

LEVIN LANDFILL AUGUST TO OCTOBER 2020 QUARTERLY GROUNDWATER, SURFACE WATER AND LEACHATE MONITORING REPORT

PREPARED FOR HOROWHENUA DISTRICT COUNCIL

November 2020



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Executive Summary

Horowhenua District Council (HDC) is required to carry out quarterly compliance monitoring of groundwater and monthly sampling of most of the surface water locations at the Levin Landfill, as part of the conditions on Resource Consents DP6009, DP6010, DP6011 and DP102259. This report summarises the findings for the monitoring events of the period from August 2020 to October 2020, including results for:

- Background (natural) groundwater
- Landfill leachate
- Groundwater bores within the new landfill and old irrigation area
- Shallow aquifers, down-gradient of the old landfill
- The deep aquifer,
- The Hokio Stream, and
- The Tatana Property drain.

Stantec has reviewed the results of this third quarter monitoring on behalf of HDC.

Monitoring results for other aspects of the landfill operations, such as air quality/odour, stormwater and soil, are reported annually, as per resource consent requirements.

Samples were collected from 23 groundwater bores, the landfill leachate (at a manhole next to the leachate pond) and five surface water sites during the period from August 2020 to October 2020 from around and on the Levin Landfill, and were analysed for the parameters set out in Discharge Permit 6010.

The October 2020 samples were collected progressively over a 15-day period, which is a longer period than the normally accepted 7 days. Extending the sampling timeframe means that there is less confidence in comparing results from different parts of the site.

The resource consent for the landfill (namely discharge permit 6010) contains compliance limits for the quality of deeper and shallow groundwater which are based upon the Drinking Water Standards for New Zealand – Maximum Acceptable Values (DWSNZ MAVs), Guideline Values for aesthetic determinants (DWSNZ GV), and the ANZECC 2000 Livestock Drinking Water (ANZECC LDW) trigger values respectively. Compliance limits for surface water are based on the ANZECC 2000 Aquatic Ecosystems (ANZECC AE) 95% trigger values, as provided under the revised Resource Consent Condition approved in December 2019.

The August 2020 to October 2020 monitoring results have been assessed against these limits, where they are applicable.

Twenty-two non-compliances with resource consent conditions were recorded at seven individual monitoring locations, as follows:

- Exceedance of the ANZECC LDW trigger value for nitrate-N (at bore B2) in the shallow aquifer. Nitrate-N is usually elevated for this bore, but not to the extent seen this sampling round (94.4 mg/L).
- Exceedance of the DWSNZ MAV for manganese (at bores C2DD and E2D) in the deep gravel aquifer. This is a normal occurrence for bore C2DD, though unusual for bore E2D.
- The ANZECC AE 95% trigger values for nitrate-N, ammoniacal-N, and boron were exceeded at the Tatana Property drain (TD1).
- The ANZECC AE 95% trigger value for dissolved copper was exceeded at four monitoring locations within Hokio Stream (HS1A (new), HS1, HS2, and HS3) during the October 2020 sampling round. These results were slightly higher than normal but are still within the historic range.
- The ANZECC AE 95% trigger value for nitrate-N was exceeded at four monitoring locations within Hokio Stream (HS1A (new), HS1, HS2, and HS3) during the August, September, and October 2020 sampling rounds.

The August 2020 to October 2020 results were also considered in the context of background water quality, both within the groundwater aquifers (shallow and deep bores) and the surface water receiving environment. For example, low pH at background bore G1S, and elevated aluminium and iron

concentrations in the same bore indicate that groundwater could be being impacted by up-gradient activities unrelated to the landfill operations.

Results from a sample of leachate, taken from a manhole next to the leachate pond, were within the range of data obtained from previous monitoring events at the leachate manhole and are generally well below those recorded at typical Class 1 landfills in New Zealand. Mercury contamination was observed at levels below the typical range, which is in keeping with previous results.

Horowhenua District Council

Levin Landfill AUGUST TO OCTOBER 2020 Quarterly Groundwater, Surface Water and Leachate Monitoring Report

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1. Introduction

Horowhenua District Council (HDC) first commissioned Stantec New Zealand (then Montgomery Watson) to carry out environmental reporting for the discharge consent monitoring undertaken at the Levin Landfill site in the early 2000s. Until recently, monitoring has been undertaken every three months at 27 locations, as required by the previous resource consent conditions (namely for discharge permit 6010). These sampling locations consist of 23 boreholes penetrating the sand and gravel aquifers; three surface water sampling locations within Hokio Stream and a leachate sampling point, as shown in the Site Plan in Appendix A. In addition, HDC had agreed to undertake voluntary surface water monitoring at four locations along the Tatana Property drain.

The Levin Landfill site is comprised of two landfills: one old, closed and unlined landfill and one new, lined and active landfill. The new landfill footprint is being developed in stages. The most recent stage is Stage 3C which was developed in 2017, though landfill operations are also now occurring over the top of Stages 1A, 2 and 3C.

The Levin Landfill site is located above two identified aquifers, a shallow sand aquifer and a deeper gravel aquifer. The shallow aquifer is unconfined, has a low to moderate permeability, and flows in a northerly direction. The deeper gravel aquifer is a confined to semi-confined aquifer. Horizons Regional Council hydrology staff advised that '*the general confined groundwater flow direction is towards the west*'. Groundwater quality in the area is highly variable because of interaction with peat deposits that are prevalent in the area, localised effects such as from grazing activities, droppings from scavenging birds and from nitrogen-fixing plants such as gorse.

Since July 2010 groundwater has been tested for dissolved metals and nutrients rather than for total concentrations of these parameters.

The review of the resource consent conditions was finalised in December 2019. Changes have been made to some of the surface water and groundwater monitoring conditions and HDC is in the process of acting on all the changes. The sampling that was done in the October 2020 sampling round has been in line with what has been done previously, but different parameters have been applied to assess the surface water sampling results, as required by the new consent conditions.

This report presents the results for the October 2020 quarterly monitoring round.

2. Groundwater and Surface Water Monitoring

2.1 Sample Analysis

Samples were collected by Downer (a contractor to HDC) between 1 and 15 October 2020. Samples were couriered overnight and analysed by Eurofins ELS Ltd in Lower Hutt, Wellington, the following day.

The sampling programme for April 2020 - January 2023 is summarised in the schedule in Appendix B. From July 2019, faecal coliform counts analyses have been included within the indicator and comprehensive analytical suites, as agreed by HDC with the Horizons Regional Council (HRC). This means that faecal coliform counts will be assessed more frequently throughout each year, as compared to past monitoring.

Groundwater samples taken from the boreholes were analysed for the indicator suite of parameters which are outlined in [Table 2-1](#), whilst surface water samples from Hokio Stream, and samples of landfill leachate effluent were analysed for the comprehensive suite of parameters. Surface water samples collected from the Tatana Property drain were analysed based on a specific parameter list that has been included in the reviewed resource consent conditions. From the April 2020 monitoring round onward, sampling of the Tatana Drain will follow the comprehensive and indicator suites of parameters used for other surface water sampling.

Note that, following the revision of the resource consent conditions which were approved in December 2019, soluble carbonaceous BOD₅ (scBOD₅) and soluble mercury (Hg) have each been added to the indicator and comprehensive suites of parameters, and E. coli to the comprehensive suite of parameters. The scBOD₅ and E. coli parameters replace BOD₅ and faecal coliforms respectively. Monitoring of these additional parameters has commenced from the April 2020 sampling round.

Table 2-1: Indicator Parameters

Type	Parameters
Characteristics	pH Electrical Conductivity (EC)
Oxygen demand	Chemical Oxygen Demand (COD), scBOD ₅ ⁺⁺
Nutrients*	Nitrate nitrogen (NO ₃ -N), Ammoniacal-nitrogen (NH ₄ -N)
Metals*	Aluminium, Iron ^{**} , Lead, Manganese, Nickel
Other elements	Boron, Chloride, Sodium ^{**} , Mercury ⁺⁺
Biological ⁺	Faecal coliforms

Note:

*Analyses performed for nutrients and metals are for dissolved rather than total concentrations.

**Selected bores as per stormwater consent 102559

⁺Faecal coliforms added from July 2019 onwards (see Appendix B)

⁺⁺Soluble carbonaceous BOD₅ (scBOD₅) and Soluble Mercury added as per revised consent conditions for Discharge Permit 6010, December 2019

Note regarding interpretation of results below detection limits

For those chemical constituents which were below laboratory detection limits during the reporting period, the results have been set at 50% of the laboratory detection limit, and a median calculated on this basis. This is standard practice when dealing with chemical concentrations in water. However, the same rule cannot be applied for E. coli in the context of the Levin Landfill.

The laboratory detection limit for E. coli is 4 CFU/100mL (4 Colony Forming Units/100mL). As the resource consent requires that groundwater results for E. coli be compared against the DWSNZ (for compliance), which sets a value of NIL (i.e. 0 CFU/100mL), we have chosen to indicate where E. coli organisms were not detected, rather than calculating a median as we would for chemical constituents (described above). This method has been applied in all instances where E. coli numbers are assessed for compliance with the DWSNZ.

2.2 Background Groundwater Quality

Water quality from the natural background water up-gradient from the landfill site is not subject to any consent conditions. However, for comparison purposes, both the ANZECC LDW trigger values and the DWSNZ guidelines were used to benchmark the quality of water up-gradient from the landfill site.

Groundwater samples were collected from the two background bores situated hydraulically up-gradient from both the new and old landfills to the southeast of the site (bores G1S and G1D, Site Plan, Appendix A). These two bores were constructed in late 2009 to sample background water quality from the two main hydrogeological units.

The results are presented in Table 2-2. Bore F3 is also included in the background table as it is near the southern boundary of the landfill site (and further west) and is unlikely to be impacted by landfill activities. A full laboratory report containing analytical results is presented in Appendix C.

Table 2-2: Background Monitoring Results for October 2020

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Water level	mBGL	-	-	14.375	14.81	5.56
pH	-	7 to 8.5*	6 to 9	6.6	7	7
Conductivity	mS/m	-	-	43.5	28.1	23.5
scBOD ₅	mg/L	-	-	0.5	0.5	0.5
COD	mg/L	-	-	105	7.5	7.5
Faecal coliforms	CFU/100ml	NIL	100	ND	ND	ND
Chloride	mg/L	250*	-	59.1	31.7	21.6

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Nitrate-N	mg/L	11.3	90.3	0.005	0.005	2.05
Ammoniacal-N	mg/L	1.17	-	0.04	0.1	0.005
Sodium	mg/L	200*	-	69.6	n/r	26.8
Dissolved Aluminium	mg/L	0.1*	5	0.157	0.001	0.03
Dissolved Boron	mg/L	1.4	5	0.015	0.04	0.015
Dissolved Iron	mg/L	0.2*	-	3.34	n/r	0.01
Dissolved Lead	mg/L	0.01	0.1	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	0.4	-	0.176	0.0616	0.00025
Dissolved Mercury	mg/L	0.007	0.002	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.08	1	0.0016	0.00025	0.00025

Notes:

*denotes guideline values for aesthetic determinants (G.V.)

copper trigger values range from 0.4 mg/L for sheep, up to 5 mg/L for poultry

Bold – denotes an exceedance of the relevant DWSNZ guidelines

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

'ND' indicates where E. coli were not detected

n/r – not required to be tested during this monitoring period

The results in Table 2-2 indicate that all background bores (G1S, G1D and F3) contain groundwater that has concentrations of all monitored parameters within the ANZECC LDW trigger values.

There were two exceedances of the DWSNZ limits during the October 2020 monitoring round for dissolved iron and aluminium at G1S. It is also noted that the pH level for G1S (6.6) is below the DWSNZ range of 7-8.5.

It is noted that bores G1S and G1D are background bores and therefore any exceedances of the DWSNZ in these bores do not constitute non-compliances with the consent conditions.

2.3 Groundwater Quality Hydraulically Down-Gradient of the New Landfill

Monitoring is carried out within the two main hydrogeological units for bores hydraulically up-gradient of the old landfill and hydraulically down-gradient of the new landfill respectively.

2.3.1 Shallow Aquifer

Bores D1, D2, D3(r), D4, D5, D6 and E1S (Refer to Site Plan, Appendix A) are located hydraulically up-gradient of the old landfill, but down-gradient of the new landfill. This means they are not influenced by potential leaching from the old landfill and can act as a warning system for any leaching from the new landfill. Borehole D4 is likely to show evidence of any leaching from the new landfill. Borehole D5 is located at the south western corner of the site and is expected to provide an indication of shallow background groundwater quality because it is unlikely to be influenced by either landfill. It is unlikely that leachate from the new landfill will significantly affect groundwater quality due to the leachate collection system which is in place at the new landfill; however, these bores would still give early warning of any potential problems.

The results from the October 2020 monitoring round for these bores are presented in Table 2-3. The results have been compared with the ANZECC LDW trigger values as per the consent conditions. The full laboratory report is included in Appendix C.

There were no **exceedances of the resource consent conditions** during the October 2020 monitoring round.

Table 2-3: D-Series and EIS Monitoring Bore Results for October 2020

Determinant	Units	ANZECC LDW	D1	D2	D3(r)	D4	D5	D6	EIS
Water level	mBGL	-	16.92	21.58	4.94	8.28	10.075	16.5	11.51
pH	-	6 to 9	6.6	6.4	6.7	6.8	7	6.7	6.8
Conductivity	mS/m	-	49.6	34.4	22.1	31.1	29.4	44.7	27.4
scBOD5	mg/L	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
COD	mg/L	-	7.5	40	7.5	7.5	50	7.5	19
Faecal coliforms	CFU/100ml	100	ND	ND	ND	ND	ND	ND	ND
Chloride	mg/L	-	28.2	31.5	22.1	44.3	54.8	20.9	27.8
Nitrate-N	mg/L	90.3	10.9	0.02	0.19	0.005	1.64	21.2	0.005
Ammoniacal-N	mg/L	-	0.005	0.49	0.16	0.25	0.005	0.005	0.23
Sodium	mg/L	-	n/r	30.6	25.3	32	n/r	n/r	26.8
Dissolved Aluminium	mg/L	5	0.001	0.015	0.001	0.001	0.001	0.001	0.007
Dissolved Boron	mg/L	5	0.05	0.06	0.04	0.04	0.03	0.06	0.015
Dissolved Iron	mg/L	-	n/r	9.28	1.05	0.43	n/r	n/r	4.83
Dissolved Lead	mg/L	0.1	0.00025	0.0028	0.00025	0.00025	0.00025	0.00025	0.0018
Dissolved Manganese	mg/L	-	0.00025	0.317	0.184	0.201	0.0149	0.00025	0.241
Dissolved Mercury	mg/L	0.002	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	1	0.00025	0.00025	0.00025	0.00025	0.0007	0.00025	0.00025

Notes:

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

copper trigger values range from 0.4 mg/L for sheep, up to 5 mg/L for poultry

'ND' indicates where E. coli were not detected

n/r – not required to be tested during this monitoring period

2.3.2 Deep Gravel Aquifer

Bores E1D, C2DD, E2D and G1D all penetrate the deeper gravel aquifer. Deep groundwater flow is assumed to be towards the northwest. Boreholes E2D and C2DD are located to the north-northwest of both the landfills and are therefore considered to be hydraulically down gradient of both landfills. Borehole E1D is located to the southwest of the old landfill and it is therefore considered that this bore would be unlikely to be affected by either landfill.

Results for the October 2020 compliance monitoring round are presented in Table 2-4. The results have been compared with the DWSNZ as per the requirements of discharge consent 6010. The full laboratory report is included in Appendix C.

Table 2-4: Results for Monitoring Bores within the Deep Aquifer for October 2020

Determinant	Units	DWSNZ MAV	E1D	C2DD	E2D
Water level	mBGL	-	11.39	2.38	4.765
pH	-	7 to 8.5*	7.5	7.4	7.3
Conductivity	mS/m	-	44.9	53.3	44.8
scBOD5	mg/L	-	0.5	0.5	0.5
COD	mg/L	-	18	34	7.5
Faecal coliforms	CFU/100ml	NIL	ND	ND	ND
Chloride	mg/L	250*	39.2	38.8	40.6
Nitrate-N	mg/L	11.3	0.005	0.005	0.005
Ammonia-N	mg/L	1.17	0.22	0.32	0.26
Sodium	mg/L	200*	36	n/r	n/r
Dissolved Aluminium	mg/L	0.1*	0.001	0.023	0.001
Dissolved Boron	mg/L	1.4	0.05	0.06	0.06
Dissolved Iron	mg/L	0.2*	0.03	n/r	n/r
Dissolved Lead	mg/L	0.01	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	0.4	0.24	0.627	0.402
Dissolved Mercury	mg/L	0.007	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.08	0.00025	0.00025	0.00025

Notes:

* denotes guideline values for aesthetic determinants (G.V.)

Bold – denotes an exceedance of the relevant DWSNZ (2008) standard

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

n/r – not required to be tested during this monitoring period

'ND' indicates where E. coli were not detected

There were **two exceedances of the resource consent conditions** in samples from the deep gravel aquifer during the October 2020 sampling round, i.e.

- Dissolved manganese concentrations in bores C2DD and E2D were marginally above the DWSNZ MAV.

Please note, even though these exceedances are considered marginal, the value for bore C2DD is within the historical ranges. E2D is observed at the higher end of the historical range.

2.4 Impact of Old Landfill on Groundwater Quality

Water sampling is carried out to characterise the groundwater quality in a series of shallow bores situated hydraulically down-gradient from the old unlined landfill. The Series B boreholes are located within 50 m of the old landfill in a line along its northern edge. The Series C boreholes are located further down the hydraulic gradient from the old landfill towards Hokio Beach Road to detect whether leachate is moving

off site. Borehole E2S is located northwest of the old landfill to detect any leachate moving directly towards the nearest house down-stream of the site. Bore G2S was installed in late 2009 and is located to the north of the landfill site, hydraulically down-gradient of the old landfill by Hokio Road and the entrance road to the landfill (See Site Plan, Appendix A).

The results from the October 2020 consent monitoring round for these bores are presented in [Table 2-5](#) and have been compared with the ANZECC LDW trigger values as per the discharge consent 6010. The full laboratory report is included in Appendix C.

There was one exceedance of the ANZECC LDW trigger values during the October 2020 monitoring round at B2 for Nitrate-N contamination. Therefore, these **results show one non-compliance with the resource consent conditions**.

The Nitrate-N exceedance at B2 is noted as being higher than historical ranges but is less than what was recorded in the last monitoring round.

Table 2-5: Monitoring Results for Shallow Boreholes Down-Gradient from the Old Landfill for October 2020

Determinant	Units	ANZECC LDW	E2S	B1	B2	B3	C1	C2	C2DS	G2S
Water level	mBGL	-	5.67	1.96	1.32	0.15	0.02	0.22	2.12	1.8
pH	-	6 to 9	7.5	6.7	6.6	7	6.6	6.9	6.8	7.2
Conductivity	mS/m	-	36.5	168	223	261	146	239	150	235
scBOD5	mg/L	-	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5
COD	mg/L	-	7.5	90	115	211	81	129	106	66
Faecal coliforms	CFU/100ml	100	ND	ND	8	ND	ND	ND	ND	ND
Chloride	mg/L	-	45.7	264	126	159	283	161	122	584
Nitrate-N	mg/L	90.3	0.005	11.2	94.4	0.05	0.005	0.05	0.05	0.05
Ammoniacal-N	mg/L	-	0.33	7.6	42.7	169	5.64	145	1.3	0.005
Sodium	mg/L	-	31.4	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Dissolved Aluminium	mg/L	5	0.001	0.005	0.014	0.006	0.018	0.015	0.002	0.001
Dissolved Boron	mg/L	5	0.015	0.69	1.69	1.18	0.72	1.43	0.94	0.95
Dissolved Iron	mg/L	-	0.030	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Dissolved Lead	mg/L	0.1	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	-	0.246	9.84	5.02	3.05	0.471	0.0428	2.38	0.201
Dissolved Mercury	mg/L	0.002	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	1	0.00025	0.0019	0.0026	0.009	0.0009	0.0039	0.0023	0.0026

Notes:

Bold – denotes an exceedance of the ANZECC LDW trigger values

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

n/r – not required to be tested during this monitoring period

copper trigger values range from 0.4 mg/L for sheep, up to 5 mg/L for poultry

'ND' indicates where E. coli were not detected

2.5 Groundwater Quality Down-Gradient of the Irrigation Area

The F-series boreholes intersect the shallow aquifer down-gradient of the area that was used to irrigate leachate from 2004 to October 2008. All leachate is now pumped to the Levin Wastewater Treatment Plant. The F1 borehole is located within the area where leachate from the new landfill was irrigated. F2 and F3 boreholes are in an area that was set aside for leachate irrigation but was never used as such. It is expected that bores F2 and F3 would therefore be representative of background groundwater quality.

The results from the F series boreholes are presented in [Table 2-6](#) and have been compared with the ANZECC LDW trigger values, as per the discharge consent 6010. The full laboratory report is included in Appendix C.

There were **no exceedances of the resource consent conditions** during the October 2020 monitoring round.

Table 2-6: Results from Monitoring Bores in the Irrigation Area for October 2020

Determinant	Units	ANZECC LDW	F1	F2	F3
Water level	mBGL	-	8.13	3.1	5.56
pH	-	6 to 9	6.9	7.1	7
Conductivity	mS/m	-	47.5	21.6	23.5
scBOD5	mg/L	-	0.5	0.5	0.5
COD	mg/L	-	7.5	7.5	7.5
Faecal coliforms	CFU/100ml	100	ND	ND	ND
Chloride	mg/L	-	28.5	21.8	21.6
Nitrate-N	mg/L	90.3	1.64	0.47	2.05
Ammoniacal-N	mg/L	-	0.05	0.005	0.005
Sodium	mg/L	-	n/r	n/r	26.8
Dissolved Aluminium	mg/L	5	0.001	0.001	0.03
Dissolved Boron	mg/L	5	0.03	0.04	0.015
Dissolved Iron	mg/L	-	n/r	n/r	0.01
Dissolved Lead	mg/L	0.1	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	-	0.0053	0.0017	0.00025
Dissolved Mercury	mg/L	0.002	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	1	0.00025	0.00025	0.00025

Notes:

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

n/r – not required to be tested during this monitoring period

copper trigger values range from 0.4 mg/L for sheep, up to 5 mg/L for poultry

'ND' indicates where E. coli were not detected

2.6 Leachate Effluent Results

Leachate effluent from the landfill is **not subject to any water quality consent conditions**. However, for comparison purposes, typical leachate characteristics for landfills, as published by the Waste Management Institute New Zealand (*Technical Guidelines for Disposal to Land*, August 2018, WasteMINZ), have been compared against the leachate quality monitoring results ([Table 2-7](#)). The full laboratory report is included in Appendix C. [Table 2-7](#) shows that the concentrations of monitored parameters for leachate effluent samples collected in August, September, and October 2020 were mostly within the typical ranges

to be expected for this type of landfill. The results for mercury were below the typical leachate range, however this is not considered an issue as the results are not outside the range.

Table 2-7: Results from Leachate Effluent Monitoring for August, September and October 2020

Determinant	Units	Typical Leachate Characteristics*	Leachate Effluent		
			August	September	October
pH		5.9 - 8.5	7.8	8.1	7.9
Suspended Solids	mg/l	-	45	51	92
Phenol	mg/L	-	0.025	0.025	0.025
VFA	mg/L	-	2.5	2.5	13
TOC	mg/L	-	680	547	596
Alkalinity	mg CaCO ₃ /L	-	6460	5100	5870
Conductivity	mS/m	308 – 27,900	1460	1280	1360
COD	mg/L	84 – 5,090	2880	2880	2650
scBOD ₅	mg/L	-	96	76	67
E-Coli	CFU/100mL	-	130	9100	24
Chloride	mg/L	45 – 2,584	1380	943	973
Nitrate-N	mg/L	-	0.50	4.48	0.66
Sulphate	mg/L	-	120	144	76.1
Ammonia-N	mg/L	3.4 – 1,440	1340	1010	1130
Hardness	mg CaCO ₃ /L	-	533	483	497
Calcium	mg/L	-	115	105	108
Magnesium	mg/L	-	59.8	53.1	54.9
Potassium	mg/L	-	690	574	642
Sodium	mg/L	50 – 4,000**	941	716	847
D.R. Phosphorus	mg/L	-	13.7	8.25	8.74
Dissolved Aluminium	mg/L	-	0.557	0.377	0.541
Dissolved Arsenic	mg/L	-	0.29	0.257	0.254
Dissolved Boron	mg/L	0.54 – 20.1	6.88	5.83	6.64
Dissolved Cadmium	mg/L	-	0.0001	0.0001	0.0001
Dissolved Chromium	mg/L	-	0.602	0.5	0.576
Dissolved Copper	mg/L	-	0.0095	0.0158	0.0142
Dissolved Iron	mg/L	1.6 – 220	5.86	3.81	4.73
Dissolved Lead	mg/L	0.001 - 0.42	0.0031	0.0021	0.0034
Dissolved Manganese	mg/L	0.3 - 45***	1.1	0.96	1.09
Dissolved Mercury	mg/L	0.2 - 50	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.02 – 2.05**	0.112	0.0953	0.107
Dissolved Zinc	mg/L	-	0.104	0.156	0.076

Notes:

* for Class 1-type landfills, Table 5-5, p82, Technical Guidelines for Disposal to Land, WasteMINZ August 2018 (same as Table 4.2 of the CAE Landfill Guidelines 2000, but corrections made to Table 5-5 in line with Table 4.2)

**Data taken from Table 5-4, p81 of the same guideline, for parameters for which no differences in concentrations between the phases of landfill development could be observed

***Data taken from Table 5-4, p81 of the same guideline, for parameters during the methanogenic phase

Bold – denotes a deviation from the typical leachate characteristics range

2.7 Tatana Property Drain

A drain is located on the Tatana property (see Site Plan in Appendix A). Since July 2015 HDC has agreed to sample surface water from the drain for a selection of parameters that were set by HRC. Four sampling

points were selected to represent the top of the drain (SW1), middle of the drain (SW2 and SW3) and lower drain (SW4).

The revised consent conditions have now reduced the extent of sampling to one location. This is known as 'TD1' and it is the same sampling location as for the previously denoted 'SW3'.

Results from the October 2020 sampling round are presented in [Table 2-8](#) and have been compared with the ANZECC AE¹ 95% trigger values as per the revised resource consent conditions.

Table 2-8: Tatana Drain Monitoring Results for October 2020

Determinant	Units	ANZECC AE (95%)	TD1 (formerly SW3)
pH	-	-	7.4
Suspended Solids	mg/l	-	66
Phenol	mg/L	0.320	0.025
VFA	mg/L	-	6
TOC	mg/L	-	44.5
Alkalinity	mg CaCO ₃ /L	-	684
Conductivity	mS/m	-	192
COD	mg/L	-	354
scBOD ₅	mg/L	2	1
E-Coli	CFU/100ml	-	40
Chloride	mg/L	-	177
Nitrate-N	mg/L	0.16	0.24
Sulphate	mg/L	-	0.62
Ammoniacal-N	mg/L	2.1	57.8
Hardness	mg CaCO ₃ /L	-	405
Calcium	mg/L	-	81.6
Magnesium	mg/L	-	48.7
Potassium	mg/L	-	49.2
Sodium	mg/L	-	134
D.R. Phosphorus	mg/L	-	0.014
Dissolved Aluminium	mg/L	0.055	0.009
Dissolved Arsenic	mg/L	0.024	0.001
Dissolved Boron	mg/L	0.370	1.35
Dissolved Cadmium	mg/L	0.0002	0.0001
Dissolved Chromium (VI)	mg/L	0.001	0.001
Dissolved Copper	mg/L	0.0014	0.0009
Dissolved Iron	mg/L	-	0.312
Dissolved Lead	mg/L	0.0034	0.00025
Dissolved Manganese	mg/L	1.9	0.936
Dissolved Mercury	mg/L	0.0006	0.00025
Dissolved Nickel	mg/L	0.011	0.0039
Dissolved Zinc	mg/L	0.008	0.003

Notes:

Bold – denotes an exceedance of the ANZECC AE 95% protection level trigger values

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

¹ Australian and New Zealand Guidelines for Fresh and Marine Water Quality - Aquatic Ecosystems (AE), Australian and New Zealand Environment and Conservation Council (ANZECC), Canberra, Australia, 2000

There were **three exceedance of the resource consent conditions** in samples from the Tatana Drain property at TD1 during the October 2020 sampling round as follows:

- The Nitrate-N concentration was above the ANZECC AE 95% trigger value
- The Ammoniacal-N concentration was above the ANZECC AE 95% trigger value
- The Boron concentration was above the ANZECC AE 95% trigger value

While Nitrate-N exceeds the trigger value, it is noted that this is in fact at the lower end of the historical range.

The exceedance of Ammoniacal-N is higher than historical ranges, and given the sudden change, it is recommended that the location of sampling in the field is confirmed. This is because the results, appear very similar to that of the previous sampling point, SW1.

2.8 Hokio Stream

Surface water grab samples are obtained from Hokio Stream at sites HS1A, HS1, HS2 and HS3 (refer to Appendix A) to investigate whether groundwater containing leachate is having an adverse environmental effect on the stream. Sites HS1A and HS1 are situated up-stream of the old landfill, HS2 is situated alongside the old landfill and up-stream of the Tatana Property Drain discharge, and HS3 is located approximately 50m down-stream of the landfill site property boundary and the Tatana Property Drain discharge. Samples from these monitoring locations on Hokio Stream are analysed for comprehensive parameters every month (as shown in Appendix B).

Results from the August, September, and October 2020 sampling rounds are presented in [Table 2-9](#) and have been compared with the ANZECC AE 95% trigger values as per the revised resource consent conditions.

Monitoring for scBOD5 and soluble mercury concentrations have now been added as per the revised Resource Consent conditions.

The revised conditions have been recently implemented and monitoring of these additional parameters and at the new location commenced during the April 2020 monitoring round.

Table 2-9: Hokio Stream Monitoring Results for August, September and October 2020

Determinant	Units	ANZECC AE (95%)	Consent Trigger Values (Table C1)	HS1A (new)			HS1			HS2			HS3		
				Aug	Sept	Oct	Aug	Sept	Oct	Aug	Sept	Oct	Aug	Sept	Oct
pH	-	-	-	7.5	7.8	7.8	7.5	7.9	7.8	7.5	7.7	7.8	7.5	7.7	7.7
Suspended Solids	mg/l	-	-	12	17	18	14	14	18	12	17	20	9	15	19
Phenol	mg/L	0.320	-	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
VFA	mg/L	-	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
TOC	mg/L	-	-	4.6	7.2	8.3	4.7	7.3	8	4.9	7.8	7.9	4.8	7.7	8
Alkalinity	mg CaCO ₃ /L	-	-	43	43	44	43	44	44	46	52	47	46	49	46
Conductivity	mS/m	-	-	23.5	23.6	22.3	23.7	23.7	22.5	24.5	25.9	23	24.4	25.2	23
COD	mg/L	-	-	27	29	35	37	54	34	27	33	31	28	31	32
scBOD ₅	mg/L	2	Monthly Ave. 2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
E-Coli	CFU/100 ml	-	-	780	100	600	120	150	410	88	120	210	62	60	310
Chloride	mg/L	-	-	23.7	25.5	21.6	23.9	25.0	22.3	24.9	27.1	22.4	24.8	26.4	22.5
Nitrate-N	mg/L	0.16	0.16	1.03	1.05	0.77	1.020	1.020	0.8	1.03	1.03	0.78	1.03	1.010	0.79
Sulphate	mg/L	-	-	21.8	22.7	19.4	21.7	22.0	20	21.5	21.4	19.4	21.4	21.5	19.5
Ammoniacal-N	mg/L	2.1	Max. 2.1 Ave. 0.400	0.040	0.040	0.02	0.060	0.005	0.04	0.10	0.18	0.08	0.09	0.070	0.06
Hardness	mg CaCO ₃ /L	-	-	60	65	62	61	65	60	63	70	60	63	68	62
Calcium	mg/L	-	-	13.0	14.0	13.4	13.1	14.2	12.9	13.7	15.3	12.9	13.7	14.8	13.5
Magnesium	mg/L	-	-	6.66	7.2	7.01	6.79	7.26	6.81	6.98	7.74	6.77	7.00	7.45	6.99
Potassium	mg/L	-	-	2.62	2.87	2.79	2.66	2.91	2.89	2.83	3.52	2.96	2.46	3.21	3.09
Sodium	mg/L	-	-	18.1	18.2	18.7	18.1	18.6	18.3	20.2	19.6	18.4	20.3	18.9	19.1
D.R. Phosphorus	mg/L	-	-	0.0100	0.0025	0.0025	0.010	0.0025	0.0025	0.006	0.0025	0.0025	0.014	0.0025	0.0025
Dissolved Aluminium	mg/L	0.055	Med. 0.055	0.008	0.011	0.022	0.013	0.013	0.017	0.010	0.011	0.02	0.008	0.010	0.022
Dissolved Arsenic	mg/L	0.024	Med. 0.024	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Dissolved Boron	mg/L	0.370	-	0.05	0.05	0.06	0.05	0.05	0.07	0.05	0.06	0.06	0.05	0.05	0.06

Determinant	Units	ANZECC AE (95%)	Consent Trigger Values (Table C1)	HS1A (new)			HS1			HS2			HS3		
				Aug	Sept	Oct	Aug	Sept	Oct	Aug	Sept	Oct	Aug	Sept	Oct
Dissolved Cadmium	mg/L	0.0002	Med. 0.0002	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>
Dissolved Chromium (VI)	mg/L	0.001	-	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.001</i>
Dissolved Copper	mg/L	0.0014	Med. 0.0014	0.0007	0.0012	0.0016	0.0007	0.0011	0.0017	0.0008	0.0011	0.0015	0.0006	0.0012	0.0015
Dissolved Iron	mg/L	-	-	0.024	0.089	0.065	0.025	0.082	0.041	0.029	0.104	0.043	0.035	0.111	0.069
Dissolved Lead	mg/L	0.0034	Med. 0.0034	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Manganese	mg/L	1.9	-	0.0145	0.0029	0.0109	0.0154	0.0029	0.0083	0.0227	0.0130	0.0139	0.0216	0.0119	0.0176
Dissolved Mercury	mg/L	0.0006	Med. 0.0006	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Nickel	mg/L	0.011	Med. 0.011	<i>0.00025</i>	0.0006	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	0.0005	<i>0.00025</i>
Dissolved Zinc	mg/L	0.008	Med. 0.008	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	0.003	<i>0.001</i>	0.001	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>

Notes:

Bold – denotes an exceedance of the ANZECC AE 95% protection level trigger values

All '<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

There were **sixteen exceedances of the resource consent conditions** in samples from the Hokio Stream during the August, September, and October sampling rounds; these are:

- October 2020 sampling round for dissolved copper from HS1A (new), HS1, HS2, and HS3.
- August 2020, September 2020, and October 2020 sampling rounds for nitrate-N from HS1A (new), HS1, HS2, and HS3.

It is noted that for both dissolved Copper and Nitrate-N the results are very similar throughout the four sites for each of the monitoring rounds. Given that the upstream samples are similar to the downstream samples, it suggests that any exceedances are not a result of the landfill.

3. Gas Detection in Monitoring Wells

Condition 4 of Discharge Permit 6011 requires that: "...groundwater monitoring wells shall be sampled for landfill gas when groundwater samples are taken from the wells. As a minimum, sampling shall be undertaken for methane, carbon dioxide and oxygen..."

In the past, gas monitoring results were reported in the Annual Report. A recommendation of the 2019-2020 Annual Report is that this should be done every quarter so that if any results are unusually high, that appropriate action can be undertaken, including putting safeguards in place at bores.

Appendix E summarises the results of gas testing undertaken on 01 October 2020.

Methane was detected in trace amounts in 10 of the 23 groundwater monitoring bores.

The highest recorded level was 0.08% in Bore E2D, which is 800ppm and is 62 times below the lower explosive limit.

4. Discussion

4.1 Sampling Quality Control and Assurance

The landfill extends over a significant area and there are many sampling locations. However, it is important that the length of the sampling period is kept as brief as possible because a sampling period that is too long may make comparisons of results between rounds and individual monitoring locations less valid. This current monitoring round was carried out over a 15-day period between 1 and 15 October 2020. This is a longer timespan than the previous monitoring round which was 14 days. This monitoring period is not close to the recommended period (i.e. obtaining all samples within 7 days) and therefore the results must be interpreted with some caution.

4.2 Background Groundwater Quality

Water quality from the natural background groundwater up-gradient from the landfill site is not subject to any consent conditions.

Results since 2010 from the background bores indicate that low pH values are representative of background water quality in the shallow sand aquifer (G1S) and, during the October 2020 monitoring round, the pH level (6.6) is slightly below the guideline level of 7 prescribed by DWSNZ MAV. The deeper gravel aquifer (G1D) has a pH that is slightly higher at 7.

Iron concentrations have fluctuated considerably at both the G1S and G1D bores since monitoring began and are occasionally above the DWSNZ GV. During the October 2020 sampling round, iron concentrations at G1S (3.34 mg/L) exceeded the DWSNZ GV of 0.2mg/L but were within the historical results range recorded at this bore. Elevated iron concentrations in groundwater are likely to be related to hydrogeological conditions found at the site and this phenomenon is common in groundwater in this area.

During the October 2020 sampling round, aluminium concentrations were slightly elevated at G1S (0.157 mg/L), and marginally exceeded the DWSNZ GV of 0.1 mg/L.

The monitoring results suggest that the quality of background groundwater may be being impacted by local ground conditions and/or activities up-gradient of the landfill. Background bore G1S consistently records elevated concentrations of a range of parameters and therefore may not be suitable to use as a yardstick of background water quality in the future.

4.3 Shallow Aquifer Groundwater Quality

4.3.1 Hydraulically Up-gradient from the Old Landfill

Sampling results from the October 2020 monitoring round show that water quality in the shallow monitoring bores hydraulically up-gradient from the old landfill complies with the discharge consent conditions.

Bores D1 and D6 are located down gradient of the new landfill, with bore D1 located hydraulically up-gradient of the leachate effluent pond and bore D6 located down gradient of the leachate pond. Other leachate indicators such as boron, chloride and ammoniacal nitrogen concentrations at D6 are all consistent with background concentrations and the historical record.

4.3.2 Irrigation Area

Sampling results from all shallow bores located hydraulically down-gradient of the irrigation area² (F series bores) are consistent with historical results and comply with the discharge consent conditions.

Historical trends with respect to the leachate indicators chloride, boron and ammoniacal nitrogen concentrations in the F-series bores are generally stable and do not show any indications of increasing trends. Boron concentrations at F1 have consistently been low and are sometimes below the laboratory detection limit (except for the April 2020 result of 345 mg/L which is considered to be an anomalous result).

4.3.3 Hydraulically Down-gradient from the Old Landfill

During the October 2020 sampling round there was one exceedance of the resource consent conditions for nitrate nitrogen concentrations in bore B2. No other exceedances occurred at the shallower bores.

Bores C1 and G2S are located down gradient of the old landfill to the east. These bores have consistently recorded low concentrations of ammoniacal nitrogen, with G2S often recording concentrations below the detection limit.

Bores B1, B2, B3 and C2 all appear to be located and screened within the leachate plume and consistently show significantly elevated concentrations of ammoniacal nitrogen. Historical results for all four bores are plotted in [Figure 4-1](#) below. It is noted that the concentration of ammoniacal nitrogen in bore C2 has been increasing since 2009, while the concentration in B1 has fallen. It is possible that the leachate plume flow direction has "shifted", as a result of flow in one area (or direction) being slower than in others, resulting in a time lag for flow to pass some of the bores. This may have resulted in a different spatial distribution of results from that being observed five years ago.

² Irrigation of leachate within this area ceased in October 2008

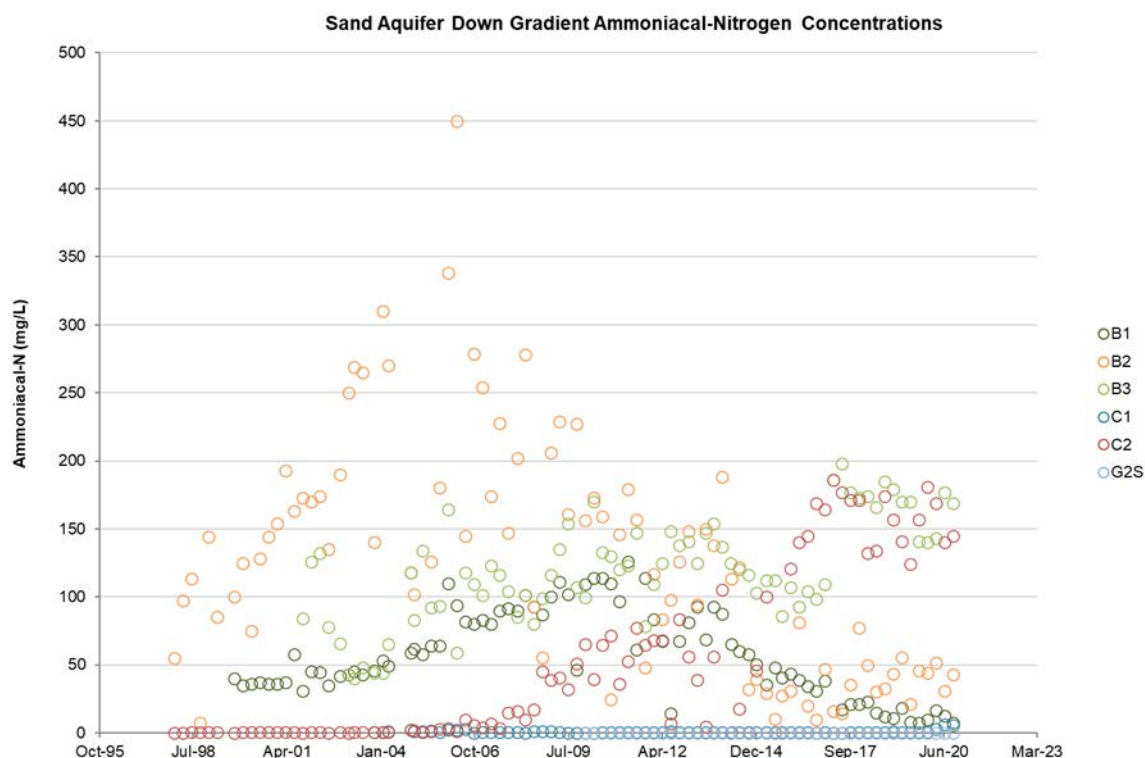


Figure 4-1: Ammoniacal Nitrogen Concentrations in Shallow Bores Screened in the Leachate Plume

Other key leachate indicators, boron, conductivity and chloride are also all elevated in concentrations within the bores that are located and screened in the leachate plume, as would be expected.

The leachate plume appears to have a confined radius northward and is not extending to the north-west or the north-east. The leachate plume width was estimated to be 300-500m in 2014.

4.4 Deep Aquifer Groundwater Quality

The concentration of manganese exceeded the DWSNZ MAV at C2DD and E2D within the deep gravel aquifer in the October 2020 monitoring round. However, it is noted that the manganese concentration at C2DD (0.6 mg/L) was consistent with historical results and is representative of background groundwater quality in the area. E2D showed a manganese concentration of 0.402 mg/L which marginally exceeds the DWSNZ MAV limit of 0.4 mg/L. The E2D October 2020 manganese result is significantly higher than historical results and is therefore considered to be an anomaly. The result for this parameter should be scrutinised in the monitoring results of the next quarterly report.

4.5 Leachate Effluent

Monitoring results from the leachate effluent samples are not required to meet either the ANZECC LDW trigger values or DWSNZ standards. Most of the results from the August, September, and October 2020 monitoring round were within the typical composition ranges for Class 1 landfills published in the WasteMINZ guidelines³. The only exception to this was for mercury which was below the typical range and therefore not of concern.

4.6 Tatana Property Drain

Under the revised resource consent conditions approved in December 2019, monitoring location 'SW3' is now re-designated as 'TD1', and sampling at locations 'SW2', 'SW3' and 'SW4' has been discontinued.

Under the revised conditions, the Tatana Property drain samples are now assessed against the ANZECC AE 95% trigger values.

³ Technical Guidelines for Disposal to Land, WasteMINZ, 2018

During this October 2020 monitoring period, there were three exceedances of the resource consent conditions in samples from the Tatana Drain property at TD1 where the nitrate-N, ammoniacal-N, and boron concentrations exceeded the ANZECC AE 95% value.

The conditions exceedance of the ammoniacal-N concentration is similar to the last monitoring period and differs significantly from historical trends. This may be the result of a change of site activities (e.g. stock grazing in the paddock) and it is recommended that this contaminant is closely monitored in the next quarterly report.

The conditions exceedance of the nitrate-N concentration is in keeping with historical trends and suggests the more elevated level observed during the last monitoring round was an anomaly. It is recommended that this contaminant is closely monitored in the next quarterly report.

The conditions exceedance observed for boron is at a higher concentration than was observed in the April 2020 and July 2020 monitoring rounds. However, as this contaminant has not been assessed for the Tatana Drain property at TD1 before, it is too soon to understand if this is anomalous. It is therefore recommended that this is checked in the next monitoring round.

It is also noted that, during the October 2020 sampling round, the concentrations of the following parameters were the higher than for previous sampling rounds. These were; conductivity, ammoniacal-N, hardness, calcium, magnesium, potassium, sodium, dissolved boron, dissolved chromium, dissolved copper, dissolved manganese, dissolved nickel, and dissolved zinc.

It is important to note however that these particular parameters were only recently included in monitoring suite and, therefore, knowledge about their trends is yet to be established.

4.7 Hokio Stream

Under the revised resource consent conditions, a new monitoring location (HS1A), upstream of HS1, was added to the Hokio Stream monitoring sites.

Under the revised conditions, the monitoring results for the Hokio Stream samples are now assessed against the ANZECC AE 95% trigger values.

During the August, September and October 2020 monitoring rounds, there were sixteen exceedances of the resource consent conditions in samples from the Hokio Stream where:

- The Dissolved copper concentration marginally exceeded the ANZECC AE 95% trigger value at HS1A (new), HS1, HS2, and HS3 in the October 2020 sampling round.
- The Nitrate-N concentration exceeded the ANZECC AE 95% trigger value at HS1A (new), HS1, HS2, and HS3 during the August, September, and October 2020 sampling rounds.

4.8 Consent Compliance

Discharge permit 6010 states that quarterly and annual monitoring results should comply with the ANZECC LDW trigger values in the shallow groundwater aquifer (sand aquifer) and surface water bodies. Samples from the deep groundwater (gravel aquifer) should comply with the DWSNZ. Should any parameters exceed these standards, the permit holder shall report to the Regional Council as soon as practicable on the significance of the results and, where the change can be attributed to the influence of landfill leachate, consult with the Regional Council to determine if further investigations or remedial measures are required.

Shallow aquifer

There was **one exceedance** of the resource consent conditions during the October 2020 sampling round for samples obtained from the shallow aquifer:

- The Nitrate-N concentration in bore B2 exceeded the ANZECC LDW trigger value.

Deeper gravel aquifer

There were **two exceedances** of the resource consent conditions in samples from the deep gravel aquifer during the October 2020 sampling round:

- The Manganese concentrations in bores C2DD and E2D exceeded the DWSNZ MAV.

Irrigation area

There were **no exceedances** of the resource consent conditions during the October 2020 sampling round for samples obtained from the irrigation area.

Tatana Property drain

There were **three exceedances** of the resource consent conditions during the October 2020 sampling round for samples obtained from the Tatana Drain sampling location at TD1:

- The Nitrate-N concentration exceeded the ANZECC AE 95% trigger value
- The Ammoniacal-N concentration exceeded the ANZECC AE 95% trigger value
- The Boron concentration exceeded the ANZECC AE 95% trigger value

Hokio Stream

There were **sixteen exceedances** of the resource consent conditions during the August, September and October 2020 sampling rounds for samples obtained from the Hokio Stream:

- The Dissolved copper concentrations marginally exceeded the ANZECC AE 95% trigger value at HS1A (new), HS1, HS2, and HS3 in the October 2020 sampling round.
- The Nitrate-N concentrations exceeded the ANZECC AE 95% trigger value at HS1A (new), HS1, HS2, and HS3 during the August, September, and October 2020 sampling rounds.

As discussed previously in the report, these results suggests that any exceedances are not a result of the landfill activities.

5. Conclusions

Monitoring results obtained in the August 2020 to October 2020 sampling rounds suggest that the groundwater at the background monitoring sites is being impacted by local ground conditions and/or activities up-gradient of the landfill.

During the August 2020 to October 2020 monitoring period there were twenty-two exceedances of the resource consent conditions, as summarised in the following paragraphs.

In October 2020 the shallow-water bore B2 showed a nitrate-N concentration above the ANZECC LDW value.

In October 2020 the deep-water bores C2DD and E2D located immediately down-gradient hydraulically of the old unlined landfill showed manganese concentrations above the DWSNZ MAV.

There were sixteen exceedances of consent limits found in samples from surface water monitoring at the Hokio Stream between August 2020 and October 2020; these were for dissolved copper concentrations at HS1A (new), HS1, HS2, and HS3 in October 2020, and nitrate-N concentrations at HS1A (new), HS1, HS2, and HS3 in August, September and October 2020, with these all showing results above the ANZECC AE 95% trigger values.

Additionally, there were three exceedances of consent limits in samples from surface water monitoring at the Tatana Property drain (TD1) where the nitrate-N, ammoniacal-N, and boron concentrations exceeded the ANZECC AE 95% trigger values.

Appendices



Appendix A Site Plans

DO NOT SCALE - IF IN DOUBT, ASK

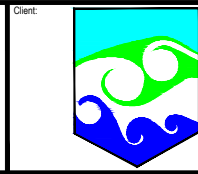
ORIGINAL SIZE A1

26/08/2019 9:35 a.m.

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REV	B	FOR INFORMATION - BORROW AREA AND LANDFILL AREA UPDATES	BCJ	PSL	PSL	22.09.20	DATE
	A	FOR INFORMATION	BCJ	PSL	PSL	26.08.19	
		REVISIONS	DRN	CHK	APP		

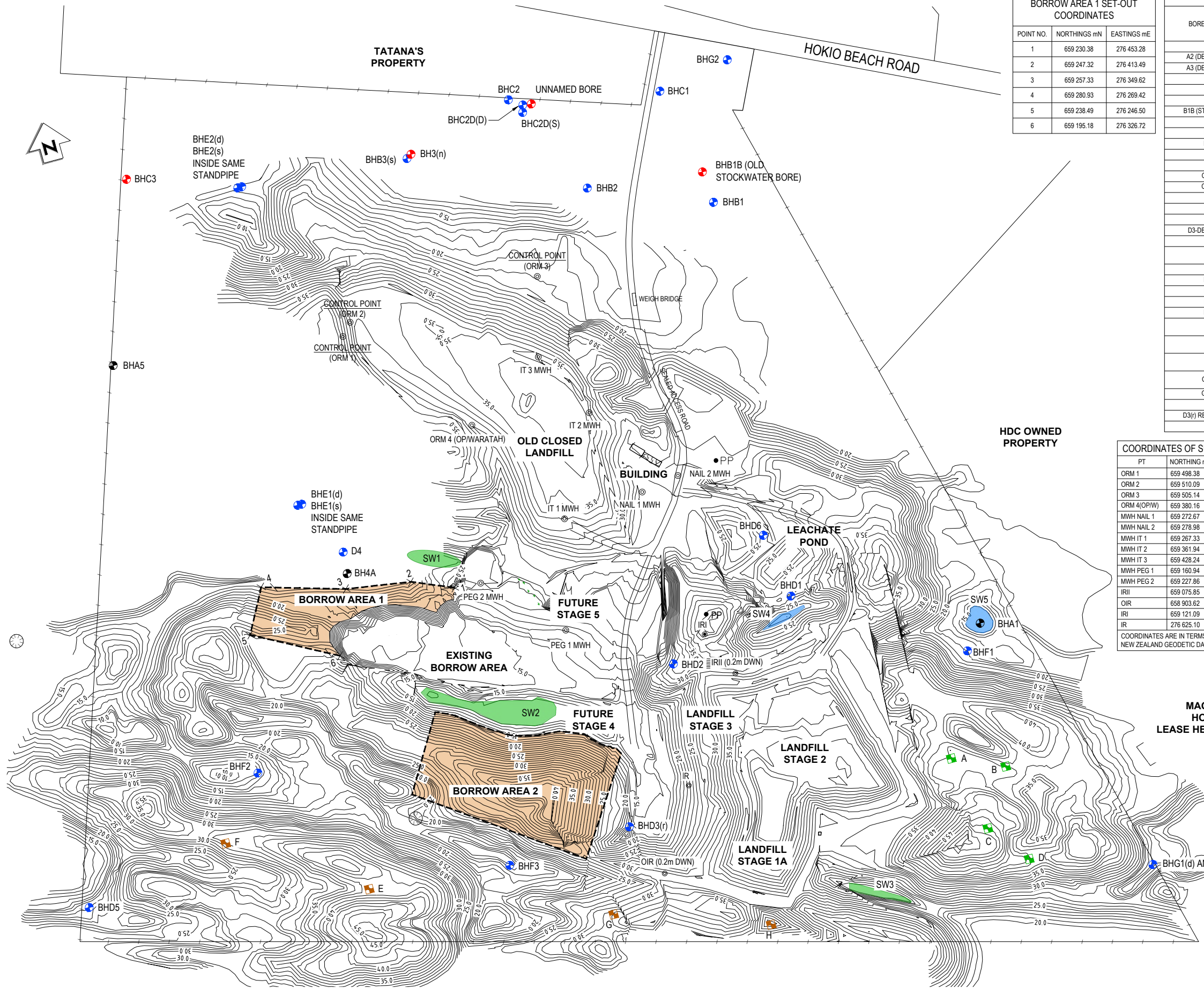
SURVEYED	MWH	
DESIGNED	N/A	
DRAWN	Brent James	08.2019
CAD REVIEW	Brent James	22.09.20
APPROVED	Phil Landmark	22.09.20
PROF REGISTRATION:		



HOROWHENUA DISTRICT COUNCIL
LEVIN LANDFILL

MONITORING BORES, SOIL SAMPLING LOCATIONS & BORROW AREAS
SITE PLAN, LOCATION AND DETAILS

Status Stamp	FOR INFORMATION ONLY	
Date Stamp	22.09.20	
Scales	1:2000 (A1) 1:4000 (A3)	
Drawing No.	310101088-19-001-G001	Rev. B



BORROW AREA 1 SET-OUT COORDINATES		
POINT NO.	NORTHINGS mN	EASTINGS mE
1	659 230.38	276 453.28
2	659 247.32	276 413.49
3	659 257.33	276 349.62
4	659 280.93	276 269.42
5	659 238.49	276 246.50
6	659 195.18	276 326.72

BORE LOCATIONS AND DETAILS					
BORE HOLE NO	NORTHING mN	EASTING mE	R.L. (m)	DEPTH OF WELL (m)	PIEZOMETE R DIAMETER (mm)
A1	659 060.15	276 944.89	12.95		
A2 (DESTROYED)					
A3 (DESTROYED)					
A4	659 271.67	276 354.72	10.10		
A5	659 530.47	276 185.91	9.62		
B1	659 561.81	276 797.35	9.04	4.3	40
B1B (STOCK BORE)	659 530.08	276 799.91	9.28	10	
B2	659 576.32	276 683.50	9.42	3.5	50
B3(s)	659 651.19	276 519.52	7.76	2.83	50
B3(n)	659 654.26	276 524.38	7.49	2.33	32
C1	659 649.64	276 777.83	7.47	3.60	50
C2	659 680.80	276 631.22	7.50	2.81	32
C2D(s)	659 671.19	276 641.63	10.13	12.88	32
C2D(d)	659 671.19	276 641.63	10.11	18.85	32
C3	659 704.29	276 246.89	7.22	2.8	32
D1	659 134.97	276 771.65	27.46	23.69	50
D2	659 101.02	276 642.06	32.12	29.46	50
D3-DESTROYED					
D4	659 293.20	276 356.60	17.97	17.0	
D5	659 020.80	276 022.40	20.65	18	
D6	659 200.31	276 761.08	26.41	16.07	50
E1(d)	659 349.54	276 329.48	20.91	37.80	32
E1(s)	659 349.54	276 329.48	20.91	20.05	32
E2(s)	659 667.30	276 354.69	13.15	15.24	32
E2(d)	659 667.30	276 354.69	13.15	28.66	32
F1	659 037.10	276 925.50	18.90	15.0	50
F2	659 105.00	276 218.00	13.50	10.2	50
F3	658 951.7	276 434.0	16.70	10.5	50
G1(s) *	658 786	277 046	24	15	50
G1(d) *	658 786	277 046	24	31.5	50
G2 *	659 673	276 835	8	4	50
D3(r) REINSTATED *	658 953	276 552	18	10	50

COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETTIC DATUM 1949: WANGANUI CIRCUIT

COORDINATES OF SURVEY CONTROL MARKS			
PT	NORTHING mN	EASTING mE	RL
ORM 1	659 498.38	276 412.21	38.94
ORM 2	659 510.09	276 422.72	34.98
ORM 3	659 505.14	276 612.86	21.10
ORM 4(OPW)	659 380.16	276 511.94	30.92
MWH NAIL 1	659 272.67	276 656.87	27.61
MWH NAIL 2	659 278.98	276 695.22	28.40
MWH IT 1	659 267.33	276 576.02	30.03
MWH IT 2	659 361.94	276 627.00	33.70
MWH IT 3	659 428.24	276 593.00	32.74
MWH PEG 1	659 160.94	276 548.30	32.99
MWH PEG 2	659 227.86	276 479.35	30.49
IRI1	659 075.85	276 698.70	30.04
OIR	658 903.62	276 579.37	30.35
IRI	659 121.09	276 679.47	40.00
IR	276 625.10	658 981.29	21.30

COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETTIC DATUM 1949: WANGANUI CIRCUIT

SOIL MONITORING LOCATIONS	CO-ORDINATES		LEVEL (m)
	NORTHING mN	EASTING mE	
PEG A	658 938.80	276 882.30	39.2
PEG B	658 917.00	276 932.10	39.5
PEG C	658 862.70	276 899.00	46.1
PEG D	658 822.90	276 930.40	40.4
PEG E	658 965.50	276 294.00	36.6
PEG F	659 046.20	276 169.10	32.9
PEG G	658 878.00	276 520.20	32.6
PEG H	658 827.40	276 667.60	23.5

NOTES:

- LEVELS ARE TOP OF STANDPIPE. WHERE THERE IS NO STANDPIPE, LEVELS ARE TOP OF PVC PIPE.
- BHA2, BHA3 AND BHD3 HAVE BEEN LOST DUE TO SITE WORKS.
- "A" SERIES BORE HOLES ARE AUGER HOLES ONLY AND MAY NOT BE ABLE TO BE LOCATED.
- BORES INSTALLED IN AUG 2009. DETAILS ARE APPROXIMATE.
- CONTOUR INTERVALS: 5m MAJOR, 1m MINOR

LEGEND

- MONITOR BORES CURRENTLY SAMPLED (FROM JAN 2010)
- BORES NOT SAMPLED
- SHALLOW HANDAUGER STANDPIPES NOT ABLE TO BE LOCATED
- SOIL SAMPLING LOCATION PEG - MONITORED
- SOIL SAMPLING LOCATION PEG - NOT MONITORED
- EXISTING STORMWATER SOAKAGE AREA
- PROPOSED STORMWATER SOAKAGE AREA
- PROPOSED BORROW AREAS

NOT FOR CONSTRUCTION



Hokio Stream ("HS") and Tatana's Property Drain ("SW") Monitoring Locations

Appendix B Sampling Schedule

LEVIN LANDFILL - SUMMARY OF SURFACE AND GROUNDWATER MONITORING REQUIREMENTS (April 2020 - January 2023).
(The testing regime is based on Consent Conditions following the completion of the 2015 Resource Consent Review process).

		Table A (Condition 3, DP 6010)					Table B (Condition 3, DP 6010)																				Table C (Condition 3, DP 6010)												
Reports Due		Sampling Month	Deep Aquifer Bores					Shallow Aquifer Bores														Irrigation Bores						Hokio Stream ⁽⁴⁾				Tatana Drain	Leachate Pond ⁽⁵⁾						
Annual	Quarterly		C2dd	E1d	E2d	G1d	Xd1 ⁽¹⁾	C1	C2	C2ds	D4	B1	B2	B3s	E1s	E2s	D1 ⁽²⁾	D2 ⁽²⁾	D3r ⁽²⁾	D6 ⁽²⁾	G1s	G2s	Xs1 ⁽¹⁾	Xs2 ⁽¹⁾	D5 ⁽³⁾	F1 ⁽³⁾	F2 ⁽³⁾	F3 ⁽³⁾	HS1	HS1A	HS2	HS3	TD1						
	May-20	Apr-20	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	Monthly Comprehensive for 2 Years	Monthly Comprehensive for 2 Years	Monthly Comprehensive for 2 Years	Monthly Comprehensive for 2 Years	C	Monthly Comprehensive for 2 Years	A				
Sep-20	Aug-20	Jul-20	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	Nov-20	Oct-20	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	Feb-21	Jan-21	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	May-21	Apr-21	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A					C		A				
Sep-21	Aug-21	Jul-21	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	Nov-21	Oct-21	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	Feb-22	Jan-22	I	I + SW	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	C	C	I	I	I	I + SW					I		I	I	I	I	I
	May-22	Apr-22	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C + A	C	C + A										
Sep-22	Aug-22	Jul-22	I	I + SW	I	I	I	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	I	I	I	I	I	I + SW	Discontinue after 2 years	C	C	C	C	C	C + A				
	Nov-22	Oct-22	I	I + SW	I	I	I	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	I	I	I	I	I + SW	I		I	I	I	I	I					
	Feb-23	Jan-23	I	I + SW	I	I	I	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	I + SW	I	I + SW	I	I	I	I	I	I + SW	I		I	I	I	I	I					
Measure groundwater level and sample all bores for CH ₄ , CO ₂ and O ₂ each time that groundwater is sampled (Condition 4a of DP 6011)																																							

Notes:

- (1) Bores to be developed by Consent Holder
- (2) See table below
- (3) If irrigation re-commences then the annual sampling is to change from comprehensive + 3 times indicator to bi-annual comprehensive + indicator (Clause D of Condition 3, DP 6010) .
- (4) See table below
- (5) See table below
- C Comprehensive list (see below)
- I Indicator list (see below)
- A Pesticide and SVOC analysis
- SW Add sodium and iron analysis (for stormwater consent 102559)

A reduction in sampling frequency at any **groundwater monitoring point** is conditional on (Clauses A - D of Condition 3, DP 6010):

- A. Completion of the initial monitoring program;
- B. Good consistency of groundwater sample analysis results, or a clearly identified reason for inconsistent results that excludes the contaminant source being landfill operations, stored waste or leachate;
- C. No decline in groundwater quality as determined from indicator parameter trends over a period of four consecutive sampling rounds;
- D. If a well being monitored on a conditional frequency becomes non-compliant with condition C, the monitoring frequency for that well should return to the initial monitoring frequency until conditions B and C are again being fulfilled.

⁽²⁾ If site management planning indicates any **early detection monitoring well** is likely to become buried or otherwise destroyed within the following year as a result of normal operations (Clauses E - H, Condition 3, DP 6010):

- E. This must be communicated to the regional council;
- F. A replacement well is to be constructed in a position agreed upon with Horizons Regional Council
- G. The replacement well should be installed in a position suitable to act as a early detection well and be classed as an early detection well;
- H. The replacement well should be constructed as a nested well (or two separate wells) with screens positioned in both shallow and deep aquifers.

⁽⁴⁾ A reduction in sampling frequency at the **Hokio Stream monitoring locations (HS1A, HS2 and HS3)** is conditional on (Clauses I - L, Condition 3 of DP 6010):

- I. No significant increases in the concentrations between monitoring sites HS1A and HS3, for parameters exceeding the trigger values contained in Table C1 at Site HS3.
- J. A statistical analysis approach is to be used to determine if there is a significant increase in contaminant levels between HS1A and HS3.
- K. Following the 24 month monitoring period, there shall be no significant increases in concentrations between monitoring sites HS1A and HS3.
- L. If the Hokio Stream monitoring locations are being sampled on a conditional frequency and do not meet condition K, the monitoring frequency for all three monitoring locations (HS1A, HS2 and HS3) shall return to the base case intensive monitoring until conditions J and K are again being fulfilled.

⁽⁵⁾ A reduction in sampling frequency at the **leachate pond outlet** is conditional on (Clauses M - P, Condition 3, DP 6010):

- M. Completion of the initial 2 year monitoring program;
- N. Good consistency of water sample analysis results, or a clearly identified reason for inconsistent results;
- O. No decline in water quality over a period of four consecutive sampling rounds;
- P. If the leachate pond outlet is being sampled on a conditional frequency and becomes non-compliant with condition O, the monitoring frequency should return to the base case intensive monitoring until conditions N and O are again being fulfilled.

COMPREHENSIVE PARAMETER LIST (Table E of Condition 3, DP 6010)

Characterising parameters	pH
	electrical conductivity (EC)
	alkalinity
	total hardness
	suspended solids
Oxygen demand	COD and scBOD ₅
Nutrients*	NO3-N, NH4-N, DRP and SO ₄
Metals*	Al, As, Cd, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Zn and Hg
Other elements	B, Ca, Cl, K and Na
Organics	Total organic carbon, total phenols, volatile acids
Biological	E. coli

* Analyses performed for nutrients and metals are for dissolved rather than total concentrations

INDICATOR PARAMETER LIST (Table F, Condition 3, DP 6010)

Characterising parameters	pH
Oxygen demand	electrical conductivity (EC)
Nutrients*	COD and scBOD ₅
Metals*	NO3-N and NH4-N
Other elements	AL, Mn, Ni, Pb and Hg
Biological ⁺	B and Cl
	E. coli

* Analyses performed for nutrients and metals are for dissolved rather than total concentrations

⁺ E. coli added from April 2019 sampling onwards

Appendix C Analytical Results

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/27962
Issue: 1
28 August 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/27962-01	Levin Leachate Pond		11/08/2020 00:00	11/08/2020 15:03	0
Notes: 185277-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		11/08/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	45	g/m ³	12/08/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	680	g/m ³	12/08/2020	Amit Kumar KTP	
0052 Alkalinity - Total	6,460	g CaCO ₃ /m ³	12/08/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	1,460	mS/m	11/08/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	2,880	g/m ³	13/08/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	96	g/m ³	12/08/2020	Marylou Cabral KTP	
0602 Chloride	1,380	g/m ³	14/08/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	< 1.00	g/m ³	14/08/2020	Amit Kumar KTP	
0607 Sulphate	120	g/m ³	14/08/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	1,340	g/m ³	12/08/2020	Athena Cao KTP	
1642 Total Hardness	533	g CaCO ₃ /m ³	12/08/2020	Shuyu Zhao KTP	
1810 Calcium - Dissolved	115	g/m ³	12/08/2020	Shuyu Zhao KTP	
1819 Iron - Dissolved	5.86	g/m ³	12/08/2020	Shuyu Zhao KTP	
1822 Magnesium - Dissolved	59.8	g/m ³	12/08/2020	Shuyu Zhao KTP	
1834 Sodium - Dissolved	941	g/m ³	12/08/2020	Shuyu Zhao KTP	
2088 Dissolved Reactive Phosphorus	13.7	g/m ³	12/08/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.557	g/m ³	17/08/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	0.290	g/m ³	17/08/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	6.88	g/m ³	20/08/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/08/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	0.602	g/m ³	17/08/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0095	g/m ³	17/08/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	0.0031	g/m ³	17/08/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	1.10	g/m ³	17/08/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.112	g/m ³	17/08/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	690	g/m ³	20/08/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	0.104	g/m ³	17/08/2020	Shanel Kumar KTP	
M0104 E. coli	130	cfu/100mL	11/08/2020	Juana Tamayo KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Lizzie Addis Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Lizzie Addis Transcribed by	
P1859 Sample Filtration	Completed		12/08/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³



Wellington
85 Port Road, Seaview
Lower Hutt 5045
Phone: (04) 576-5016

Rolleston
43 Detroit Drive
Rolleston 7675
Phone: (03) 343-5227

Dunedin
16 Lorne Street
South Dunedin 9012
Phone: (03) 972-7963

Page 1 of 2
Report Number: 20/27962-1 ELS
28 August 2020 20:01:37

Test	Methodology	Detection Limit
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
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.

"<" 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.

g/m³ is the equivalent to mg/L and ppm.

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

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Report Number: 20/27962-1 ELS

28 August 2020 20:01:37

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/27966
Issue: 1
28 August 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/27966-01	Levin HS3		11/08/2020 00:00	11/08/2020 14:47	0
Notes: 185281-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		11/08/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	9	g/m ³	12/08/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	4.8	g/m ³	12/08/2020	Amit Kumar KTP	
0052 Alkalinity - Total	46	g CaCO ₃ /m ³	11/08/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	24.4	mS/m	11/08/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	28	g/m ³	13/08/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	12/08/2020	Marylou Cabral KTP	
0602 Chloride	24.8	g/m ³	10/08/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	1.03	g/m ³	10/08/2020	Shanel Kumar KTP	
0607 Sulphate	21.4	g/m ³	10/08/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.09	g/m ³	12/08/2020	Athena Cao KTP	
1642 Total Hardness	63	g CaCO ₃ /m ³	12/08/2020	Shuyu Zhao KTP	
1810 Calcium - Dissolved	13.7	g/m ³	12/08/2020	Shuyu Zhao KTP	
1819 Iron - Dissolved	0.035	g/m ³	12/08/2020	Shuyu Zhao KTP	
1822 Magnesium - Dissolved	7.00	g/m ³	12/08/2020	Shuyu Zhao KTP	
1834 Sodium - Dissolved	20.3	g/m ³	12/08/2020	Shuyu Zhao KTP	
2088 Dissolved Reactive Phosphorus	0.014	g/m ³	12/08/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.008	g/m ³	17/08/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	17/08/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/08/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0006	g/m ³	17/08/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0216	g/m ³	17/08/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.46	g/m ³	17/08/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/08/2020	Shanel Kumar KTP	
M0104 E. coli	62	cfu/100mL	11/08/2020	Juana Tamayo KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Lizzie Addis Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Lizzie Addis Transcribed by	
P1859 Sample Filtration	Completed		12/08/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³



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Report Number: 20/27966-1 ELS
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Test	Methodology	Detection Limit
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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"<" 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.

g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/27966-1 ELS

28 August 2020 20:01:57

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/27965
Issue: 1
28 August 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/27965-01	Levin HS2		11/08/2020 00:00	11/08/2020 14:45	0
Notes: 185280-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		11/08/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	12	g/m ³	12/08/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	4.9	g/m ³	12/08/2020	Amit Kumar KTP	
0052 Alkalinity - Total	46	g CaCO ₃ /m ³	11/08/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	24.5	mS/m	11/08/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	27	g/m ³	13/08/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	12/08/2020	Marylou Cabral KTP	
0602 Chloride	24.9	g/m ³	10/08/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	1.03	g/m ³	10/08/2020	Shanel Kumar KTP	
0607 Sulphate	21.5	g/m ³	10/08/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.10	g/m ³	12/08/2020	Athena Cao KTP	
1642 Total Hardness	63	g CaCO ₃ /m ³	12/08/2020	Shuyu Zhao KTP	
1810 Calcium - Dissolved	13.7	g/m ³	12/08/2020	Shuyu Zhao KTP	
1819 Iron - Dissolved	0.029	g/m ³	12/08/2020	Shuyu Zhao KTP	
1822 Magnesium - Dissolved	6.98	g/m ³	12/08/2020	Shuyu Zhao KTP	
1834 Sodium - Dissolved	20.2	g/m ³	12/08/2020	Shuyu Zhao KTP	
2088 Dissolved Reactive Phosphorus	0.006	g/m ³	12/08/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.010	g/m ³	17/08/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	17/08/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/08/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0008	g/m ³	17/08/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0227	g/m ³	17/08/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.83	g/m ³	17/08/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	0.003	g/m ³	17/08/2020	Shanel Kumar KTP	
M0104 E. coli	88	cfu/100mL	11/08/2020	Juana Tamayo KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Lizzie Addis Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Lizzie Addis Transcribed by	
P1859 Sample Filtration	Completed		12/08/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³



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Report Number: 20/27965-1 ELS
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Test	Methodology	Detection Limit
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/27965-1 ELS

28 August 2020 20:01:53

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/27964
Issue: 1
28 August 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/27964-01	Levin HS1A		11/08/2020 00:00	11/08/2020 14:54	0
Notes: 185279-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		11/08/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	12	g/m ³	12/08/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	4.6	g/m ³	12/08/2020	Amit Kumar KTP	
0052 Alkalinity - Total	43	g CaCO ₃ /m ³	11/08/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	23.5	mS/m	11/08/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	27	g/m ³	13/08/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	12/08/2020	Marylou Cabral KTP	
0602 Chloride	23.7	g/m ³	10/08/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	1.03	g/m ³	10/08/2020	Shanel Kumar KTP	
0607 Sulphate	21.8	g/m ³	10/08/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.04	g/m ³	12/08/2020	Athena Cao KTP	
1642 Total Hardness	60	g CaCO ₃ /m ³	12/08/2020	Shuyu Zhao KTP	
1810 Calcium - Dissolved	13.0	g/m ³	12/08/2020	Shuyu Zhao KTP	
1819 Iron - Dissolved	0.024	g/m ³	12/08/2020	Shuyu Zhao KTP	
1822 Magnesium - Dissolved	6.66	g/m ³	12/08/2020	Shuyu Zhao KTP	
1834 Sodium - Dissolved	18.1	g/m ³	12/08/2020	Shuyu Zhao KTP	
2088 Dissolved Reactive Phosphorus	0.010	g/m ³	12/08/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.008	g/m ³	17/08/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	17/08/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/08/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0007	g/m ³	17/08/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0145	g/m ³	17/08/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.62	g/m ³	17/08/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/08/2020	Shanel Kumar KTP	
M0104 E. coli	780	cfu/100mL	11/08/2020	Juana Tamayo KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Lizzie Addis Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Lizzie Addis Transcribed by	
P1859 Sample Filtration	Completed		12/08/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³



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Report Number: 20/27964-1 ELS
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Test	Methodology	Detection Limit
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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"<" 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.

g/m³ is the equivalent to mg/L and ppm.

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

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Page 2 of 2
Report Number: 20/27964-1 ELS

28 August 2020 20:01:48

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/27963
Issue: 1
28 August 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/27963-01	Levin HS1		11/08/2020 00:00	11/08/2020 15:03	0
Notes: 185278-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		11/08/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	14	g/m ³	12/08/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	4.7	g/m ³	12/08/2020	Amit Kumar KTP	
0052 Alkalinity - Total	43	g CaCO ₃ /m ³	11/08/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	23.7	mS/m	11/08/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	37	g/m ³	13/08/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	12/08/2020	Marylou Cabral KTP	
0602 Chloride	23.9	g/m ³	10/08/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	1.02	g/m ³	10/08/2020	Shanel Kumar KTP	
0607 Sulphate	21.7	g/m ³	10/08/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.06	g/m ³	12/08/2020	Athena Cao KTP	
1642 Total Hardness	61	g CaCO ₃ /m ³	12/08/2020	Shuyu Zhao KTP	
1810 Calcium - Dissolved	13.1	g/m ³	12/08/2020	Shuyu Zhao KTP	
1819 Iron - Dissolved	0.025	g/m ³	12/08/2020	Shuyu Zhao KTP	
1822 Magnesium - Dissolved	6.79	g/m ³	12/08/2020	Shuyu Zhao KTP	
1834 Sodium - Dissolved	18.1	g/m ³	12/08/2020	Shuyu Zhao KTP	
2088 Dissolved Reactive Phosphorus	0.010	g/m ³	12/08/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.013	g/m ³	17/08/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	17/08/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/08/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/08/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0007	g/m ³	17/08/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0154	g/m ³	17/08/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/08/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.66	g/m ³	17/08/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/08/2020	Shanel Kumar KTP	
M0104 E. coli	120	cfu/100mL	11/08/2020	Juana Tamayo KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Lizzie Addis Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Lizzie Addis Transcribed by	
P1859 Sample Filtration	Completed		12/08/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³



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Report Number: 20/27963-1 ELS
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Test	Methodology	Detection Limit
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/27963-1 ELS

28 August 2020 20:01:43

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/34380
Issue: 1
02 October 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/34380-01	Levin Leachate Pond		15/09/2020 00:00	16/09/2020 09:27	0
Notes: 188556-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	8.1		16/09/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	51	g/m ³	16/09/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	547	g/m ³	18/09/2020	Amit Kumar KTP	
0052 Alkalinity - Total	5,100	g CaCO ₃ /m ³	25/09/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	1,280	mS/m	16/09/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	2,880	g/m ³	16/09/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	76	g/m ³	16/09/2020	Marylou Cabral KTP	
0602 Chloride	943	g/m ³	17/09/2020	Divina Lagazon KTP	
0605 Nitrate - Nitrogen	4.48	g/m ³	17/09/2020	Divina Lagazon KTP	
0607 Sulphate	144	g/m ³	17/09/2020	Divina Lagazon KTP	
0760 Ammonia Nitrogen	1,010	g/m ³	22/09/2020	Divina Lagazon KTP	
1642 Total Hardness	483	g CaCO ₃ /m ³	16/09/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	105	g/m ³	16/09/2020	Amit Kumar KTP	
1819 Iron - Dissolved	3.81	g/m ³	16/09/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	53.1	g/m ³	16/09/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	716	g/m ³	16/09/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	8.25	g/m ³	22/09/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.377	g/m ³	16/09/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	0.257	g/m ³	16/09/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	5.83	g/m ³	16/09/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	16/09/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	0.500	g/m ³	16/09/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0158	g/m ³	16/09/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	0.0021	g/m ³	16/09/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.959	g/m ³	16/09/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0953	g/m ³	16/09/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	574	g/m ³	16/09/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	0.156	g/m ³	16/09/2020	Shanel Kumar KTP	
M0104 E. coli	9,100	cfu/100mL	16/09/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Prashilla Singh Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Prashilla Singh Transcribed by	
P1859 Sample Filtration	Completed		16/09/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1



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Report Number: 20/34380-1 ELS
02 October 2020 20:00:47

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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"<" 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.

g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/34380-1 ELS

02 October 2020 20:00:47

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/34384
Issue: 1
02 October 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/34384-01	Levin HS3		15/09/2020 00:00	16/09/2020 09:27	0
Notes: 188560-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.7		16/09/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	15	g/m ³	16/09/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	7.7	g/m ³	18/09/2020	Amit Kumar KTP	
0052 Alkalinity - Total	49	g CaCO ₃ /m ³	16/09/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	25.2	mS/m	16/09/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	31	g/m ³	16/09/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/09/2020	Marylou Cabral KTP	
0602 Chloride	26.4	g/m ³	17/09/2020	Divina Lagazon KTP	
0605 Nitrate - Nitrogen	1.01	g/m ³	17/09/2020	Divina Lagazon KTP	
0607 Sulphate	21.5	g/m ³	17/09/2020	Divina Lagazon KTP	
0760 Ammonia Nitrogen	0.07	g/m ³	22/09/2020	Divina Lagazon KTP	
1642 Total Hardness	68	g CaCO ₃ /m ³	16/09/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	14.8	g/m ³	16/09/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.111	g/m ³	16/09/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	7.45	g/m ³	16/09/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.9	g/m ³	16/09/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/09/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.010	g/m ³	16/09/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	16/09/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	16/09/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0012	g/m ³	16/09/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0119	g/m ³	16/09/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	3.21	g/m ³	16/09/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	16/09/2020	Shanel Kumar KTP	
M0104 E. coli	60	cfu/100mL	16/09/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Prashilla Singh Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Prashilla Singh Transcribed by	
P1859 Sample Filtration	Completed		16/09/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1



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Report Number: 20/34384-1 ELS
02 October 2020 20:01:02

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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"<" 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.

g/m³ is the equivalent to mg/L and ppm.

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

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Report Number: 20/34384-1 ELS

02 October 2020 20:01:02

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/34383
Issue: 1
07 October 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/34383-01	Levin HS2		15/09/2020 00:00	16/09/2020 09:27	0
Notes: 188559-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.7		16/09/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	17	g/m ³	16/09/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	7.8	g/m ³	18/09/2020	Amit Kumar KTP	
0052 Alkalinity - Total	52	g CaCO ₃ /m ³	16/09/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	25.9	mS/m	16/09/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	33	g/m ³	16/09/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/09/2020	Marylou Cabral KTP	
0602 Chloride	27.1	g/m ³	17/09/2020	Divina Lagazon KTP	
0605 Nitrate - Nitrogen	1.03	g/m ³	17/09/2020	Divina Lagazon KTP	
0607 Sulphate	21.4	g/m ³	17/09/2020	Divina Lagazon KTP	
0760 Ammonia Nitrogen	0.18	g/m ³	22/09/2020	Divina Lagazon KTP	
1642 Total Hardness	70	g CaCO ₃ /m ³	16/09/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	15.3	g/m ³	16/09/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.104	g/m ³	16/09/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	7.74	g/m ³	16/09/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	19.6	g/m ³	16/09/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/09/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.011	g/m ³	16/09/2020	Shuyu Zhao KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	16/09/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	16/09/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	16/09/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	16/09/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0011	g/m ³	16/09/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	16/09/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0130	g/m ³	16/09/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	16/09/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	16/09/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	3.52	g/m ³	16/09/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	16/09/2020	Shuyu Zhao KTP	
M0104 E. coli	120	cfu/100mL	16/09/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Prashilla Singh Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Prashilla Singh Transcribed by	
P1859 Sample Filtration	Completed		16/09/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1



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Report Number: 20/34383-1 ELS
07 October 2020 16:01:40

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/34383-1 ELS

07 October 2020 16:01:40

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/34382
Issue: 1
02 October 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/34382-01	Levin HS1A		15/09/2020 00:00	16/09/2020 09:27	0
Notes: 188558-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		16/09/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	17	g/m ³	16/09/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	7.2	g/m ³	18/09/2020	Amit Kumar KTP	
0052 Alkalinity - Total	43	g CaCO ₃ /m ³	16/09/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	23.6	mS/m	16/09/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	29	g/m ³	16/09/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/09/2020	Marylou Cabral KTP	
0602 Chloride	25.5	g/m ³	17/09/2020	Divina Lagazon KTP	
0605 Nitrate - Nitrogen	1.05	g/m ³	17/09/2020	Divina Lagazon KTP	
0607 Sulphate	22.7	g/m ³	17/09/2020	Divina Lagazon KTP	
0760 Ammonia Nitrogen	0.04	g/m ³	22/09/2020	Divina Lagazon KTP	
1642 Total Hardness	65	g CaCO ₃ /m ³	16/09/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	14.0	g/m ³	16/09/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.089	g/m ³	16/09/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	7.20	g/m ³	16/09/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.2	g/m ³	16/09/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/09/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.011	g/m ³	16/09/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	16/09/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	16/09/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0012	g/m ³	16/09/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0029	g/m ³	16/09/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0006	g/m ³	16/09/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.87	g/m ³	16/09/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	16/09/2020	Shanel Kumar KTP	
M0104 E. coli	100	cfu/100mL	16/09/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Prashilla Singh Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Prashilla Singh Transcribed by	
P1859 Sample Filtration	Completed		16/09/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1



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Report Number: 20/34382-1 ELS
02 October 2020 20:00:55

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD ₅ - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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g/m³ is the equivalent to mg/L and ppm.

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Report Number: 20/34382-1 ELS

02 October 2020 20:00:55

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/34381
Issue: 1
02 October 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/34381-01	Levin HS1		15/09/2020 00:00	16/09/2020 09:27	0
Notes: 188557-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.9		16/09/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	14	g/m ³	16/09/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	7.3	g/m ³	18/09/2020	Amit Kumar KTP	
0052 Alkalinity - Total	44	g CaCO ₃ /m ³	16/09/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	23.7	mS/m	16/09/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	54	g/m ³	16/09/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/09/2020	Marylou Cabral KTP	
0602 Chloride	25.0	g/m ³	17/09/2020	Divina Lagazon KTP	
0605 Nitrate - Nitrogen	1.02	g/m ³	17/09/2020	Divina Lagazon KTP	
0607 Sulphate	22.0	g/m ³	17/09/2020	Divina Lagazon KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	22/09/2020	Divina Lagazon KTP	
1642 Total Hardness	65	g CaCO ₃ /m ³	16/09/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	14.2	g/m ³	16/09/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.082	g/m ³	16/09/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	7.26	g/m ³	16/09/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.6	g/m ³	16/09/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	22/09/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.013	g/m ³	16/09/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.05	g/m ³	16/09/2020	Shanel Kumar KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	16/09/2020	Shanel Kumar KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	16/09/2020	Shanel Kumar KTP	
6713 Copper - Dissolved	0.0011	g/m ³	16/09/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0029	g/m ³	16/09/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	16/09/2020	Shanel Kumar KTP	
6726 Potassium - Dissolved	2.91	g/m ³	16/09/2020	Shanel Kumar KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	16/09/2020	Shanel Kumar KTP	
M0104 E. coli	150	cfu/100mL	16/09/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5	g/m ³		Prashilla Singh Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Prashilla Singh Transcribed by	
P1859 Sample Filtration	Completed		16/09/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1



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Report Number: 20/34381-1 ELS
02 October 2020 20:00:51

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m ³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
E. coli	APHA 9222:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m ³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m ³
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.

"<" 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.

g/m³ is the equivalent to mg/L and 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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02 October 2020 20:00:51

Downer EDI Levin - Landfill
P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Analytical Report

Report Number: 20/40302
Issue: 1
10 November 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-01	Levin C2dd		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191362-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.4		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	53.3	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	34	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	38.8	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.32	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.023	g/m ³	13/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.627	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-02	Levin E1d		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191363-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	44.9	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	18	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	39.2	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.22	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	08/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.05	g/m ³	08/10/2020	Shuyu Zhao KTP	
6717 Iron - Dissolved	0.03	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.240	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6731 Sodium - Dissolved	36.0	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-03	Levin E2d		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191364-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.3		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	44.8	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	40.6	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.26	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	08/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.402	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-03	Levin E2d		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191364-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-04	Levin G1D		01/10/2020 00:00	05/10/2020 14:19	0
Notes: 191365-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.0		06/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	28.1	mS/m	06/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	< 15	g/m³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m³	05/10/2020	Marylou Cabral KTP	
0602 Chloride	31.7	g/m³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	0.10	g/m³	06/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	< 0.002	g/m³	06/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.04	g/m³	06/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m³	06/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0616	g/m³	06/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m³	06/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m³	06/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	05/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		06/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-06	Levin C1		07/10/2020 00:00	08/10/2020 09:47	0
Notes: 191367-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.6		08/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	146	mS/m	08/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	81	g/m³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	283	g/m³	12/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m³	09/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	5.64	g/m³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.018	g/m³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.72	g/m³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.471	g/m³	09/10/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0009	g/m³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-07	Levin C2		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191368-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.9		08/10/2020	Jennifer Mont KTP	
0055 Conductivity at 25°C	239	mS/m	08/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	129	g/m³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	161	g/m³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.10	g/m³	12/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	145	g/m³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.015	g/m³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	1.43	g/m³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.0428	g/m³	09/10/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0039	g/m³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-08	Levin C2ds		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191369-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.8		08/10/2020	Jennifer Mont KTP	
0055 Conductivity at 25°C	150	mS/m	08/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	106	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	122	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.10	g/m ³	12/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	1.30	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.002	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.94	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	2.38	g/m ³	13/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0023	g/m ³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-09	Levin D4		07/10/2020 00:00	08/10/2020 09:47	0
Notes: 191370-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.8		08/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	31.1	mS/m	08/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	44.3	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	09/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.25	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.04	g/m ³	09/10/2020	Shanel Kumar KTP	
6717 Iron - Dissolved	0.43	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.201	g/m ³	09/10/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6731 Sodium - Dissolved	32.0	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-10	Levin B1		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191372-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.7		08/10/2020	Jennifer Mont KTP	
0055 Conductivity at 25°C	168	mS/m	08/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	90	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	264	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	11.2	g/m ³	09/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	7.60	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.005	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.69	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	9.84	g/m ³	13/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0019	g/m ³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-11	Levin B2		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191372-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.6		08/10/2020	Jennifer Mont KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-11	Levin B2		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191372-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0055 Conductivity at 25°C	223	mS/m	08/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	115	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	126	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	94.4	g/m ³	12/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	42.7	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.014	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	1.69	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	5.02	g/m ³	13/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0026	g/m ³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	8	cfu/100mL	08/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-12	Levin B3s		08/10/2020 00:00	08/10/2020 15:26	0
Notes: 191373-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.0		08/10/2020	Jennifer Mont KTP	
0055 Conductivity at 25°C	261	mS/m	08/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	211	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	159	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.10	g/m ³	12/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	169	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.006	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	1.18	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	3.05	g/m ³	13/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	0.0090	g/m ³	09/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-13	Levin E1s		07/10/2020 00:00	08/10/2020 09:47	0
Notes: 191374-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.8		08/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	27.4	mS/m	08/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	19	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	27.8	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	09/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.23	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.007	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	< 0.03	g/m ³	09/10/2020	Shanel Kumar KTP	
6717 Iron - Dissolved	4.83	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	0.0018	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.241	g/m ³	09/10/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6731 Sodium - Dissolved	26.8	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-14	Levin E2s		07/10/2020 00:00	08/10/2020 09:47	0
Notes: 191375-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.5		08/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	36.5	mS/m	08/10/2020	Gordon McArthur KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-14	Levin E2s		07/10/2020 00:00	08/10/2020 09:47	0
Notes: 191375-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	08/10/2020	Marylou Cabral KTP	
0602 Chloride	45.7	g/m ³	09/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.01	g/m ³	12/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.33	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	09/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	< 0.03	g/m ³	09/10/2020	Shanel Kumar KTP	
6717 Iron - Dissolved	0.03	g/m ³	09/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6721 Manganese - Dissolved	0.246	g/m ³	09/10/2020	Shanel Kumar KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	09/10/2020	Shanel Kumar KTP	
6731 Sodium - Dissolved	31.4	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	08/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		09/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-15	Levin D1		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191376-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.6		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	49.6	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	28.2	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	10.9	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	08/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.05	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-16	Levin D2		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191377-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.4		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	34.4	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	40	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	31.5	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.02	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.49	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.015	g/m ³	13/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	08/10/2020	Shuyu Zhao KTP	
6717 Iron - Dissolved	9.28	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	0.0028	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.317	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6731 Sodium - Dissolved	30.6	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-17	Levin D3r		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191378-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.7		07/10/2020	Gordon McArthur KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-17	Levin D3r		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191378-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0055 Conductivity at 25°C	22.1	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	22.1	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.19	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.16	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	08/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.04	g/m ³	08/10/2020	Shuyu Zhao KTP	
6717 Iron - Dissolved	1.05	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.184	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6731 Sodium - Dissolved	25.3	g/m ³	13/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-18	Levin D6		06/10/2020 00:00	07/10/2020 09:43	0
Notes: 191379-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.7		07/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	44.7	mS/m	07/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	08/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	20.9	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	21.2	g/m ³	05/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	08/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	08/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	08/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	07/10/2020	Yuemei Yu KTP	
P1859 Sample Filtration	Completed		08/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-19	Levin G1S		01/10/2020 00:00	05/10/2020 14:19	0
Notes: 191380-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.6		06/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	43.5	mS/m	06/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	105	g/m ³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	05/10/2020	Marylou Cabral KTP	
0602 Chloride	59.1	g/m ³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	< 0.10	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	0.04	g/m ³	06/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.157	g/m ³	06/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	< 0.03	g/m ³	06/10/2020	Shuyu Zhao KTP	
6717 Iron - Dissolved	3.34	g/m ³	06/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	06/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.176	g/m ³	06/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	06/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	0.0016	g/m ³	06/10/2020	Shuyu Zhao KTP	
6731 Sodium - Dissolved	69.6	g/m ³	06/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	05/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		06/10/2020	Ruth Ashton .	



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20/40302-20	Levin G2s		01/10/2020 00:00	05/10/2020 14:19	0
Notes: 191381-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.2		06/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	235	mS/m	06/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	66	g/m ³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	05/10/2020	Marylou Cabral KTP	
0602 Chloride	584	g/m ³	05/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	< 0.10	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	06/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	06/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.95	g/m ³	06/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	06/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.201	g/m ³	06/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	06/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	0.0026	g/m ³	06/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	05/10/2020	Maria Norris KTP	
P1859 Sample Filtration	Completed		06/10/2020	Ruth Ashton .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-21	Levin D5		05/10/2020 00:00	06/10/2020 11:01	0
Notes: 191382-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.0		06/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	29.4	mS/m	06/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	50	g/m ³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	54.8	g/m ³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	1.64	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	07/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.03	g/m ³	07/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0149	g/m ³	07/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	0.0007	g/m ³	07/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	06/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		07/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-22	Levin F1		05/10/2020 00:00	06/10/2020 11:01	0
Notes: 191383-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	6.9		06/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	47.5	mS/m	06/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	28.5	g/m ³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	1.64	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	07/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.03	g/m ³	07/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0053	g/m ³	07/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	06/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		07/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-23	Levin F2		05/10/2020 00:00	06/10/2020 11:01	0
Notes: 191384-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.1		06/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	21.6	mS/m	06/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	06/10/2020	Gordon McArthur KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-23	Levin F2		05/10/2020 00:00	06/10/2020 11:01	0
Notes: 191384-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	21.8	g/m ³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	0.47	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	< 0.002	g/m ³	07/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	0.04	g/m ³	07/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0017	g/m ³	07/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
M0104 E. coli	< 4	cfu/100mL	06/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		07/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-24	Levin F3		05/10/2020 00:00	06/10/2020 11:01	0
Notes: 191385-0 Levin Landfill					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.0		06/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	23.5	mS/m	06/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	< 15	g/m ³	06/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	07/10/2020	Gordon McArthur KTP	
0602 Chloride	21.6	g/m ³	05/10/2020	Amit Kumar KTP	
0605 Nitrate - Nitrogen	2.05	g/m ³	05/10/2020	Amit Kumar KTP	
0760 Ammonia Nitrogen	< 0.01	g/m ³	09/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.030	g/m ³	07/10/2020	Shanel Kumar KTP	
6707 Boron - Dissolved	< 0.03	g/m ³	07/10/2020	Shuyu Zhao KTP	
6717 Iron - Dissolved	0.01	g/m ³	14/10/2020	Shanel Kumar KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	07/10/2020	Shuyu Zhao KTP	
6731 Sodium - Dissolved	26.8	g/m ³	14/10/2020	Shanel Kumar KTP	
M0104 E. coli	< 4	cfu/100mL	06/10/2020	Juana Tamayo KTP	
P1859 Sample Filtration	Completed		07/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-27	Levin TD1		01/10/2020 00:00	15/10/2020 14:30	0
Notes: 191388-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.4		16/10/2020	Gordon McArthur KTP	
0002 Suspended Solids - Total	66	g/m ³	16/10/2020	Gordon McArthur KTP	
0040 Total (NP) Organic Carbon	44.5	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	684	g CaCO ₃ /m ³	16/10/2020	Gordon McArthur KTP	
0055 Conductivity at 25°C	192	mS/m	16/10/2020	Gordon McArthur KTP	
0081 Chemical Oxygen Demand	354	g/m ³	20/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	1	g/m ³	16/10/2020	Gordon McArthur KTP	
0602 Chloride	177	g/m ³	16/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.24	g/m ³	20/10/2020	Shanel Kumar KTP	
0607 Sulphate	0.62	g/m ³	16/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	57.8	g/m ³	21/10/2020	Athena Cao KTP	
1642 Total Hardness	405	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	81.6	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.312	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	48.7	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	134	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	0.014	g/m ³	21/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.009	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	1.35	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0009	g/m ³	17/10/2020	Shuyu Zhao KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-27	Levin TD1		01/10/2020 00:00	15/10/2020 14:30	0
Notes: 191388-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.936	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	0.0039	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	49.2	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	0.003	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	40	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	6 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-28	Levin Leachate Pond		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191389-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.9		16/10/2020	Jennifer Mont KTP	
0002 Suspended Solids - Total	92	g/m ³	16/10/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	596	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	5,870	g CaCO ₃ /m ³	20/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	1,360	mS/m	16/10/2020	Jennifer Mont KTP	
0081 Chemical Oxygen Demand	2,650	g/m ³	20/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	67	g/m ³	16/10/2020	Marylou Cabral KTP	
0602 Chloride	973	g/m ³	20/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.66	g/m ³	20/10/2020	Shanel Kumar KTP	
0607 Sulphate	76.1	g/m ³	20/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	1,130	g/m ³	22/10/2020	Athena Cao KTP	
1642 Total Hardness	497	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	108	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	4.73	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	54.9	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	847	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	8.74	g/m ³	22/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.541	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	0.254	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	6.64	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	0.576	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0142	g/m ³	17/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	0.0034	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	1.09	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	0.107	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	642	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	0.076	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	24	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	13 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	
SVOC-001 2,3-Diuron	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-002 a-BHC	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-003 a-chlordane	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-004 Aldrin	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-005 b-BHC	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-006 cis-Permethrin	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-007 Dieldrin	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-008 Endosulfan II	<0.005	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-009 Endosulfan Sulfate	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-010 Endrin	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-011 Endrin Aldehyde	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-012 Endrin Ketone	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-013 Gamma-Chlordane	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-28	Levin Leachate Pond		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191389-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
SVOC-014 Heptachlor	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-015 Heptachlor Epoxide	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-016 Hexachlorobenzene	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-017 Lindane (g-BHC)	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-018 Methoxychlor	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-019 p,p'-DDD	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-020 p,p'DDE	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-021 p,p'-DDT	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-022 Procymidone	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-023 Propanil	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-024 Endosulfan I	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-025 Alachlor	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-026 Aldicarb	<0.1	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-027 Atrazine	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-028 Bromacil	<0.005	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-029 Carbofuran	0.012	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-030 Cyanazine	<0.005	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-031 d-BHC	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-032 Metalaxyl-M	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-033 Metolachlor	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-034 Metribuzin	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-035 Molinate	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-037 Oxadiazon	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-038 Pendimethalin	<0.002	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-039 Propazine	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-040 Pyriproxyfen	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-041 Simazine	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-042 Terbutylazine	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-043 Trifluralin	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-044 Hexazinone	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-045 Chlorpyrifos	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-046 Diazinon	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-047 Dimethoate	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-048 Pirimiphos methyl	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-049 Acenaphthene	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-050 Acenaphthylene	< 0.0010	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-051 Anthracene	< 0.0010	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-052 benz(a)anthracene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-053 Benzo(a)pyrene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-054 Total Benzo(b) and Benzo(k) fluoranthrene	< 0.0010	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-055 Benzo(g,h,i)perylene	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-057 Chrysene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-058 Dibenz(a,h)anthracene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-059 Fluoranthene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-060 Fluorene	< 0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-061 Indeno(1,2,3-cd)pyrene	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-062 Naphthalene	0.0013	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-063 Phenanthrene	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-064 Pyrene	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-066 2,2',3,4,4',5'-Hexachlorobiphenyl	<0.001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-067 2,2',4,5,5'-Pentachlorobiphenyl	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-068 2,4,4'-Trichlorobiphenyl	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-069 2,4-Dichlorobiphenyl	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-070 2,2',3,4,4',5',6'-Heptachlorobiphenyl	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
SVOC-072 Bis(2-ethylhexyl)adipate	<0.0001	mg/L	16/10/2020	Dr Alan Stanley KTP	
VOC-001 1,2,4-Trimethylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-002 1,3,5-Trimethylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-003 Benzene	0.0016	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-005 Isopropylbenzene	< 0.0010	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-007 Naphthalene	0.0017	mg/L	16/10/2020	Ganesh Ilancko KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-28	Levin Leachate Pond		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191389-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
VOC-008 n-Butylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-009 n-Propylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-010 o-Xylene	0.0066	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-011 p-Isopropyltoluene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-013 sec-Butylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-014 Styrene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-015 tert-Butylbenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-016 Toluene	0.0020	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-017 Total p,m Xylene, Ethylbenzene	0.0040	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-018 1,1,1,2-Tetrachloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-019 1,1,1-Trichloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-020 1,1,2,2-Tetrachloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-021 1,1,2-Trichloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-022 1,1-Dichloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-023 1,1-Dichloroethene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-024 1,1-Dichloropropene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-025 1,2,3-Trichloropropane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-026 1,2-Dibromo-3-chloropropane	<0.001	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-027 1,2-Dibromoethane	<0.0002	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-028 1,2-Dichloroethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-029 1,2-Dichloropropane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-030 1,3-Dichloropropane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-031 2,2-Dichloropropane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-032 Allyl chloride	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-033 Bromochloromethane	<0.0012	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-034 Bromomethane	<0.001	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-035 Carbon tetrachloride	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-036 Chloroethane	<0.001	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-037 Chloromethane	<0.006	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-038 cis-1,2-Dichloroethene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-039 cis-1,3-Dichloropropene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-040 Dibromomethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-041 Dichlorodifluoromethane	<0.001	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-042 Dichloromethane	< 0.006	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-043 Hexachlorobutadiene	<0.0002	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-044 Tetrachloroethene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-045 trans-1,2-Dichloroethene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-046 trans-1,3-Dichloropropene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-047 Trichloroethene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-048 Trichlorofluoromethane	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-049 Vinyl Chloride	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-050 1,2,3-Trichlorobenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-051 1,2,4-Trichlorobenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-052 1,2-Dichlorobenzene	< 0.0010	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-053 1,3-Dichlorobenzene	< 0.0010	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-054 1,4-Dichlorobenzene	< 0.0010	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-055 2-Chlorotoluene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-056 4-Chlorotoluene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-057 Bromobenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-058 Chlorobenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-059 1,3,5-Trichlorobenzene	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-060 4-Methyl-2-Pentanone	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-061 Carbon disulphide	<0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-062 Bromodichloromethane	< 0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-063 Bromoform	< 0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-064 Chloroform	< 0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	
VOC-065 Dibromochloromethane	< 0.0005	mg/L	16/10/2020	Ganesh Ilancko KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-29	Levin HS1		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191390-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		16/10/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	18	g/m ³	16/10/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	8.0	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	44	g CaCO ₃ /m ³	16/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	22.5	mS/m	16/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	34	g/m ³	16/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/10/2020	Marylou Cabral KTP	
0602 Chloride	22.3	g/m ³	16/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.80	g/m ³	16/10/2020	Shanel Kumar KTP	
0607 Sulphate	20.0	g/m ³	16/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.04	g/m ³	21/10/2020	Athena Cao KTP	
1642 Total Hardness	60	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	12.9	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.041	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	6.81	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.3	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	21/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.017	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.07	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0017	g/m ³	17/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0083	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	2.89	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	410	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-30	Levin HS1A		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191391-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		16/10/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	18	g/m ³	16/10/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	8.3	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	44	g CaCO ₃ /m ³	16/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	22.3	mS/m	16/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	35	g/m ³	16/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/10/2020	Marylou Cabral KTP	
0602 Chloride	21.6	g/m ³	16/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.77	g/m ³	16/10/2020	Shanel Kumar KTP	
0607 Sulphate	19.4	g/m ³	16/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.02	g/m ³	21/10/2020	Athena Cao KTP	
1642 Total Hardness	62	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	13.4	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.065	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	7.01	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.7	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	21/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.022	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0016	g/m ³	17/10/2020	Shuyu Zhao KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-30	Levin HS1A		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191391-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0109	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	2.79	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	600	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-31	Levin HS2		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191392-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.8		16/10/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	20	g/m ³	16/10/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	7.9	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	47	g CaCO ₃ /m ³	16/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	23.0	mS/m	16/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	31	g/m ³	16/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/10/2020	Marylou Cabral KTP	
0602 Chloride	22.4	g/m ³	16/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.78	g/m ³	16/10/2020	Shanel Kumar KTP	
0607 Sulphate	19.4	g/m ³	16/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.08	g/m ³	21/10/2020	Athena Cao KTP	
1642 Total Hardness	60	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	12.9	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.043	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	6.77	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	18.4	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	21/10/2020	Athena Cao KTP	
6701 Aluminium - Dissolved	0.020	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0015	g/m ³	17/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0139	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	2.96	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	210	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-32	Levin HS3		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191393-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0001 pH	7.7		16/10/2020	Marylou Cabral KTP	
0002 Suspended Solids - Total	19	g/m ³	16/10/2020	Marylou Cabral KTP	
0040 Total (NP) Organic Carbon	8.0	g/m ³	16/10/2020	Sharon van Soest KTP	
0052 Alkalinity - Total	46	g CaCO ₃ /m ³	16/10/2020	Marylou Cabral KTP	
0055 Conductivity at 25°C	23.0	mS/m	16/10/2020	Marylou Cabral KTP	
0081 Chemical Oxygen Demand	32	g/m ³	16/10/2020	Gordon McArthur KTP	
0180 BOD5 - Soluble Carbonaceous	< 1	g/m ³	16/10/2020	Marylou Cabral KTP	
0602 Chloride	22.5	g/m ³	16/10/2020	Shanel Kumar KTP	
0605 Nitrate - Nitrogen	0.79	g/m ³	16/10/2020	Shanel Kumar KTP	



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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/40302-32	Levin HS3		15/10/2020 00:00	15/10/2020 14:30	0
Notes: 191393-0 Levin Landfill Sample					
Test	Result	Units	Test Date	Signatory	
0607 Sulphate	19.5	g/m ³	16/10/2020	Shanel Kumar KTP	
0760 Ammonia Nitrogen	0.06	g/m ³	17/10/2020	Divina Lagazon KTP	
1642 Total Hardness	62	g CaCO ₃ /m ³	16/10/2020	Amit Kumar KTP	
1810 Calcium - Dissolved	13.5	g/m ³	16/10/2020	Amit Kumar KTP	
1819 Iron - Dissolved	0.069	g/m ³	16/10/2020	Amit Kumar KTP	
1822 Magnesium - Dissolved	6.99	g/m ³	16/10/2020	Amit Kumar KTP	
1834 Sodium - Dissolved	19.1	g/m ³	16/10/2020	Amit Kumar KTP	
2088 Dissolved Reactive Phosphorus	< 0.005	g/m ³	17/10/2020	Divina Lagazon KTP	
6701 Aluminium - Dissolved	0.022	g/m ³	17/10/2020	Shanel Kumar KTP	
6703 Arsenic - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6707 Boron - Dissolved	0.06	g/m ³	17/10/2020	Shuyu Zhao KTP	
6708 Cadmium - Dissolved	< 0.0002	g/m ³	17/10/2020	Shuyu Zhao KTP	
6711 Chromium - Dissolved	< 0.001	g/m ³	17/10/2020	Shuyu Zhao KTP	
6713 Copper - Dissolved	0.0015	g/m ³	17/10/2020	Shuyu Zhao KTP	
6718 Lead - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6721 Manganese - Dissolved	0.0176	g/m ³	17/10/2020	Shuyu Zhao KTP	
6722 Mercury - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6724 Nickel - Dissolved	< 0.0005	g/m ³	17/10/2020	Shuyu Zhao KTP	
6726 Potassium - Dissolved	3.09	g/m ³	17/10/2020	Shuyu Zhao KTP	
6738 Zinc - Dissolved	< 0.002	g/m ³	17/10/2020	Shuyu Zhao KTP	
M0104 E. coli	310	cfu/100mL	15/10/2020	Maria Norris KTP	
MO-5001 Volatile Fatty Acids	< 5 *	g/m ³		Chen Lin Transcribed by	
MO-5002 Total Halogenated Phenolics	< 0.05	g/m ³		Chen Lin Transcribed by	
P1859 Sample Filtration	Completed		16/10/2020	Robyn Madge .	

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m ³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO ₃ /m ³
Conductivity at 25°C	APHA Online Edition Method 2510 B.	0.1 mS/m
Chemical Oxygen Demand	APHA Online Edition Method 5220 D.	15 g/m ³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m ³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m ³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m ³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH ₃ -H.	0.01 g/m ³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO ₃ /m ³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m ³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m ³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m ³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m ³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m ³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m ³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m ³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m ³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m ³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m ³



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Test	Methodology	Detection Limit
Manganese - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Mercury - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Potassium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 92221:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following APHA 22nd Edition Method 5560C. Results are reported as acetic acid equivalent.	5 g/m³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method USEPA 8270 Phenols.	0.01 g/m³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a
2,3-Diuron	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
a-BHC	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
a-chlordane	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Aldrin	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
b-BHC	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
cis-Permethrin	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Dieldrin	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Endosulfan II	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.005 mg/L
Endosulfan Sulfate	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Endrin	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Endrin Aldehyde	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Endrin Ketone	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Gamma-Chlordane	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Heptachlor	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Heptachlor Epoxide	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Hexachlorobenzene	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Lindane (g-BHC)	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Methoxychlor	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
p,p'-DDD	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
p,p'-DDE	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
p,p'-DDT	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Procymidone	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Propanil	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Endosulfan I	Organochlorine Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Alachlor	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Aldicarb	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.1 mg/L
Atrazine	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Bromacil	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.005 mg/L
Carbofuran	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Cyanazine	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.005 mg/L
d-BHC	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Metaxyl-M	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Metolachlor	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Metribuzin	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Molinate	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Oxadiazon	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Pendimethalin	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.002 mg/L
Propazine	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Pyriproxyfen	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Simazine	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Terbutylazine	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Trifluralin	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Hexazinone	Organonitrogen Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Chlorpyrifos	Organophosphorous Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Diazinon	Organophosphorous Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L
Dimethoate	Organophosphorous Pesticide compound analysed by in-house method using GC-MS	0.001 mg/L
Pirimiphos methyl	Organophosphorous Pesticide compound analysed by in-house method using GC-MS	0.0001 mg/L



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Test	Methodology	Detection Limit
Acenaphthene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Acenaphthylene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.001 mg/L
Anthracene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.001 mg/L
benz(a)anthracene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Benzo(a)pyrene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Total Benzo(b) and Benzo(k) fluoranthrene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.001 mg/L
Benzo(g,h,i)perylene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.001 mg/L
Chrysene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Dibenz(a,h)anthracene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Fluoranthene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Fluorene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Indeno(1,2,3-cd)pyrene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Naphthalene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Phenanthrene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
Pyrene	Polyaromatic Hydrocarbon compound analysed by in-house method using GC-MS	0.0001 mg/L
2,2',3,4,4',5'-Hexachlorobiphenyl	Polychlorinated biphenyl compound analysed by in-house method using GC-MS. Also known as PCB 138.	0.001 mg/L
2,2',4,5,5'-Pentachlorobiphenyl	Polychlorinated biphenyl compound analysed by in-house method using GC-MS. Also known as PCB 101.	0.0001 mg/L
2,4,4'-Trichlorobiphenyl	Polychlorinated biphenyl compound analysed by in-house method using GC-MS. Also known as PCB 28.	0.0001 mg/L
2,4-Dichlorobiphenyl	Polychlorinated biphenyl compound analysed by in-house method using GC-MS. Also known as PCB 7.	0.0001 mg/L
2,2',3,4,4',5',6-Heptachlorobiphenyl	Polychlorinated biphenyl compound analysed by in-house method using GC-MS. Also known as PCB 183.	0.0001 mg/L
Bis(2-ethylhexyl)adipate	Phthalate Plasticiser compound analysed by in-house method using GC-MS	0.0001 mg/L
1,2,4-Trimethylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,3,5-Trimethylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Benzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Isopropylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Naphthalene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
n-Butylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
n-Propylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
o-Xylene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
p-Isopropyltoluene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
sec-Butylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Styrene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
tert-Butylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Toluene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Total p,m Xylene, Ethylbenzene	VOC Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0015 mg/L
1,1,1,2-Tetrachloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1,1-Trichloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1,2,2-Tetrachloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1,2-Trichloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1-Dichloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1-Dichloroethene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,1-Dichloropropene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2,3-Trichloropropane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2-Dibromo-3-chloropropane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.001 mg/L
1,2-Dibromoethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0002 mg/L
1,2-Dichloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2-Dichloropropane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L

Test	Methodology	Detection Limit
1,3-Dichloropropane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
2,2-Dichloropropane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Allyl chloride	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Bromochloromethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0012 mg/L
Bromomethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.001 mg/L
Carbon tetrachloride	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260. Also known as Tetrachloromethane.	0.0005 mg/L
Chloroethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.001 mg/L
Chloromethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.006 mg/L
cis-1,2-Dichloroethene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
cis-1,3-Dichloropropene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Dibromomethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Dichlorodifluoromethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.001 mg/L
Dichloromethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.005 mg/L
Hexachlorobutadiene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0002 mg/L
Tetrachloroethene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
trans-1,2-Dichloroethene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
trans-1,3-Dichloropropene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Trichloroethene	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Trichlorofluoromethane	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Vinyl Chloride	VOC Halogenated Alkanes and Alkenes Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2,3-Trichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2,4-Trichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,2-Dichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,3-Dichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,4-Dichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
2-Chlorotoluene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
4-Chlorotoluene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Bromobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Chlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
1,3,5-Trichlorobenzene	VOC Halogenated Aromatic Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
4-Methyl-2-Pentanone	VOC Other Volatile Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L



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Test	Methodology	Detection Limit
Carbon disulphide	VOC Other Volatile Compound analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Bromodichloromethane	VOC Trihalomethane analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Bromoform	VOC Trihalomethane analysed by GCMS following an in house method based on USEPA Method 8260. Also known as Tribromomethane.	0.0005 mg/L
Chloroform	VOC Trihalomethane analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L
Dibromochloromethane	VOC Trihalomethane analysed by GCMS following an in house method based on USEPA Method 8260.	0.0005 mg/L

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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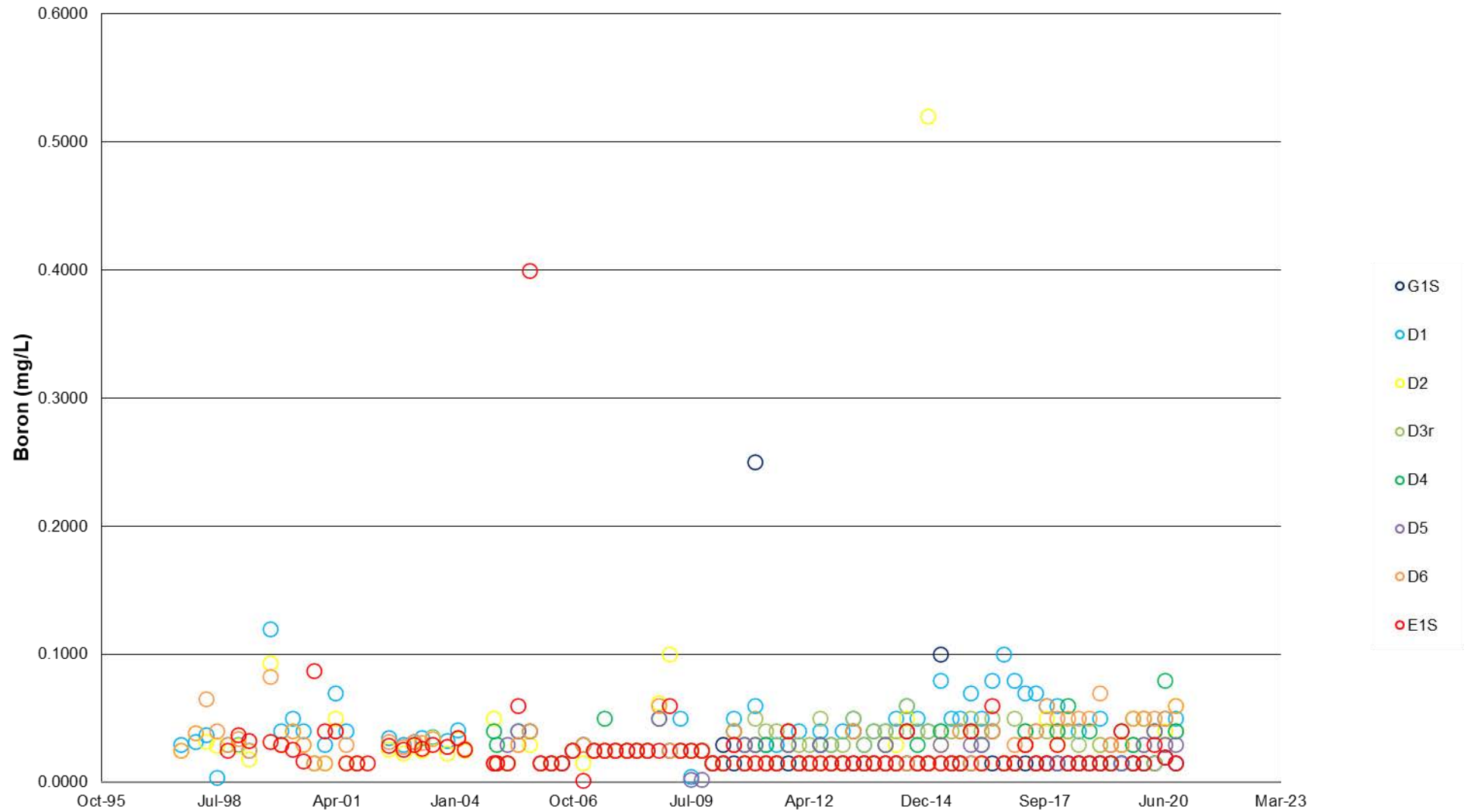
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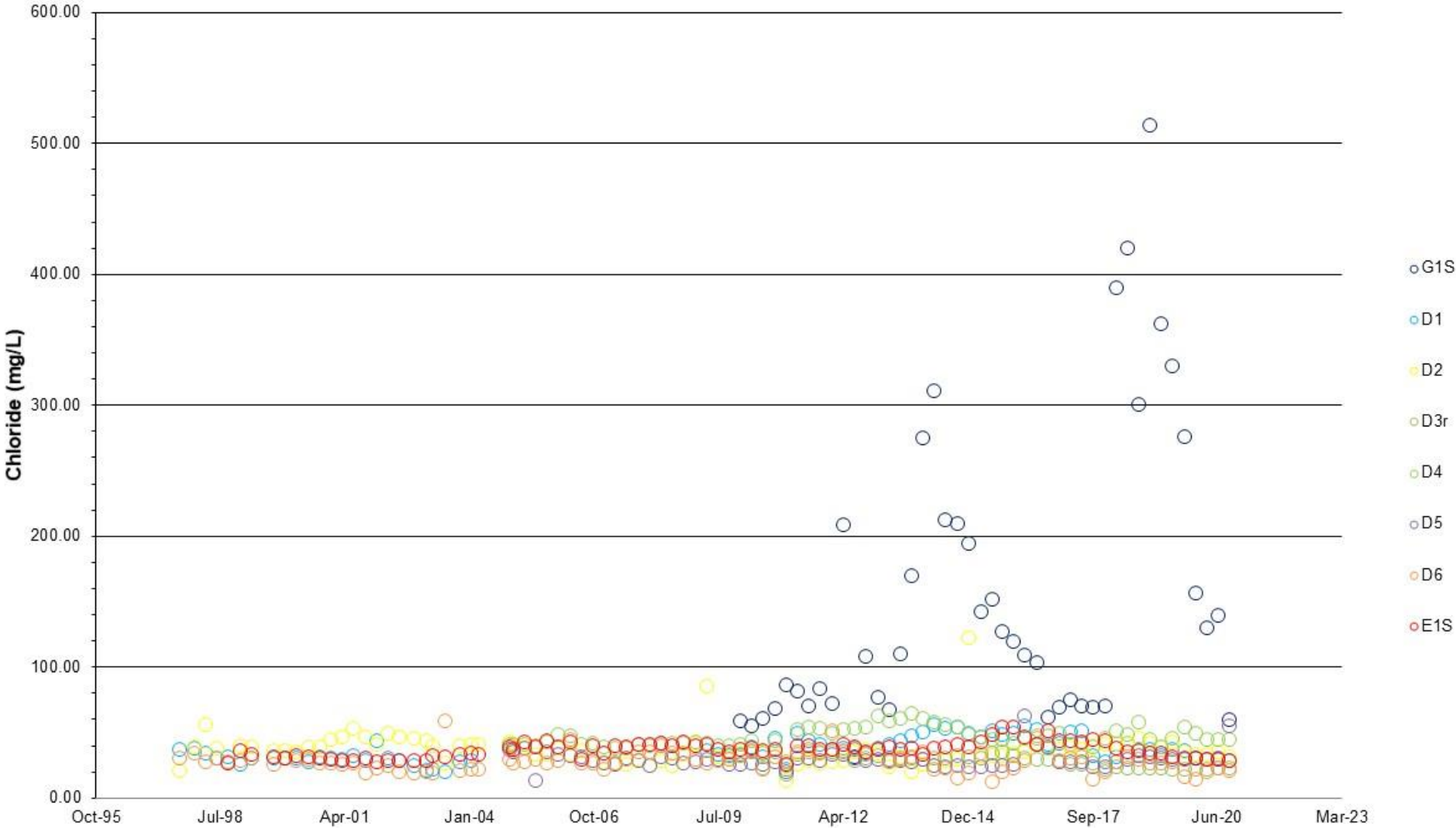
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Appendix D Historical Result Graphs

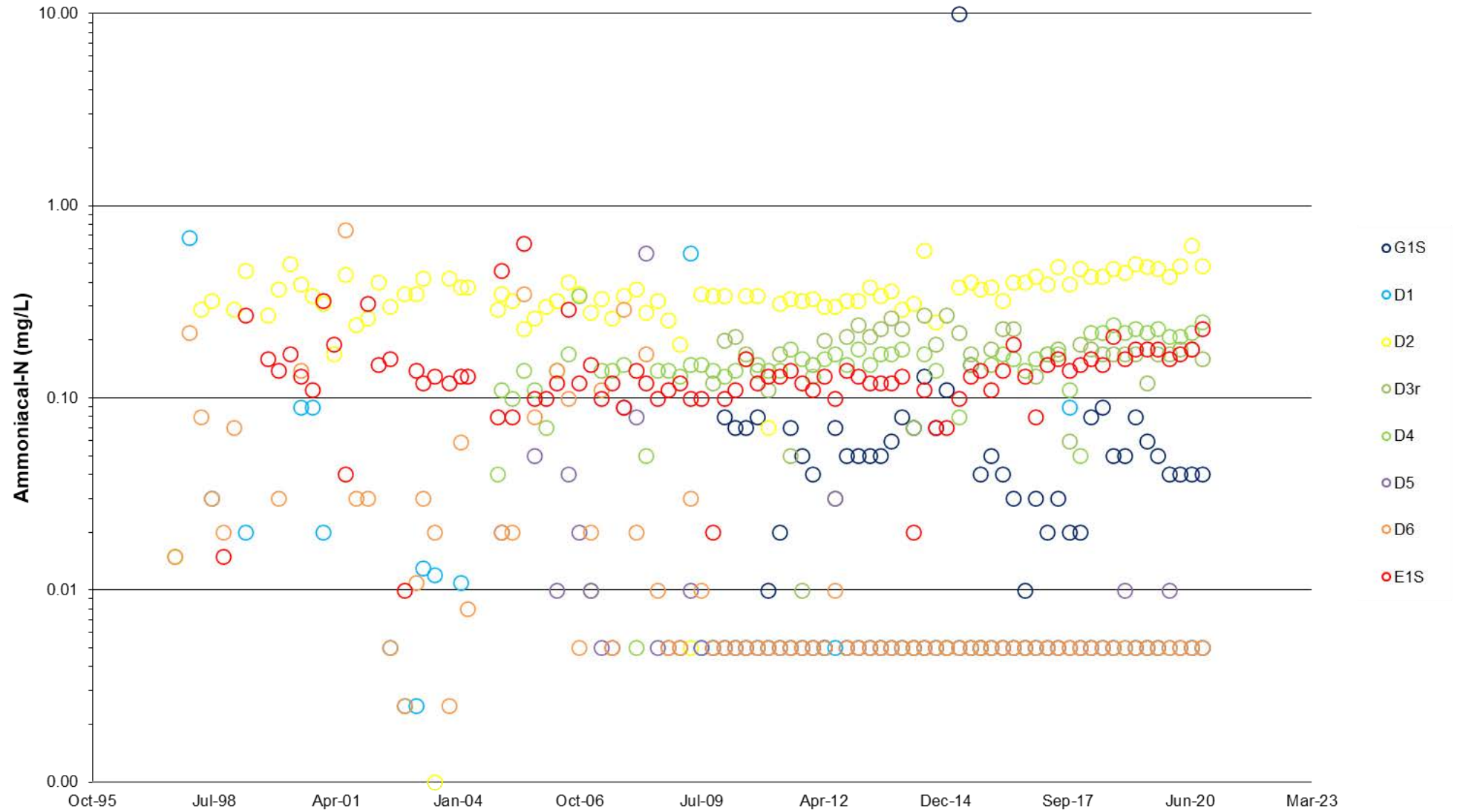
Sand Aquifer Downgrade of New Landfill - Boron Concentrations



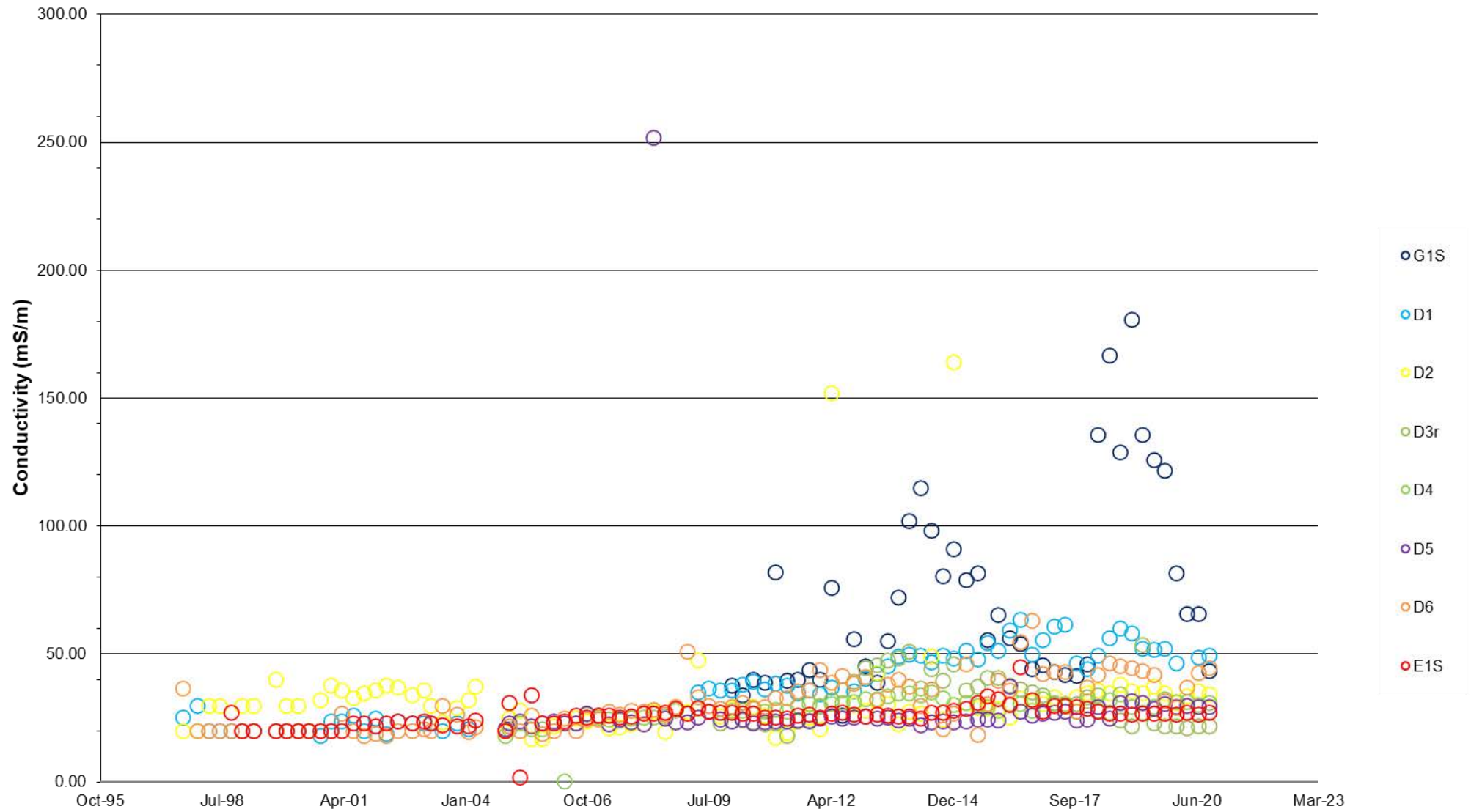
Sand Aquifer Downgrade of New Landfill - Chloride Concentrations



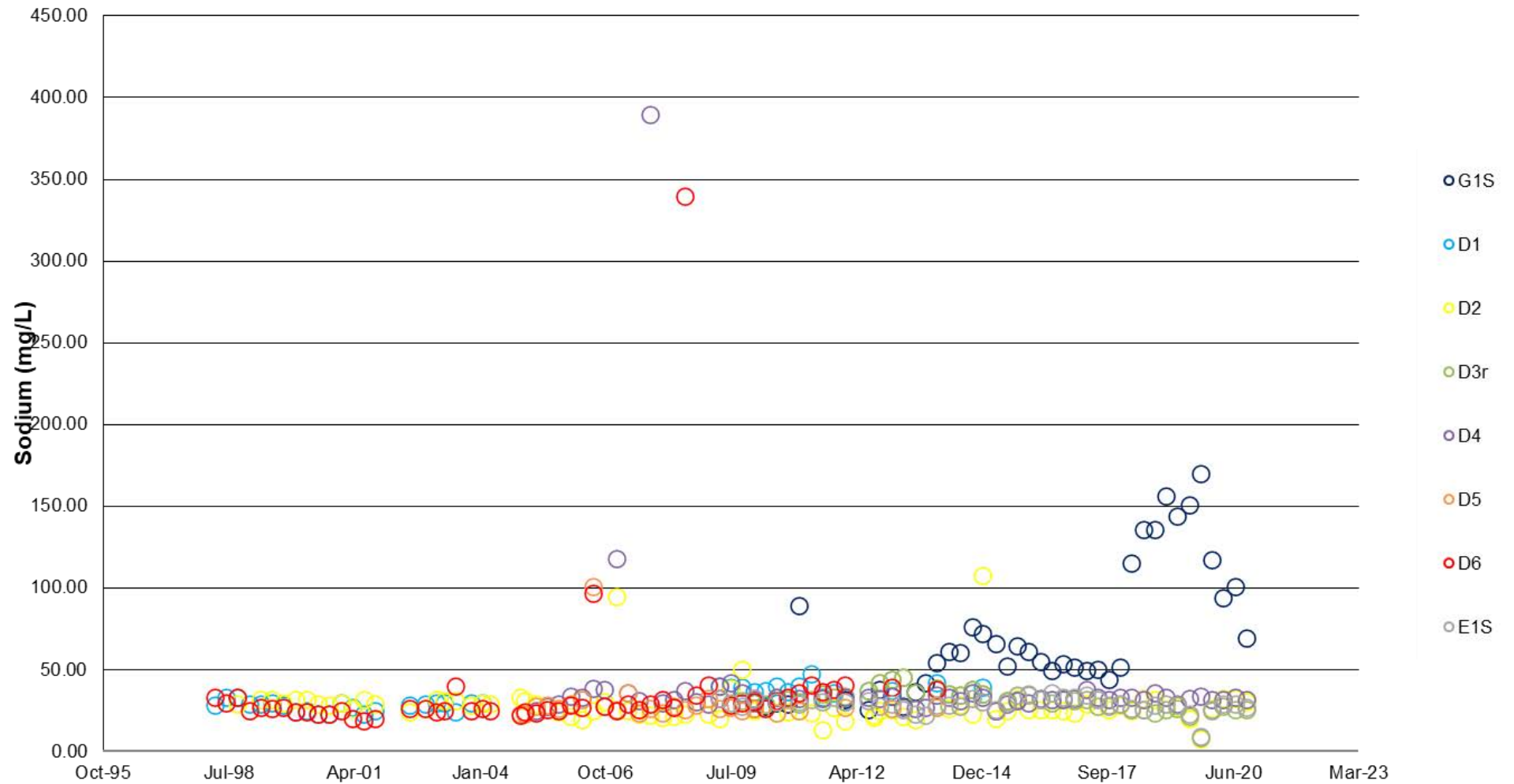
Sand Aquifer Downgrade of New Landfill - Ammoniacal-Nitrogen Concentrations



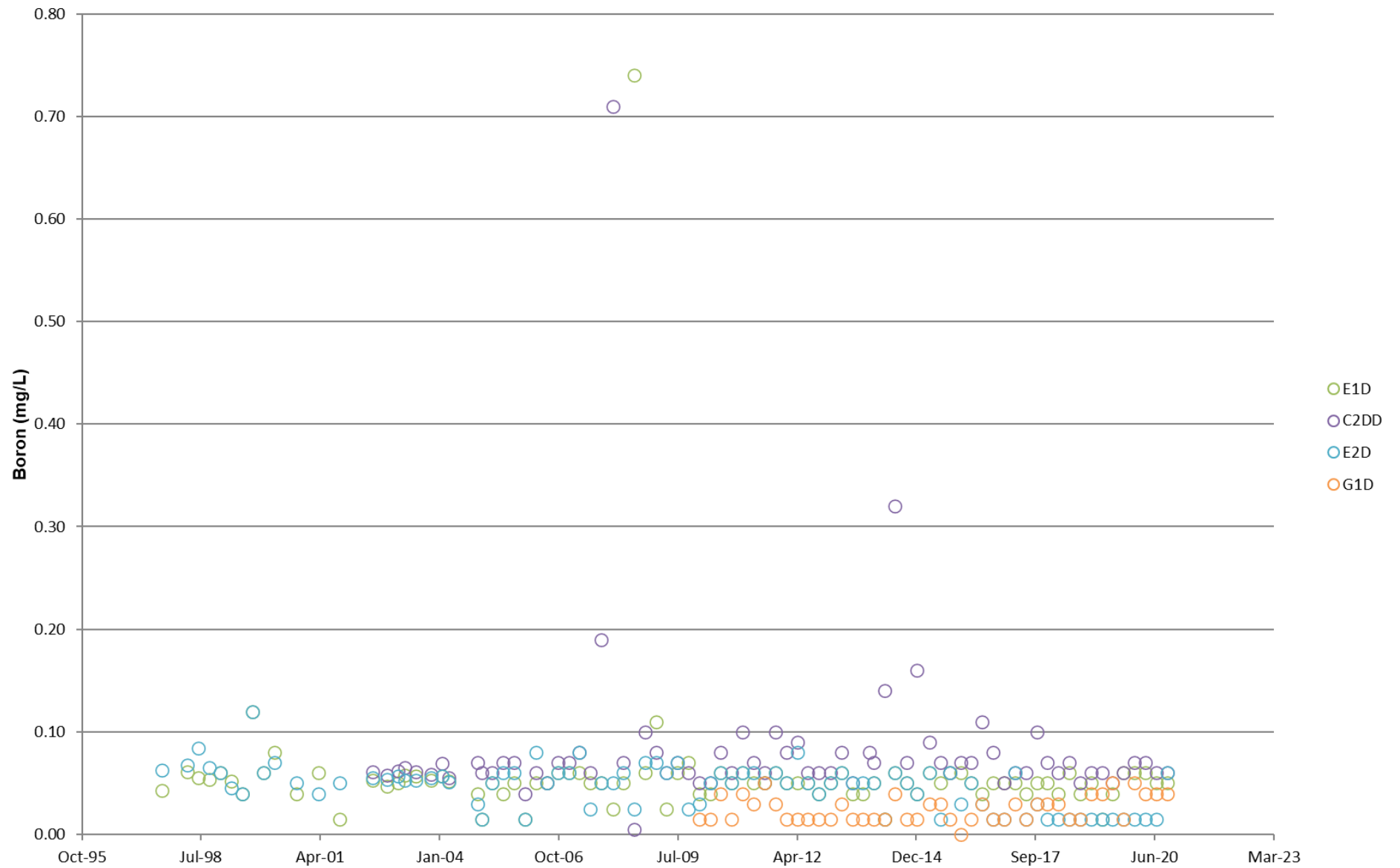
Sand Aquifer Downgrade of New Landfill - Conductivity Levels



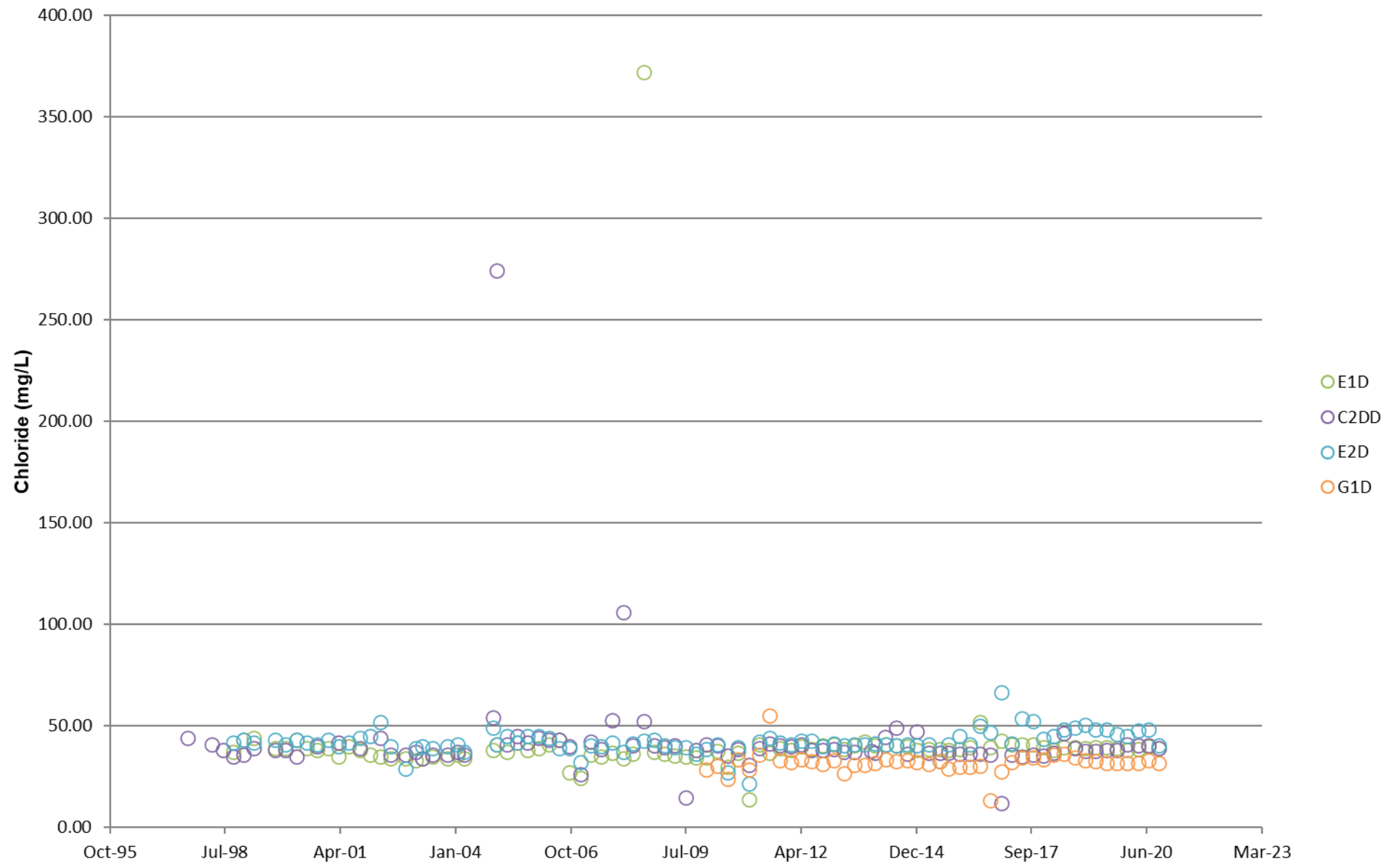
Sand Aquifer Downgrade of New Landfill - Sodium Concentrations



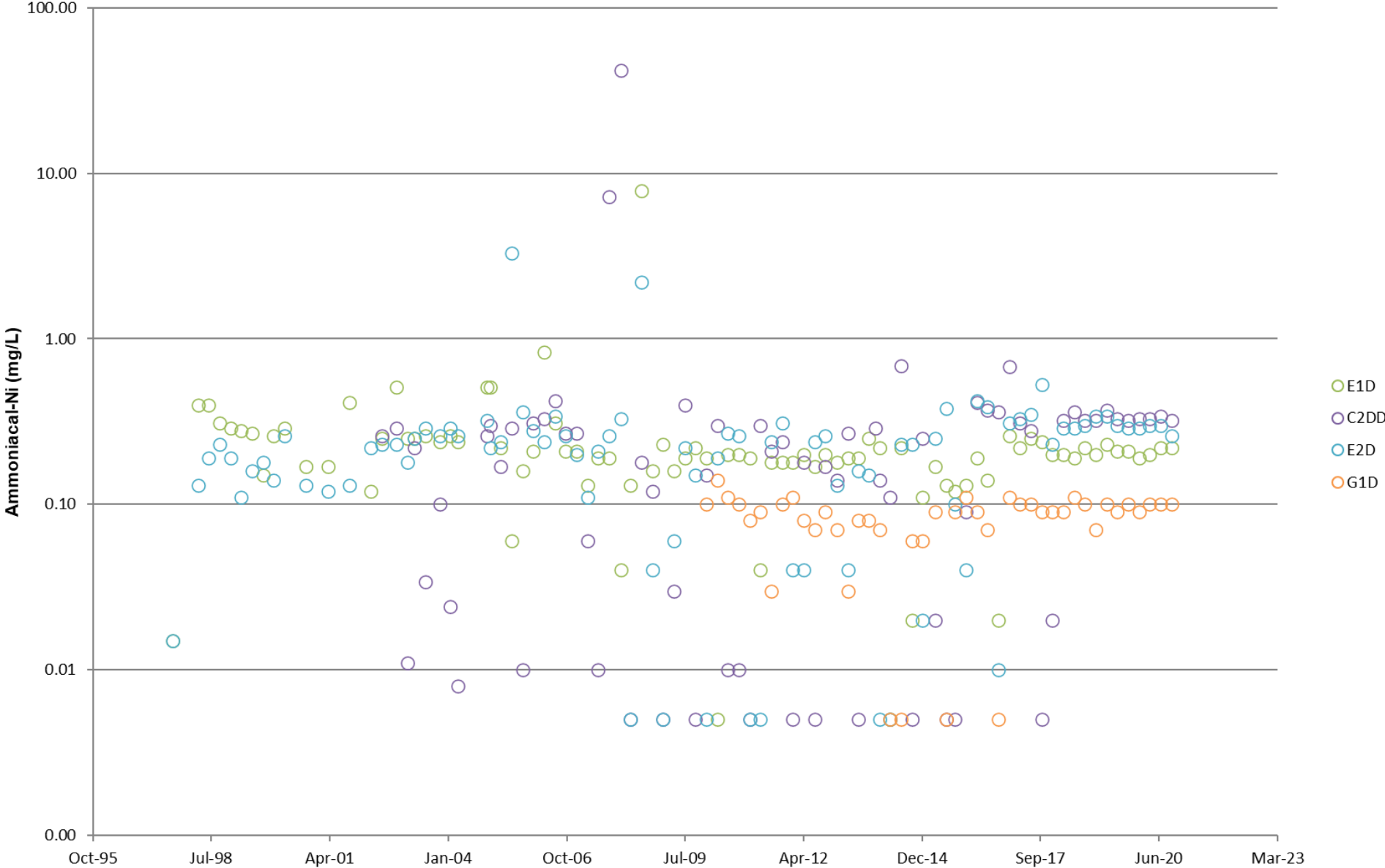
Gravel Aquifer - Boron Concentrations



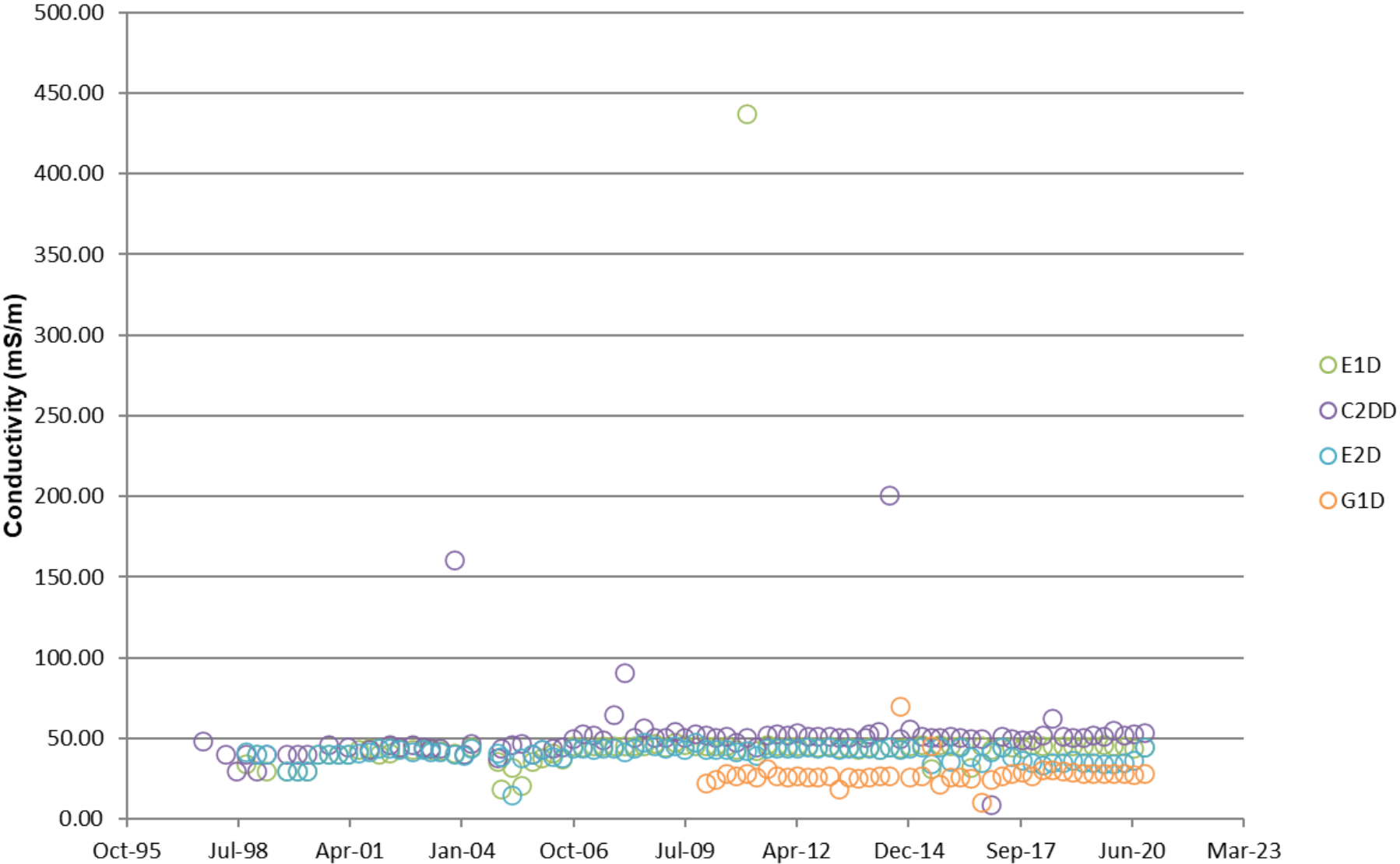
Gravel Aquifer - Chloride Concentrations



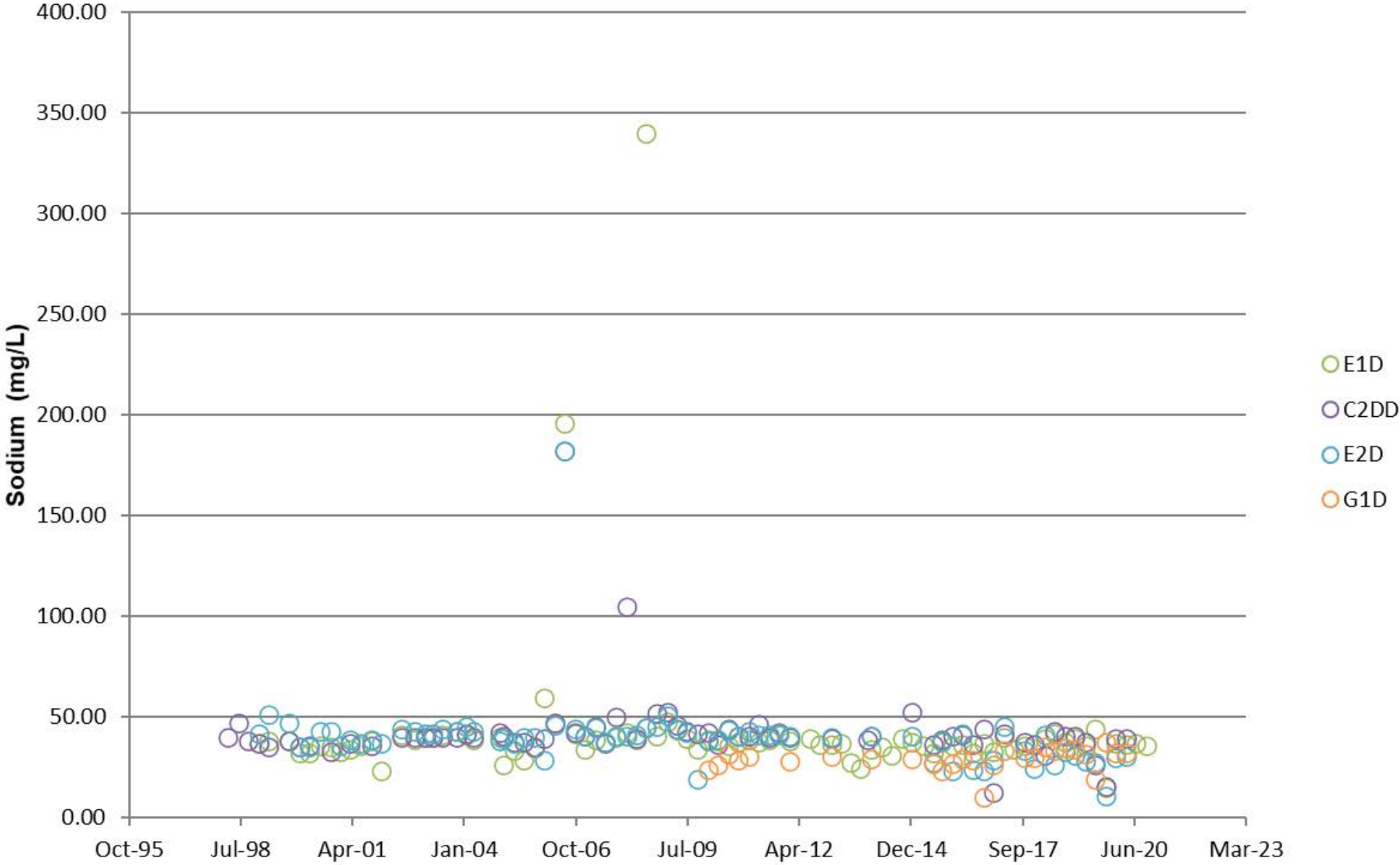
Gravel Aquifer - Ammoniacal-Nitrogen Concentrations



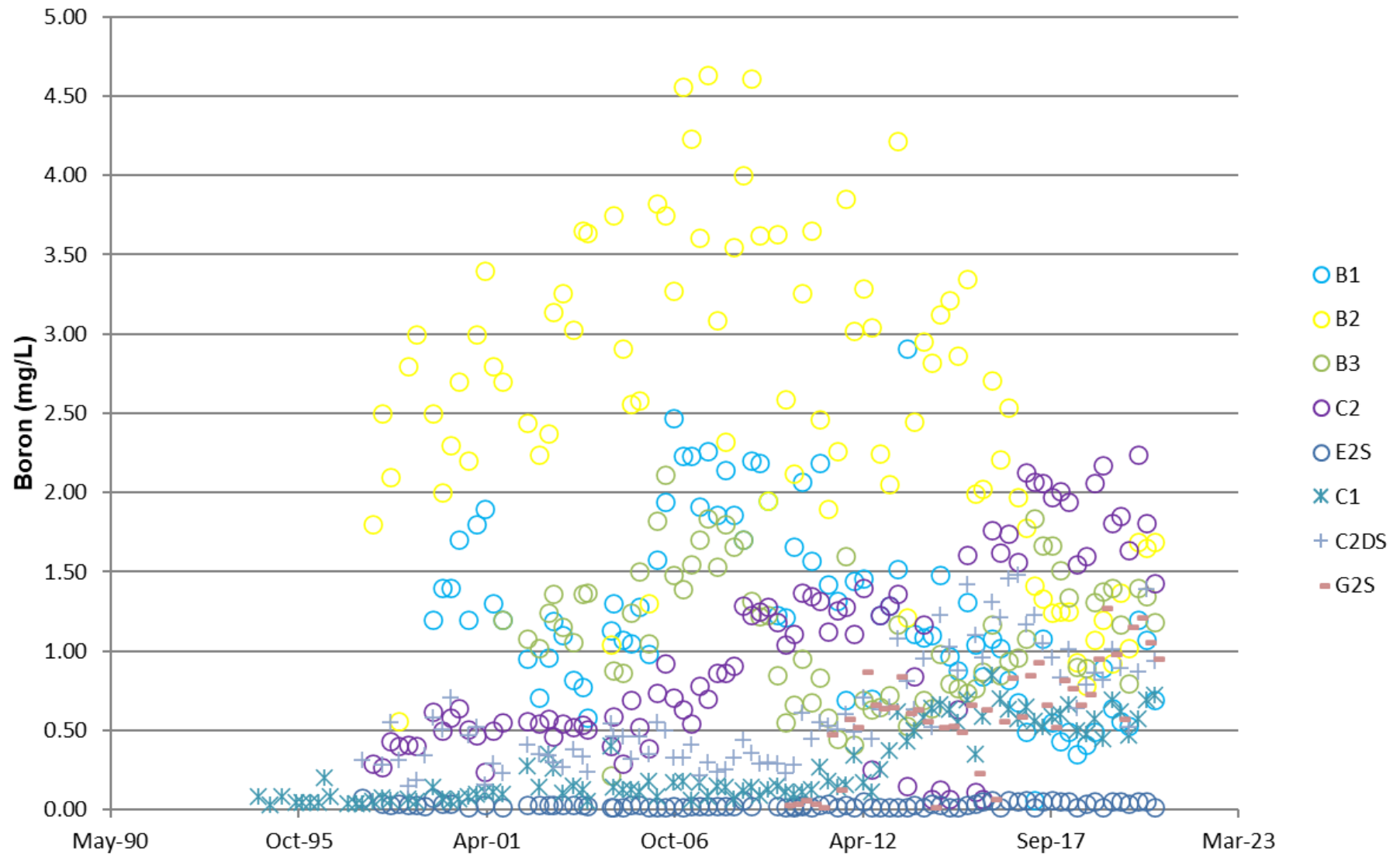
Gravel Aquifer - Conductivity Levels



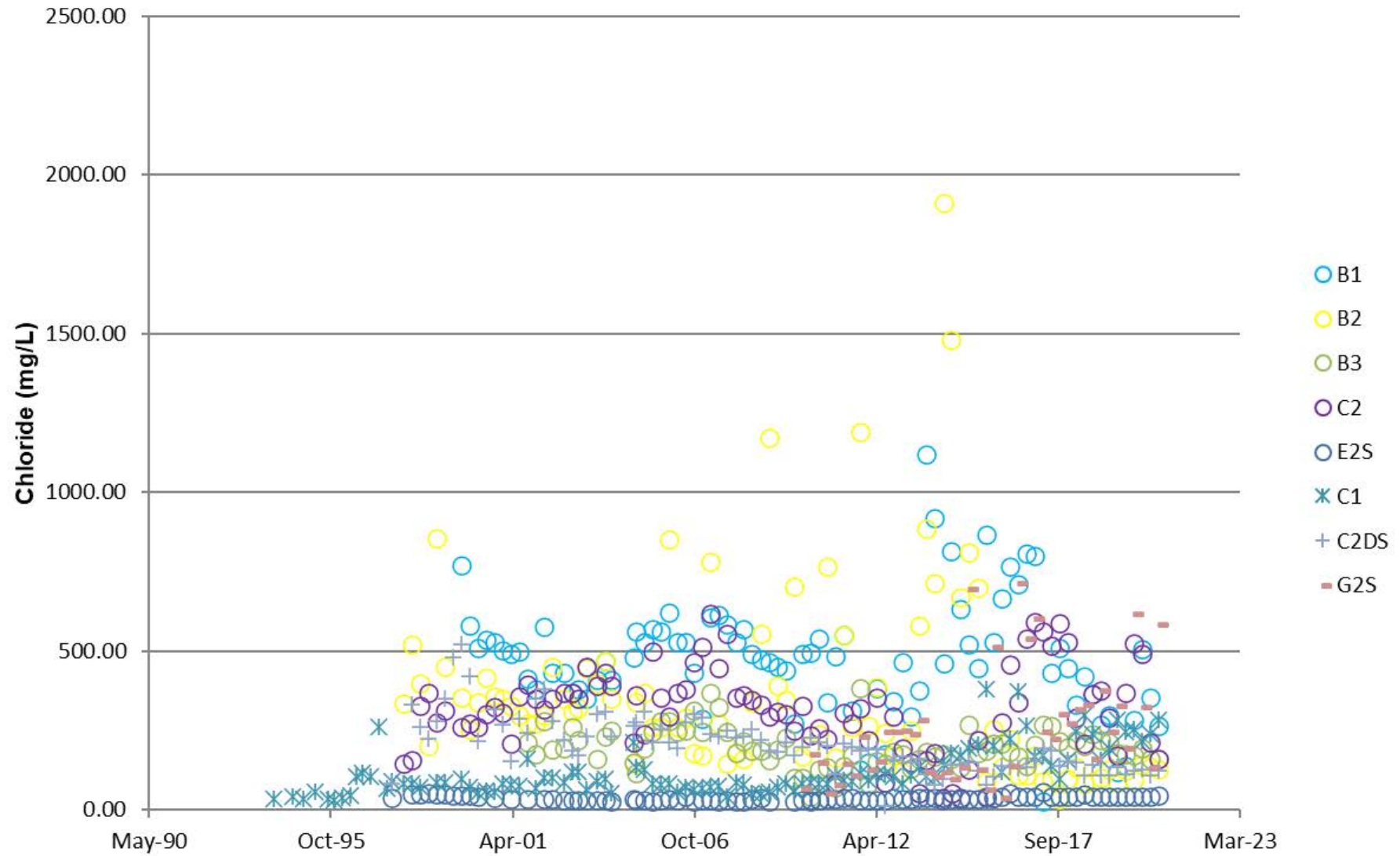
Gravel Aquifer - Sodium Levels



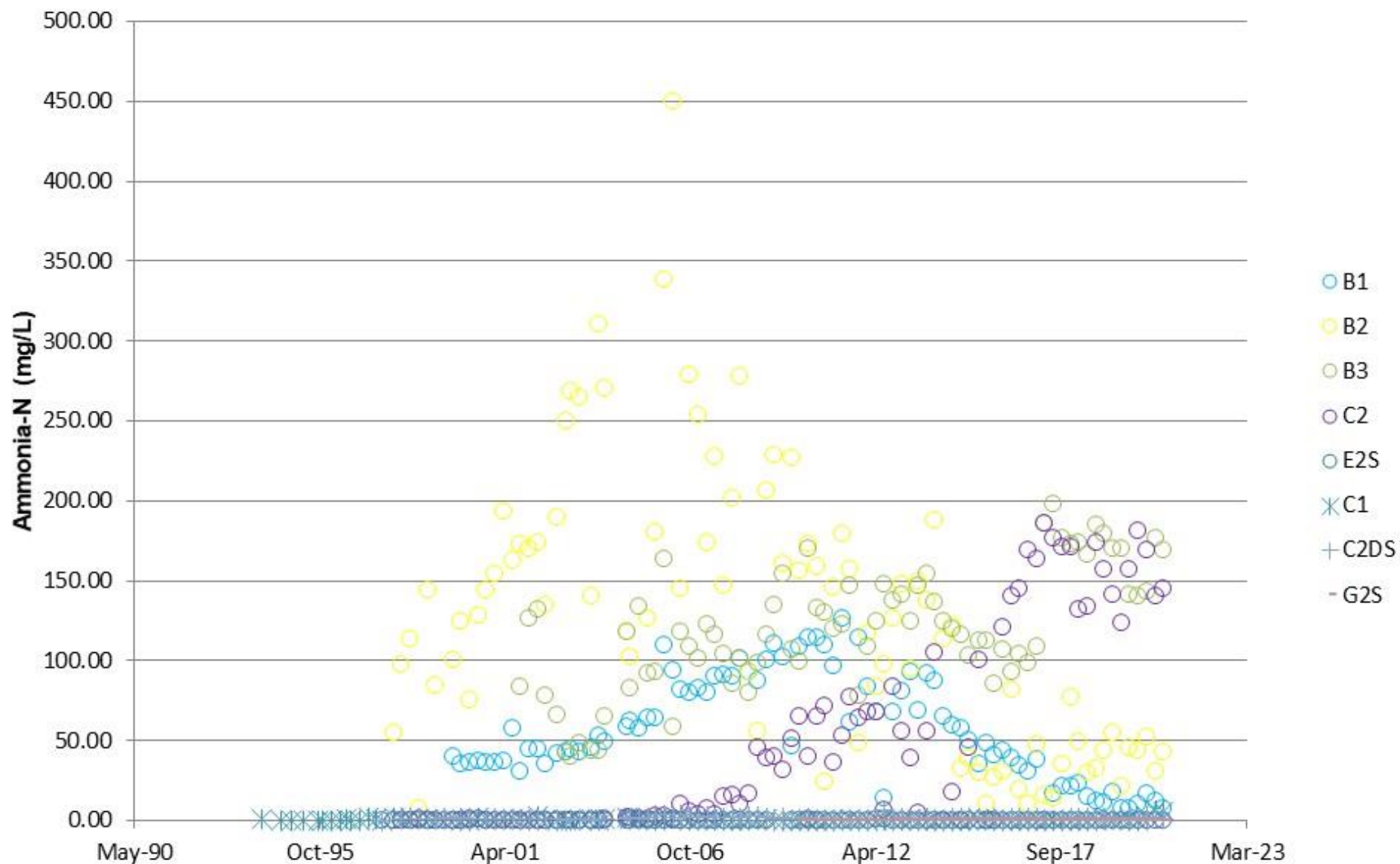
Sand Aquifer Downgrade of Old Landfill - Boron Concentrations



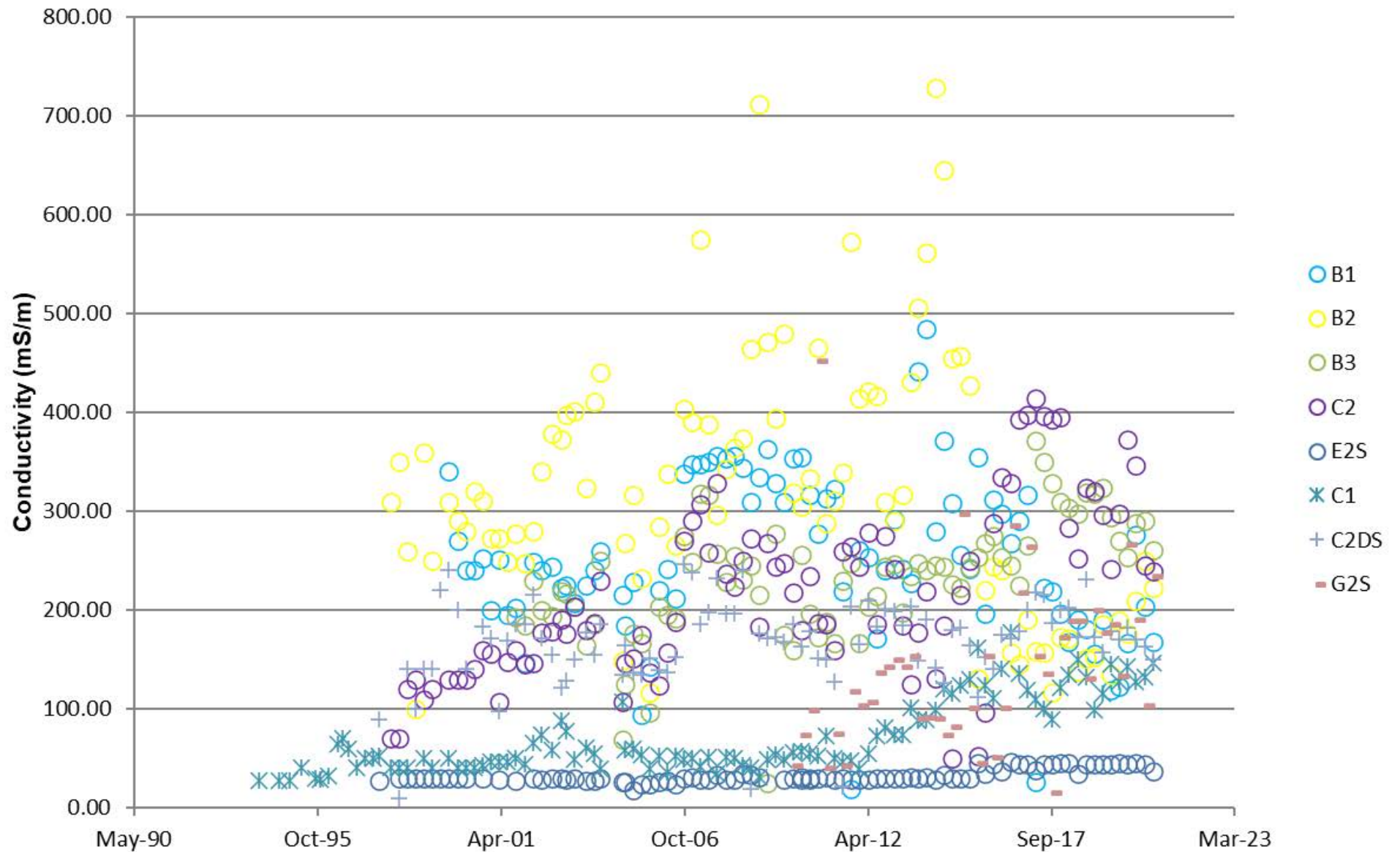
Sand Aquifer Downgrade of Old Landfill - Chloride Concentrations



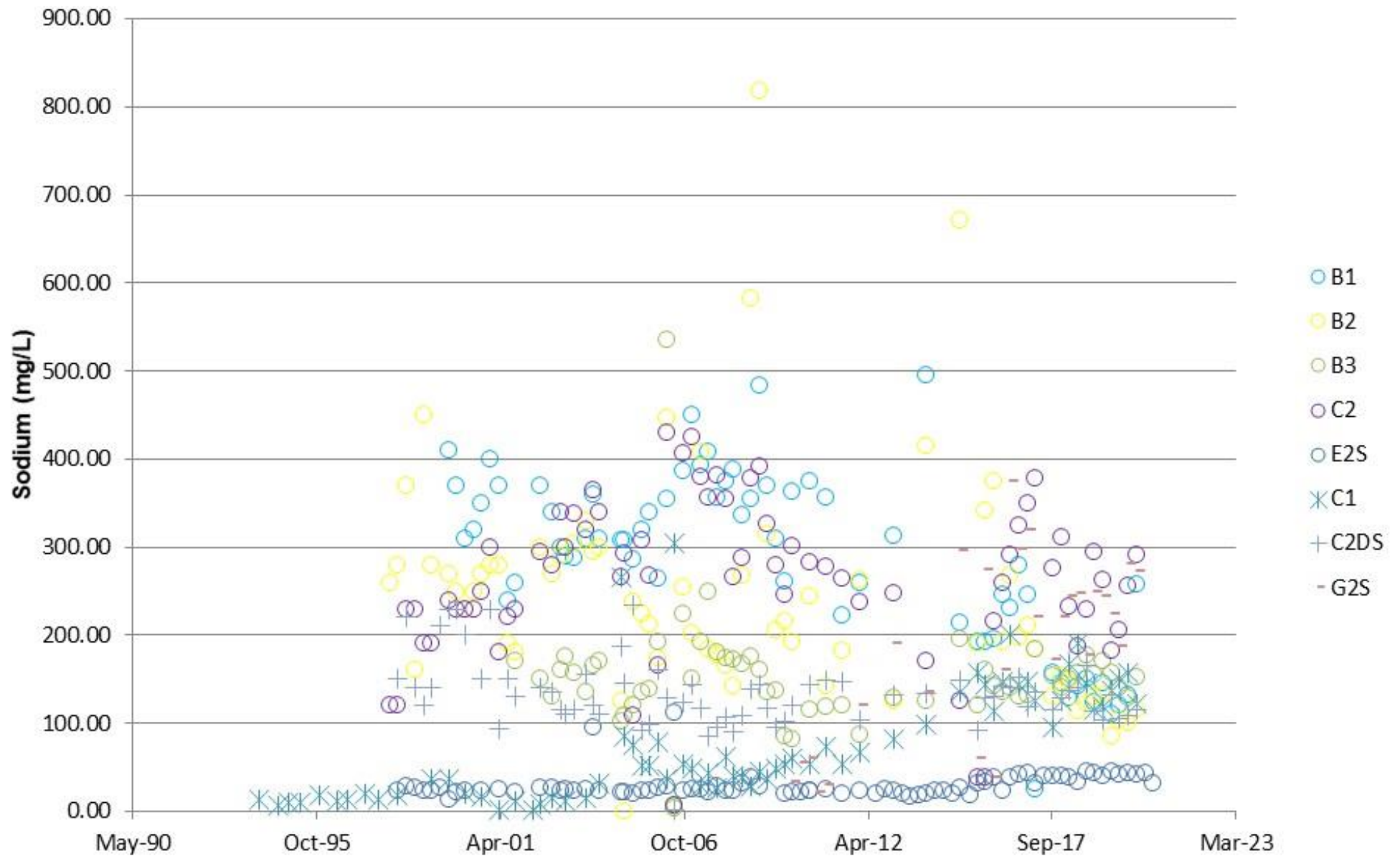
Sand Aquifer Downgrade of Old Landfill - Ammonia-N Concentrations



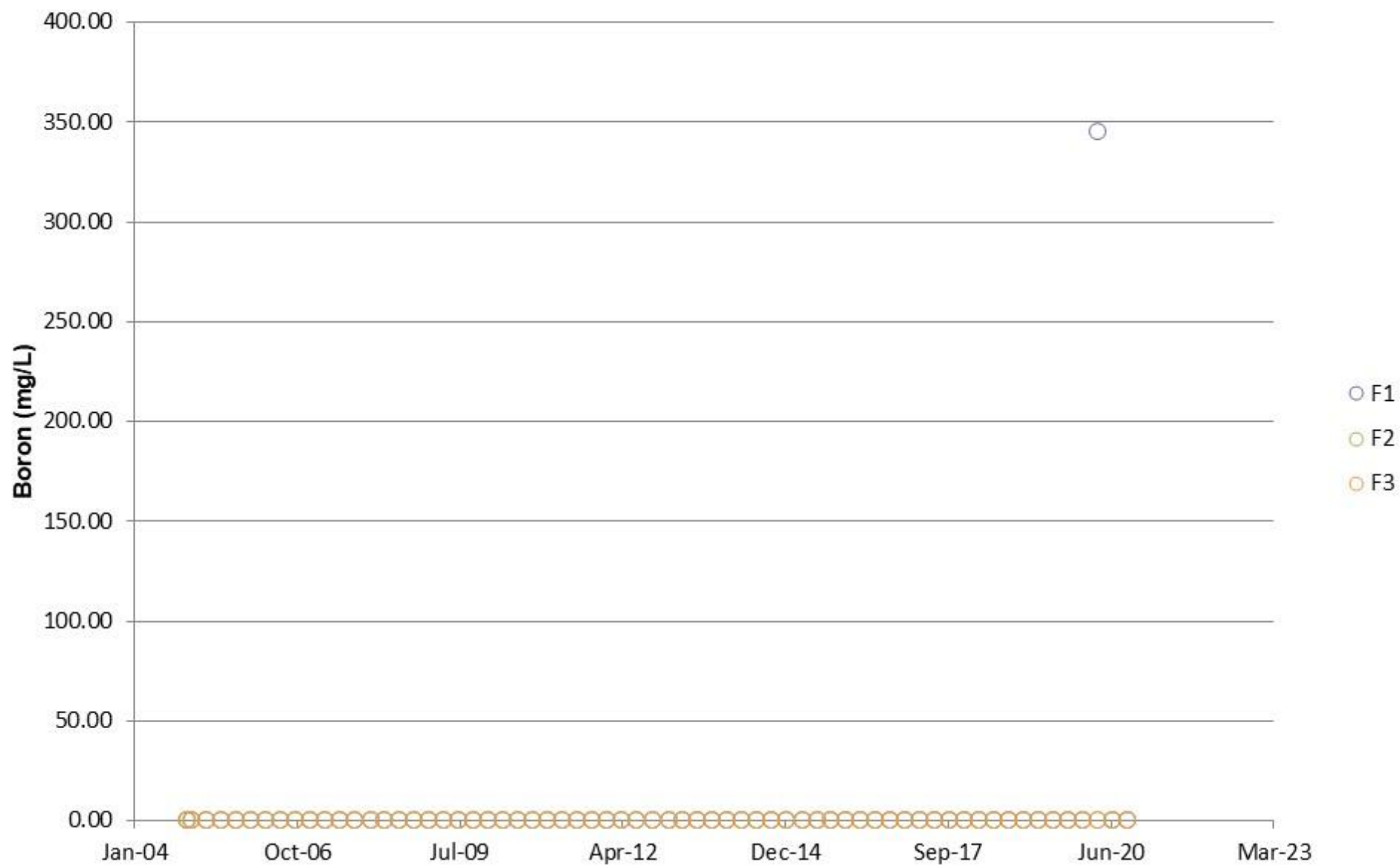
Sand Aquifer Downgrade of Old Landfill - Conductivity Levels



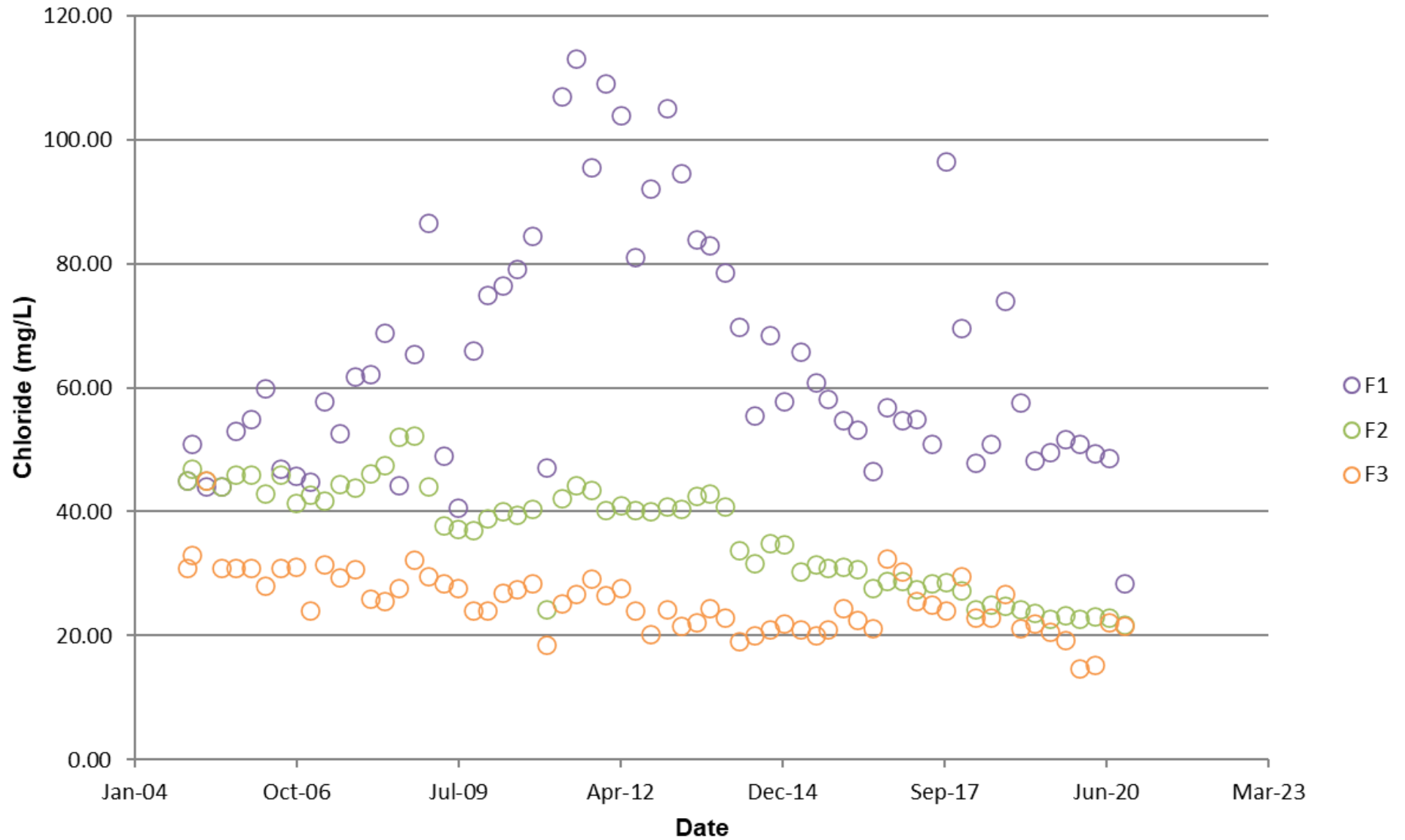
Sand Aquifer Downgrade of Old Landfill - Sodium Concentrations



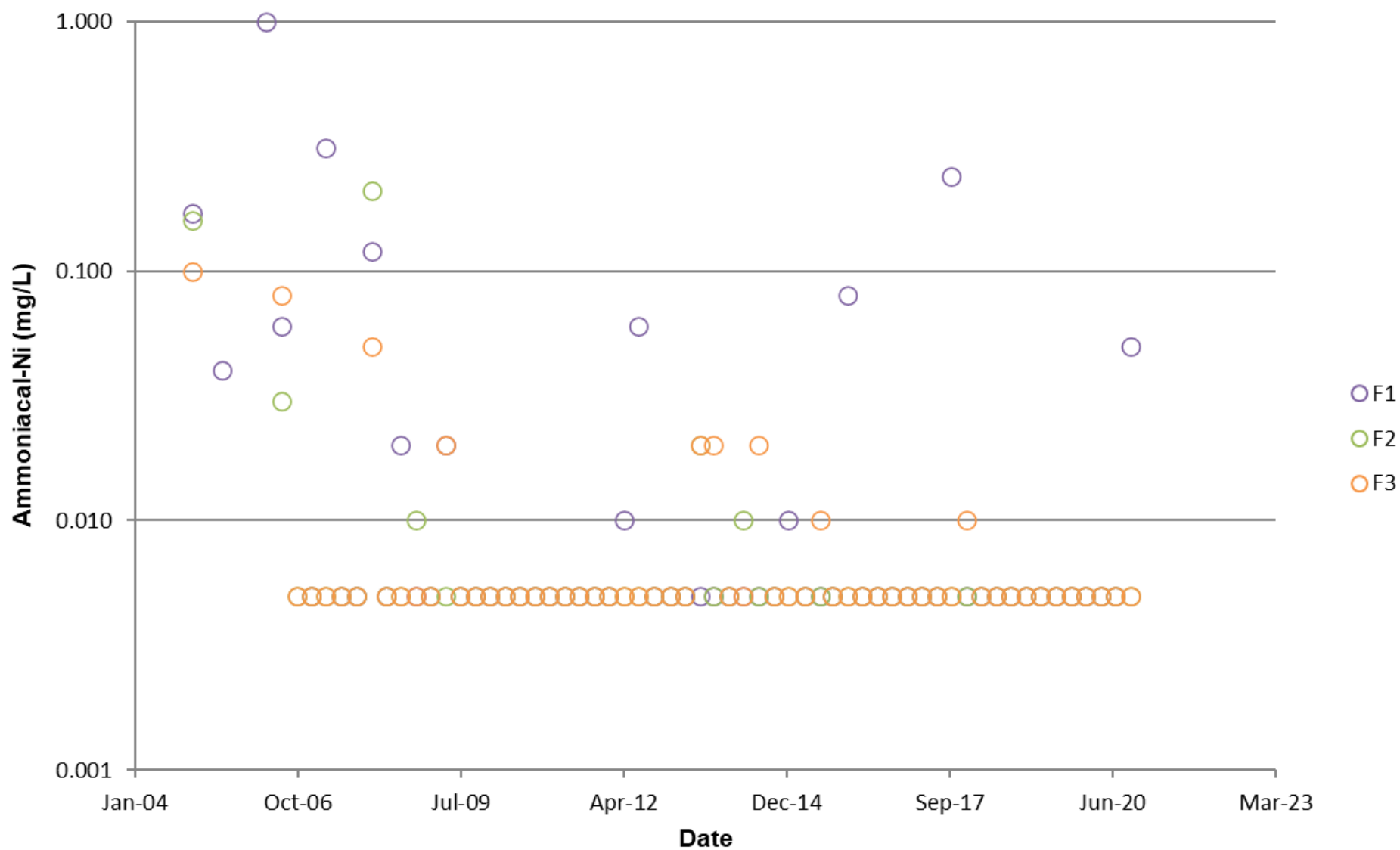
Irrigation Area - Boron Concentrations



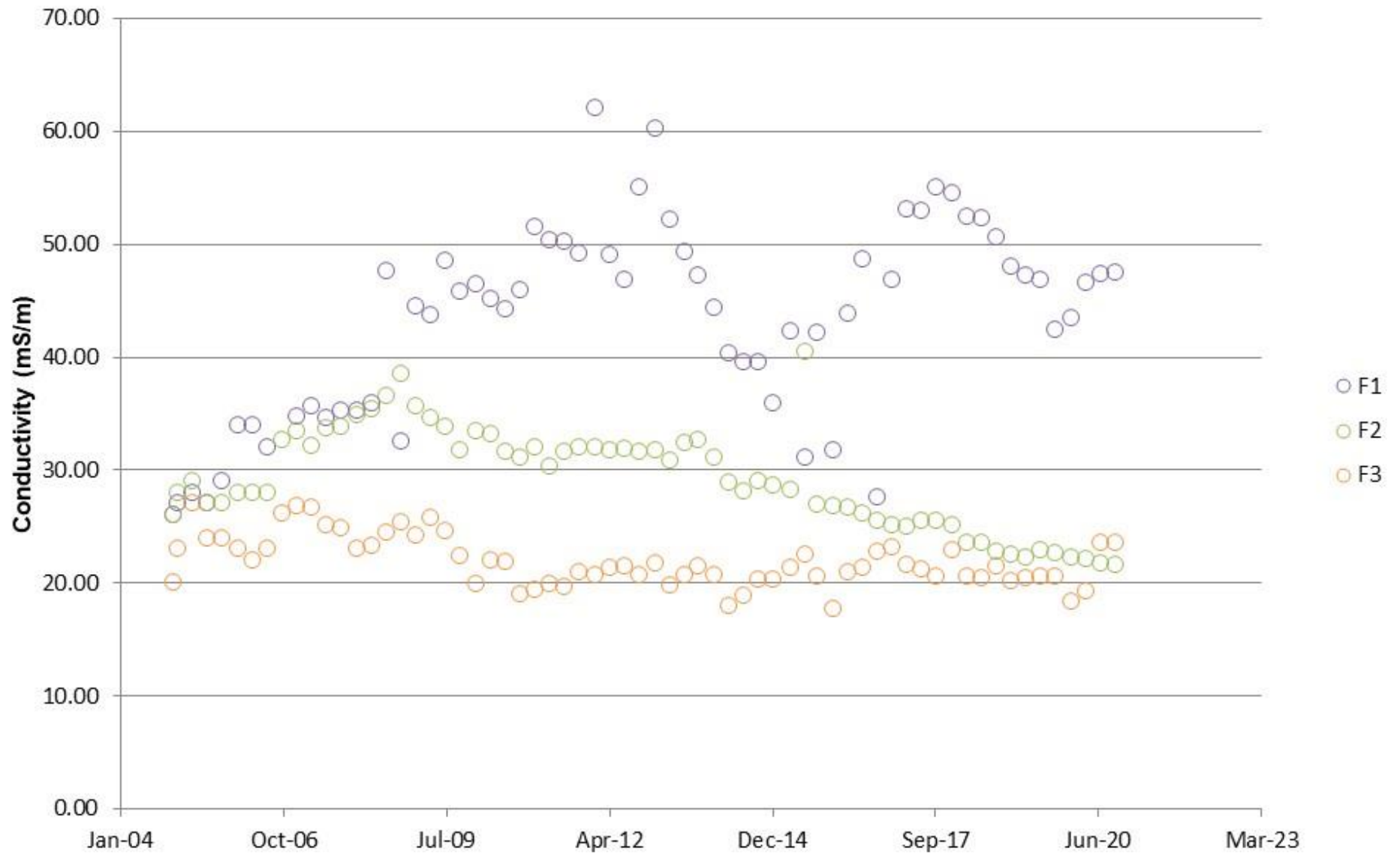
Irrigation Area - Chloride Concentrations



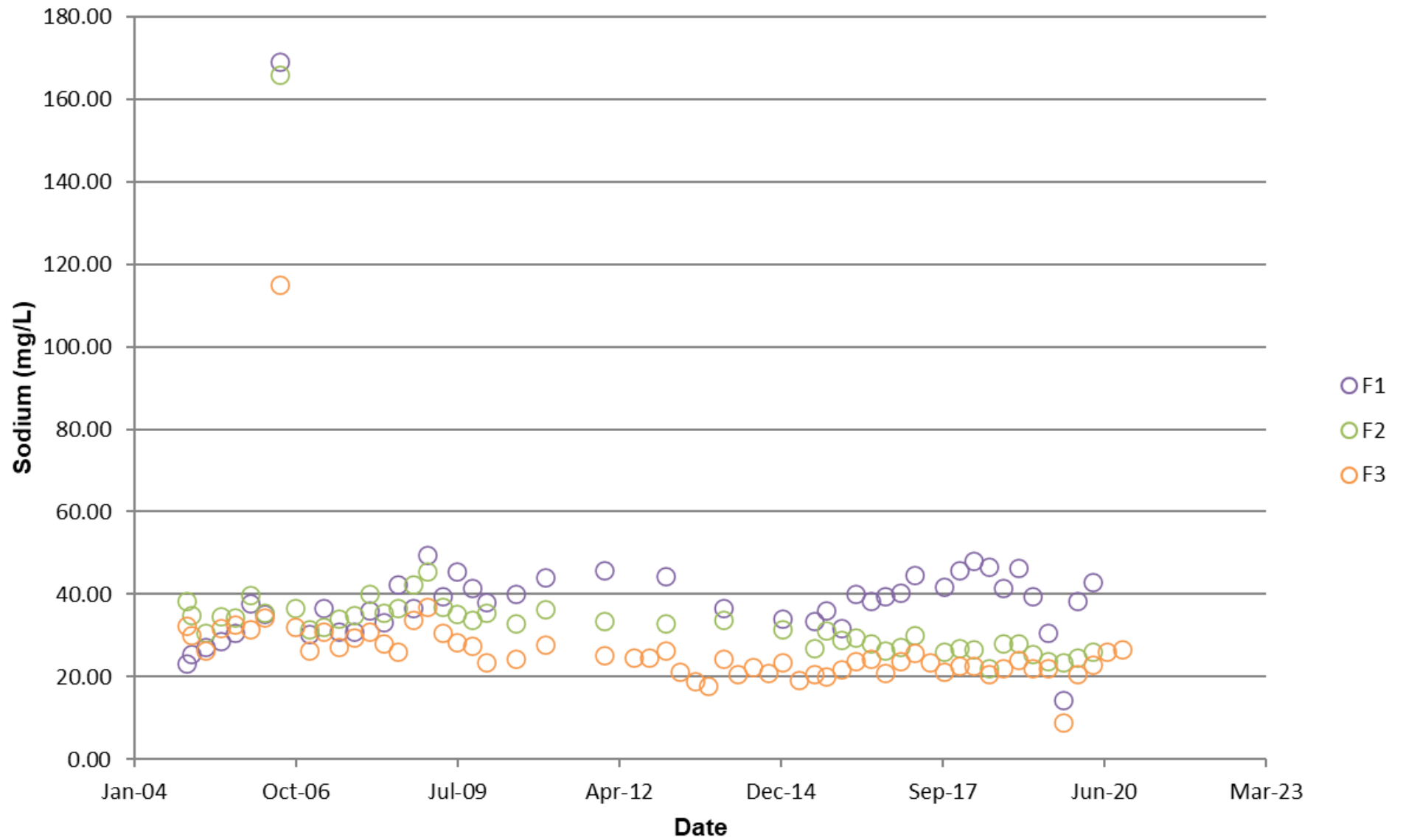
Irrigation Area - Ammoniacal-Nitrogen Concentrations



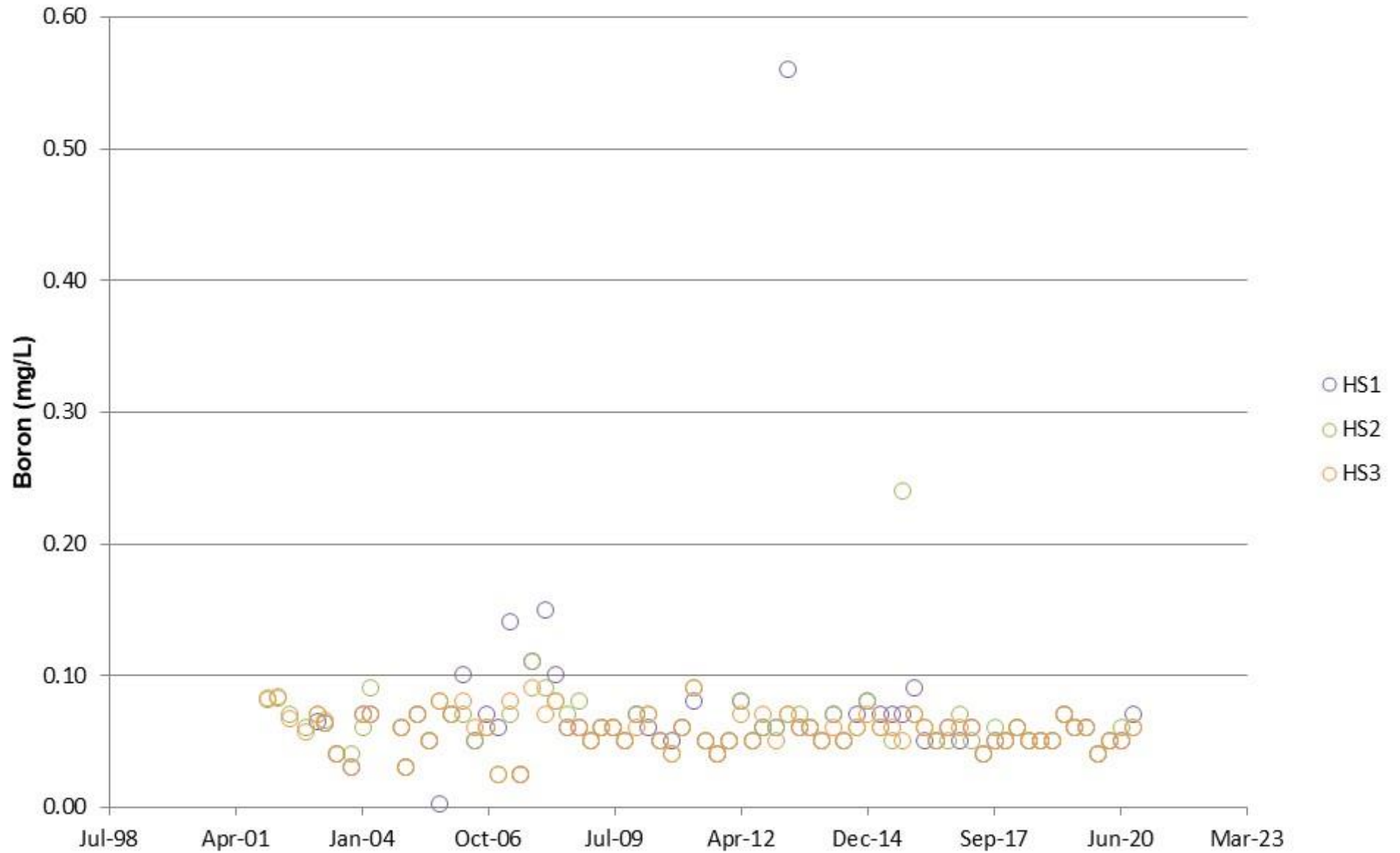
Irrigation Area - Conductivity Levels



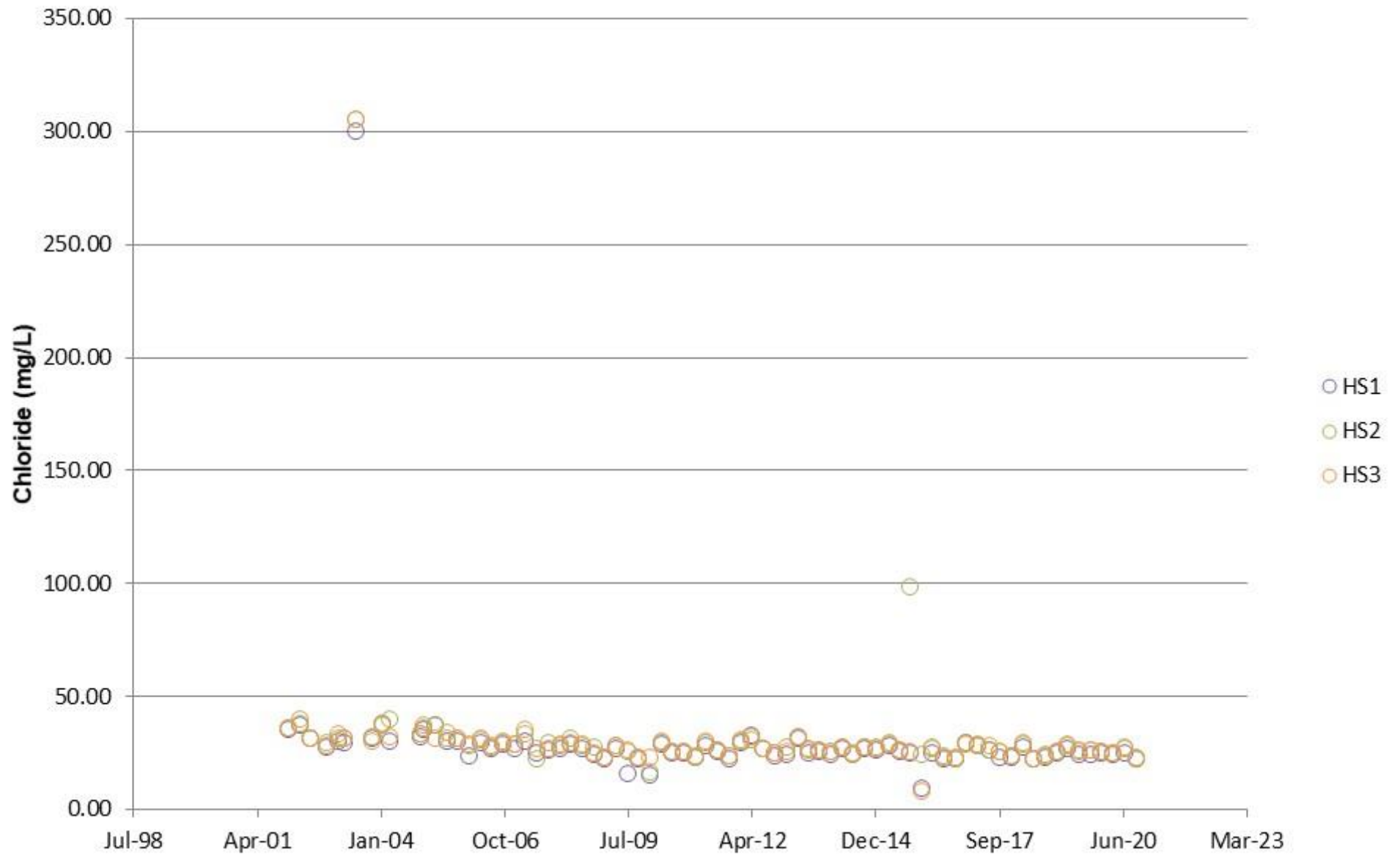
Irrigation Area - Sodium Concentrations



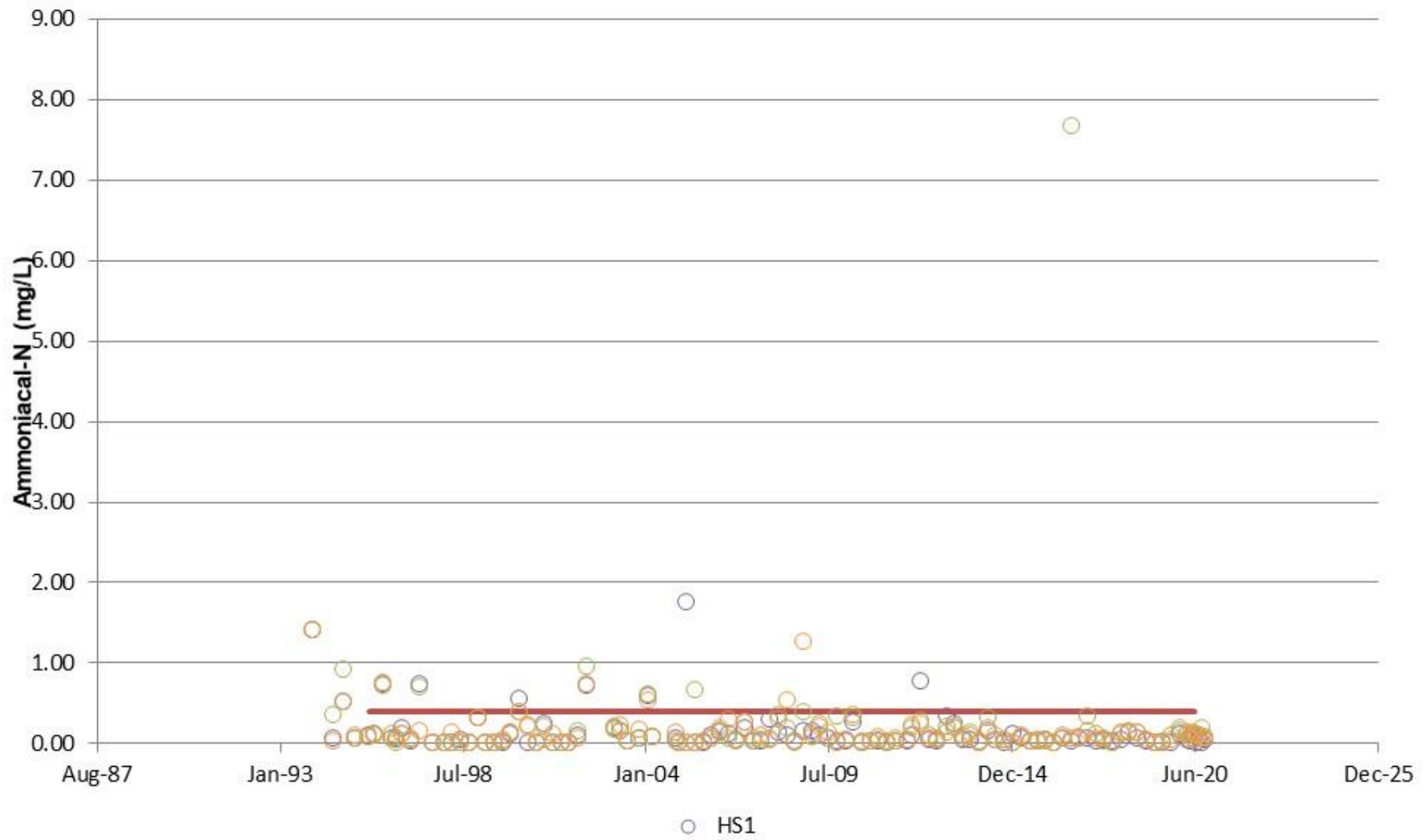
Hokio Stream - Boron Concentrations



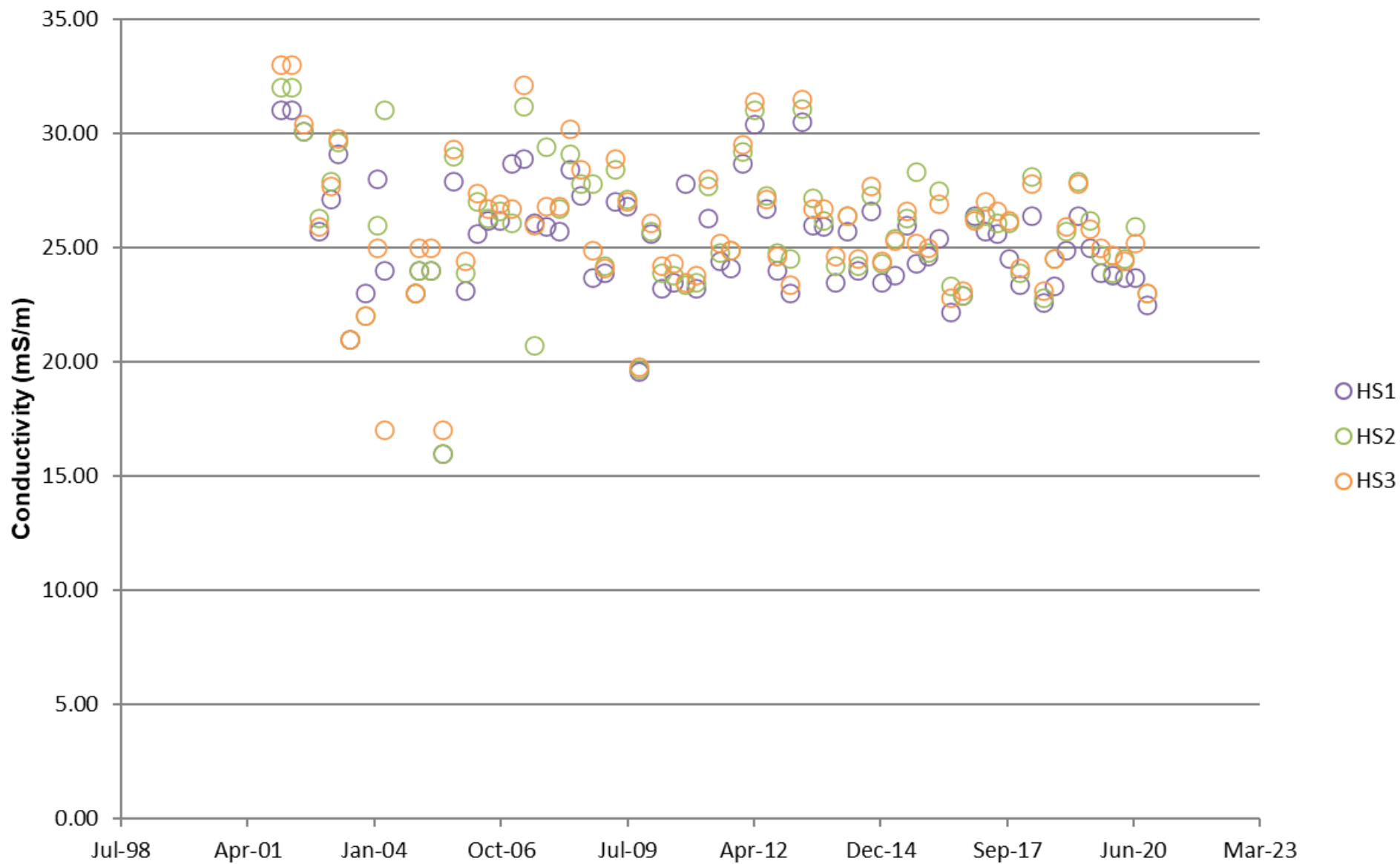
Hokio Stream - Chloride Concentrations



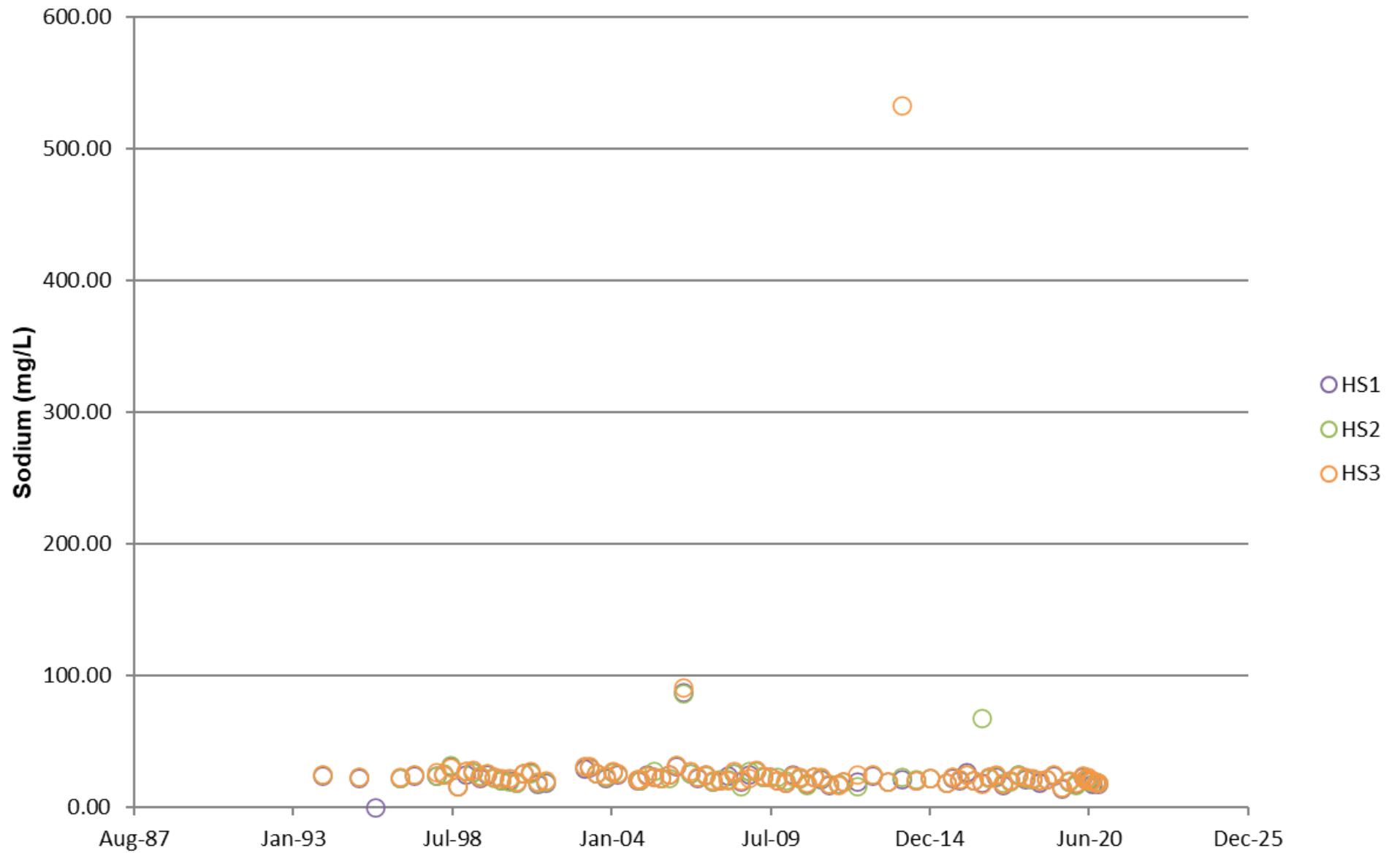
Hokio Stream - Ammoniacal-N Concentrations



Hokio Stream - Conductivity



Hokio Stream Sodium Concentrations



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