nitric acid.	n/a
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

Unless otherwise stated, all tests are performed in Wellington.

The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

For liquid samples g/m³ is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.



Report Released By
Rob Deacon



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Email: reports@scsurlabs.com Website: <http://www.scsurlabs.co.nz>

Soil samples, composite of 10 evenly spread sites 0-50mm BGL, lower flats



Eurofins ELS Limited

NZET Ltd.
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Upper Hutt 5140
Attention: Stu Clark

Analytical Report

Report Number: 21/7308
Issue: 1
24 February 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/7308-01	NZET Sample		17/02/2021 00:00	18/02/2021 13:00	0
Notes: 7 Lower Flats					
Test	Result	Units	Test Date	Signatory	
6203 Arsenic - Total	5.97	mg/Kg	22/02/2021	Sharon van Soest KTP	
6208 Cadmium - Total	0.14	mg/Kg	22/02/2021	Sharon van Soest KTP	
6211 Chromium - Total	13.4	mg/Kg	22/02/2021	Sharon van Soest KTP	
6213 Copper - Total	140	mg/Kg	22/02/2021	Sharon van Soest KTP	
6218 Lead - Total	13.6	mg/Kg	22/02/2021	Sharon van Soest KTP	
6224 Nickel - Total	11.1	mg/Kg	22/02/2021	Sharon van Soest KTP	
6238 Zinc - Total	246	mg/Kg	22/02/2021	Sharon van Soest KTP	
P1866 Metals Digestion - Misc Solids	Completed		19/02/2021	Stephen Hutton Analyst	

Comments:

Sampled by customer using ELS approved containers.
All samples analysed as we receive them. Delivery was within the correct time and temperature conditions.

Test Methodology:

Test	Methodology	Detection Limit
Arsenic - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.05 mg/Kg
Cadmium - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 mg/Kg
Chromium - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.2 mg/Kg
Copper - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.3 mg/Kg
Lead - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.1 mg/Kg
Nickel - Total	ICP-MS following APHA Online Edition method 3125 (modified)	0.2 mg/Kg
Zinc - Total	ICP-MS following APHA Online Edition method 3125 (modified)	1 mg/Kg
Metals Digestion - Misc Solids	Follows in-house method using nitric and hydrochloric acids.	n/a

Unless otherwise stated, all tests are performed in Wellington.
The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.
"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

For liquid samples g/m³ is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not an accredited test", which are outside the scope of this laboratory's accreditation.

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Report Released By
Rob Deacon

Soil sample, composite of 10 evenly spread sites 0-50mm BGL from lower flats.

Verum Group



X-RAY FLUORESCENCE ANALYTICAL REPORT

CLIENT : **NZ ENVIRONMENTAL TECHNOLOGIES**
ADDRESS : PO BOX 40 399, UPPER HUTT 5018.
EMAIL : stu@nzet.net.nz
TEL : 027 449 2837
ATTENTION : STU CLARK **JOB REFERENCE** : SA22390

CLIENT REFERENCE : Not supplied
SAMPLE TYPE(S) : 1 x SOIL
DATE OF SAMPLE RECEIPT : 18/02/2021 **CONDITION** : COARSE SOLID (FIELD)
ANALYSES CARRIED OUT : XRF MULTI-ELEMENT; LOSS ON IGNITION
REPORTING BASIS : OVEN DRIED [110°C]

The analytical results presented in this report apply to the sample(s) received by SpectraChem Analytical.

Analysis	Method used	LLD	Unit
Multi-element*	Pressed powder / X-ray fluorescence spectrometry	-	%
LOI	Furnace / gravimetric (1000°C for 1 hour)	0.01	%

Comments :

*Multi-element analysis should be considered semi-quantitative.

Detection limits vary with element and sample matrix.



SpectraChem Analytical is an IANZ accredited analytical laboratory. All analyses presented in this report other than those indicated (*), have been carried out by SpectraChem or by a sub-contracted laboratory in accordance with the requirements of International Accreditation New Zealand. This report may not be reproduced either in part or whole without the prior consent of the undersigned.

Date : 23/02/2021

Signed :

Craig Fraser Signatory

Verum Group Ltd , SpectraChem Analytical : 68 Gracefield Rd : Lower Hutt
P O Box 31-244 Lower Hutt : Tel. 04 570-3799 : Email. c.fraser@verumgroup.co.nz

Results in % by weight..... x 10,000 to give mg/kg.

Verum Group



NZ ENVIRONMENTAL TECHNOLOGIES

JOB REFERENCE : SA22390

Gabites
Sample >: Main Paddock Composite

F	nd
Na	1.28
Mg	0.434
Al	6.51
Si	28.4
P	0.559
S	0.145
Cl	0.021
K	1.18
Ca	1.45
Sc	nd
Ti	0.372
V	0.007
Cr	0.002
Mn	0.039
Fe	2.50
Co	0.003
Ni	nd
Cu	0.019
Zn	0.029
Ga	nd
Ge	nd
As	nd
Se	nd
Br	nd
Rb	0.006
Sr	0.014
Y	0.002
Zr	0.025
Nb	nd
Mo	nd
Cd	nd
Sn	nd
Sb	nd
I	nd
Cs	nd
Ba	0.028
La	nd
Ta	nd
W	nd
Hg	nd
Tl	nd
Pb	nd
Bi	nd
Th	nd
U	nd
LOI	15.64

Values expressed as weight-%
nd = not detected

23/02/2021

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