Levin Landfill July 2021 Quarterly Groundwater, Surface Water and Leachate Monitoring Report

PREPARED FOR Horowhenua District Council | August 2021

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Stantec

Revision Schedule

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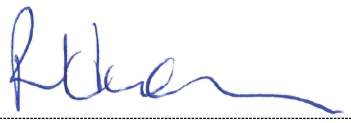
R. Hulme  26 / 08 / 2021

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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 monitoring 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 May 2021 to July 2021, 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, and
- The Hokio Stream.

Stantec has reviewed the results of this first 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 26 groundwater bores, the landfill leachate at a manhole next to the leachate pond, and from five surface water sites during the period from May 2021 to July 2021 around and on the Levin Landfill. The samples were analysed for the parameters set out in Discharge Permit 6010.

The July 2021 samples were collected progressively over an 8-day period, which is just beyond the normally accepted 7 days. Meeting the sampling timeframe means that there is greater 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 GVs), 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 May 2021 to July 2021 monitoring results have been assessed against these limits, where they are applicable.

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

- For E.Coli in bore E1D (being 200 CFU/100ml, which exceeds the DWSNZ limit of Nil)
- For dissolved manganese in bore C2DD (being 0.641mg/L, which exceeds the DWSNZ MAV of 0.4mg/L)
- For dissolved lead in bore E1D (being 0.0151mg/L, which exceeds the DWSNZ Mav of 0.01mg/L)
- The dissolved aluminium concentration exceeded the ANZECC AE (95%) limit at TD1
- For TD1 the scBOD5 concentration also exceeded the ANZECC AE (95%) limit as the limit is lower than the laboratory's detection limit
- For HS1A, HS1, HS2, HS3 in all months, the Nitrate-N concentration exceeded the ANZECC AE (95%) trigger value of 0.16mg/L.
- For May 2021 at HS3, the Dissolved Aluminium concentration exceeded the ANZECC AE (95%) trigger value of 0.055mg/L.
- For June 2021 at HS1, the phenol concentration exceeded the ANZECC AE (95%) trigger value of 5mg/L.

The May 2021 to July 2021 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 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 this leachate manhole and are generally well below those recorded at typical Class 1 landfills in New Zealand. The Ammoniacal-nitrogen concentration marginally exceeded the typical range, which is slightly lower than in previous results.

Methane was detected in 16 groundwater monitoring bores in the July 2021 sampling round. This is a substantial increase compared to the last monitoring round but may be reflective of the sensitivity of the gas detection instruments being used. The highest concentration of methane was in bore D6 (0.55%) which was approximately 10% of the lower explosive limit for methane (which is 5%).

Hydrogen sulphide was detected in one groundwater monitoring bore (D5) during the July 2021 sampling round. The concentration was 0.05% (500 ppm) which is considered to be a hazardous level. This is only the second time that hydrogen sulphide has been detected in groundwater bores since measurements began in 2015. Again, this stresses the need for samplers to take precautions when sampling and to avoid inhaling gases emanating from the bores when measurements are being taken.

1.0 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. Monitoring has been undertaken by contractors every three months at 32 locations, as required by the resource consent conditions (namely for discharge permit 6010). These sampling locations consist of 26 boreholes penetrating the sand and gravel aquifers, four surface water sampling locations within Hokio Stream, one surface sampling location along the Tatana Drain and a leachate sampling point, as shown in the Site Plan in Appendix A.

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 advises 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 has acted on all of the changes. Sampling since the January 2021 sampling round has been in line with what has been done previously, but different reference 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 July 2021 quarterly monitoring round.

Please note, the laboratory detection limit for E. coli is 1 cfu/100ml; however, in the results received, results were often noted as being below detection levels at 100 cfu/100ml or 4 cfu/100ml. This is assumed to be an error and has been noted in the report as being "not detected". There were also some results reported with a concentration of 0, it is assumed this means the parameter was below the laboratory detection limit.

2.0 GROUNDWATER AND SURFACE WATER MONITORING

2.1 SAMPLE ANALYSIS

Samples were collected by Downer (a contractor to HDC) on 1 and 17 June 2021; 15,16,19, 21, and 22 July 2021.

Samples were received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington on 23 June 2021; and 15, 16, 20, 21, 22, and 23 July 2021.

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 the past monitoring regime.

Groundwater samples taken from the boreholes were analysed for the indicator suite of parameters which are outlined in Table 2-1. Surface water samples from Hokio Stream and samples of landfill leachate effluent were analysed for the indicator list 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 onwards, sampling of the Tatana Drain has followed 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 BOD_5 ($scBOD_5$) 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 $scBOD_5$ and E. coli parameters replace BOD_5 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), scBOD5++
Nutrients*	Nitrate nitrogen (NO_3-N), Ammoniacal-nitrogen (NH_4-N)
Metals*	Aluminium, Manganese, Mercury++, Nickel, Lead
Other elements	Boron, Chloride
Biological+	E. coli

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

Those chemical constituents for which concentrations were below laboratory detection limits during the reporting period have had results set at 50% of the laboratory detection limit, which is then used to calculate a median value that is used in the annual report. 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.

2.2 BACKGROUND GROUNDWATER QUALITY

The quality of 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 are 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, see 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 July 2021

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Water level	mBGL	-	-	14.47	15	5.67
pH	-	7 to 8.5*	6 to 9	**6.6**	7.2	7.9
Conductivity	mS/m	-	-	53.5	28.2	21.8
COD	mg/L	-	-	63.0	18	29
scBOD5	mg/L	-	-	5.9	*0.5*	*1.5*
E. Coli	CFU/100ml	NIL	100	**3.9**	*ND*	*ND*
Chloride	mg/L	250*	-	119.0	32.2	19.2
Nitrate-N	mg/L	11.3	90.3	0.02	*0.005*	1.15

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Ammoniacal-N	mg/L	1.17	-	0.05	0.08	*0.005*
Sodium	mg/L	200*	-	80.5	n/r	25.7
Dissolved Aluminium	mg/L	0.1*	5	0.077	0.009	0.007
Dissolved Boron	mg/L	1.4	5	0.02	0.05	*0.015*
Dissolved Iron	mg/L	0.2*	-	**2.68**	n/r	*0.005*
Dissolved Lead	mg/L	0.01	0.1	0.0004	0.0021	*0.00025*
Dissolved Manganese	mg/L	0.4	-	0.0546	0.0602	*0.00025*
Dissolved Mercury	mg/L	0.007	0.002	0.0004	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.08	1	0.0007	*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

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

Values which exceeded the DWSNZ MAV are shown in **bold**

The results in Table 2-2 indicate that bores G1D and F3 contain groundwater that had concentrations of all monitored parameters within the ANZECC LDW trigger values and DWSNZ limits during the July 2021 monitoring round. While bore G1S also shows concentrations of the parameters within the ANZECC LDW trigger values, there are exceedances of the DWSNZ limits.

Bore G1S has concentrations of: pH below the range of DWSNZ limits; dissolved iron (2.68mg/L) which exceeds the DWSNZ limit of 0.2 mg/L; and E. coli (3.9 CFU/100ml) which exceeds the DWSNZ limit of Nil. However, these results are not considered to be an issue as they are within historical ranges and are not considered to be the result of landfill activities.

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 July 2021 monitoring round for most of these bores are presented in Table 2-3. Results for Bore D3(r) were not received, most likely because the old D3(r) bore had been disestablished and a new one commissioned next to the access road and this may have been occurring when sampling was being undertaken in July. 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 July 2021** monitoring round.

Table 2-3: D-Series and E1S Monitoring Bore Results for July 2021

Determinant	Units	ANZECC LDW	D1	D2	D3(r)	D4	D5	D6	E1S
Water level	mBGL	-	17.1	21.59	Not received	8.4	10.23	16.59	11.6
pH	-	6 to 9	7.8	6.8	Not received	7.0	7.0	6.9	7.1
Conductivity	mS/m	-	44.3	41.4	Not received	29.6	30.5	40.4	25.8
COD	mg/L	-	*7.5*	16	Not received	16	2,820	*7.5*	19
scBOD5	mg/L	-	*3*	5.9	Not received	*3*	*3*	*3*	*3*
E-Coli	CFU/100ml	100	*ND*	3.9	Not received	*ND*	*ND*	*ND*	*ND*
Chloride	mg/L	-	32.4	33.5	Not received	35.6	29.4	22.6	26.6
Nitrate-N	mg/L	90.3	9.68	*0.005**	Not received	*0.005*	1.34	17.5	*0.005*
Ammoniacal-N	mg/L	-	*0.005*	0.52	Not received	0.25	*0.005*	*0.005*	0.19
Sodium	mg/L	-	n/r	36.6	n/r	31.9	n/r	n/r	27.5
Dissolved Aluminium	mg/L	5	*0.001*	0.017	Not received	0.002	0.004	*0.001*	0.007
Dissolved Boron	mg/L	5	0.05	0.05	Not received	0.03	0.04	0.04	*0.015*
Dissolved Iron	mg/L	-	n/r	18	n/r	0.71	n/r	n/r	4.93
Dissolved Lead	mg/L	0.1	*0.00025*	0.0008	Not received	*0.00025*	*0.00025*	*0.00025*	0.0008
Dissolved Manganese	mg/L	-	*0.00025*	0.41	Not received	0.213	0.0071	*0.00025*	0.242
Dissolved Mercury	mg/L	0.002	*0.00025*	0.0004	Not received	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	1	*0.00025*	0.0004	Not received	*0.00025*	*0.00025*	*0.00025*	0.0007

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

* Value was noted as '0' in results received, however it is assumed it indicates the concentration was below the laboratory detection limit.

2.3.2 Deep Gravel Aquifer

Bores E1D, C2DD, E2D and Xd1 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.

Bore Xd1 was installed in late 2020 as a requirement of the reviewed resource consent conditions (December 2019). It is located on the western boundary of the site and slightly downstream of the old landfill.

Results for the July 2021 compliance monitoring round are presented in Table 2-5. 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 July 2021

Determinant	Units	DWSNZ MAV	E1D	C2DD	E2D	Xd1
Water level	mBGL	-	11.46	2.56	4.9	3.08
pH	-	7 to 8.5*	7.7	7.6	7.7	7.6
Conductivity	mS/m	-	43.6	55.3	44.2	53.8
COD	mg/L	-	75	18	*7.5*	34
scBOD5	mg/L	-	*3*	*3*	*3*	*3*
E-Coli	CFU/100ml	NIL	**200**	*ND*	*ND*	*ND*
Chloride	mg/L	250*	40.4	42.3	40.7	57.2
Nitrate-N	mg/L	11.3	*0.005*	*0.005*	*0.005*	*0.005*
Ammoniacal-N	mg/L	1.17	0.28	0.35	0.26	0.39
Sodium	mg/L	200*	36.6	n/r	n/r	n/r
Dissolved Aluminium	mg/L	0.1*	0.006	*0.001*	*0.001*	*0.001*
Dissolved Boron	mg/L	1.4	0.05	0.07	0.06	0.07
Dissolved Iron	mg/L	0.2*	0.19	n/r	n/r	n/r
Dissolved Lead	mg/L	0.01	**0.0151**	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	0.4	0.280	**0.641**	0.405	0.486
Dissolved Mercury	mg/L	0.007	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.08	0.0007	*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 three exceedances of the DWSNZ limits in samples from the deep gravel aquifer during the July 2021 monitoring round, as follows:

- For E.Coli in bore E1D which exceeded the DWSNZ MAV of Nil. This is a significant increase from the previous monitoring round which was below the laboratory detection limit. This should be monitored in future reports to determine if this is an outlier or representative of an overall trend.
- For dissolved manganese in bore C2DD which exceeded the DWSNZ MAV of 0.4mg/L

- For dissolved lead in bore E1D which exceeded the DWSNZ MAV of 0.01mg/L. While this is only a marginal exceedance of the limits, it is a significant increase from the previous monitoring round for which the result was below the laboratory detection limit. This should be monitored in future reports to determine if this is an outlier or representative of an overall trend.

Please note, the manganese exceedance at bore C2DD is within the historical range of concentrations observed.

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.

Bores Xs1 and Xs2 are located along Hokio Beach Road, within the road reserve. Bore Xs1 is adjacent to Tatana's property and bore Xs2 is next to the driveway leading to a Council-owned property. Bore Xs2 is considered to be hydraulically upgradient of the old landfill (See Site Plan, Appendix A).

The results from the July 2021 consent monitoring round for these bores are presented in Table 2-6 and have been compared with the ANZECC LDW trigger values as per the requirements of discharge consent 6010. The full laboratory report is included in Appendix C.

There were **no exceedances of the ANZECC LDW trigger values during the July 2021** monitoring round. Therefore, these results show full compliance with the resource consent conditions.

Table 2-5: Monitoring Results for Shallow Boreholes Down-Gradient from the Old Landfill for July 2021

Determinant	Units	ANZECC LDW	E2S	B1	B2	B3	C1	C2	C2DS	G2S	Xs1	Xs2
Water level	mBGL	-	5.8	1.19	1.49	0.26	0.26	0.32	2.3	2.31	0.49	2.37
pH	-	6 to 9	7.8	7.0	6.9	7.5	7.0	7.3	7.2	6.7	6.6	6.8
Conductivity	mS/m	-	33.1	185	185	254	99.9	228	105	222	91.4	21.2
COD	mg/L	-	*7.5*	92	98	369	43	132	89	89	64	*7.5*
scBOD5	mg/L	-	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*
E-Coli	CFU/100ml	100	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	20	12
Chloride	mg/L	-	39.8	263	122	154	128	127	66.5	481	54.6	18.0
Nitrate-N	mg/L	90.3	*0.005*	6.85	27.3	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	*0.05*	0.37
Ammoniacal-N	mg/L	-	0.32	10.1	33.5	174	1.97	149	1.28	0.02	10.5	0.07
Sodium	mg/L	-	30.9	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Dissolved Aluminium	mg/L	5	*0.001*	0.007	0.011	0.005	0.013	0.018	0.003	0.005	0.010	0.015
Dissolved Boron	mg/L	5	*0.015*	1.38	1.67	1.23	0.84	1.66	0.87	1.05	0.09	0.06
Dissolved Iron	mg/L	-	0.04	n/r	n/r	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*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	0.239	8.53	2.47	2.59	0.279	0.0411	1.52	0.272	1.60	0.107
Dissolved Mercury	mg/L	0.002	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	1	*0.00025*	0.0041	0.0027	0.0091	0.0009	0.0043	0.0025	0.0035	0.0008	*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

2.5 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. The 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 2-8 and have been compared with the ANZECC LDW trigger values, as per discharge consent 6010. The full laboratory report is included in Appendix C.

There were **no exceedances of the resource consent conditions** during the July 2021 monitoring round.

Table 2-6: Results from Monitoring Bores in the Irrigation Area for July 2021

Determinant	Units	ANZECC LDW	F1	F2	F3
Water level	mBGL	-	Not received	3.21	Not received
pH	-	6 to 9	6.8	7	7.9
Conductivity	mS/m	-	47.8	21.8	21.8
COD	mg/L	-	28	14.99	29
scBOD5	mg/L	-	*3*	5.9	*1.5*
E-Coli	CFU/100ml	100	*ND*	3.9	*ND*
Chloride	mg/L	-	48.2	23.3	19.2
Nitrate-N	mg/L	90.3	0.67	0.13	1.15
Ammoniacal-N	mg/L	-	*0.005*	*0.005**	*0.005*
Sodium	mg/L	-	n/r	n/r	25.7
Dissolved Aluminium	mg/L	5	0.005	0.003	0.007
Dissolved Boron	mg/L	5	0.03	0.04	*0.015*
Dissolved Iron	mg/L	-	n/r	n/r	*0.005*
Dissolved Lead	mg/L	0.1	*0.00025*	0.0004	*0.00025*
Dissolved Manganese	mg/L	-	0.0161	0.0252	*0.00025*
Dissolved Mercury	mg/L	0.002	*0.00025*	0.0004	*0.00025*
Dissolved Nickel	mg/L	1	0.0008	0.0004	*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
* Value was noted as '0' in results received, however it is assumed it indicates the concentration was below the laboratory detection limit.

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 2-9). The full laboratory report is included in Appendix C. Table 2-9 shows that the concentrations of monitored parameters for leachate effluent samples collected in May, June, and July 2021 were mostly within the typical ranges to be expected for this type of landfill. The result for Ammonia-N in May 2021 was slightly above the maximum range value, however, they are in line with historical results and are not considered to be an issue.

It is noted that not all parameters were reported on for July 2021, most likely because the testing instructions given to the laboratory referred only to the indicator suite of parameters, instead of the comprehensive suite required for some sampling sites, such as the leachate pond and Hokio Stream sampling sites.

It is also noted that the leachate effluent is sent to Levin WWTP for treatment.

Table 2-7: Results from Leachate Effluent Monitoring for May, June, and July 2021

Determinant	Units	Typical Leachate Characteristics* (range)	May	June	July
pH		5.9 - 8.5	7.9	8	7.6
Suspended Solids	mg/l	-	30	21	Not received
Phenol	mg/L	-	*0.025*	*0.025*	Not received
VFA	mg/L	-	*2.5*	*25*	Not received
TOC	mg/L	-	931	589	Not received
Alkalinity	mg $CaCO_3$/L	-	7000	5710	Not received
Conductivity	mS/m	308 – 27,900	1690	1410	930
COD	mg/L	84 – 5,090	4980	4970	1,730
scBOD5	mg/L	-	134	66	70
E-Coli	CFU/100mL	-	390	200	500
Chloride	mg/L	45 – 2,584	1350	1130	876
Nitrate-N	mg/L	-	*0.5*	10.4	17.1
Sulphate	mg/L	-	74.8	137	Not received
Ammonia-N	mg/L	3.4 – 1,440	**1460**	1200	720
Hardness	mg $CaCO_3$/L	-	520	595	Not received
Calcium	mg/L	-	109	124	Not received
Magnesium	mg/L	-	60.2	68.90	Not received
Potassium	mg/L	-	746	1200	Not received
Sodium	mg/L	50 – 4,000**	1120	1200	Not received
D.R. Phosphorus	mg/L	-	15.2	10.6	Not received
Dissolved Aluminium	mg/L	-	0.964	1.07	0.327
Dissolved Arsenic	mg/L	-	0.407	0.684	Not received
Dissolved Boron	mg/L	0.54 – 20.1	6.94	16.8	4.57
Dissolved Cadmium	mg/L	-	*0.001*	*0.0001*	Not received
Dissolved Chromium	mg/L	-	1.060	1.1	Not received
Dissolved Copper	mg/L	-	0.0176	0.0375	Not received
Dissolved Iron	mg/L	1.6 – 220	4.09	5.34	Not received
Dissolved Lead	mg/L	0.001 - 0.42	*0.0025*	0.0064	0.0027
Dissolved Manganese	mg/L	0.3 - 45***	1.3	1.92	1.08
Dissolved Mercury	mg/L	0.2 - 50	***0.0025***	***0.00025***	***0.00025***
Dissolved Nickel	mg/L	0.02 – 2.05**	0.134	0.211	0.0743
Dissolved Zinc	mg/L	-	0.086	0.21	Not received

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

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 this 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 reduced the extent of sampling to a single location. This is known as 'TD1' and is the same sampling location as for the previously denoted 'SW3'.

Results from the July 2021 sampling round are presented in Table 2-11 and have been compared with the ANZECC AE[1] 95% trigger values, as per the revised resource consent conditions.

Table 2-8 Tatana Drain Monitoring Results for July 2021

Determinant	Units	ANZECC AE (95%)	TD1 (formerly SW3)
pH	-	-	7.1
Conductivity	mS/m	-	40.4
COD	mg/L	-	81
scBOD5	mg/L	2	***3***
E-Coli	CFU/100ml	-	48
Chloride	mg/L	-	61.6
Nitrate-N	mg/L	0.16	0.08
Ammoniacal-N	mg/L	2.1	0.63
Dissolved Aluminium	mg/L	0.055	**0.064**
Dissolved Boron	mg/L	-	0.11
Dissolved Lead	mg/L	0.0034	*0.00025*
Dissolved Manganese	mg/L	1.9	0.0868
Dissolved Mercury	mg/L	0.0006	*0.00025*
Dissolved Nickel	mg/L	0.011	0.0011

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

There were two exceedances of the resource consent conditions in a sample from the Tatana Drain property at TD1 during the July 2021 sampling round. The dissolved aluminium concentration of 0.064mg/L was marginally above the ANZECC AE 95% trigger value of 0.055mg/L and was at the higher level of historical results.

The concentration for scBOD5 of 3mg/L also exceeded the ANZECC AE (95%) trigger value of 2mg/L. This is not considered an issue however, as the result for scBOD5 was below the detection limit of 6 and has been depicted as 3 in italics. Therefore, this apparent exceedance of the trigger value is misleading.

Previously, Ammoniacal-N was noted as exceeding the ANZECC AE (95%) limit and showing a sudden change compared to previous results. It is noted that the concentrations in the April and July 2021 sampling rounds were below the ANZECC AE (95%) limit and significantly lower than historical ranges. The cause of these significant concentration fluctuations is not known and this matter should be kept under observation in subsequent reports.

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

[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

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 a comprehensive suite of parameters every month (as shown in Appendix B).

Results from the May, June, and July 2021 sampling rounds are presented in Table 2-12 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 has 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.

It is noted that results were only received for all indicator suite of parameters for the July surface water monitoring round, whilst the July monitoring results were not provided at all for surface water sampling site HS1.

Table 2-9: Hokio Stream Monitoring Results for May, June, and July 2021

Determinant	Units	ANZECC AE (95%)	Consent Trigger Values (Table C1)	HS1A (new)			HS1			HS2			HS3		
				May	June	July	May	June	July	May	June	July	May	June	July
pH	-	-	-	7.5	7.7	7.4	7.6	7.7	Not received	7.5	7.7	7.3	7.5	7.7	7.4
Suspended Solids	mg/l	-	-	58	112	Not received	56	12	Not received	60	14	Not received	400	9.0	Not received
Phenol	mg/L	0.320	-	*0.025*	*0.025*	Not received	*0.025*	**5**	Not received	*0.025*	*0.025*	Not received	*0.025*	0.04	Not received
VFA	mg/L	-	-	*2.5*	*2.5*	Not received	*2.5*	*2.5*	Not received	*2.5*	*2.5*	Not received	*2.5*	4.9	Not received
TOC	mg/L	-	-	8.5	4.4	Not received	7.9	*0.025*	Not received	7.8	4.6	Not received	49.7	4.7	Not received
Alkalinity	mg CaCO3/L	-	-	65	53	Not received	67	56	Not received	67	56	Not received	65	57.0	Not received
Conductivity	mS/m	-	-	24.8	23.8	20.6	25	24.2	Not received	25.7	24.6	20.8	26.1	24.5	20.9
COD	mg/L	-	-	40	*7.5*	18	29	*7.5*	Not received	44	*7.5*	16	67	14.99	*7.5*
scBOD5	mg/L	2	Monthly Ave. 2	BDL	BDL	BDL	BDL	BDL	Not received	BDL	BDL	BDL	BDL	0.9	BDL
E-Coli	CFU/100ml	-	-	580	110	180	740	110	Not received	600	140	210	810	120.0	190
Chloride	mg/L	-	-	24.5	23.5	20.6	24.5	24.4	Not received	26.9	24.7	22.2	25.8	24.6	21.6
Nitrate-N	mg/L	0.16	0.16	**0.420**	**0.66**	**1.25**	**0.42**	**0.65**	Not received	**0.5**	**0.78**	**1.27**	**0.5**	**0.76**	**1.27**
Sulphate	mg/L	-	-	10.1	18.3	Not received	28.4	18.4	Not received	10.5	18.2	Not received	14.3	18.2	Not received
Ammoniacal-N	mg/L	2.1	Max. 2.1 Ave. 0.400	0.750	*0.005*	0.09	0.8	0.01	Not received	0.79	0.09	0.17	0.73	0.03	0.12
Hardness	mg CaCO3/L	-	-	65	58	Not received	65	62	Not received	69	63	Not received	72	64.0	Not received
Calcium	mg/L	-	-	13.9	12.8	Not received	14	13.7	Not received	14.9	14	Not received	16.2	14.3	Not received
Magnesium	mg/L	-	-	7.35	6.22	Not received	7.36	6.67	Not received	7.81	6.73	Not received	7.67	6.95	Not received
Potassium	mg/L	-	-	3.19	2.93	Not received	3.18	3.24	Not received	3.85	3.25	Not received	3.64	3.12	Not received
Sodium	mg/L	-	-	18.6	19	Not received	18.7	19.2	Not received	20.1	21.2	Not received	20.5	21.5	Not received
D.R. Phosphorus	mg/L	-	-	0.042	0.01	Not received	0.047	0.01	Not received	0.063	0.011	Not received	0.017	0.012	Not received
Dissolved Aluminium	mg/L	0.055	Med. 0.055	0.014	0.005	0.021	0.016	0.008	Not received	0.009	0.004	0.024	**0.413**	0.004	0.027
Dissolved Arsenic	mg/L	0.024	Med. 0.024	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005**	Not received
Dissolved Boron	mg/L	0.370	-	0.06	0.05	0.05	0.06	0.05	Not received	0.06	0.05	0.05	0.06	0.06	0.05
Dissolved Cadmium	mg/L	0.0002	Med. 0.0002	*0.0001*	*0.0001*	Not received	*0.0001*	*0.0001*	Not received	*0.0001*	*0.0001*	Not received	*0.0001*	0.0001	Not received
Dissolved Chromium (VI)	mg/L	0.001	-	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005*	Not received	*0.0005*	*0.0005**	Not received
Dissolved Copper	mg/L	0.0014	Med. 0.0014	0.001	0.001	Not received	0.0007	0.0014	Not received	0.0007	0.0009	Not received	0.0008	0.001	Not received
Dissolved Iron	mg/L	-	-	0.067	0.019	Not received	0.048	0.016	Not received	0.067	0.02	Not received	0.727	0.022	Not received
Dissolved Lead	mg/L	0.0034	Med. 0.0034	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	Not received	*0.00025*	*0.00025*	*0.00025*	0.0006	0.0004	*0.00025*
Dissolved Manganese	mg/L	1.9	-	0.0265	0.0125	0.0112	0.0231	0.0165	Not received	0.0444	0.0231	0.0083	0.0586	0.0217	0.0123
Dissolved Mercury	mg/L	0.0006	Med. 0.0006	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	Not received	*0.00025*	*0.00025*	*0.00025*	*0.00025*	0.0004	*0.00025*
Dissolved Nickel	mg/L	0.011	Med. 0.011	*0.00025*	*0.00025*	*0.00025*	*0.00025*	0.0006	Not received	*0.00025*	*0.00025*	*0.00025*	*0.00025*	0.0004	*0.00025*
Dissolved Zinc	mg/L	0.008	Med. 0.008	0.004	*0.001*	Not received	*0.001*	0.004	Not received	*0.001*	0.01	Not received	0.002	0.002	Not received

Notes:
NR = Not reported
BDL = Below detection limit
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
* Value was noted as '0' in results received, however it is assumed it indicates the concentration was below the laboratory detection limit

There were **thirteen exceedances** of the resource consent conditions in samples from the Hokio Stream during the May, June, and July 2021 sampling rounds. These are summarised as follows:

- For all months and sampling locations, the Nitrate-N concentration exceeded the ANZECC AE (95%) trigger value of 0.16mg/L.
- For May 2021 at HS3, the Dissolved Aluminium concentration exceeded the ANZECC AE (95%) trigger value of 0.055mg/L.
- For June 2021 at HS1, phenol exceeded the ANZECC AE (95%) trigger value of 5.

Please note that using the method of halving results below detection limits, the scBOD5 concentrations for May and July 2021 at HS1A, HS2, and HS3 are 3 mg/L. By representing this result as 3mg/L it would suggest there is an exceedance of the ANZECC AE (95%) trigger value of 2 mg/L which is not accurate. Therefore, these results for scBOD5 have been represented in Table 2-12 as BDL.

Overall, the differences between the sites are marginal and there is little to no change in concentrations between upstream and downstream sites. An exception is the Nitrate-N concentration which shows an increasing trend at all the sites.

For some parameters there may be an apparent decreasing trend downstream but this is not consistent over all parameters and may even increase slightly for some parameters. Therefore, this suggests that any influence found is likely to be the result of upstream sources and not the old (closed) landfill.

3.0 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 was that this should be done every quarter so that if any results are unusually high, appropriate action can be undertaken, including putting safeguards in place at bores.

Appendix E summarises the results of gas testing undertaken on 9 June, 13 July, and 14 July 2021.

Out of the 29 groundwater monitoring bores:

- Methane was detected in 14 bores. The highest recorded level was 0.55% in bore D6. This is about 10% of the lower explosive limit which is not considered to be a dangerous level but reinforces the need for people to take necessary precautions generally applicable to landfill sites when conducting sampling.
- Hydrogen sulphide was detected at one bore (D5). The concentration measured was 0.05% (500 ppm) which is considered to be a hazardous level. This is only the second time that hydrogen sulphide has been detected in groundwater bores since measurements were started in 2015. Again, this stresses the need for samplers to take precautions when sampling and to avoid inhaling gases from the bores when measurements are being taken.

This is a substantial change compared to the last quarter monitoring round where methane was reported as being detected in a single groundwater monitoring bore. It is however similar to the quarterly report prior to that one which reported methane being detected in 20 groundwater bores. This substantial change between quarters will be observed closely at the next monitoring round to see if it continues. It is possible that the difference is related to the sensitivity of the instruments used in detecting gases and it is recommended that Downer be asked to ensure that a consistent approach is applied for each sampling round.

The possibility of encountering methane in groundwater bores endorses the need for appropriate health and safety measures to be adopted during monitoring, as is the case for the landfill gas extraction wells. No smoking should be permitted by personnel who undertake the groundwater sampling when in the vicinity of the groundwater wells, or in fact anywhere else on the site.

4.0 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 time span of the sampling period is kept as short 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 an 8-day period between 15 July 2021 and 22 July 2021. This is a longer timespan than the previous monitoring round which was 4 days. This monitoring period is only marginally outside the recommended timeframe (i.e., obtaining all samples within 7 days) and the results can therefore be interpreted with reasonable certainty.

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 for the background bores indicate that low pH values are representative of background water quality in the shallow sand aquifer (G1S) and, during the July 2021 monitoring round, the pH level (6.6) was slightly below the guideline level of 7 prescribed by DWSNZ MAV. The deeper gravel aquifer (G1D) had a pH that was slightly higher at 7.2.

Dissolved iron concentrations have fluctuated considerably at both the G1S and G1D bores since monitoring began and are occasionally above the DWSNZ GV. During the July 2021 sampling round, the iron concentration at G1S (2.68 mg/L) exceeded the DWSNZ GV of 0.2 mg/L but was still within the historical results range recorded at these bores. 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 July 2021 sampling round, E coli concentrations at G1S exceeded DWSNZ MAV, with a value of 3.9 CFU/100ml being recorded.

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 July 2021 monitoring round show that water quality in the shallow monitoring bores hydraulically up-gradient from the old landfill complies with the discharge consent conditions.

4.3.2 Irrigation Area

Sampling results from all shallow bores located hydraulically down-gradient of the irrigation area[2] (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 and ammoniacal-nitrogen concentrations at F1 and F3 have consistently been low and are sometimes below the laboratory detection limit. Ammoniacal-nitrogen concentrations have also been consistently low and sometimes below the laboratory detection limit at F2.

[2] Irrigation of leachate within this area ceased in October 2008

4.3.3 Hydraulically Down-gradient from the Old Landfill

During the July 2021 sampling round there were no exceedances of the resource consent conditions.

4.4 DEEP AQUIFER GROUNDWATER QUALITY

The concentration of dissolved manganese exceeded the DWSNZ MAV at C2DD (0.641 mg/L) within the deep gravel aquifer in the July 2021 monitoring round. However, it is noted that this manganese concentration at C2DD is consistent with historical results and appears to be representative of background groundwater quality in the area.

At bore E1D, the dissolved lead concentration was also recorded as marginally exceeding the DWSNZ MAV limit of 0.01mg/L, with a concentration recorded of 0.0151mg/L. In previous monitoring periods, the lead concentration has been below the laboratory detection limit and, given this, the result for this monitoring round is a significant increase. This should be monitored closely in the next sampling round.

It is also noted that an E. coli concentration of 200 CFU/100ml was detected at E1D and this exceeded the DWSNZ MAV of zero CFU/100ml. This is the highest level recorded to date; however, given previous monitoring rounds have shown results that have been below the laboratory detection limit, it is possible this is an anomaly. E. coli levels should be monitored closely in the next sampling round to confirm if this is an anomaly or a change in the trend.

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 May, June, and July 2021 monitoring rounds were within the typical composition ranges for leachate at Class 1 landfills, as published in the WasteMINZ guidelines[3]. The only exception to this was for ammoniacal-nitrogen in May 2021, for which the leachate concentration (1,460mg/L) marginally exceeded the typical range of 3.4 – 1,440 mg/L, although this is not of concern.

It is also noted that results for several parameters in the July 2021 sampling round were not received.

4.6 TATANA PROPERTY DRAIN

Under the revised resource consent conditions approved in December 2019, the 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.

There were two exceedances (for scBOD5 and dissolved aluminium concentrations respectively) of the resource consent conditions in the July 2021 sampling round. Therefore, the conditions of the consent are not met as the ANZECC AE (95%) limits were exceeded. However, it is important to note that the result for the scBOD5 concentration is below the laboratory detection limit and, as per our methodology, has been assumed to be half of the detection limit (3mg/L) for the purposes of reporting of results.

The result for scBOD5 is within historical ranges, however, the result for dissolved aluminium is the highest it has ever been to date. Given this, the dissolved aluminium concentration at TD1 should be monitored closely in the next sampling round.

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 and all monitoring results for the Hokio Stream samples are now assessed against the ANZECC AE 95% trigger values.

[3] Technical Guidelines for Disposal to Land, WasteMINZ, 2018

During the May, June, and July 2021 monitoring rounds there were thirteen exceedances of the resource consent conditions in samples from the Hokio Stream, which where:

- For all months and sampling locations, the Nitrate-N concentration exceeded the ANZECC AE (95%) trigger value of 0.16mg/L.
- For May 2021 at HS3, the Dissolved Aluminium concentration exceeded the ANZECC AE (95%) trigger value of 0.055mg/L.
- For June 2021 at HS1, the phenol concentration exceeded the ANZECC AE (95%) trigger value of 5.

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 applicable DWSNZ values. 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 were no exceedances of the resource consent conditions during the July 2021 sampling round for samples obtained from the shallow aquifer.

Deeper gravel aquifer

There were three exceedances of the resource consent conditions in samples from the deeper gravel aquifer during the July 2021 sampling round:

- For E.Coli in bore E1D (being 200 CFU/100ml, which exceeds the DWSNZ limit of Nil)
- For dissolved manganese in bore C2DD (being 0.641mg/L, which exceeds the DWSNZ MAV of 0.4mg/L)
- For dissolved lead in bore E1D (being 0.0151mg/L, which exceeds the DWSNZ Mav of 0.01mg/L)

Irrigation area

There were no exceedances of the resource consent conditions during the July 2021 sampling round for samples obtained from the irrigation area.

Tatana Property drain

There were two exceedances of the resource consent conditions in samples from Tatana Drain during the July 2021 sampling round:

- The dissolved aluminium concentration exceeded the ANZECC AE (95%) limit
- The scBOD5 concentration also exceeded the ANZECC AE (95%) limit as the limit is lower than the laboratory detection limit

Hokio Stream

During the May, June, and July 2021 monitoring rounds there were thirteen exceedances of the resource consent conditions in samples from the Hokio Stream, which where:

- For all months and sampling locations, the Nitrate-N concentration exceeded the ANZECC AE (95%) trigger value of 0.16mg/L.
- For May 2021 at HS3, the Dissolved Aluminium concentration exceeded the ANZECC AE (95%) trigger value of 0.055mg/L.
- For June 2021 at HS1, the phenol concentration exceeded the ANZECC AE (95%) trigger value of 5.

5.0 CONCLUSIONS

Monitoring results obtained in the May to July 2021 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 May – July 2021 monitoring period there were eighteen exceedances of the resource consent conditions; three exceedances were in samples from the deep gravel aquifer, two exceedances occurred in the sample from Tatana Drain and thirteen exceedances occurred in samples from surface water monitoring at the Hokio Stream.

There were no exceedances in samples from the shallow aquifer hydraulically down-gradient of the new landfill, the old landfill or in the leachate irrigation area (which has not been used since October 2008).

Leachate quality is typical of the composition of leachate recorded generally at Class 1 landfills in New Zealand.

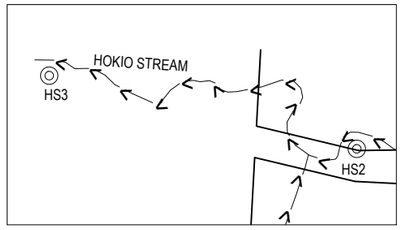
Methane was detected in 16 groundwater monitoring bores in the July 2021 sampling round. This is a substantial increase compared to the last monitoring round but may be reflective of the sensitivity of the gas detection instruments being used. The highest concentration of methane was in bore D6 (0.55%) which was approximately 10% of the lower explosive limit for methane (which is 5%).

Hydrogen sulphide was detected in one groundwater monitoring bore (D5) during the July 2021 sampling round. The concentration was 0.05% (500 ppm) which is considered to be a hazardous level. This is only the second time that hydrogen sulphide has been detected in groundwater bores since measurements began in 2015. Again, this stresses the need for samplers to take precautions when sampling and to avoid inhaling gases from the bores when measurements are being taken.

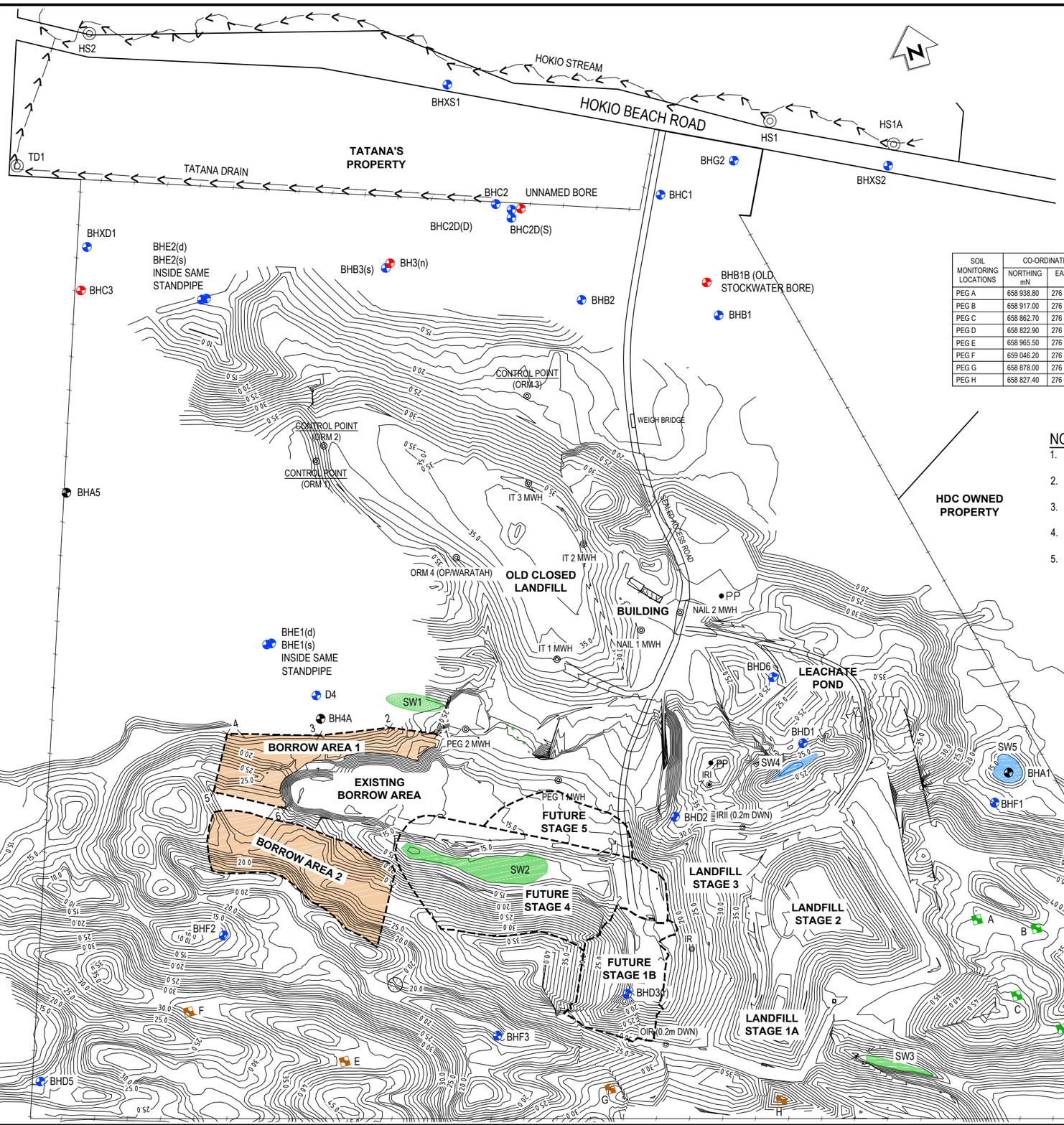
Appendices

We design with community in mind

APPENDIX A SITE PLAN



CONTINUATION



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(OP/W)	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
IRII	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 GEODETIC 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

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	659 233.27	276 243.39
6	659 201.34	276 302.68

BORE LOCATIONS AND DETAILS						
BORE HOLE NO	NORTHING mN	EASTING mE	R.L. (m)	DEPTH OF WELL (m)	PIEZOMETER DIAMETER (mm)	FUNCTION
A1	659 060.15	276 944.89	12.95			SHALLOW AQUIFER
A2 (DESTROYED)						SHALLOW AQUIFER
A3 (DESTROYED)						SHALLOW AQUIFER
A4	659 271.67	276 354.72	10.10			SHALLOW AQUIFER
A5	659 530.47	276 185.91	9.62			SHALLOW AQUIFER
B1	659 561.81	276 797.35	9.04	4.3	40	SHALLOW AQUIFER
B1B (STOCK BORE)	659 530.08	276 799.91	9.28	10		
B2	659 576.32	276 683.50	9.42	3.5	50	SHALLOW AQUIFER
B3(s)	659 651.19	276 519.52	7.76	2.83	50	SHALLOW AQUIFER
B3(n)	659 654.26	276 524.38	7.49	2.33	32	DEEP AQUIFER
C1	659 649.64	276 777.83	7.47	3.60	50	SHALLOW AQUIFER
C2	659 680.80	276 631.22	7.50	2.81	32	SHALLOW AQUIFER
C2D(s)	659 671.19	276 641.63	10.13	12.88	32	SHALLOW AQUIFER
C2D(d)	659 671.19	276 641.63	10.11	18.85	32	DEEP AQUIFER
C3	659 704.29	276.246.89	7.22	2.8	32	SHALLOW AQUIFER
D1	659 134.97	276 771.65	27.46	23.69	50	EARLY DETECTION
D2	659 101.02	276 642.06	32.12	29.46	50	EARLY DETECTION
D3-DESTROYED						
D4	659 293.20	276 356.60	17.97	17.0		SHALLOW AQUIFER
D5	659 020.80	276 022.40	20.65	18		SHALLOW AQUIFER BACKGROUND
D6	659 200.31	276 761.08	26.41	16.07	50	EARLY DETECTION
E1(d)	659 349.54	276 329.48	20.91	37.80	32	SHALLOW AQUIFER
E1(s)	659 349.54	276 329.48	20.91	20.05	32	DEEP AQUIFER
E2(s)	659 667.30	276 354.69	13.15	15.24	32	SHALLOW AQUIFER
E2(d)	659 667.30	276 354.69	13.15	28.66	32	DEEP AQUIFER
F1	659 037.10	276 925.50	18.90	15.0	50	SHALLOW AQUIFER LEACHATE IRRIGATION
F2	659 105.00	276 218.00	13.50	10.2	50	SHALLOW AQUIFER LEACHATE IRRIGATION
F3	658 951.70	276 434.00	16.70	10.5	50	SHALLOW AQUIFER LEACHATE IRRIGATION
G1(s) [4]	658 786.00	277 046.00	24	15	50	SHALLOW AQUIFER BACKGROUND
G1(d) [4]	658 786.00	277 046.00	24	31.5	50	DEEP AQUIFER BACKGROUND
G2 [4]	659 673.00	276 835.00	8	4	50	SHALLOW AQUIFER
D3(r) REINSTATED [4]	658 953.00	276 552.00	18	10	50	EARLY DETECTION
COORDINATES FOR BORE HOLES BELOW ARE APPROXIMATE ONLY						
BHXS1	659 797.20	276 617.30	-	4	50	SHALLOW AQUIFER
BHXS2	659 620.80	276 984.30	-	4	50	SHALLOW AQUIFER
BHXD1	659 741.00	276 262.60	-	35	50	DEEP AQUIFER
COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC DATUM 1949: WANGANUI CIRCUIT						

LEGEND

- MONITORING SAMPLING LOCATION
- 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

NOTES:

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

NOT FOR CONSTRUCTION

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRN	CHK	APP	DATE
D	FOR INFORMATION - BORROW AREA 2 RELOCATED, DEFINED AREAS OF FUTURE STAGES 1B, 4 AND 5	BCJ	PSL	PSL	01.06.21
C	FOR INFORMATION - BORROW AREA AND LANDFILL AREA UPDATES AND BORE HOLES AND SAMPLING LOCATIONS ADDED FOR HOKIO STREAM AND TATANA DRAIN	BCJ	PSL	PSL	24.03.21
B	FOR INFORMATION - BORROW AREA AND LANDFILL AREA UPDATES	BCJ	PSL	PSL	22.09.20
A	FOR INFORMATION	BCJ	PSL	PSL	26.08.19

SURVEYED	MWH	
DESIGNED	N/A	-
DRAWN	Brent James	08.2019
CAD REVIEW	Brent James	23.03.21
APPROVED	Phil Landmark	01.06.21
PROF REGISTRATION:		

Stantec

Client:

HOROWHENUA DISTRICT COUNCIL
LEVIN LANDFILL

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

Status Stamp: FOR INFORMATION ONLY
Date Stamp: 01.06.21
Scales: 1:2000 (A1) 1:4000 (A3)
Drawing No.: 310101088-19-001-G001
Rev.: D

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

pw:\\stantec-ap-pw.bentley.com:stantec-ap-pw-01\Documents\New Zealand Clients\Horowhenua District Council\80500724 (310101088) - Levin Landfill Volumes\2019\General\310101088-19-001-G001

APPENDIX B SAMPLING SCHEDULE

LEVIN LANDFILL - SUMMARY OF SURFACE AND GROUNDWATER MONITORING REQUIREMENTS (July 2021 - April 2024).

(The testing regime is based on Consent Conditions following the completion of the 2015 Resource Consent Review process).

Reports Due		Sampling Month	Table A (Condition 3, DP 6010)	Table B (Condition 3, DP 6010)																						Table C (Condition 3, DP 6010)						
			Deep Aquifer Bores	Shallow Aquifer Bores																		Irrigation Bores				Hokio Stream[4]				Tatana Drain	Leachate Pond[5]	
Annual	Quarterly		C2dd	E1d	E2d	G1d	Xd1	D3rd[1]	C1	C2	C2ds	D4	B1	B2	B3s	E1s	E2s	D1[2]	D2[2]	D3rs[1,2]	D6[2]	G1s	G2s	Xs1	Xs2	D5[3]	F1[3]	F2[3]	F3[3]	HS1	HS1A	HS2	HS3	TD1		
Sep-21	**Aug-21**	**Jul-21**	I	I + SW	I	I	C	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	C	C	I	I	I	I + SW	Monthly Compre. To 03/2022				I	Monthly Compre.	
	Nov-21	**Oct-21**	I	I + SW	I	I	C	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	C	C	I	I	I	I + SW					C		A
	Feb-22	**Jan-22**	I	I + SW	I	I	C	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	C	C	I	I	I	I + SW					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 + A	C + A		C	C	C	C	C + A	
Sep-22	**Aug-22**	**Jul-22**	I	I + SW	I	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	I	I	I	I	I	I + SW	Discontinue after 2 years, i.e. after March 2022	I	I	I	I	I	
	Nov-22	**Oct-22**	I	I + SW	I	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	I	I	I	I	I	I + SW		C	C	C	C	C	
	Feb-23	**Jan-23**	I	I + SW	I	I	I	C	I	I	I	I + SW	I	I	I	I + SW	I + SW	I	I + SW	C + SW	I	I + SW	I	I	I	I	I	I	I + SW		I	I	I	I	I	
	May-23	**Apr-23**	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		C	C	C	C	C	
Sep-23	**Aug-23**	**Jul-23**	I	I + SW	I	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		I	I	I	I	I	
	Nov-23	**Oct-23**	I	I + SW	I	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		C	C	C	C	C	
	Feb-24	**Jan-24**	I	I + SW	I	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		I	I	I	I	I	
	May-24	**Apr-24**	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		C	C	C	C	C	
			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) Replacement bore D3r consists of two nested piezometers that have been calledL D3rs and D3rd.
(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 signficant 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
	electrical conductivity (EC)
Oxygen demand	COD and $scBOD_5$
Nutrients*	NO3-N and NH4-N
Metals*	AL, Mn, Ni, Pb and Hg
Other elements	B and Cl
Biological+	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

eurofins | ELS

Eurofins ELS Limited

Analytical Report

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

Report Number: 21/13721
Issue: 1
13 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/13721-01	Levin Leachate Pond		17/06/2021 00:00	23/06/2021 08:25	0

Notes: 213697-0 Levin Landfill Sample

	Test	Result	Units	Test Date	Signatory
0001	pH	8.0		24/06/2021	Jennifer Mont KTP
0002	Suspended Solids - Total	21	g/m³	23/06/2021	Gordon McArthur KTP
0040	Total (NP) Organic Carbon	589	g/m³	25/06/2021	Sharon van Soest KTP
0052	Alkalinity - Total	5,710	g CaCO3/m³	25/06/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	1,410	mS/m	24/06/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	4,970	g/m³	23/06/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	66	g/m³	23/06/2021	Marylou Cabral KTP
0602	Chloride	1,130	g/m³	25/06/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	10.4	g/m³	25/06/2021	Divina Lagazon KTP
0607	Sulphate	137	g/m³	25/06/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	1,200	g/m³	23/06/2021	Divina Lagazon KTP
1642	Total Hardness	595	g CaCO3/m³	26/06/2021	Edwin Lowe KTP
1810	Calcium - Dissolved	124	g/m³	26/06/2021	Edwin Lowe KTP
1819	Iron - Dissolved	5.34	g/m³	26/06/2021	Edwin Lowe KTP
1822	Magnesium - Dissolved	68.9	g/m³	26/06/2021	Edwin Lowe KTP
1834	Sodium - Dissolved	1,200	g/m³	26/06/2021	Edwin Lowe KTP
2088	Dissolved Reactive Phosphorus	10.6	g/m³	23/06/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	1.07	g/m³	26/06/2021	Sharon van Soest KTP
6703	Arsenic - Dissolved	0.684	g/m³	26/06/2021	Sharon van Soest KTP
6707	Boron - Dissolved	16.8	g/m³	26/06/2021	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	26/06/2021	Sharon van Soest KTP
6711	Chromium - Dissolved	1.10	g/m³	26/06/2021	Sharon van Soest KTP
6713	Copper - Dissolved	0.0375	g/m³	26/06/2021	Sharon van Soest KTP
6718	Lead - Dissolved	0.0064	g/m³	26/06/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	1.92	g/m³	26/06/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	26/06/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.211	g/m³	26/06/2021	Sharon van Soest KTP
6726	Potassium - Dissolved	1,200	g/m³	26/06/2021	Sharon van Soest KTP
6738	Zinc - Dissolved	0.210	g/m³	26/06/2021	Sharon van Soest KTP
M0104	E. coli	200	cfu/100mL	23/06/2021	Yuemei Yu KTP
MO-5001	Volatile Fatty Acids	< 50 *	g/m³		Prashilla Singh Transcribed by
MO-5002	Total Halogenated Phenolics	< 0.05	g/m³		Prashilla Singh Transcribed by
P1859	Sample Filtration	Completed		23/06/2021	Harsimran Dhanoa .

Comments:

***** Not an accredited test.

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
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/m³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO3/m³
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³

Test	Methodology	Detection Limit
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO3/m³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Volatile Fatty Acids	Performed by Eurofins Melbourne following Method: LTM-ORG-2360 Determination of Volatile Fatty Acids in Water by GC-MS. Results are reported as acetic acid equivalent.	5 g/m³
Total Halogenated Phenolics	Analyses at Eurofins Melbourne following Method LTM-INO-4050 Total Phenolics in Waters and solids by CFA	0.05 g/m³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

Unless otherwise stated, all tests are performed in Wellington.
The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.
"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.
For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/13722
Issue: 1
07 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/13722-01	Levin HS1		01/06/2021 00:00	23/06/2021 08:25	0

Notes: 213698-0 Levin Landfill Sample

	Test	Result	Units	Test Date	Signatory
0001	pH	7.7		24/06/2021	Jennifer Mont KTP
0002	Suspended Solids - Total	12	g/m³	23/06/2021	Gordon McArthur KTP
0040	Total (NP) Organic Carbon	5.0	g/m³	25/06/2021	Sharon van Soest KTP
0052	Alkalinity - Total	56	g CaCO3/m³	24/06/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	24.2	mS/m	24/06/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	< 15	g/m³	23/06/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 1	g/m³	23/06/2021	Marylou Cabral KTP
0602	Chloride	24.4	g/m³	25/06/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.65	g/m³	25/06/2021	Divina Lagazon KTP
0607	Sulphate	18.4	g/m³	25/06/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.01	g/m³	23/06/2021	Divina Lagazon KTP
1642	Total Hardness	62	g CaCO3/m³	23/06/2021	Edwin Lowe KTP
1810	Calcium - Dissolved	13.7	g/m³	23/06/2021	Edwin Lowe KTP
1819	Iron - Dissolved	0.016	g/m³	23/06/2021	Edwin Lowe KTP
1822	Magnesium - Dissolved	6.67	g/m³	23/06/2021	Edwin Lowe KTP
1834	Sodium - Dissolved	19.2	g/m³	23/06/2021	Edwin Lowe KTP
2088	Dissolved Reactive Phosphorus	0.010	g/m³	23/06/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.008	g/m³	23/06/2021	Sharon van Soest KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	23/06/2021	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	23/06/2021	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6713	Copper - Dissolved	0.0014	g/m³	23/06/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0165	g/m³	23/06/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0006	g/m³	23/06/2021	Sharon van Soest KTP
6726	Potassium - Dissolved	3.24	g/m³	23/06/2021	Sharon van Soest KTP
6738	Zinc - Dissolved	0.004	g/m³	23/06/2021	Sharon van Soest KTP
M0104	E. coli	110	cfu/100mL	23/06/2021	Yuemei Yu KTP
MO-5001	Volatile Fatty Acids	< 5 *	g/m³		Prashilla Singh Transcribed by
MO-5002	Total Halogenated Phenolics	< 0.05	g/m³		Prashilla Singh Transcribed by
P1859	Sample Filtration	Completed		23/06/2021	Harsimran Dhanoa .

Comments:

***** Not an accredited test.

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
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/m³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO3/m³
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³

Test	Methodology	Detection Limit
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO3/m³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 9222I: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 LTM-INO-4050 Total Phenolics in Waters and solids by CFA	0.05 g/m³
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.
For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/13723
Issue: 1
07 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/13723-01	Levin HS1A		01/06/2021 00:00	23/06/2021 08:25	0

Notes: 213699-0 Levin Landfill Sample

	Test	Result	Units	Test Date	Signatory
0001	pH	7.7		24/06/2021	Jennifer Mont KTP
0002	Suspended Solids - Total	112	g/m³	23/06/2021	Marylou Cabral KTP
0040	Total (NP) Organic Carbon	4.4	g/m³	25/06/2021	Sharon van Soest KTP
0052	Alkalinity - Total	53	g CaCO3/m³	24/06/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	23.8	mS/m	24/06/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	< 15	g/m³	23/06/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 1	g/m³	23/06/2021	Gordon McArthur KTP
0602	Chloride	23.5	g/m³	25/06/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.66	g/m³	25/06/2021	Divina Lagazon KTP
0607	Sulphate	18.3	g/m³	25/06/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	23/06/2021	Divina Lagazon KTP
1642	Total Hardness	58	g CaCO3/m³	23/06/2021	Edwin Lowe KTP
1810	Calcium - Dissolved	12.8	g/m³	23/06/2021	Edwin Lowe KTP
1819	Iron - Dissolved	0.019	g/m³	23/06/2021	Edwin Lowe KTP
1822	Magnesium - Dissolved	6.22	g/m³	23/06/2021	Edwin Lowe KTP
1834	Sodium - Dissolved	19.0	g/m³	23/06/2021	Edwin Lowe KTP
2088	Dissolved Reactive Phosphorus	0.010	g/m³	23/06/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.005	g/m³	23/06/2021	Sharon van Soest KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	23/06/2021	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	23/06/2021	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6713	Copper - Dissolved	0.0010	g/m³	23/06/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0125	g/m³	23/06/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6726	Potassium - Dissolved	2.93	g/m³	23/06/2021	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	23/06/2021	Sharon van Soest KTP
M0104	E. coli	110	cfu/100mL	23/06/2021	Yuemei Yu KTP
MO-5001	Volatile Fatty Acids	< 5 *	g/m³		Prashilla Singh Transcribed by
MO-5002	Total Halogenated Phenolics	< 0.05	g/m³		Prashilla Singh Transcribed by
P1859	Sample Filtration	Completed		23/06/2021	Harsimran Dhanoa .

Comments:

***** Not an accredited test.

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
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/m³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO3/m³
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³

Test	Methodology	Detection Limit
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO3/m³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 9222I: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 LTM-INO-4050 Total Phenolics in Waters and solids by CFA	0.05 g/m³
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.
For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/13724
Issue: 1
07 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/13724-01	Levin HS2		01/06/2021 00:00	23/06/2021 08:25	0

Notes: 213700-0 Levin Landfill Sample

	Test	Result	Units	Test Date	Signatory
0001	pH	7.7		24/06/2021	Jennifer Mont KTP
0002	Suspended Solids - Total	14	g/m³	23/06/2021	Gordon McArthur KTP
0040	Total (NP) Organic Carbon	4.6	g/m³	25/06/2021	Sharon van Soest KTP
0052	Alkalinity - Total	56	g CaCO3/m³	24/06/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	24.6	mS/m	24/06/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	< 15	g/m³	23/06/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 1	g/m³	23/06/2021	Marylou Cabral KTP
0602	Chloride	24.7	g/m³	25/06/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.78	g/m³	25/06/2021	Divina Lagazon KTP
0607	Sulphate	18.2	g/m³	25/06/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.09	g/m³	23/06/2021	Divina Lagazon KTP
1642	Total Hardness	63	g CaCO3/m³	23/06/2021	Edwin Lowe KTP
1810	Calcium - Dissolved	14.0	g/m³	23/06/2021	Edwin Lowe KTP
1819	Iron - Dissolved	0.020	g/m³	23/06/2021	Edwin Lowe KTP
1822	Magnesium - Dissolved	6.73	g/m³	23/06/2021	Edwin Lowe KTP
1834	Sodium - Dissolved	21.2	g/m³	23/06/2021	Edwin Lowe KTP
2088	Dissolved Reactive Phosphorus	0.011	g/m³	23/06/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.004	g/m³	23/06/2021	Sharon van Soest KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	23/06/2021	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	23/06/2021	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	23/06/2021	Sharon van Soest KTP
6713	Copper - Dissolved	0.0009	g/m³	23/06/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0231	g/m³	23/06/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	23/06/2021	Sharon van Soest KTP
6726	Potassium - Dissolved	3.25	g/m³	23/06/2021	Sharon van Soest KTP
6738	Zinc - Dissolved	0.010	g/m³	23/06/2021	Sharon van Soest KTP
M0104	E. coli	140	cfu/100mL	23/06/2021	Yuemei Yu KTP
MO-5001	Volatile Fatty Acids	< 5 *	g/m³		Prashilla Singh Transcribed by
MO-5002	Total Halogenated Phenolics	< 0.05	g/m³		Prashilla Singh Transcribed by
P1859	Sample Filtration	Completed		23/06/2021	Harsimran Dhanoa .

Comments:

***** Not an accredited test.

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
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/m³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO3/m³
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³

Test	Methodology	Detection Limit
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO3/m³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 9222I: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 LTM-INO-4050 Total Phenolics in Waters and solids by CFA	0.05 g/m³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

Interim

Downer EDI Levin - Landfill

P O Box 642
LEVIN 5540
Attention: Bruce Marshall

Report Number: 21/13725

Issue: 1
01 June 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/13725-01	Levin HS3		01/06/2021 00:00		0

Notes: 213701-0 Levin Landfill Sample

	Test	Result	Units	Test Date	Signatory
0001	pH	Not Available			
0002	Suspended Solids - Total	Not Available	g/m³		
0040	Total (NP) Organic Carbon	Not Available	g/m³		
0052	Alkalinity - Total	Not Available	g CaCO3/m³		
0055	Conductivity at 25°C	Not Available	mS/m		
0081	Chemical Oxygen Demand	Not Available	g/m³		
0180	BOD5 - Soluble Carbonaceous	Not Available	g/m³		
0602	Chloride	Not Available	g/m³		
0605	Nitrate - Nitrogen	Not Available	g/m³		
0607	Sulphate	Not Available	g/m³		
0760	Ammonia Nitrogen	Not Available	g/m³		
1642	Total Hardness	Not Available	g CaCO3/m³		
1810	Calcium - Dissolved	Not Available	g/m³		
1819	Iron - Dissolved	Not Available	g/m³		
1822	Magnesium - Dissolved	Not Available	g/m³		
1834	Sodium - Dissolved	Not Available	g/m³		
2088	Dissolved Reactive Phosphorus	Not Available	g/m³		
6701	Aluminium - Dissolved	Not Available	g/m³		
6703	Arsenic - Dissolved	Not Available	g/m³		
6707	Boron - Dissolved	Not Available	g/m³		
6708	Cadmium - Dissolved	Not Available	g/m³		
6711	Chromium - Dissolved	Not Available	g/m³		
6713	Copper - Dissolved	Not Available	g/m³		
6718	Lead - Dissolved	Not Available	g/m³		
6721	Manganese - Dissolved	Not Available	g/m³		
6722	Mercury - Dissolved	Not Available	g/m³		
6724	Nickel - Dissolved	Not Available	g/m³		
6726	Potassium - Dissolved	Not Available	g/m³		
6738	Zinc - Dissolved	Not Available	g/m³		
M0104	E. coli	Not Available	cfu/100mL		
MO-5001	Volatile Fatty Acids	Not Available *	g/m³		
MO-5002	Total Halogenated Phenolics	Not Available	g/m³		
P1859	Sample Filtration	Not Available			

Comments:

* Not an accredited test.

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
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/m³
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m³
Alkalinity - Total	APHA Online Edition Method 2320 B	1 g CaCO3/m³
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³

Test	Methodology	Detection Limit
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Sulphate	Ion Chromatography following APHA 4110B.	0.02 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA Online Edition Method 3120 B (modified).	1 g CaCO3/m³
Calcium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA Online Edition Method 3120 B (modified).	0.02 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G.	0.005 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Arsenic - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Cadmium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Zinc - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
E. coli	APHA 9222I: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 LTM-INO-4050 Total Phenolics in Waters and solids by CFA	0.05 g/m³
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17686
Issue: 1
22 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17686-01	Levin C2dd		16/07/2021 00:00	16/07/2021 14:17	0

Notes: 217257-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.6		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	55.3	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	18	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	17/07/2021	Marylou Cabral KTP
0602	Chloride	42.3	g/m³	19/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	19/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.35	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.07	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.641	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	16/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		17/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17687
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17687-01	Levin E1d		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217258-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.7		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	43.6	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	75	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	40.4	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.28	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.006	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	21/07/2021	Sharon van Soest KTP
6717	Iron - Dissolved	0.19	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	0.0151	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.280	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0007	g/m³	21/07/2021	Sharon van Soest KTP
6731	Sodium - Dissolved	36.6	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	200	cfu/100mL	20/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17688
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17688-01	Levin E2d		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217259-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.7		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	44.2	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	< 15	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	40.7	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.26	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.06	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.405	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17689
Issue: 1
21 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17689-01	Levin G1D		15/07/2021 00:00	15/07/2021 14:00	0

Notes: 217260-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.2		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	28.2	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	18	g/m³	16/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 1	g/m³	16/07/2021	Gordon McArthur KTP
0602	Chloride	32.2	g/m³	19/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	19/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.08	g/m³	16/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.009	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	0.0021	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0602	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	15/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		15/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17690
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17690-01	Levin Xd1		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217261-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.6		22/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	53.8	mS/m	22/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	34	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	57.2	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.39	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.07	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.486	g/m³	23/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17691
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17691-01	Levin C1		21/07/2021 00:00	21/07/2021 13:51	0

Notes: 217262-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.0		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	99.9	mS/m	22/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	43	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	128	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	1.97	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.013	g/m³	22/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.84	g/m³	22/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.279	g/m³	22/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0009	g/m³	22/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	21/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		21/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17692
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17692-01	Levin C2		21/07/2021 00:00	21/07/2021 13:51	0

Notes: 217263-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.3		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	228	mS/m	22/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	132	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	127	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	149	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.018	g/m³	22/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	1.66	g/m³	22/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0411	g/m³	22/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0043	g/m³	22/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	21/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		21/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17693
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17693-01	Levin C2ds		21/07/2021 00:00	21/07/2021 13:51	0

Notes: 217264-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.2		23/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	105	mS/m	23/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	89	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	66.5	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	1.28	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.003	g/m³	22/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.87	g/m³	22/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	1.52	g/m³	22/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	22/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0025	g/m³	22/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	21/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		21/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17694
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17694-01	Levin D4		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217265-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.0		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	29.6	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	16	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	35.6	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.25	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.002	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.03	g/m³	21/07/2021	Sharon van Soest KTP
6717	Iron - Dissolved	0.71	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.213	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6731	Sodium - Dissolved	31.9	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Analytical Report

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

Report Number: 21/17695
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17695-01	Levin B1		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217266-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.0		22/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	185	mS/m	22/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	92	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	263	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	6.85	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	10.1	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.007	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	1.38	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	8.53	g/m³	28/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0041	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17696
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17696-01	Levin B2		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217267-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.9		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	185	mS/m	22/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	98	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	122	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	27.3	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	33.5	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.011	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	1.67	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	2.47	g/m³	28/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0027	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17697
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17697-01	Levin B3s		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217268-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.5		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	254	mS/m	22/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	369	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	154	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	174	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.005	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	1.23	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	2.59	g/m³	28/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0091	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17698
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17698-01	Levin E1s		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217269-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.1		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	25.8	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	19	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	26.6	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.19	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.007	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	< 0.03	g/m³	21/07/2021	Sharon van Soest KTP
6717	Iron - Dissolved	4.93	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	0.0008	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.242	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0007	g/m³	21/07/2021	Sharon van Soest KTP
6731	Sodium - Dissolved	27.5	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17699
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17699-01	Levin E2s		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217270-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.8		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	33.1	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	< 15	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	39.8	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.32	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	< 0.03	g/m³	21/07/2021	Sharon van Soest KTP
6717	Iron - Dissolved	0.04	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.239	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6731	Sodium - Dissolved	30.9	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17700
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17700-01	Levin D1		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217271-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.8		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	44.3	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	< 15	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	32.4	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	9.68	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	21/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17703
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17703-01	Levin D6		19/07/2021 00:00	20/07/2021 07:46	0

Notes: 217274-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.9		20/07/2021	Gordon McArthur KTP
0055	Conductivity at 25°C	40.4	mS/m	20/07/2021	Gordon McArthur KTP
0081	Chemical Oxygen Demand	< 15	g/m³	20/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	21/07/2021	Gordon McArthur KTP
0602	Chloride	22.6	g/m³	22/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	17.5	g/m³	22/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	20/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	< 0.002	g/m³	21/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.04	g/m³	21/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	21/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	20/07/2021	Yuemei Yu KTP
P1859	Sample Filtration	Completed		20/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17705
Issue: 1
21 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17705-01	Levin G2s		15/07/2021 00:00	16/07/2021 08:56	0

Notes: 217276-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.7		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	222	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	89	g/m³	16/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	16/07/2021	Gordon McArthur KTP
0602	Chloride	481	g/m³	20/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	20/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.02	g/m³	16/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.005	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	1.05	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.272	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0035	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	16/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		16/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17706
Issue: 1
21 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17706-01	Levin D5		15/07/2021 00:00	16/07/2021 08:56	0

Notes: 217277-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.0		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	30.5	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	2,820	g/m³	16/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	16/07/2021	Gordon McArthur KTP
0602	Chloride	29.4	g/m³	19/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	1.34	g/m³	19/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	16/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.004	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.04	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0071	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	17/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		16/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17707
Issue: 1
21 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17707-01	Levin F1		15/07/2021 00:00	16/07/2021 08:56	0

Notes: 217278-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.8		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	47.8	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	28	g/m³	16/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	16/07/2021	Gordon McArthur KTP
0602	Chloride	48.2	g/m³	19/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.67	g/m³	19/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	16/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.005	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.03	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0161	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0008	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	16/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		16/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17709
Issue: 1
21 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17709-01	Levin F3		15/07/2021 00:00	16/07/2021 08:56	0

Notes: 217280-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.9		16/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	21.8	mS/m	16/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	29	g/m³	16/07/2021	Gordon McArthur KTP
0180	BOD5 - Soluble Carbonaceous	< 3	g/m³	16/07/2021	Gordon McArthur KTP
0602	Chloride	19.2	g/m³	19/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	1.15	g/m³	19/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	16/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.007	g/m³	17/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	< 0.03	g/m³	17/07/2021	Sharon van Soest KTP
6717	Iron - Dissolved	< 0.01	g/m³	17/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	17/07/2021	Sharon van Soest KTP
6731	Sodium - Dissolved	25.7	g/m³	17/07/2021	Sharon van Soest KTP
M0104	E. coli	< 4	cfu/100mL	17/07/2021	Sunita Raju KTP
P1859	Sample Filtration	Completed		16/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Iron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.01 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
Sodium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified)	0.01 g/m³
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17710
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17710-01	Levin Xs1		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217281-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.6		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	91.4	mS/m	22/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	64	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	54.6	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	< 0.10	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	10.5	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.010	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.09	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	1.60	g/m³	28/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0008	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	20	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17711
Issue: 1
27 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17711-01	Levin Xs2		21/07/2021 00:00	22/07/2021 08:41	0

Notes: 217282-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	6.8		22/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	21.2	mS/m	22/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	< 15	g/m³	22/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	22/07/2021	Gordon McArthur KTP
0602	Chloride	18.0	g/m³	23/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.37	g/m³	23/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.07	g/m³	22/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.015	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.06	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.107	g/m³	23/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	12	cfu/100mL	22/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		22/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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For liquid samples g/m3 is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.
Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

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Eurofins ELS Limited

Analytical Report

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

Report Number: 21/17712
Issue: 1
29 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17712-01	Levin TD1		22/07/2021 00:00	23/07/2021 07:58	0

Notes: 217283-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.1		23/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	40.4	mS/m	23/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	81	g/m³	23/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	23/07/2021	Marylou Cabral KTP
0602	Chloride	61.6	g/m³	26/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	0.08	g/m³	26/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.63	g/m³	24/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.064	g/m³	23/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.11	g/m³	23/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0868	g/m³	23/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	23/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0011	g/m³	23/07/2021	Sharon van Soest KTP
M0104	E. coli	48	cfu/100mL	23/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		23/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17713
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17713-01	Levin Leachate Pond		22/07/2021 00:00	23/07/2021 07:58	0

Notes: 217284-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.6		23/07/2021	Jennifer Mont KTP
0055	Conductivity at 25°C	930	mS/m	23/07/2021	Jennifer Mont KTP
0081	Chemical Oxygen Demand	1,730	g/m³	23/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	70	g/m³	23/07/2021	Marylou Cabral KTP
0602	Chloride	876	g/m³	26/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	17.1	g/m³	26/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	720	g/m³	24/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.327	g/m³	24/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	4.57	g/m³	24/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	0.0027	g/m³	24/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	1.08	g/m³	24/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	30/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	0.0743	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	500	cfu/100mL	23/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		23/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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

Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17714
Issue: 1
29 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17714-01	Levin HS1A		22/07/2021 00:00	23/07/2021 07:58	0

Notes: 217285-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.4		23/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	20.6	mS/m	23/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	18	g/m³	23/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	23/07/2021	Marylou Cabral KTP
0602	Chloride	20.6	g/m³	26/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	1.25	g/m³	26/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.09	g/m³	24/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.021	g/m³	24/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	24/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0112	g/m³	24/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	180	cfu/100mL	23/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		23/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17715
Issue: 1
29 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17715-01	Levin HS2		22/07/2021 00:00	23/07/2021 07:58	0

Notes: 217286-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.3		23/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	20.8	mS/m	23/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	16	g/m³	23/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	23/07/2021	Marylou Cabral KTP
0602	Chloride	22.2	g/m³	26/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	1.27	g/m³	26/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.17	g/m³	24/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.024	g/m³	24/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	24/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0083	g/m³	24/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	210	cfu/100mL	23/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		23/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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Report Released By
Rob Deacon

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Analytical Report

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

Report Number: 21/17716
Issue: 1
30 July 2021

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
21/17716-01	Levin HS3		22/07/2021 00:00	23/07/2021 07:58	0

Notes: 217287-0 Levin Landfill

	Test	Result	Units	Test Date	Signatory
0001	pH	7.4		23/07/2021	Marylou Cabral KTP
0055	Conductivity at 25°C	20.9	mS/m	23/07/2021	Marylou Cabral KTP
0081	Chemical Oxygen Demand	< 15	g/m³	23/07/2021	Marylou Cabral KTP
0180	BOD5 - Soluble Carbonaceous	< 6	g/m³	23/07/2021	Marylou Cabral KTP
0602	Chloride	21.6	g/m³	26/07/2021	Divina Lagazon KTP
0605	Nitrate - Nitrogen	1.27	g/m³	26/07/2021	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.12	g/m³	24/07/2021	Divina Lagazon KTP
6701	Aluminium - Dissolved	0.027	g/m³	24/07/2021	Sharon van Soest KTP
6707	Boron - Dissolved	0.05	g/m³	24/07/2021	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
6721	Manganese - Dissolved	0.0123	g/m³	24/07/2021	Sharon van Soest KTP
6722	Mercury - Dissolved	< 0.0005	g/m³	30/07/2021	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	24/07/2021	Sharon van Soest KTP
M0104	E. coli	190	cfu/100mL	23/07/2021	Maria Norris KTP
P1859	Sample Filtration	Completed		23/07/2021	Emily Couper .

Comments:

Sampled by customer using ELS approved containers.

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

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA Online Edition Method 4500-H B.	0.1
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/m³
BOD5 - Soluble Carbonaceous	APHA Online Edition Method 5210 B. The sample is filtered through Whatman GFC and treated with nitrification inhibitor.	1 g/m³
Chloride	Ion Chromatography following APHA 4110B.	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following APHA 4110B.	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Aluminium - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.002 g/m³
Boron - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.03 g/m³
Lead - Dissolved	ICP-MS following APHA Online Edition method 3125 (modified).	0.0005 g/m³
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
E. coli	APHA 9222I:Online Edition	1 cfu/100mL
Sample Filtration	Sample filtered through 0.45 micron filter following APHA Online Edition Method 3030B.	n/a

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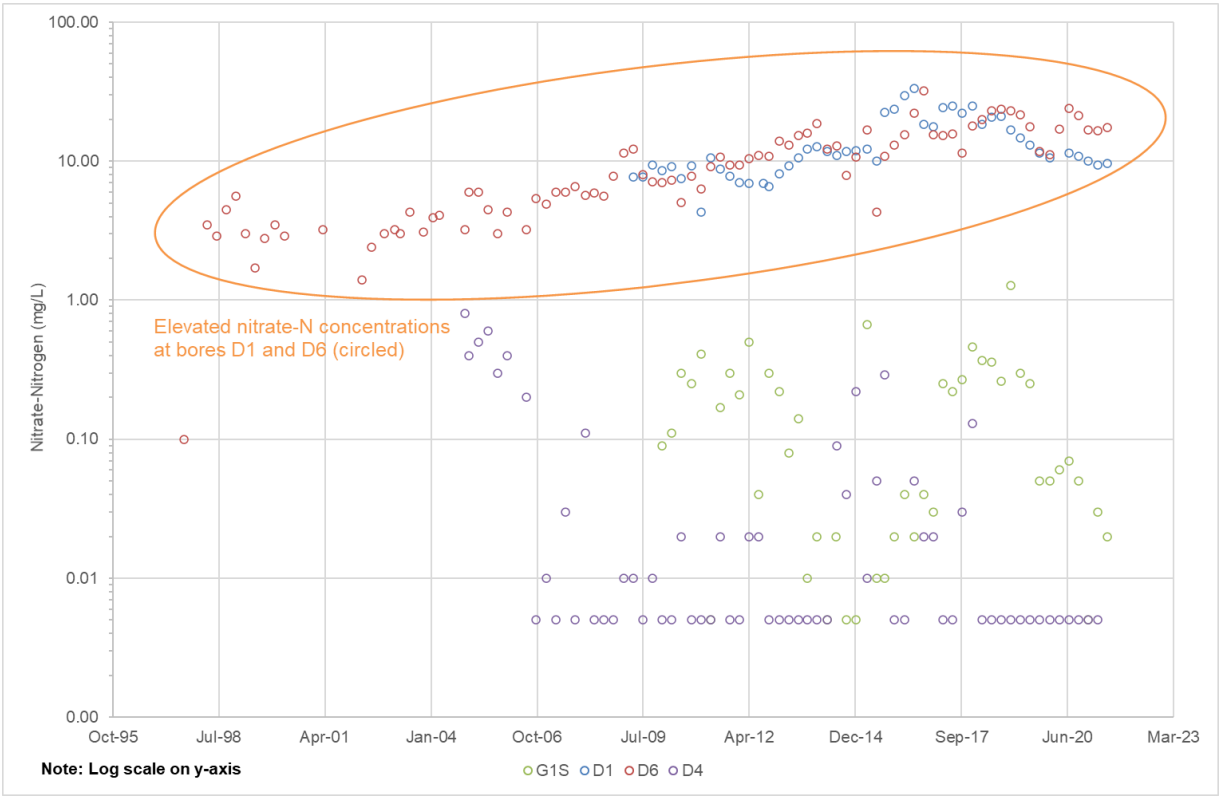
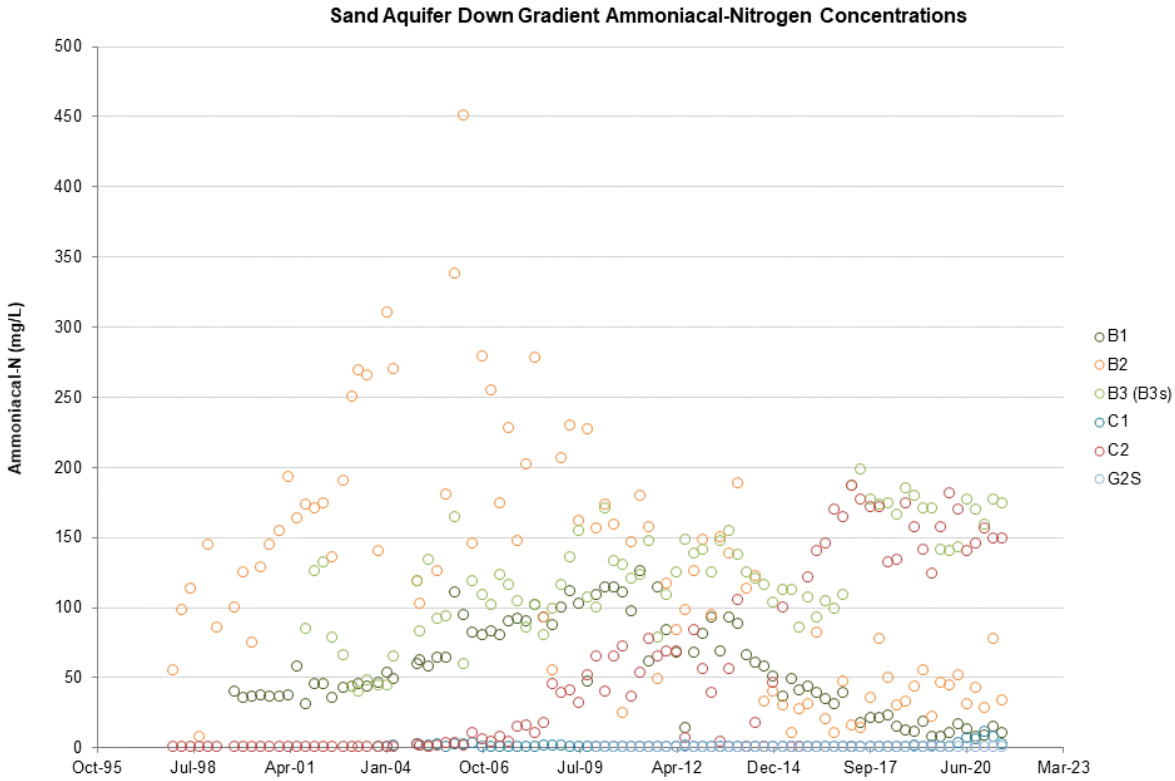
Report Released By
Rob Deacon

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.

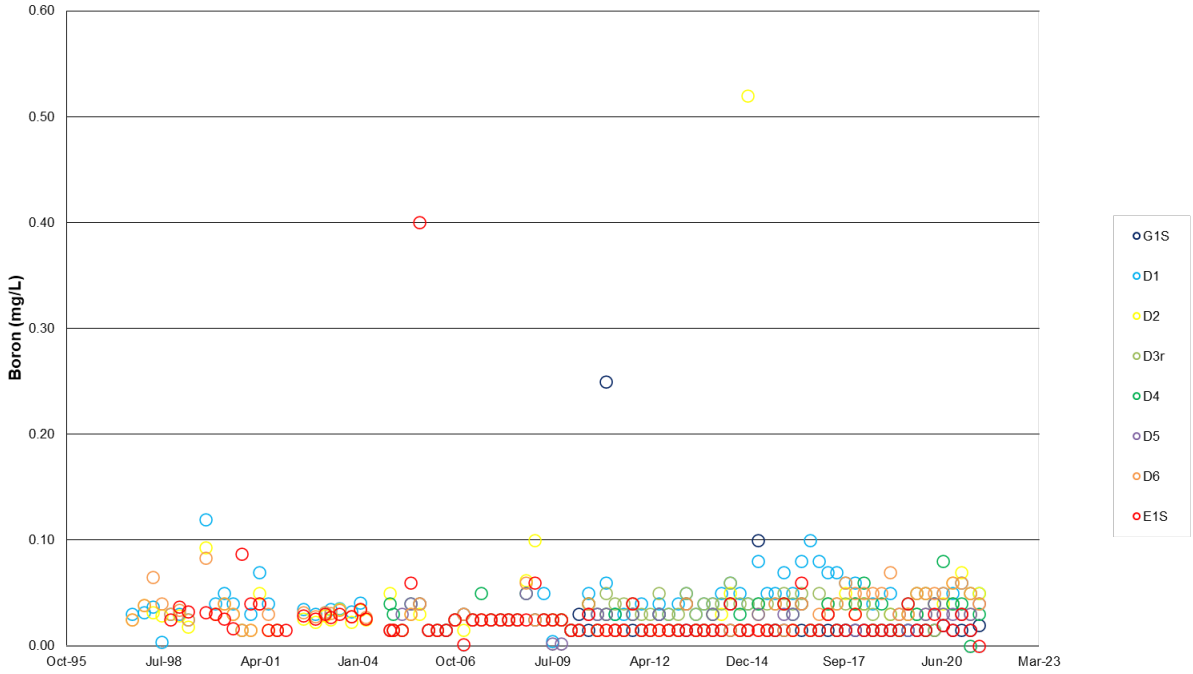
		HS3	D2	F2	G1s
Unit:	Date	1/06/2021 0:00	19/07/2021 12:30	15/07/2021 12:55	15/07/2021 9:50
g CaCO3/m³	Alkalinity - Total	57			
g/m³	Aluminium - Dissolved	0.004	0.017	0.003	0.077
g/m³	Ammonia Nitrogen - Add P1859 Filtration	0.03	0.52	0	0.05
g/m³	Arsenic - Dissolved	0			
g/m³	BOD - Soluble Carbonaceous	0.9	5.9	5.9	5.9
g/m³	Boron - Dissolved	0.06	0.05	0.04	0.02
g/m³	Cadmium - Dissolved	0.0001			
g/m³	Calcium - Dissolved by OES	14.3			
g/m³	Chemical Oxygen Demand	14.99	16	14.99	63
g/m³	Chloride - Add P1859 Filtration	24.6	33.5	23.3	119
g/m³	Chromium - Dissolved	0			
mS/m	Conductivity at 25Â°C - mS/m unit	24.5	41.4	21.8	53.5
g/m³	Copper - Dissolved	0.001			
g/m³	Dissolved Reactive Phosphorus - Add P1859 Filtration	0.012			
cfu/100mL	E. coli by MF - Environmental Water	120	3.9	3.9	3.9
	IC - 3 Elements	Completed	Completed	Completed	Completed
	ICP-MS - 16 Elements	Completed	Completed	Completed	Completed
g/m³	Iron - Dissolved by OES	0.022	18		2.68
g/m³	Lead - Dissolved	0.0004	0.0008	0.0004	0.0004
g/m³	Magnesium - Dissolved by OES	6.95			
g/m³	Manganese - Dissolved	0.0217	0.41	0.0252	0.0546
g/m³	Mercury - Dissolved	0.0004	0.0004	0.0004	0.0004
g/m³	Nickel - Dissolved	0.0004	0.0004	0.0004	0.0007
g/m³	Nitrate - Nitrogen - Add P1859 Filtration	0.76	0	0.13	0.02
	pH	7.7	6.8	7	6.6
g/m³	Potassium - Dissolved	3.12			
	Sample Filtration	Completed	Completed	Completed	Completed
g/m³	Sodium - Dissolved by OES	21.5	36.6		80.5
g/m³	Sulphate - Add P1859 Filtration	18.2			
g/m³	Suspended Solids - Total	9			
g CaCO3/m³	Total Hardness by OES requires Ca and Mg by ICPOES	64			
g/m³	Total Non-Purgeable Organic Carbon	4.7			
g/m³	Total Phenolics	0.04			
g/m³	Volatile Fatty Acids	4.9			
g/m³	Zinc - Dissolved	0.002			
	Unscheduled tests (if present)				

APPENDIX D HISTORICAL RESULTS GRAPHS

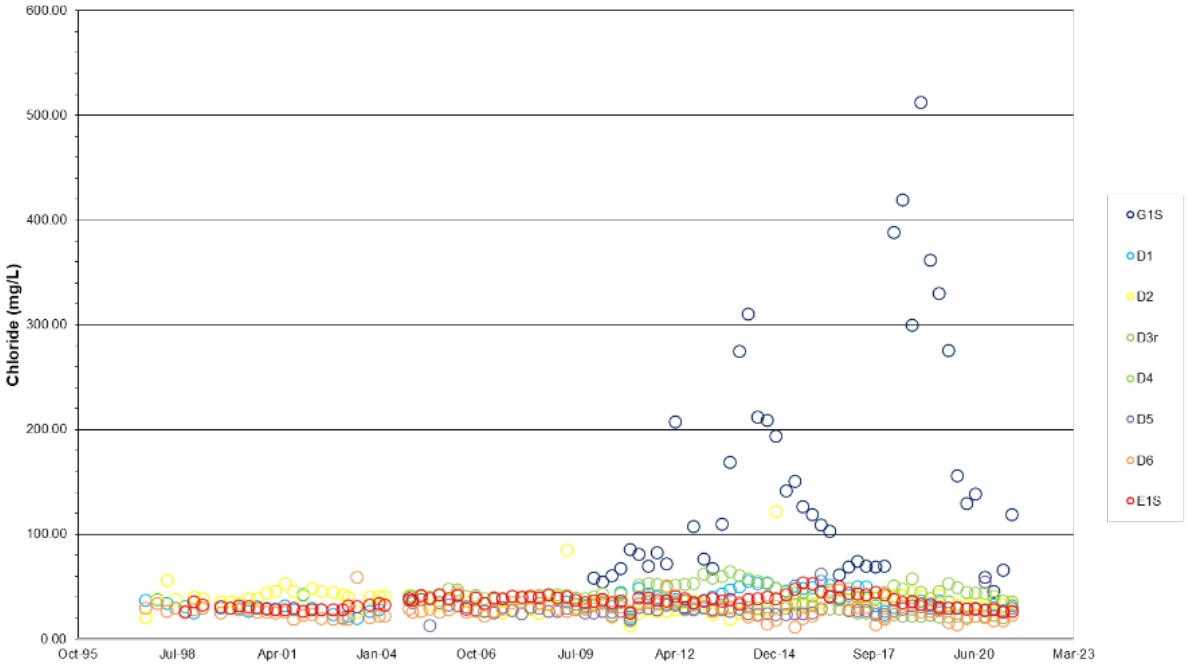

100.00
10.00
1.00
0.10
0.01
0.00
Nitrate-Nitrogen (mg/L)
Elevated nitrate-N concentrations
at bores D1 and D6 (circled)
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Note: Log scale on y-axis
G1S
D1
D6
D4


Sand Aquifer Down Gradient Ammoniacal-Nitrogen Concentrations
500
450
400
350
300
250
200
150
100
50
0
Ammoniacal-N (mg/L)
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C1
C2
G2S

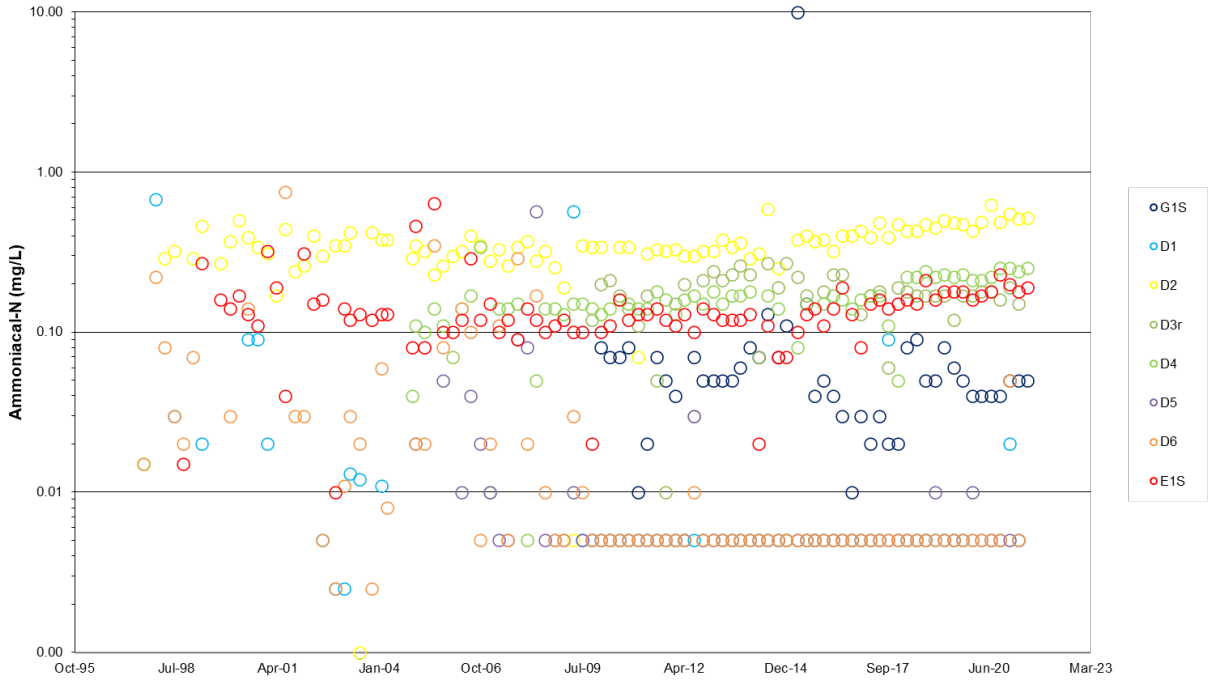
Sand Aquifer Downgrade of New Landfill - Boron Concentrations



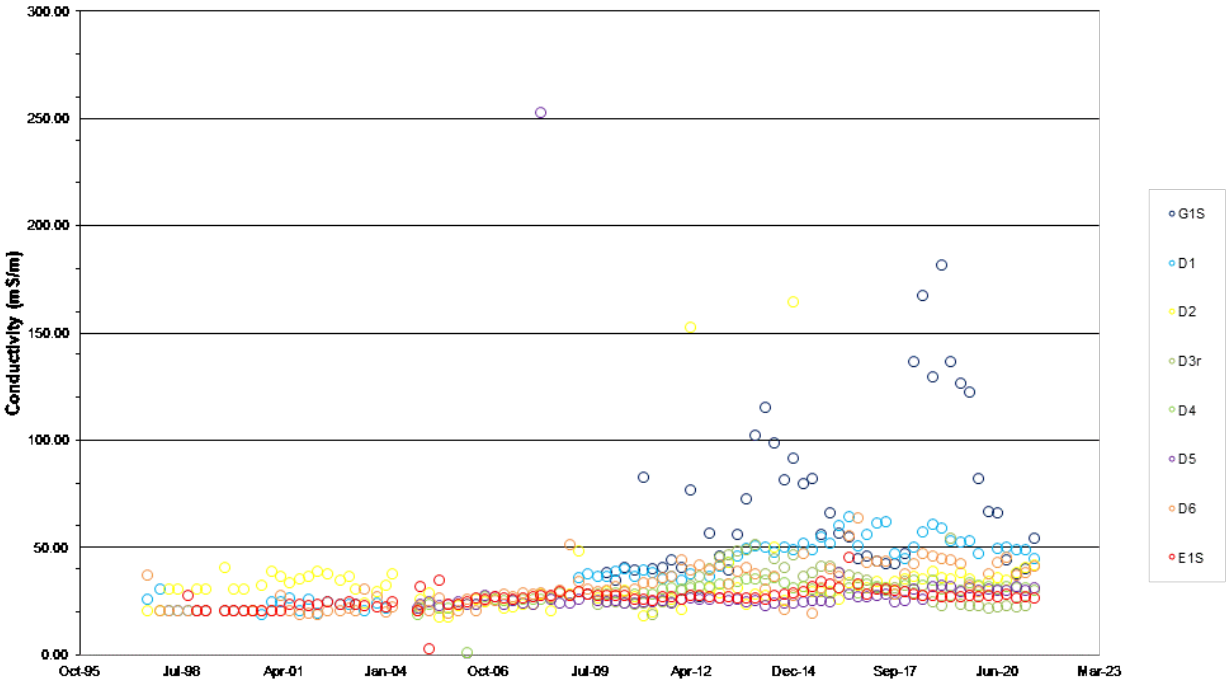
Sand Aquifer Downgrade of New Landfill - Chloride Concentrations

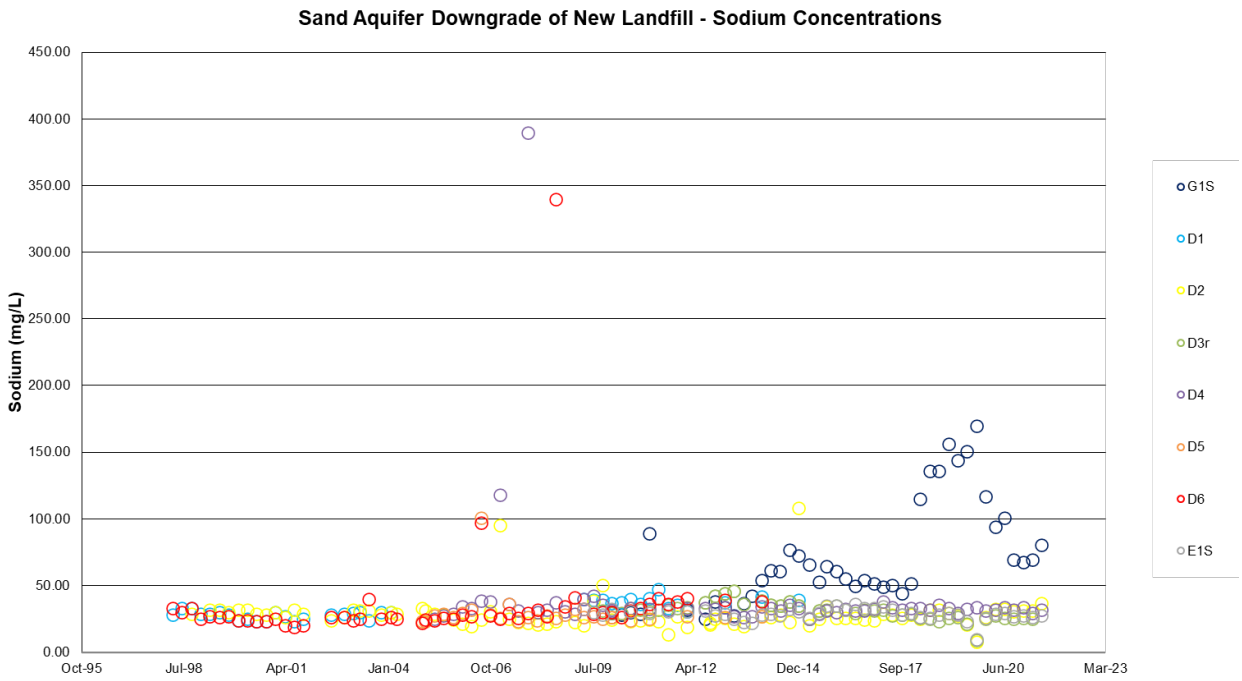


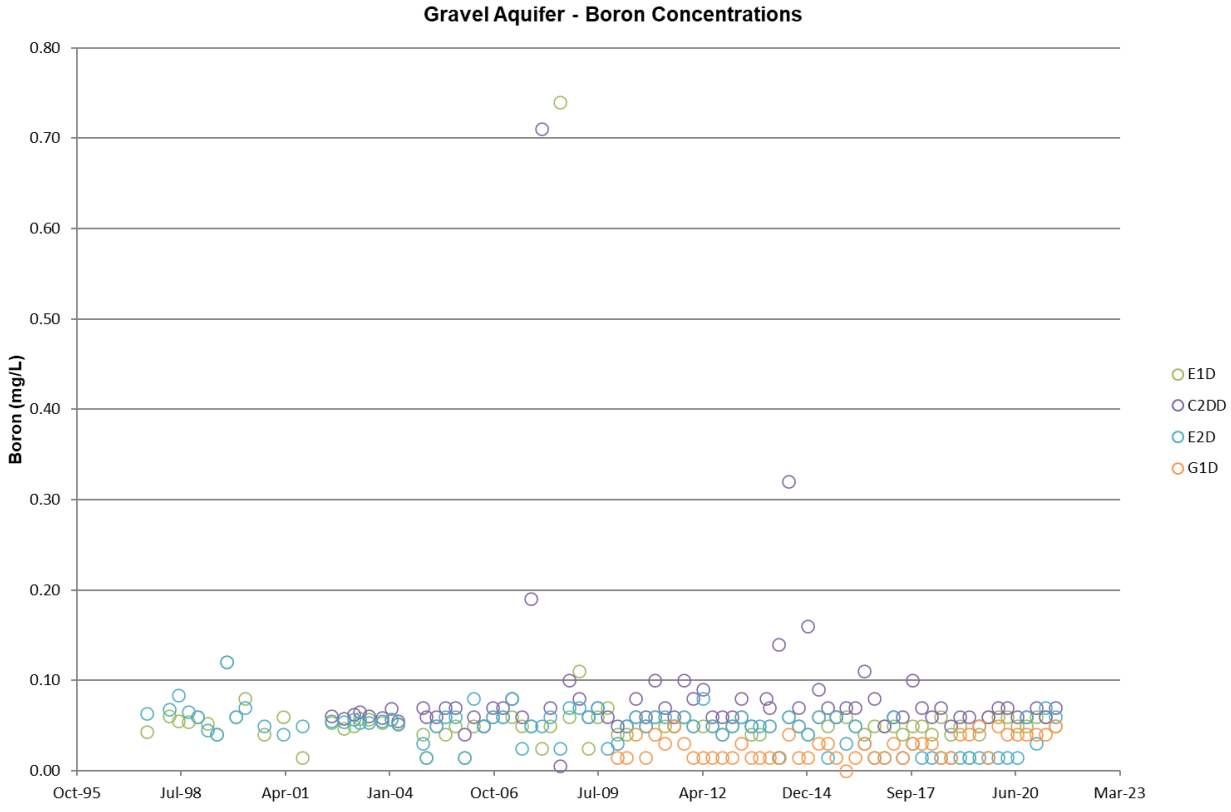
Sand Aquifer Downgrade of New Landfill - Ammoniacal-Nitrogen Concentrations

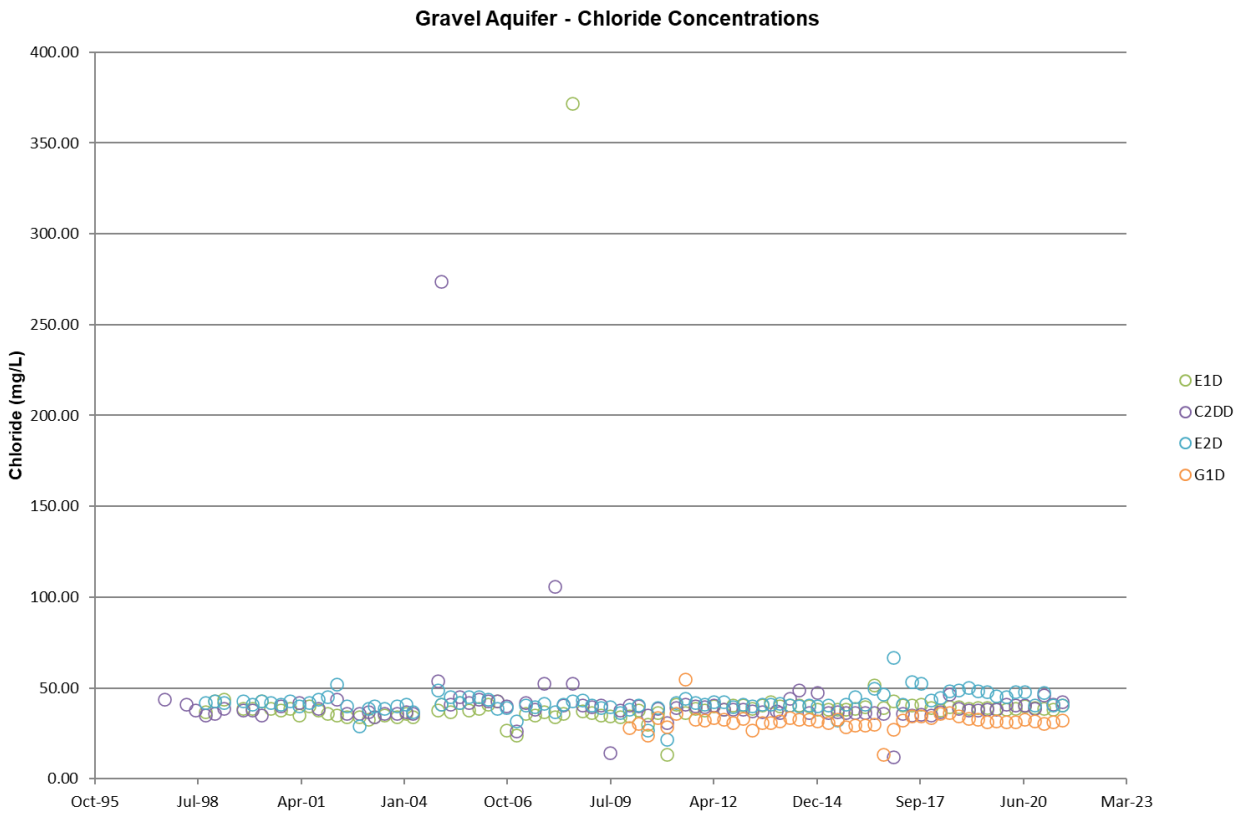


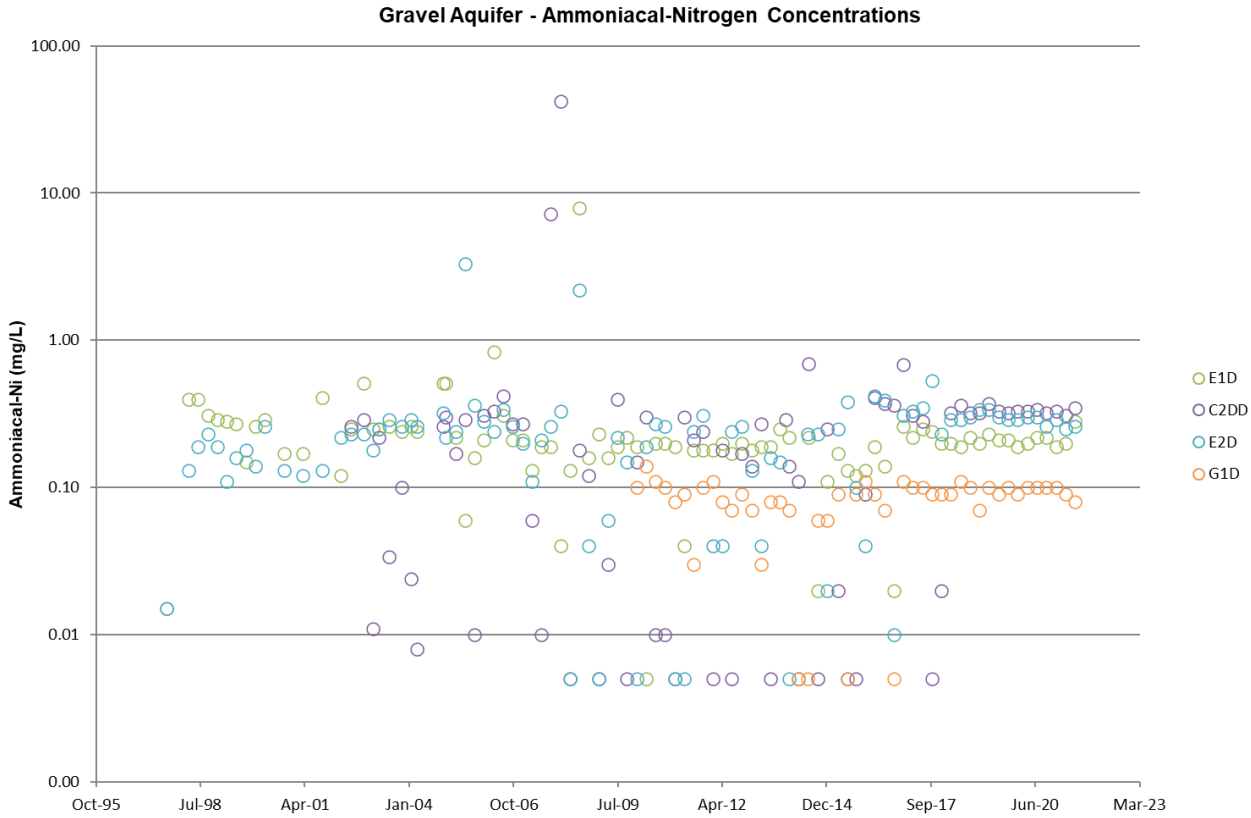
Sand Aquifer Downgrade of New Landfill - Conductivity Levels

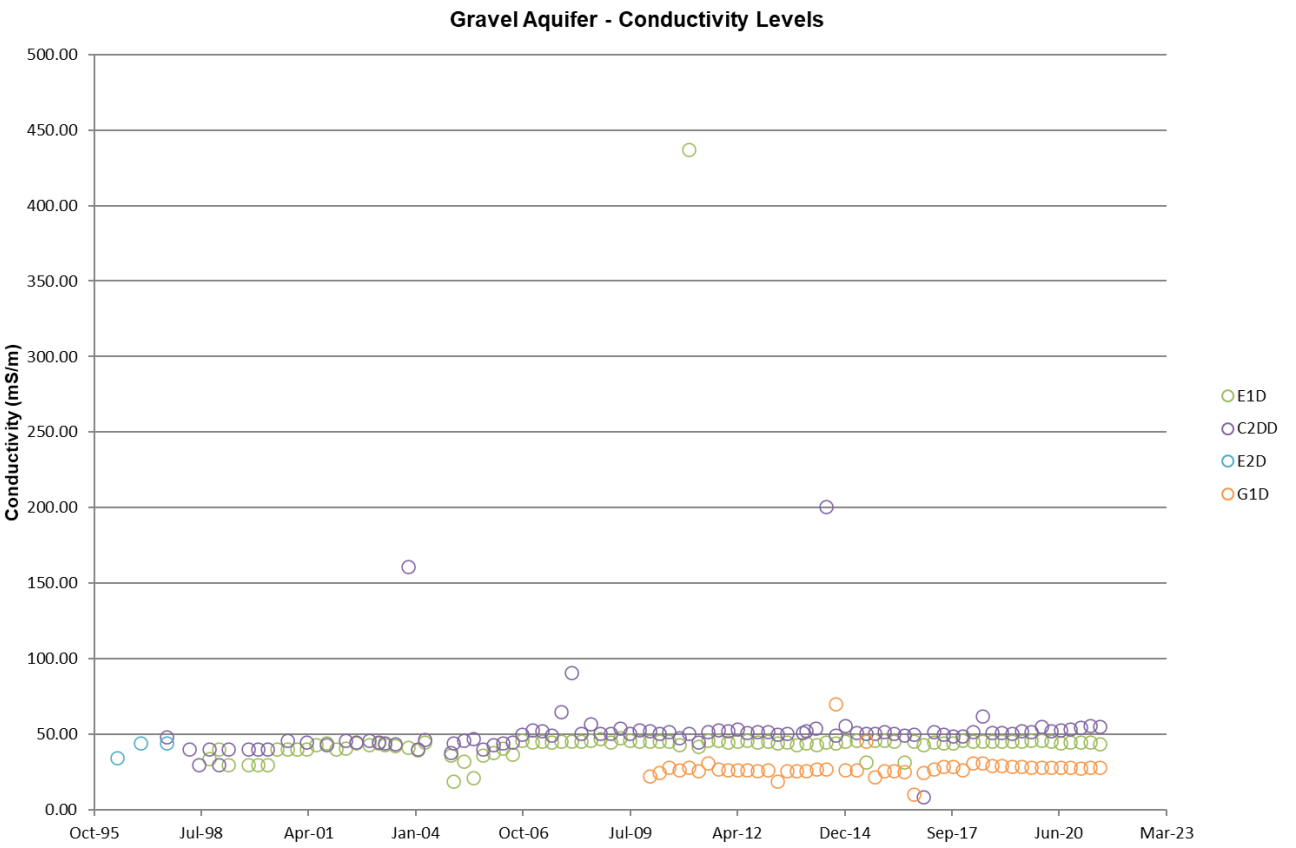


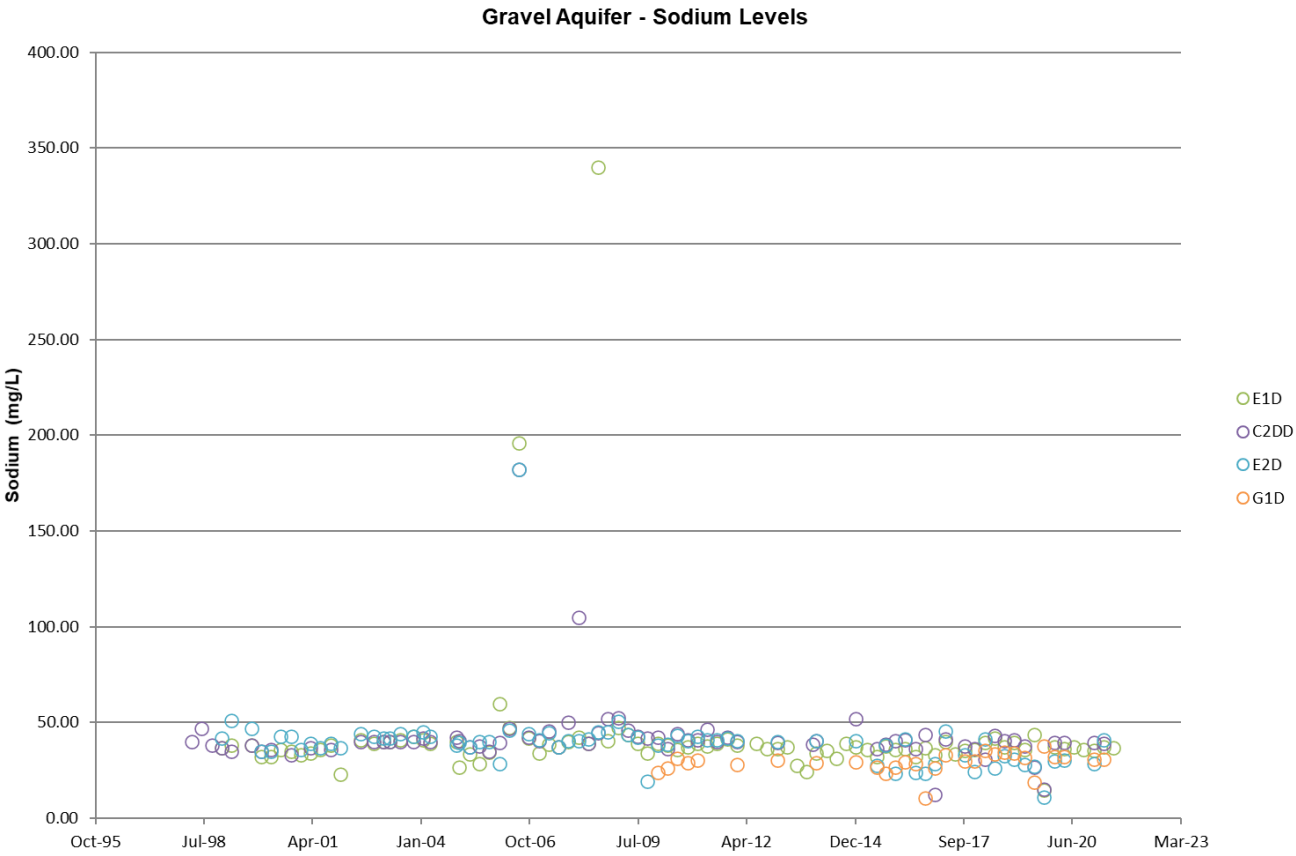

Sand Aquifer Downgrade of New Landfill - Sodium Concentrations
Sodium (mg/L)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
G1S
D1
D2
D3r
D4
D5
D6
E1S

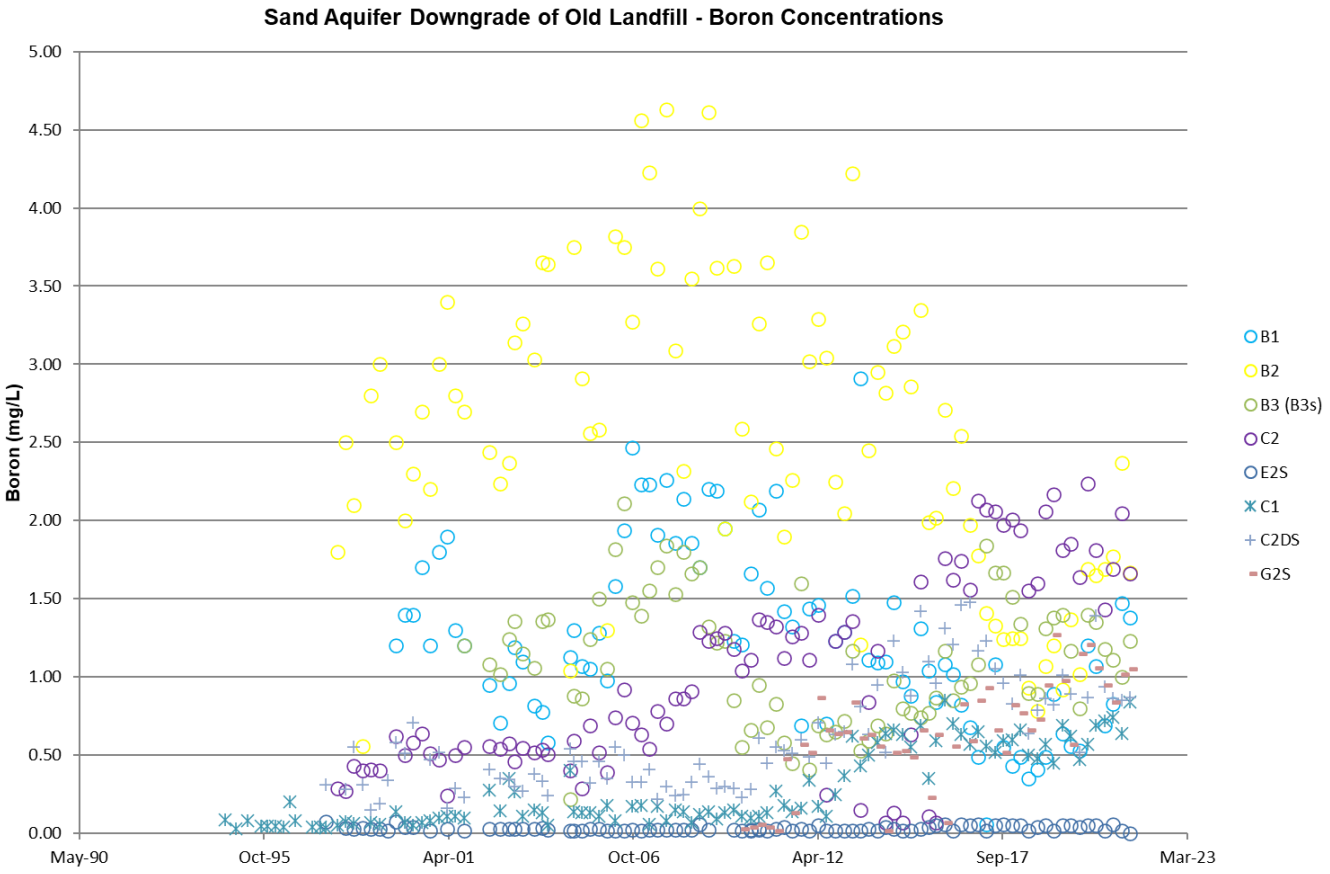

Gravel Aquifer - Boron Concentrations
Boron (mg/L)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

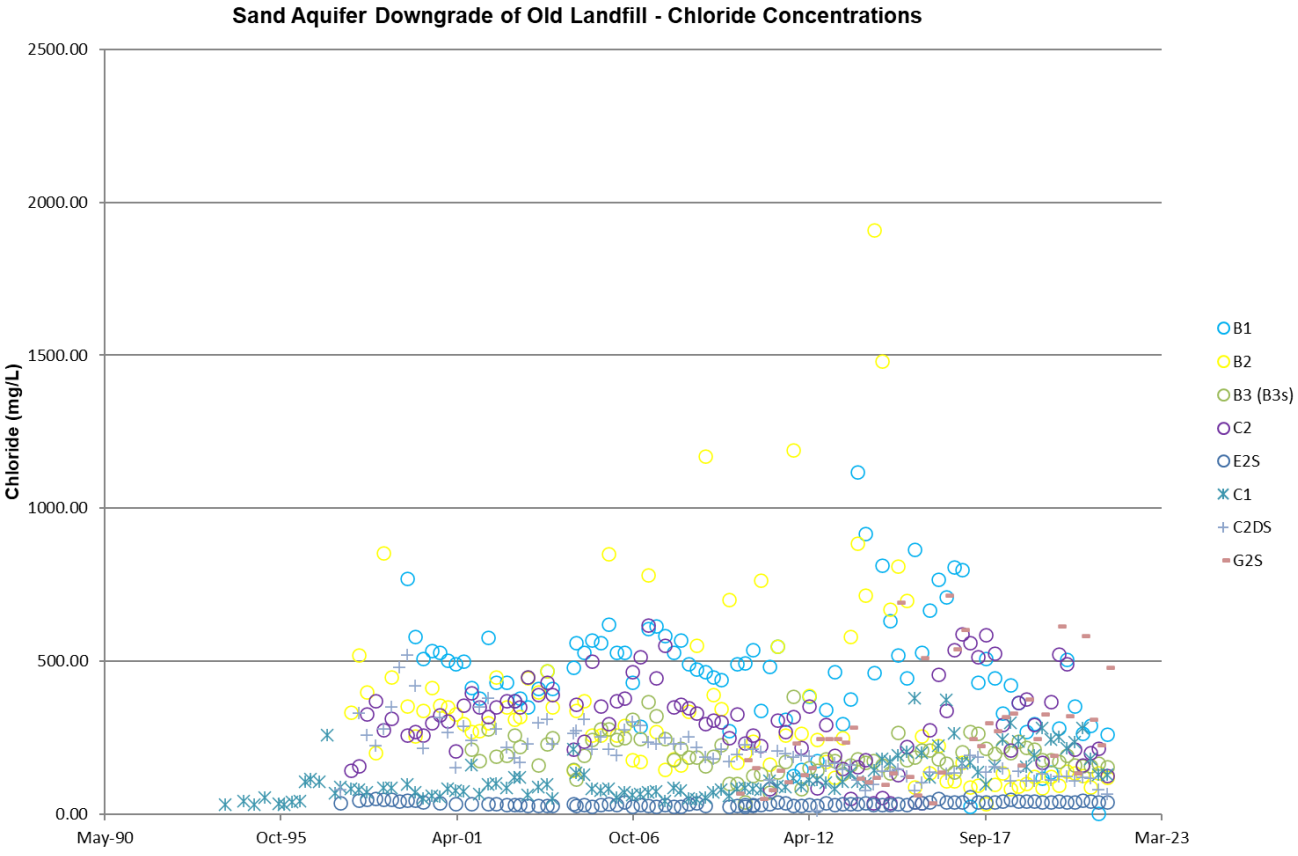

Gravel Aquifer - Chloride Concentrations
Chloride (mg/L)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

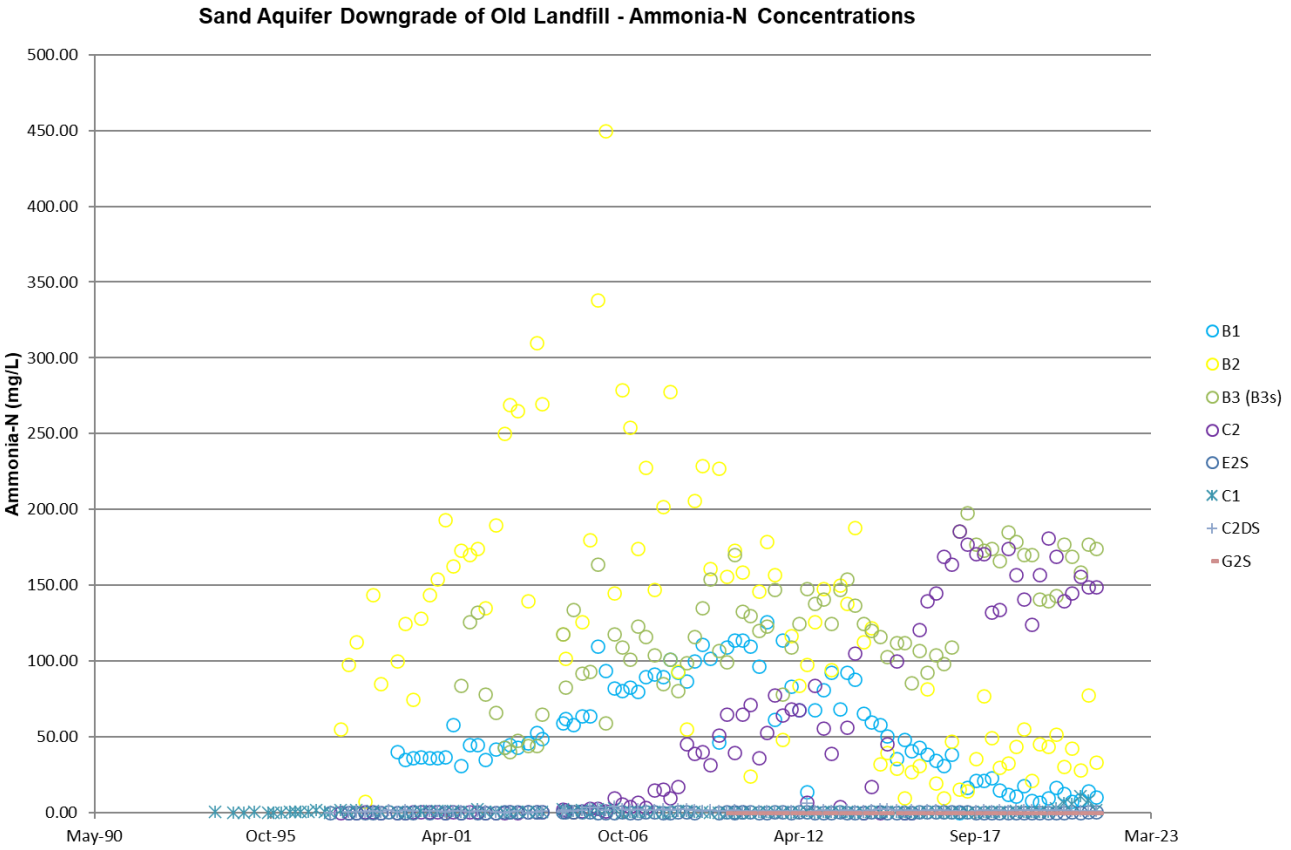

Gravel Aquifer - Ammoniacal-Nitrogen Concentrations
Ammoniacal-Ni (mg/L)
100.00
10.00
1.00
0.10
0.01
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

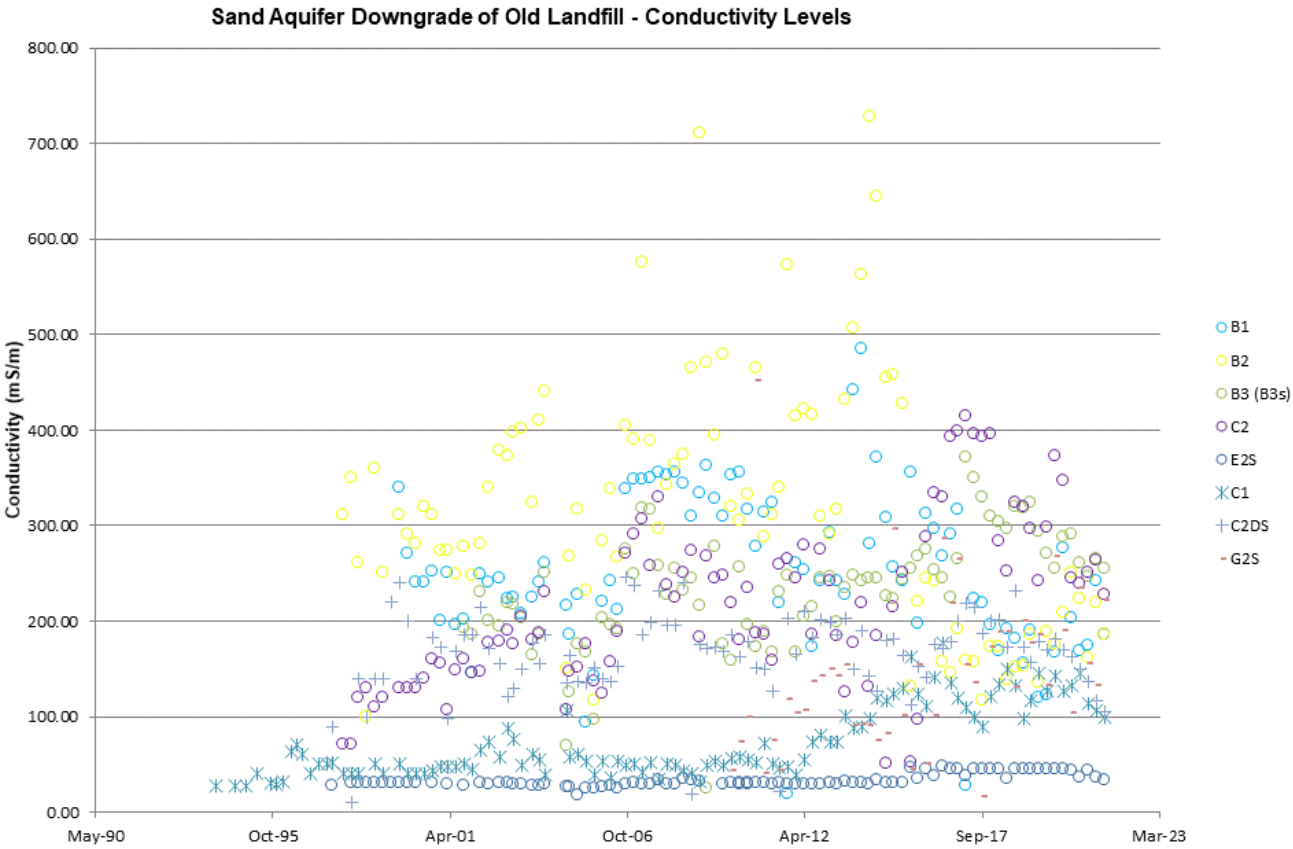

Gravel Aquifer - Conductivity Levels
Conductivity (mS/m)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

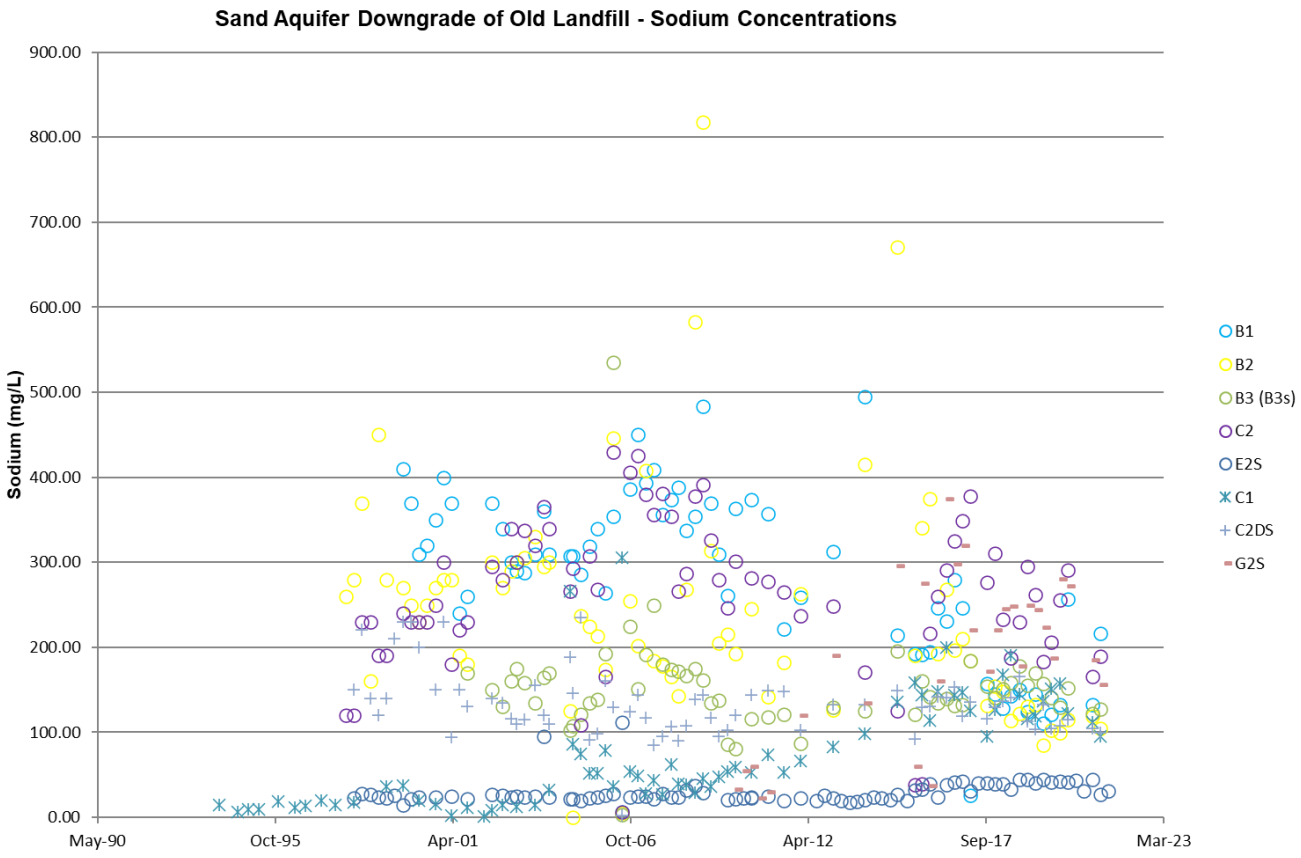

Gravel Aquifer - Sodium Levels
Sodium (mg/L)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

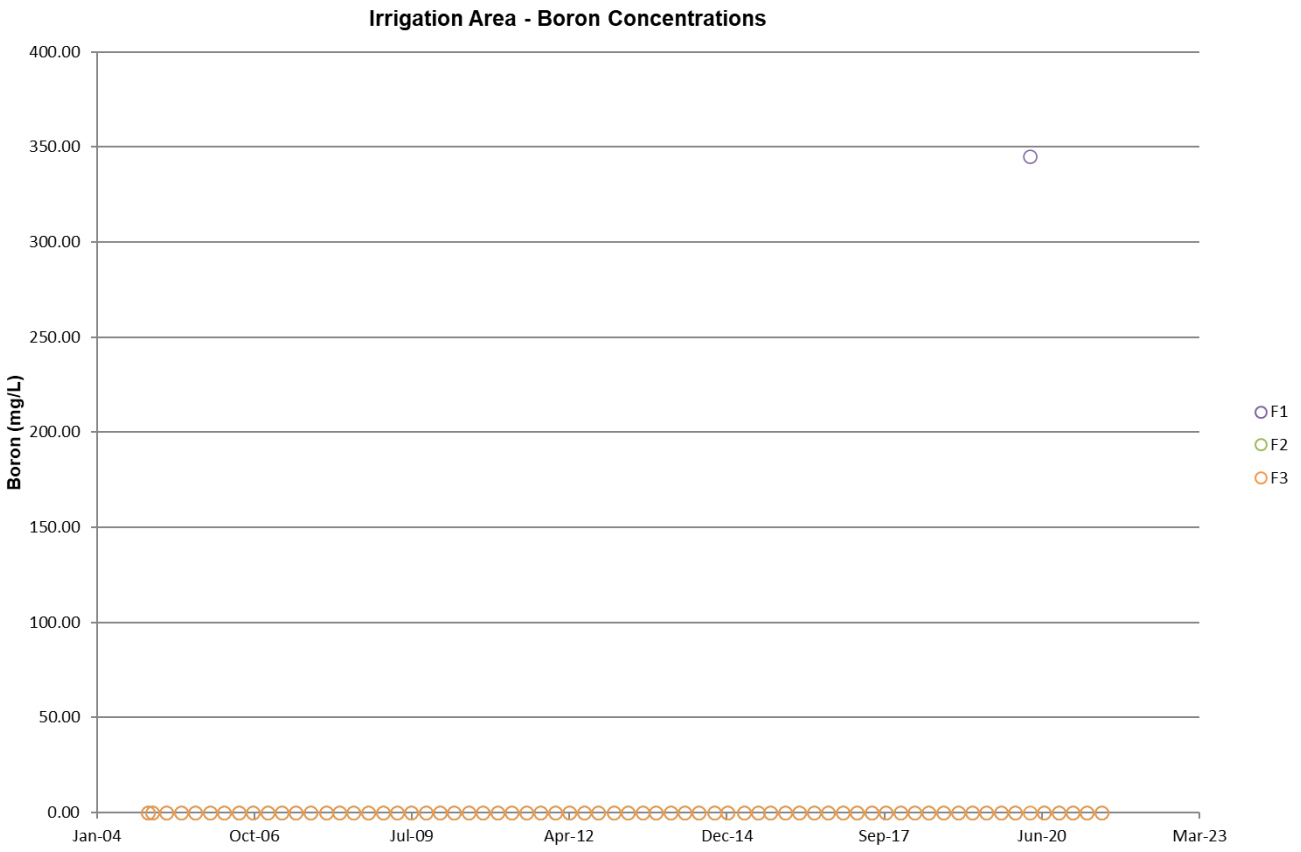

Sand Aquifer Downgrade of Old Landfill - Boron Concentrations
Boron (mg/L)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
May-90
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

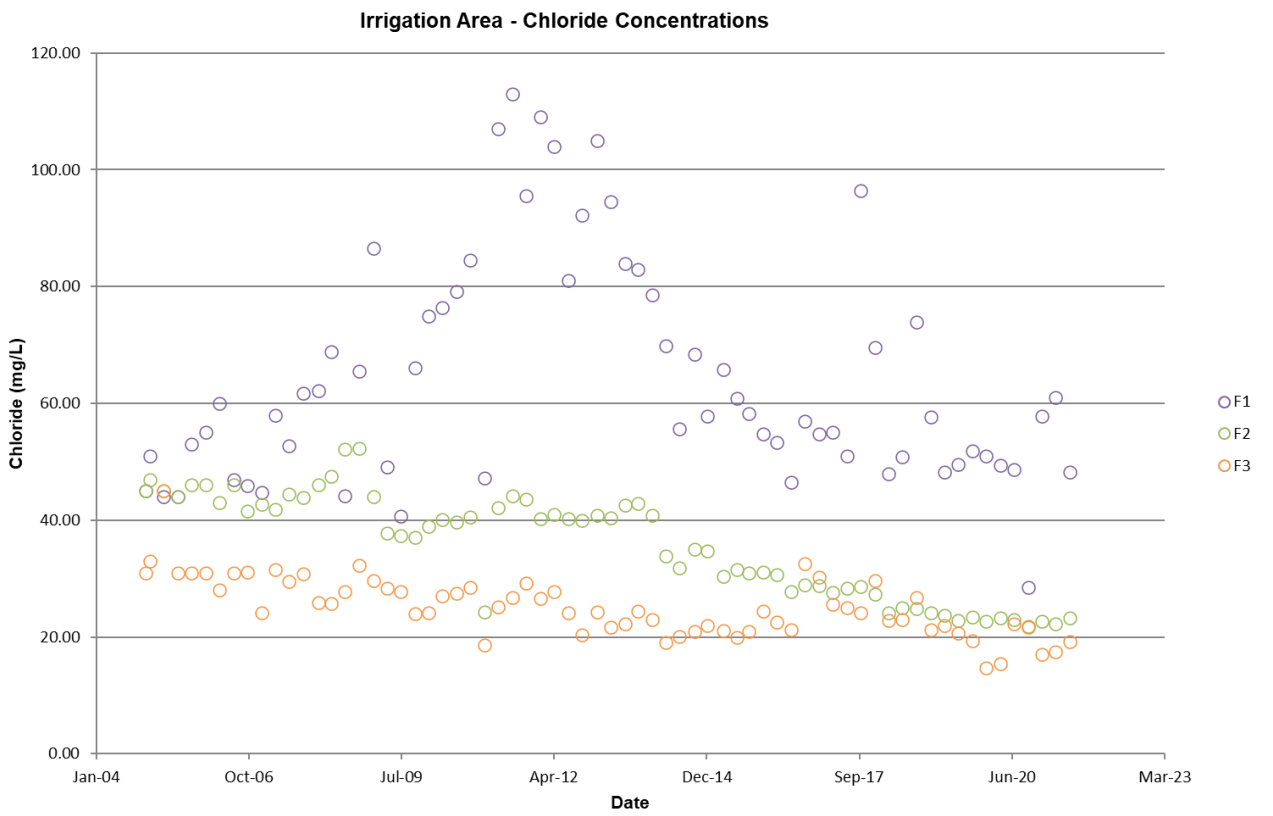

Sand Aquifer Downgrade of Old Landfill - Chloride Concentrations
Chloride (mg/L)
2500.00
2000.00
1500.00
1000.00
500.00
0.00
May-90
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

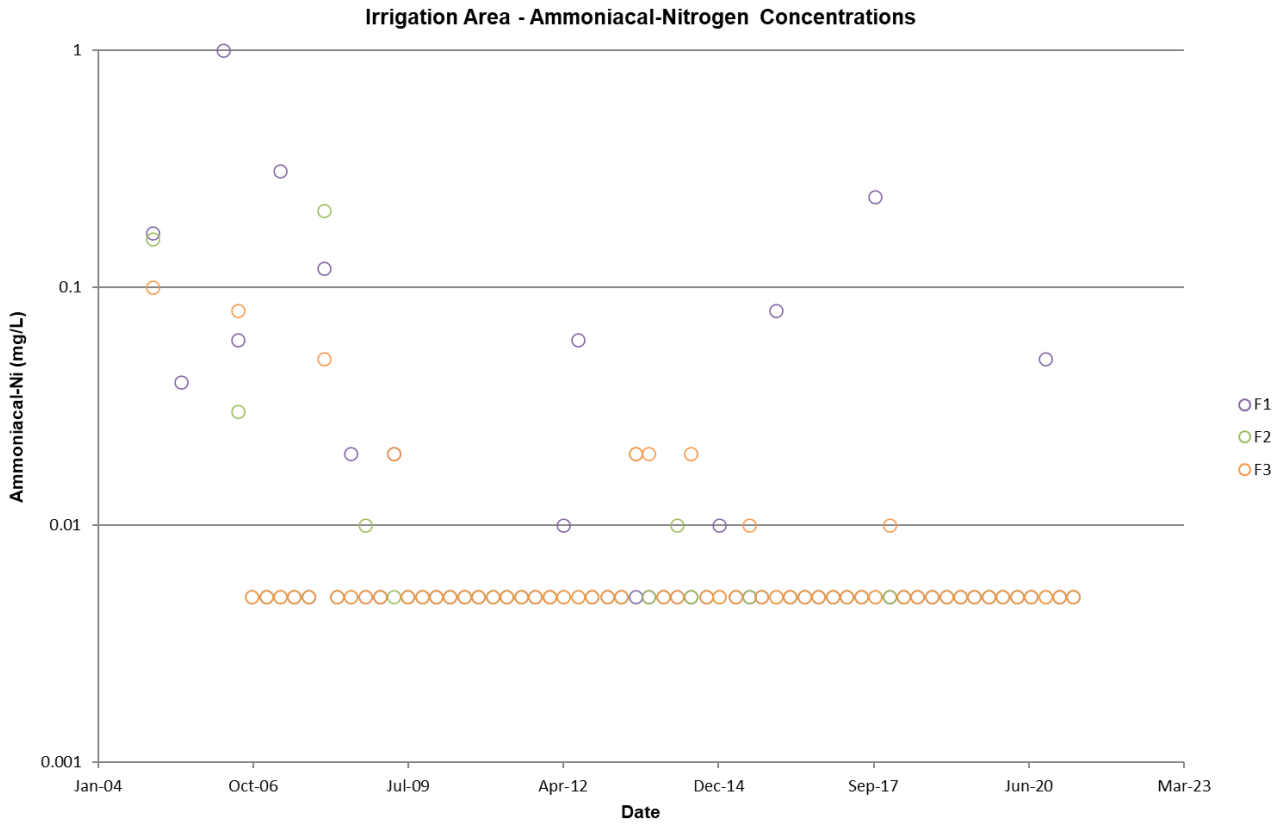

Sand Aquifer Downgrade of Old Landfill - Ammonia-N Concentrations
Ammonia-N (mg/L)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
May-90
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

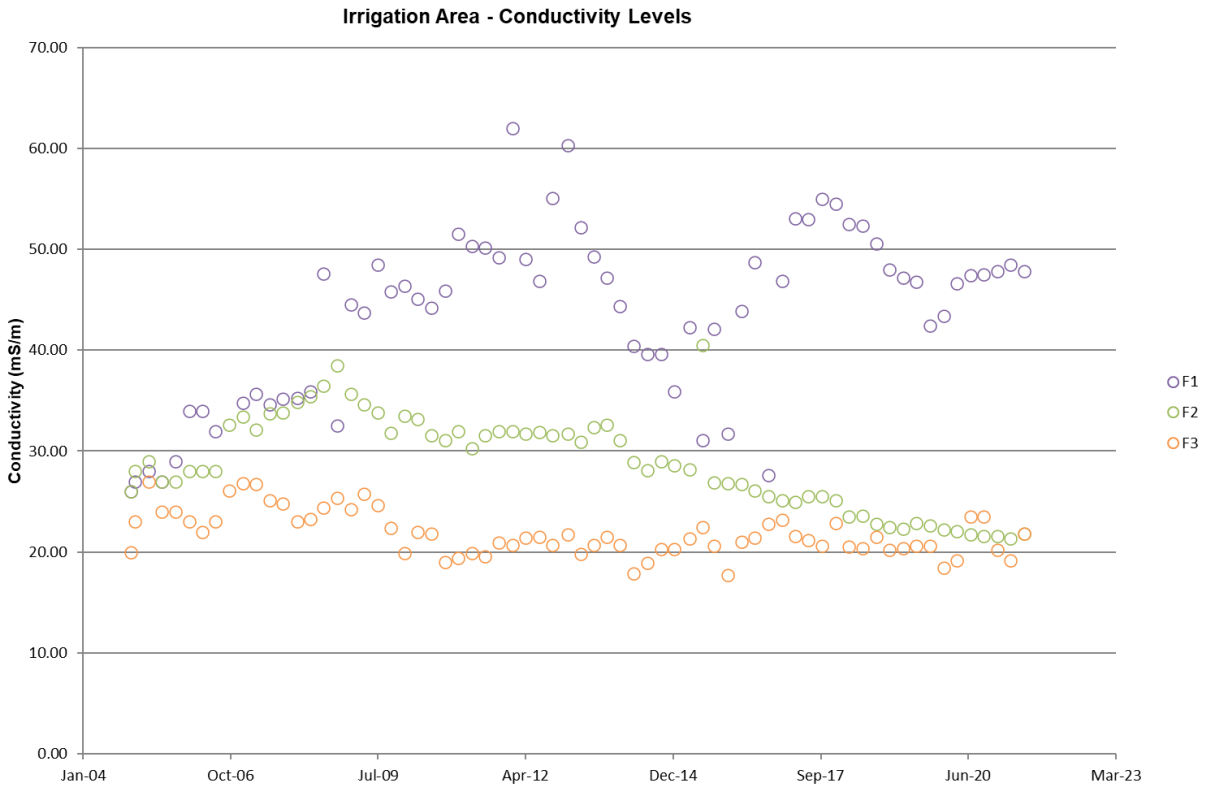

Sand Aquifer Downgrade of Old Landfill - Conductivity Levels
Conductivity (mS/m)
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
May-90
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

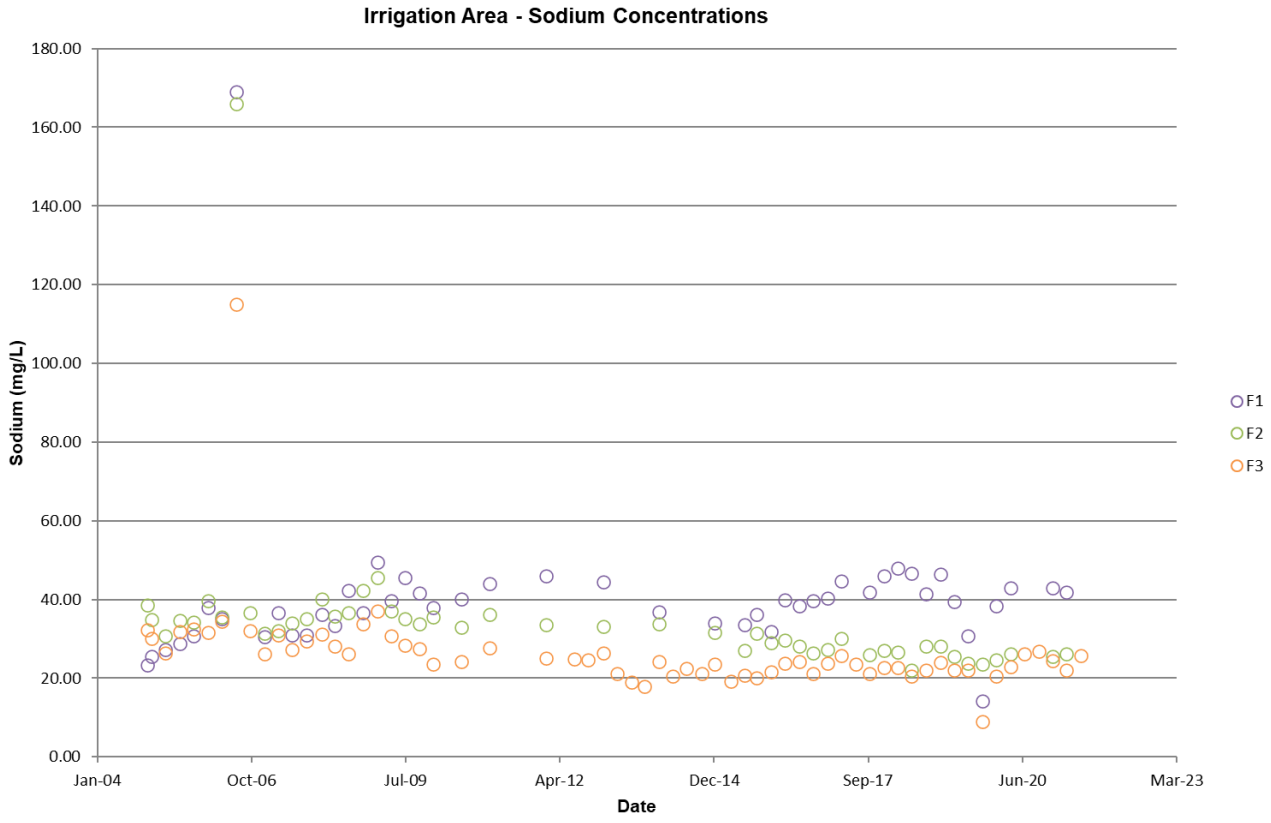

Sand Aquifer Downgrade of Old Landfill - Sodium Concentrations
Sodium (mg/L)
900.00
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
May-90
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

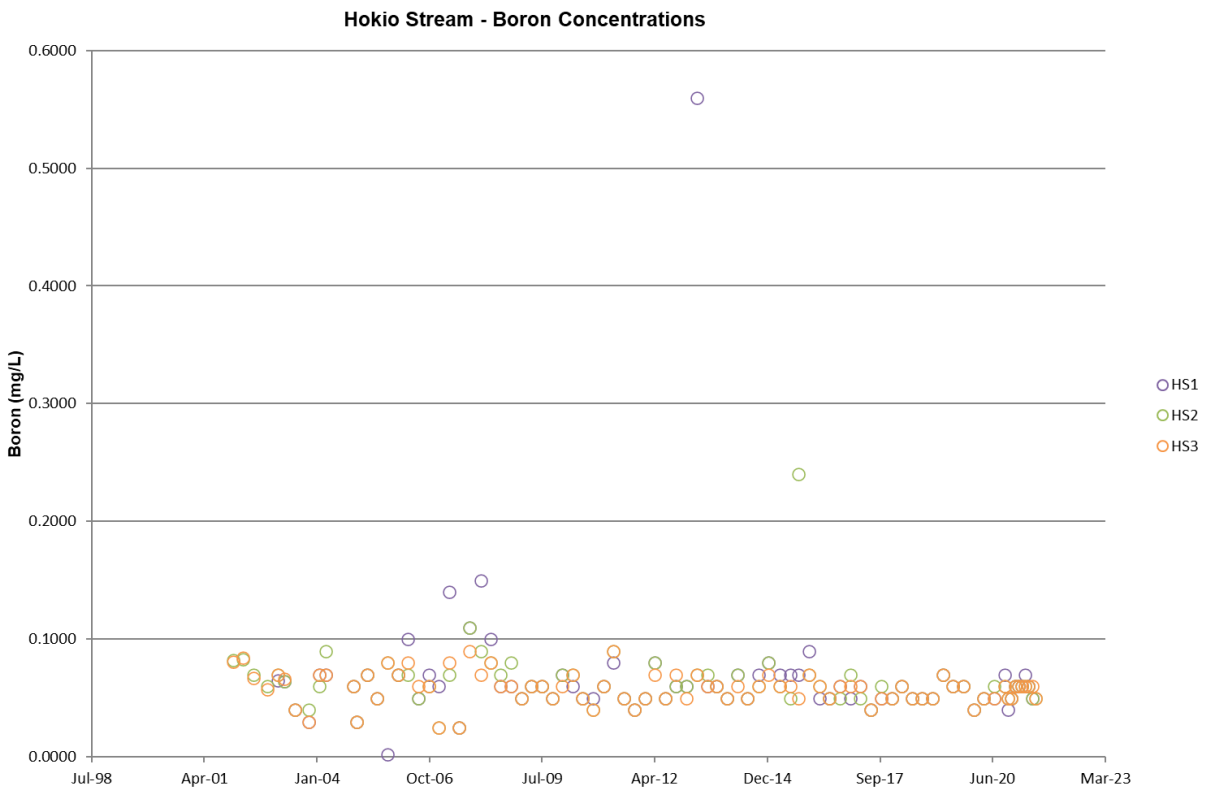

Irrigation Area - Boron Concentrations
Boron (mg/L)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
F1
F2
F3

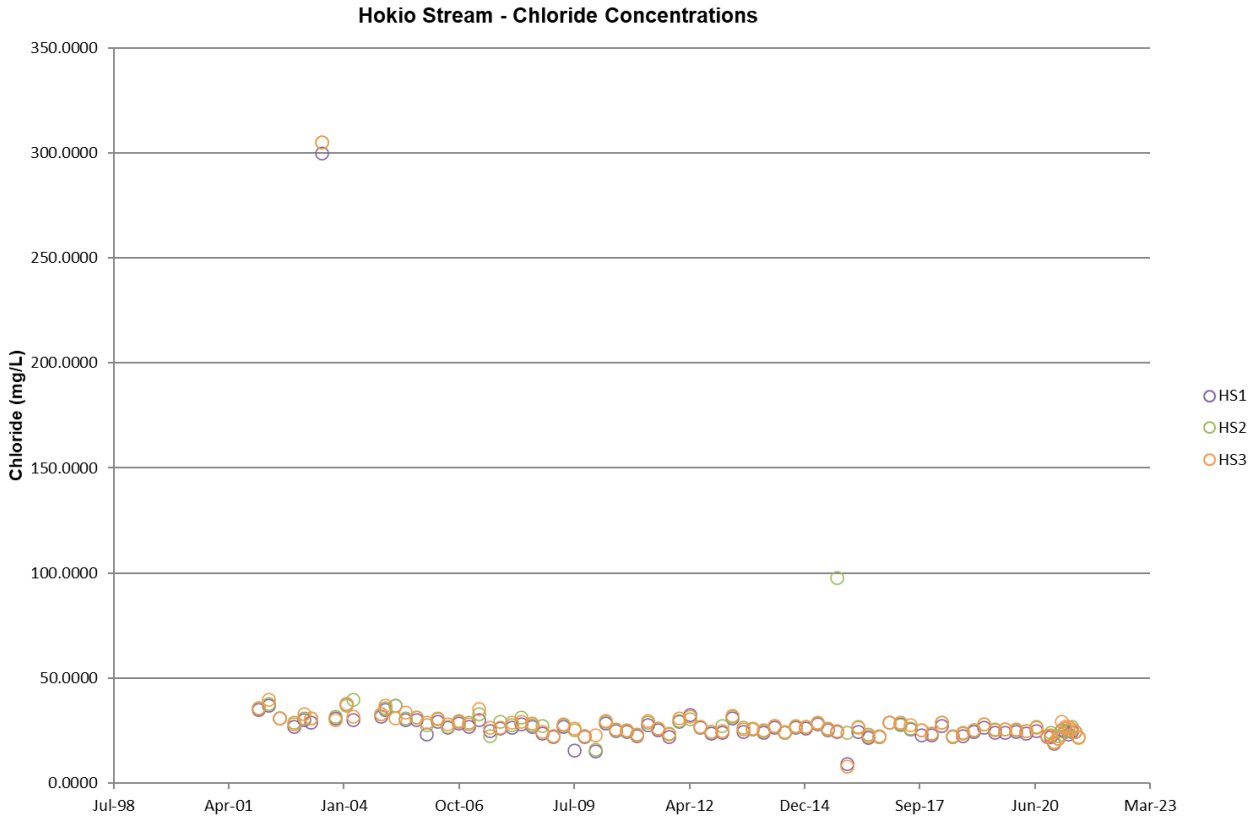

Irrigation Area - Chloride Concentrations
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Chloride (mg/L)
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Date
F1
F2
F3

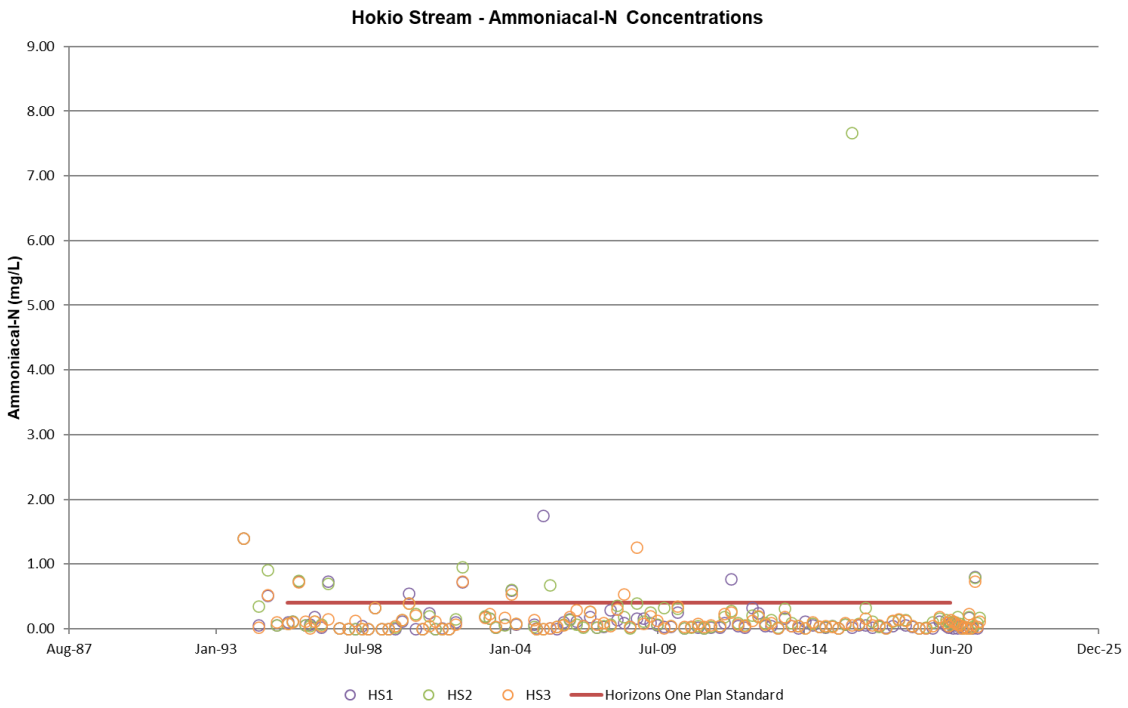

Irrigation Area - Ammoniacal-Nitrogen Concentrations
1
0.1
0.01
0.001
Ammoniacal-Ni (mg/L)
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Date
F1
F2
F3

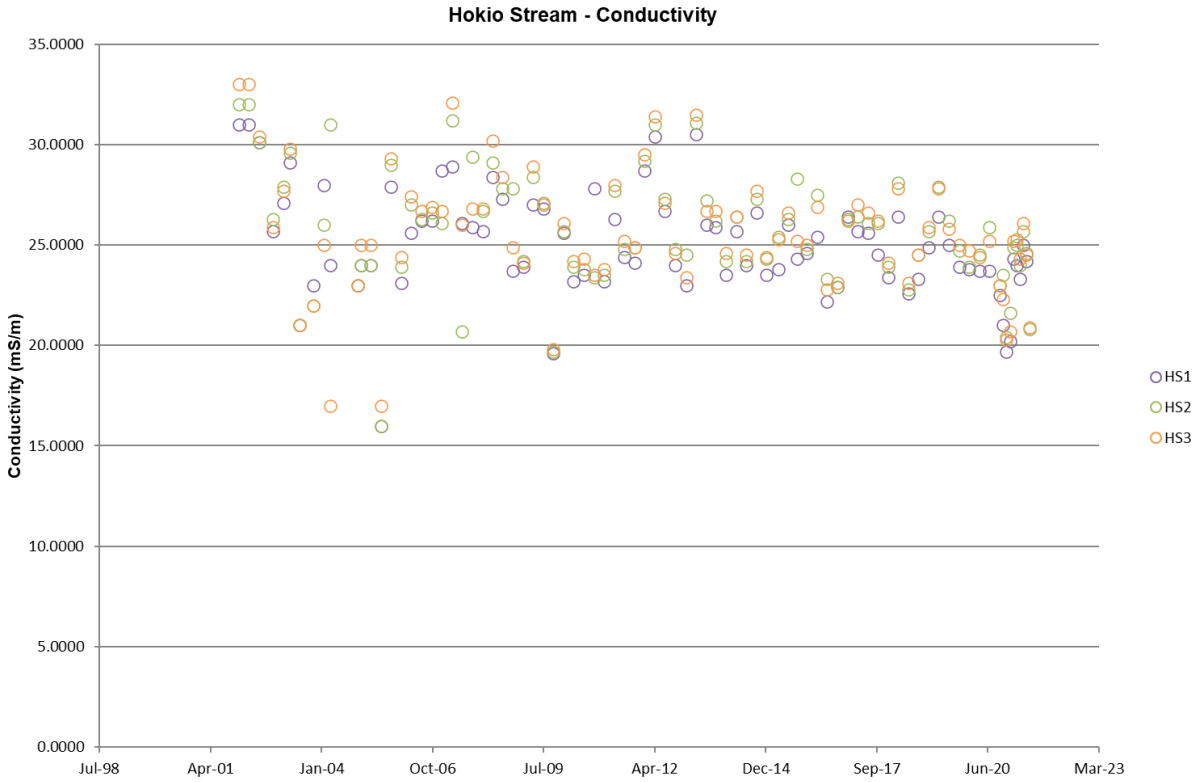

Irrigation Area - Conductivity Levels
Conductivity (mS/m)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
F1
F2
F3

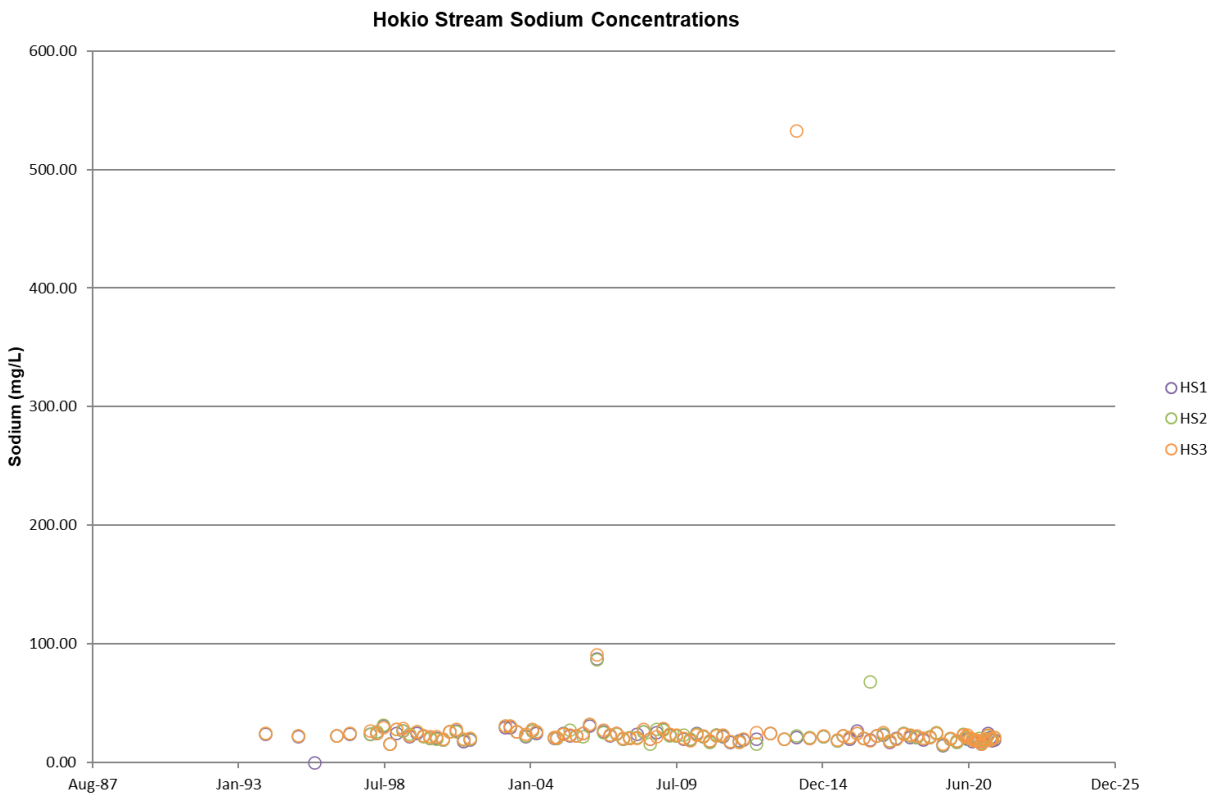

Irrigation Area - Sodium Concentrations
Sodium (mg/L)
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Date
F1
F2
F3


Hokio Stream - Boron Concentrations
Boron (mg/L)
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1
HS2
HS3


Hokio Stream - Chloride Concentrations
Chloride (mg/L)
350.0000
300.0000
250.0000
200.0000
150.0000
100.0000
50.0000
0.0000
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1
HS2
HS3


Hokio Stream - Ammoniacal-N Concentrations
Ammoniacal-N (mg/L)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Aug-87
Jan-93
Jul-98
Jan-04
Jul-09
Dec-14
Jun-20
Dec-25
HS1
HS2
HS3
Horizons One Plan Standard


Hokio Stream - Conductivity
Conductivity (mS/m)
35.0000
30.0000
25.0000
20.0000
15.0000
10.0000
5.0000
0.0000
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1
HS2
HS3


Hokio Stream Sodium Concentrations
Sodium (mg/L)
600.00
500.00
400.00
300.00
200.00
100.00
0.00
Aug-87
Jan-93
Jul-98
Jan-04
Jul-09
Dec-14
Jun-20
Dec-25
HS1
HS2
HS3

APPENDIX E GAS SAMPLING RESULTS AT GW BORES FOR JULY 2021

Date	Time	Bore	Methane (CH4)	Carbon Dioxide (CO2)	Hydrogen Sulphide (H2S)	Oxygen (O2)	Air temperature °C
9/06/2021	13:05	B3s	0	0	0	20.6	20
13/07/2021	9:34	B1	0.21	0.13	0	20.6	
13/07/2021	9:36	B2	0	0.08	0	17.7	7
13/07/2021	9:38	B3s	0.1	0.05	0	21	7
13/07/2021	9:39	C1	0.19	0.07	0	18.9	10
13/07/2021	9:41	C2	0.11	0.05	0	21	7
13/07/2021	9:42	C2dd	0.03	0.04	0	20.7	7
13/07/2021	9:43	C2ds	0	0.06	0	20.7	7
13/07/2021	9:44	D1	0.1	0.06	0	21.3	11
13/07/2021	9:46	D2	0.03	0.05	0	20.9	10
13/07/2021	9:51	D6	0.55	0	0	20.4	10
13/07/2021	9:55	E2s	0.05	0.11	0	20.9	6
13/07/2021	9:59	E2s	0.05	0.11	0	20.9	6
13/07/2021	10:00	E2d	0.05	0.11	0	20.9	6
13/07/2021	10:01	F3	0.03	0	0	21	10
13/07/2021	10:12	G2s	0.44	0.13	0	20.9	10
14/07/2021	9:49	D4	0	0.08	0	21	5
14/07/2021	9:50	D5	0	0	0.05	21.2	7
14/07/2021	9:53	E1d	0	0.02	0	20.1	5
14/07/2021	9:54	E1s	0	0.03	0	20.2	5
14/07/2021	10:05	F1	0	0.03	0	21.1	10
14/07/2021	10:07	F2	0	0.05	0	20.9	7
14/07/2021	10:09	G1d	0	0.02	0	20.7	5
14/07/2021	10:11	G1s	0	0.02	0	20.9	5
14/07/2021	10:14	Xs1	0	0.11	0	20.6	10
14/07/2021	10:15	Xs2	0.19	0.22	0	20.1	10
14/07/2021	10:16	Xd1	0	0.06	0	20.6	10

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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