Levin Landfill October 2023 Quarterly Groundwater, Surface Water and Leachate Monitoring Report

PREPARED FOR HOROWHENUA DISTRICT COUNCIL | NOVEMBER 2023

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Revision Schedule

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Abbreviations

Abbreviation	Name
ANZECC LDW	ANZECC 2000 Livestock Drinking Water
BDL	Below the detection limit
cfu	Colony-forming unit
COD	Chemical Oxygen Demand
DWSNZ GVs	Drinking Water Standards for New Zealand - Guideline Values for aesthetic determinants
DWSNZ MAVs	Drinking Water Standards for New Zealand – Maximum Acceptable Values
EC	Electrical Conductivity
HDC	Horowhenua District Council
Hg	Soluble mercury
HRC	Horizons Regional Council
mbgl	Metres below ground level
NH_3-N	Ammoniacal-nitrogen
NO_3-N	Nitrate nitrogen
ppm	Parts per million
$scBOD_5$	Soluble carbonaceous Biochemical Oxygen Demand (5-day)

Executive Summary

Horowhenua District Council (HDC) is required to carry out quarterly compliance monitoring of groundwater and monthly sampling at selected surface water monitoring locations at the Levin Landfill, as part of the conditions of Resource Consents ATH-2002003982.03 (formerly DP6009), ATH-2002003983.02 (formerly DP6010), ATH-2002003984.02 (formerly DP6011) and ATH-2002009801.02 (formerly DP102259). This report summarises the findings for the monitoring events from the second quarter (i.e., August 2023 to October 2023) sampling round and includes results for:

- Background (natural) groundwater (Bores G1S and G1D)
- Landfill leachate (manhole next to leachate pond)
- Groundwater bores, down-gradient of the new landfill (Bores D1, D2, D3rs, D4, D5, D6 and E1S)
- Groundwater bores within the old irrigation area (Bores F1, F2 and F3)
- Shallow aquifers, down-gradient of the old landfill (Bores B1, B2, B3s, C2, C2DS, E2S, G2s, Xs1 and Xs2)
- The deep aquifer (Bores C2DD, D3rd, E1D, E2D and Xd1)
- The Northern Farm Drain (TD1), and
- The Hokio Stream (HS1A, HS1, HS2 and HS3).

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

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

Samples were collected from 27 groundwater bores from around Levin Landfill during October 2023, and landfill leachate was sampled at a manhole next to the leachate pond. Additionally, five surface water sites were each sampled during August 2023, September 2023, and October 2023. All samples were analysed for the parameters set out in ATH-2002003983.02, and as listed in the results tables presented in this report.

For several of the samples taken during the October 2023 quarter, time between sampling and reception at the laboratory was considerably longer than the normally accepted timeframe of <24 hours. The specifics of this issue are discussed further, but the issue of extended timeframes should be addressed and corrected for the next round of sampling.

The resource consent for the landfill (namely, ATH-2002003983.02) establishes 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[1] default guideline values (DGV) for 95th percentile species protection for toxicants in freshwater, as required by the revised Resource Consent condition approved in December 2019.

The August 2023 to October 2023 monitoring results have been assessed against these limits, where they are applicable.

Twenty-eight non-compliances with resource consent conditions were recorded across eight monitoring locations, as follows:

- *E. coli* at D3rd was analysed at a laboratory detection level of 100 cfu/100mL, and was not detected, thus has been represented as *50* cfu/100mL as per standard practice. However, this level detection is not acceptable – all other deep gravel aquifer bores were analysed against a detection level of 1 cfu/100mL, because the comparative DWSNZ MAV is NIL. Therefore, the *E. coli* result at D3rd has been considered a non-compliance.
- Dissolved arsenic at bore D3rd (0.02 mg/L) exceeded the DWSNZ MAV of 0.01 mg/L. This is characteristic of D3rd.
- Dissolved manganese concentrations in bores C2DD (0.741 mg/L), Xd1 (0.482 mg/L), and D3rd (0.455 mg/L) exceeded the DWSNZ MAV of 0.4 mg/L. The results for C2DD (from 1997), Xd1 (from March 2021 when sampling started) and D3rd (from October 2021 when sampling started) are within the historical range of concentrations observed. Dissolved manganese is generally elevated in the deep aquifer bores.
- Nitrate-N at TD1 in August 2023 (5.63 mg/L), September 2023 (2.22 mg/L), and October 2023 (1.98 mg/L) exceeded the ANZECC (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.

[1] Now superseded by the Australian and New Zealand Water Quality Guidelines 2018 (ANZG 2018), however the ANZECC 2000 guideline values are applied in accordance with the resource consent.

- Ammoniacal-N at TD1 in August 2023 (5.63 mg/L), September 2023 (17.1 mg/L), and October 2023 (10.1 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 mg/L.
- Dissolved zinc at TD1 in August 2023 (0.017 mg/L) and September 2023 (0.015 mg/L) exceeded the ANZECC (95%ile) DGV of 0.008 mg/L.
- Nitrate-N exceeded both the ANZECC (95%ile) DGV and consent trigger value of 0.16 mg/L at all Hokio Stream sites in September 2023 and October 2023, with values ranging between 0.92 mg/L and 1.52 mg/L.
- Ammoniacal-N exceeded both the ANZECC (95%ile) DGV and consent trigger value maximum of 2.1 mg/L in September 2023 at HS2 (2.71 mg/L).
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.055 mg/L in August 2023 at HS1A (0.114 mg/L) and September 2023 at HS2 (0.066 mg/L).
- Dissolved copper exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.0014 mg/L in September 2023 at HS1A (0.0017 mg/L), HS1 (0.0048 mg/L), and HS2 (0.0018 mg/L), and in October 2023 at HS3 (0.0015 mg/L). However, these exceedances are not uncharacteristic given historical data which shows copper frequently exceeding 0.0014 mg/L for all surface water sampling locations since 1994.

The August 2023 to October 2023 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. This trend will be examined in greater detail in the Annual Report.

There were sixteen occasions where the leachate effluent quality (at the leachate pond manhole sampling location) was outside of the ranges for typical leachate composition, as recorded generally at Class 1 landfills in New Zealand. This occurred for Ammoniacal-N (NH_4-N), which exceeded the typical range for Class 1 landfills, and for dissolved mercury which was not detected, so was under its typical range. Note that leachate effluent is not subject to any consent limits. Typical leachate concentrations are derived from data originating from seven New Zealand landfills, dating back to between 1998 and 1999. More updated data could be sought for comparison purposes.

Methane was detected in three of the bores in October 2023, with the greatest reading at Xd1 (0.04%). These concentrations were well below the explosive limit of 5%, and therefore represent a ‘safe’ level. Methane is commonly detected at the landfill site, and its detection reinforces the need for sampling staff to take the necessary precautions for gas safety, generally applicable at landfill sites. Minor concentrations of carbon dioxide were recorded at all bores, with the highest being 1% at bore B2. Hydrogen sulphide was detected at one bore – G1s (2 ppm), which is around the threshold at which a ‘rotten egg’ smell (commonly associated with H_2S) can be detected.

The possibility of encountering methane (and hydrogen sulphide) in groundwater bores endorses the need for appropriate health and safety measures to be adopted during monitoring.

Consecutive monthly sampling has occurred at all Hokio Stream sites since October 2021. It is recommended that HDC assess the results of these 25 sampling events, as required by the conditions of the consent, to determine the significance of the results, and to ascertain, in conjunction with HRC, if a reduction in sampling frequency can be made.

If it is permitted for the sampling frequency to be reduced to quarterly, then it is also proposed that the sampling frequency at the Northern Farm Drain (TD1) and the manhole next to the leachate pond be similarly reduced.

In early 2023 the Council has decided to close the Levin Landfill, and the remainder of the site will be capped permanently either later this year, or early next year.

1 Introduction

Horowhenua District Council (HDC) first commissioned Stantec New Zealand (then Montgomery Watson) to carry out environmental reporting for the discharge consent monitoring undertaken at the Levin Landfill site in the early 2000s. Monitoring has been undertaken by contractors every three months at 33 locations, as required by the resource consent conditions (namely for discharge permit ATH-2002003983.02). These sampling locations consist of 27 boreholes penetrating the sand and gravel aquifers; four surface water sampling locations within Hokio Stream; one surface sampling location along the Northern Farm Drain (previously referenced as the Tatana Drain), and one 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 landfill that has now been closed for the disposal of municipal solid waste, following a recent decision by Council. The new landfill footprint has been developed in stages. The most recent stage was Stage 3C which was developed in 2017, though landfill operations have, until the end of October 2021, occurred over the top of Stages 1A, 2 and 3C. The current landfill within this new footprint has reached capacity and has been capped with a permanent clay capping (0.7m thick) on all sides except for under the access road and on the front face of the landfill where there is a temporary capping (0.3m thick). Following Council's decision to close the landfill, the remainder of the permanent capping will be completed later this year.

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.

A 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 the changes. Sampling since the January 2021 sampling round has been in line with previous monitoring, 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 October 2023 quarterly monitoring round.

Laboratory detection limits are provided for all test results which are attached in Appendix C.

2 Groundwater and Surface Water Monitoring

2.1 Sample Analyses

Surface water samples were collected by Downer (a contractor to HDC) on 15 August 2023, 19 September 2023, and 10 October 2023, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. The timeframe between sample collection and laboratory reception generally varied between 13 and 29 hours, with one exception – 118 hours for leachate sampling in October 2023, which is an unacceptable timeframe. Regardless, the turnaround time for many samples, between sampling and testing, exceeded normally accepted range of within 24 hours – an issue which has been reported on previously.

Groundwater samples were collected by Downer on 8, 9, 10, and 11 October 2023, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. Whilst samples were collected within the normally accepted monitoring timeframe of within seven days, the time between collection and laboratory reception exceeded the <24-hour guideline for some samples. This issue has been reported on previously, and it appears that an effort was made to amend extensive timeframe issues for this monitoring round. Extended timeframes were noted for bores C1, C2, C2ds, Xs1, and Xs2, which ranged between 32 and 45 hours. It is noted that laboratory reports for G1s and XD1 did not display a sampling time. Furthermore, laboratory reports indicate that some samples were taken between 8:30pm and 10pm. It is unusual for sampling to occur at these hours, so assuming these times are incorrect, the necessity to report correct timing (preferably 24-hour) on datasheets is stressed. Incorrect timing has been noted in the previous quarterly report.

With increased time between sampling and testing, results become less reliable due to sample deterioration, therefore assessments can be inaccurate. The importance of a short turnaround time between sampling and laboratory reception is reiterated.

The monitoring schedule for July 2021 - April 2024 is summarised in Appendix B. From July 2019, *E. coli* counts analyses have been included within the indicator and comprehensive analytical suites, as agreed by HDC with Horizons Regional Council (HRC). This means that *E. coli* counts will be assessed more frequently throughout each year, as compared to the past monitoring regime.

Groundwater samples taken at each of the boreholes (excluding D3rs, D3rd, Xd1, Xs1, and Xs2) were analysed for the indicator list of parameters which is outlined in Table 2-1. Groundwater samples at D3rs, D3rd, Xd1, Xs1, and Xs2, and surface water samples from Hokio Stream, the Northern Farm Drain and a sample of the leachate effluent were analysed for the comprehensive list of parameters (see Table 2-1).

Note that, following the revision of the resource consent conditions which were approved in December 2019, 5-day soluble carbonaceous Biochemical Oxygen Demand ($scBOD_5$) and soluble mercury (Hg) have each been added to the indicator and comprehensive suites of parameters, and *E. coli* added 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 began with the April 2020 sampling round.

Table 2-1: Test Parameters

Type	Indicator Parameters	Comprehensive Parameters
Physico-chemical characteristics	pH, Electrical Conductivity (EC)	pH, Electrical Conductivity (EC), Alkalinity, Total Hardness, Suspended Solids
Oxygen demand	Chemical Oxygen Demand (COD), $scBOD_5$**	Chemical Oxygen Demand (COD), soluble carbonaceous Biochemical Oxygen Demand ($scBOD_5$**)
Nutrients*	Nitrate nitrogen (NO_3-N), Ammoniacal-nitrogen (NH_4-N)	Nitrate nitrogen (NO_3-N), Ammoniacal-nitrogen (NH_4-N), Dissolved Reactive Phosphorus (DRP), Sulphate (SO_4)
Metals*	Aluminium (Al), Manganese (Mn), Nickel (Ni), Lead (Pb), Mercury (Hg)**	Aluminium (Al), Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Iron (Fe)***, Magnesium (Mg), Manganese (Mn), Nickel (Ni), Lead (Pb), Zinc (Zn), Mercury (Hg)**
Other elements	Boron (B), Chloride (Cl)	Boron (B), Calcium (Ca), Chloride (Cl), Potassium (K), Sodium (Na)***

Type	Indicator Parameters	Comprehensive Parameters
Biological+	*E. coli*	*E. coli*
Organics	Not required	Total organic carbon, total phenols, volatile acids

Note:

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

** $scBOD_5$ and Soluble Mercury added as per revised consent conditions for Discharge Permit ATH-2002003983.02, December 2019

*** Iron and sodium are tested at certain groundwater bores only.

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 for annual reporting purposes. This is standard practice when dealing with chemical concentrations in water, where the constituent is not detected.

2.2 Background Groundwater Quality

The background (natural) quality of the groundwater 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 are regularly used to benchmark the quality of water up-gradient from the landfill site.

Groundwater samples were collected from the two background bores situated hydraulically up-gradient from both the new and old landfills to the southeast of the site in October 2023 (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. 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 and the historical graphs are presented in Appendix D.

The results presented in Table 2-2 show that all parameters at bore F3 were within the ANZECC LDW trigger values and DWSNZ limits during the October 2023 monitoring round. Results outside the range of relevant guidelines are as follows:

- Dissolved iron at G1S (1.37 mg/L) exceeded the DWSNZ limit of 0.2 mg/L, in line with historical reporting.
- pH at G1S (6.8) was below the lower DWSNZ limit of 7.0.

E. coli was 'not detected' at any of the background monitoring locations, but it is noted that the laboratory detection level changed between sites – 1cfu/100mL at G1D and 100 cfu/100mL at G1S and F3. While the DWSNZ MAV for *E. coli* is NIL, this guideline is only applicable to the deep aquifer bore G1D, whereas the ANZECC standard (100 cfu/100mL) is more appropriate for G1S and F3, given their shallow nature. Given this, the difference in laboratory detection limits between the bores are acceptable and compliant.

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. Elevated iron concentrations are likely to be related to hydrogeological conditions found at this site, and this phenomenon is common for groundwater in this area. Results dating to 2010 indicate that low pH values are representative of background water quality in the shallow sand aquifer, whereas the deep gravel aquifer frequently presents higher pH readings. Overall, monitoring results at G1S indicate that it is likely modified or impacted by anthropogenic activities, and therefore may not be suitable to use as reliable 'control' location for background water quality in the future.

Table 2-2: Background Monitoring Results for October 2023

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Sampling date				n/p	09/10/2023	09/10/2023
Water level	mbgl	-	-	13.78	14.34	4.62
pH	pH units	7 to 8.5*	6 to 9	**6.7**	7.3	7.4
Conductivity	mS/m	-	-	62.9	27.5	20
COD	mg/L	-	-	32	*7.5*	20

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
$scBOD_5$	mg/L	-	-	*0.5*	*0.5*	*0.5*
E. Coli	CFU/100ml	NIL	100	ND	ND	ND
Chloride	mg/L	250*	-	148	32.8	23.2
Nitrate-N	mg/L	11.3	90.3	0.29	*0.005*	1.68
Ammoniacal-N	mg/L	1.17	-	0.01	0.08	*0.005*
Sodium	mg/L	200*	-	60.4	n/r	32.9
Dissolved Aluminium	mg/L	0.1*	5	0.045	*0.001*	0.074
Dissolved Boron	mg/L	1.4	5	0.04	0.05	0.06
Dissolved Iron	mg/L	0.2*	-	**1.37**	n/r	0.02
Dissolved Lead	mg/L	0.01	0.1	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	0.4	-	0.0733	0.0728	0.0031
Dissolved Mercury	mg/L	0.007	0.002	*0.00025*	*0.00025*	0.0006
Dissolved Nickel	mg/L	0.08	1	0.0006	*0.00025*	0.0008

Notes:

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

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 at or above the laboratory detection limit

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

n/p – not provided

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

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.

2.3.1 Shallow Aquifer

Bores D1, D2, D3rs, D4, 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 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 considered unlikely that leachate from the new landfill would significantly affect groundwater quality due to the leachate collection system which is in place at the new landfill; however, these bores would still provide early warning of any potential problems. It is noted that bore D3r was replaced in June 2021 with two bores; D3rs, which is a shallow bore and D3rd, which is a deep bore. Both have been sampled from October 2021 onwards. It is also noted that new bores D3rs and D3rd are required to be monitored for the comprehensive suite of parameters for the first two years following installation.

The results from the October 2023 monitoring round for these bores are presented in Table 2-3 and 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 and the historical graphs are presented in Appendix D.

There were **no exceedances of the resource consent conditions during the October 2023** monitoring round in samples from the shallow aquifer.

Table 2-3: D-Series and E1S Monitoring Bore Results for October 2023

Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1S
Sampling date			10/10/2023	10/10/2023	10/10/2023	11/10/2023	08/10/2023	10/10/2023	10/10/2023
Water Level	mbgl	-	16.6	21.2	5.34	7.53	8.95	16.16	11.08
pH	pH units	6 to 9	7.1	6.7	6.5	7.4	7.2	7	7.2
Suspended Solids	mg/l	-	n/r	n/r	*3*	n/r	n/r	n/r	n/r
Phenol	mg/l	-	n/r	n/r	*0.025*	n/r	n/r	n/r	n/r
VFA	mg/l	-	n/r	n/r	*2.5*	n/r	n/r	n/r	n/r
TOC	mg/L	-	n/r	n/r	24.4	n/r	n/r	n/r	n/r
Alkalinity	mg $CaCO_3$/L	-	n/r	n/r	79	n/r	n/r	n/r	n/r
Conductivity	mS/m	-	43	54	21.6	27.1	31.8	43.1	24.8
COD	mg/L	-	*7.5*	85	74	19	17	*7.5*	*7.5*
$scBOD_5$	mg/L	-	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
E. coli	CFU/100ml	100	ND	ND	ND	ND	ND	ND	ND
Chloride	mg/L	-	17.9	17.1	17.3	29.8	31.8	25.1	26.1
Nitrate-N	mg/L	90.3	5.61	*0.005*	*0.005*	*0.005*	0.91	11.6	*0.005*
Sulphate	mg/L	1000	n/r	n/r	1.07	n/r	n/r	n/r	n/r
Ammoniacal-N	mg/L	-	*0.005*	0.74	0.76	0.26	0.02	*0.005*	0.17
Hardness	mg $CaCO_3$/L	-	n/r	n/r	43	n/r	n/r	n/r	n/r
Calcium	mg/L	1000	n/r	n/r	9.6	n/r	n/r	n/r	n/r
Magnesium	mg/L	-	n/r	n/r	4.68	n/r	n/r	n/r	n/r
Potassium	mg/L	-	n/r	n/r	4.44	n/r	n/r	n/r	n/r
Sodium	mg/L	-	n/r	50.6	21.4	28.4	n/r	n/r	24.4
D.R. Phosphorus	mg/L	-	n/r	n/r	0.198	n/r	n/r	n/r	n/r
Dissolved Aluminium	mg/L	5	*0.001*	0.003	0.078	0.002	0.002	*0.001*	0.006
Dissolved Arsenic	mg/L	0.5	n/r	n/r	0.001	n/r	n/r	n/r	n/r
Dissolved Boron	mg/L	5	0.06	0.07	0.03	0.03	0.06	0.06	*0.015*
Dissolved Cadmium	mg/L	0.01	n/r	n/r	*0.0001*	n/r	n/r	n/r	n/r
Dissolved Chromium (VI)	mg/L	1	n/r	n/r	0.004	n/r	n/r	n/r	n/r
Dissolved Copper	mg/L	0.4	n/r	n/r	*0.00025*	n/r	n/r	n/r	n/r
Dissolved Iron	mg/L	-	n/r	12.4	15.7	1.88	n/r	n/r	4.35

Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1S
Dissolved Lead	mg/L	0.1	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	*0.00025*	0.47	0.343	0.169	0.0245	0.0022	0.21
Dissolved Mercury	mg/L	0.002	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	1	*0.00025*	*0.00025*	0.0006	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Zinc	mg/L	20	n/r	n/r	0.007	n/r	n/r	n/r	n/r

Notes:

Bold – denotes an exceedance of the ANZECC LDW

Underlined – denotes exceedance of the Consent Trigger Value.

'ND' indicates where *E. coli* were not detected at or above the laboratory detection limit

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

n/p – not provided

2.3.2 Deep Gravel Aquifer

Bores E1D, C2DD, E2D, Xd1, and the new replacement bore D3rd 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 October 2023 compliance monitoring round are presented in Table 2-4. The results have been compared with the DWSNZ as per the requirements of discharge consent ATH-2002003983.02. The full laboratory report is included in Appendix C and the historical graphs are presented in Appendix D.

There were **five exceedances of the DWSNZ limits** in samples from the deep gravel aquifer during the October 2023 monitoring round, as follows:

- *E. coli* at D3rd was analysed at a laboratory detection level of 100 cfu/100mL, and was not detected, thus has been represented as *50* cfu/100mL as per standard practice. However, this level detection is not accurate enough to allow for comparison against the DWSNZ MAV – all other deep gravel aquifer bores were analysed against a detection level of 1 cfu/100mL, because the comparative DWSNZ MAV is NIL. Therefore, the *E. coli* result at D3rd has been considered a non-compliance.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.02 mg/L). This is characteristic of D3rd.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2DD (0.741 mg/L), Xd1 (0.482 mg/L), and D3rd (0.455 mg/L). The results for C2DD (from 1997), Xd1 (from March 2021 when sampling started) and D3rd (from October 2021 when sampling started) are within the historical range of concentrations observed. Dissolved manganese is generally elevated in the deep aquifer bores.

Table 2-4: Results for Monitoring Bores within the Deep Aquifer for October 2023

Determinant	Units	DWSNZ MAV	E1D	C2DD	E2D	Xd1	D3rd
Sampling date			10/10/2023	10/10/2023	10/10/2023	n/p	10/10/2023
Water Level	mbgl	-	11	2.58	4.4	2.35	5.69
pH	pH units	7 to 8.5*	7.7	7.7	7.7	7.8	7.7
Suspended Solids	mg/l	-	n/r	n/r	n/r	25	26
Phenol	mg/l	-	n/r	n/r	n/r	*0.025*	*0.025*
VFA	mg/l	-	n/r	n/r	n/r	*2.5*	*2.5*
TOC	mg/L	-	n/r	n/r	n/r	4.6	5.9
Alkalinity	mg $CaCO_3$/L	-	n/r	272	n/r	184	226
Conductivity	mS/m	-	45	65.1	44.3	53.6	53.2
COD	mg/L	-	*7.5*	37	*7.5*	*7.5*	15
$scBOD_5$	mg/L	-	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
E. coli	CFU/100ml	NIL	ND	ND	ND	ND	***50***
Chloride	mg/L	250*	39.3	47.2	41.1	39	26.6
Nitrate-N	mg/L	11.3	*0.005*	0.01	*0.005*	*0.005*	*0.005*
Sulphate	mg/L	250*	n/r	*0.01*	n/r	*0.01*	*0.01*
Ammoniacal-N	mg/L	1.17	0.2	0.33	0.25	0.38	0.4
Hardness	mg $CaCO_3$/L	200*	n/r	n/r	n/r	153	193
Calcium	mg/L	-	n/r	n/r	n/r	34	56.1
Magnesium	mg/L	-	n/r	n/r	n/r	16.5	12.8
Potassium	mg/L	-	n/r	n/r	n/r	5	6.62
Sodium	mg/L	200*	36.1	n/r	n/r	49.8	21.6
D.R. Phosphorus	mg/L	-	n/r	n/r	n/r	0.119	1.23
Dissolved Aluminium	mg/L	0.1*	*0.001*	*0.001*	*0.001*	*0.001*	0.026
Dissolved Arsenic	mg/L	0.01	n/r	n/r	n/r	*0.0005*	**0.02**
Dissolved Boron	mg/L	1.4	0.05	0.09	0.05	0.05	0.04
Dissolved Cadmium	mg/L	0.004	n/r	n/r	n/r	*0.0001*	*0.0001*
Dissolved Chromium (VI)	mg/L	0.05	n/r	n/r	n/r	*0.0005*	*0.0005*
Dissolved Copper	mg/L	2	n/r	n/r	n/r	*0.00025*	*0.00025*
Dissolved Iron	mg/L	0.2*	0.03	n/r	n/r	0.05	0.02
Dissolved Lead	mg/L	0.01	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	0.4	0.232	**0.741**	0.382	**0.482**	**0.455**
Dissolved Mercury	mg/L	-	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.08	*0.00025*	0.0007	*0.00025*	*0.00025*	*0.00025*
Dissolved Zinc	mg/L	1.5*	n/r	n/r	n/r	*0.001*	*0.001*

Notes:

Bold – denotes an exceedance of the DWSNZ MAV

Underlined – denotes exceedance of the Consent Trigger Value.

'ND' indicates where *E. coli* were not detected at or above the laboratory detection limit

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

n/p – not provided

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 50m 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 the Northern Farm property and bore Xs2 is next to the driveway leading to a Council-owned property. Bore Xs2 is hydraulically upgradient of the old landfill (See Site Plan, Appendix A).

The results from the October 2023 consent monitoring round for these bores are presented in Table 2-5 and have been compared with the ANZECC LDW trigger values as per the requirements of discharge consent ATH-2002003983.02. The full laboratory report is included in Appendix C and the historical graphs are presented in Appendix D.

There were **no exceedances of the ANZECC LDW trigger values** during the October 2023 monitoring round.

In the previous monitoring round, an exceedance of *E. coli* occurred at bore Xs1 (400 cfu/100mL). Given that there were no exceedances for other determinants at Xs1, *E. coli* contamination was assumed to not to be related to the old landfill. Instead, animal activities around the bore likely contributed to this result. Either accidental contamination during sampling or laboratory analysis may also provide an explanation. *E. coli* exceedances were of issue in the January 2023 monitoring round, with significant exceedances at B1, B2, and C2. However, this appears to have been an anomaly, as all results were below the level of detection for July 2023. Monitoring for October 2023 also did not produce any exceedances.

Table 2-5: Monitoring Results for Shallow Boreholes Down-Gradient from the Old Landfill for October 2023

Determinant	Units	ANZECC LDW	E2S	B1	B2	B3s	C1	C2	C2DS	G2S	Xs1	Xs2
Sampling date			10/10/23	11/10/23	11/10/23	11/10/23	10/11/23	10/10/23	10/10/23	09/10/23	10/10/23	10/10/23
Water level	mbgl	-	5.3	0.8	1.06	0	0.5	0.15	2.65	2.12	0.65	2.5
pH	pH units	6 to 9	7.8	7.4	7.4	7.3	7.2	7.2	7.3	7.4	7.0	7.0
Suspended Solids	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	42	26
Phenol	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.025*	*0.025*
VFA	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*2.5*	*2.5*
TOC	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	25.5	2
Alkalinity	mg $CaCO_3$/L	-	n/r	n/r	780	1110	n/r	1200	556	n/r	464	57
Conductivity	mS/m	-	34.7	238	198	243	141	276	127	134	112	18
COD	mg/L	-	15	73	87	144	91	429	63	31	76	*7.5*
scBOD5	mg/L	-	*0.5*	*0.5*	0.5	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
E-Coli	CFU/100ml	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride	mg/L	-	12.9	126	65.1	65.1	85.5	72.4	56.4	288	49.6	13.3
Nitrate-N	mg/L	90.3	*0.005*	28.5	8.79	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	0.84
Sulphate	mg/L	1000	n/r	n/r	17	*0.01*	n/r	*0.01*	*0.01*	n/r	4.77	8.35
Ammoniacal-N	mg/L	-	0.29	7.7	72.1	121	11.6	182	1.35	0.03	14.2	0.02
Hardness	mg $CaCO_3$/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	325	47
Calcium	mg/L	1000	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	80.3	10.2
Magnesium	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	30.2	5.29
Potassium	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	14.4	3.31
Sodium	mg/L	-	27.8	n/r	n/r	n/r	n/p	n/r	n/r	n/r	73	16.3
D. R. Phosphorus	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	0.014	0.018
Dissolved Aluminium	mg/L	5	0.003	0.011	0.008	0.007	0.021	0.02	*0.001*	*0.001*	0.003	0.004
Dissolved Arsenic	mg/L	0.5	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.0005*	*0.0005*
Dissolved Boron	mg/L	5	*0.015*	1.61	2.18	1.00	0.87	1.49	0.62	0.64	0.24	0.04
Dissolved Cadmium	mg/L	0.01	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.0001*	*0.0001*
Dissolved Chromium (VI)	mg/L	1	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.0005*	*0.0005*
Dissolved Copper	mg/L	0.4	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.00025*	0.0009
Dissolved Iron	mg/L	-	0.09	n/r	n/r	n/r	n/p	n/r	n/r	n/r	5.58	0.08

Determinant	Units	ANZECC LDW	E2S	B1	B2	B3s	C1	C2	C2DS	G2S	Xs1	Xs2
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	-	0.234	4.5	2.81	3.22	0.24	0.143	2.00	0.28	1.58	0.0542
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*	0.0042	0.0022	0.0081	0.0014	0.0045	0.0019	0.0019	0.0015	0.0007
Dissolved Zinc	mg/L	20	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	*0.001*	0.004

Notes:

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

'ND' indicates where *E. coli* were not detected at or above the laboratory detection limit

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

n/p – result not provided at the time of preparing this report

n/p – not provided

Bold - denotes exceedance of ANZECC LDW

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 for that purpose. It is expected that bores F2 and F3 would therefore be representative of background groundwater quality.

The results from the F series boreholes are presented in Table 2-6 and have been compared with the ANZECC LDW trigger values, as per discharge consent ATH-2002003983.02. The full laboratory report is included in Appendix C and the historical graphs are presented in Appendix D.

There were **no exceedances of the resource consent conditions** in samples from these bores during the October 2023 monitoring round.

Table 2-6: Results from Monitoring Bores in the Irrigation Area for October 2023

Determinant	Units	ANZECC LDW	F1	F2	F3
Sampling Date			09/10/2023	09/10/2023	09/10/2023
Water Level	mbgl	-	7.4	2.18	4.62
pH	pH units	6 to 9	7.2	7.3	7.4
Conductivity	mS/m	-	42.2	22.5	20
COD	mg/L	-	*7.5*	*7.5*	20
scBOD5	mg/L	-	*0.5*	*0.5*	*0.5*
E-Coli	CFU/100ml	100	ND	ND	ND
Chloride	mg/L	-	47	23.8	23.2
Nitrate-N	mg/L	90.3	1.51	0.53	1.68
Ammoniacal-N	mg/L	-	*0.005*	*0.005*	*0.005*
Sodium	mg/L	-	n/r	n/r	32.9
Dissolved Aluminium	mg/L	5	0.002	0.003	0.074
Dissolved Boron	mg/L	5	0.05	0.05	0.06
Dissolved Iron	mg/L	-	n/r	n/r	0.02
Dissolved Lead	mg/L	0.1	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	0.006	0.0059	0.0031
Dissolved Mercury	mg/L	0.002	*0.00025*	*0.00025*	0.0006
Dissolved Nickel	mg/L	1	*0.00025*	*0.00025*	0.0008

Notes:

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 at or above the laboratory detection limit

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

n/p – not provided

2.6 Leachate Effluent Results

Leachate effluent from the landfill is not subject to any water quality consent conditions and is sent to the Levin Wastewater Treatment Plant for treatment. However, for comparison purposes, typical leachate characteristics for landfills, as published by the Waste Management Institute New Zealand (*Technical Guidelines for Disposal to Land*, September 2023, WasteMINZ), have been compared against the leachate quality monitoring results (Table 2-7). The full laboratory report is included in Appendix C and the historical graphs are presented in Appendix D

As stated, typical leachate concentrations are derived from tables presented in the WasteMINZ *Technical Guidelines*. The data in those tables originate from seven landfills in New Zealand and date back to between 1998 and 1999. Whilst more updated data could be sought for comparison purposes, the WasteMINZ Guidelines are the latest version, and no updated information has been provided.

Table 2-7 presents the concentrations of monitored parameters for leachate effluent samples collected in August 2023, September 2023, and October 2023.

Up until April 2022, samples of leachate were tested monthly for the comprehensive suite of parameters, as stated in Table C under condition 3H of discharge permit ATH-2002003983.02. This requirement was for 2 years and condition 3P of discharge permit ATH-2002003983.02 allows the monitoring frequency to shift to a conditional sampling frequency (i.e., six monthly comprehensive, quarterly indicator) if water sample analysis results are consistent and there is no decline in water quality over a period of at least four consecutive sampling rounds. The quality of leachate is considered to have met these criteria and so the change in monitoring from April 2022 was justified. The resource consent conditions allowed this change to occur immediately after the four consecutive sampling rounds were completed. However, it was later decided to continue monthly sampling for the duration that monthly sampling at Hokio Stream was required.

There were **sixteen outliers from the typical leachate characteristics in the August 2023, September 2023, and October 2023 results.** Across all months, ammoniacal-N and dissolved arsenic were detected at elevated levels, and dissolved mercury was not detected and therefore less than their minimum typical values. In September and October 2023, alkalinity was detected at elevated levels, dissolved cadmium was not detected, and dissolved copper was either not detected or the measured level was below the minimum range. Additionally, in October 2023, the nitrate-N level was below detection limits.

While these results are not reflective of typical conditions at other, similar landfills around New Zealand, it is noted that they are generally consistent with the historical range of results observed at the Levin Landfill site.

Table 2-7: Results from Leachate Effluent Monitoring for October 2023

Determinant	Units	Typical Leachate Characteristics* (range)	August	September	October
Sampling Date			15/08/2023	19/09/2023	05/10/2023
pH		5.9 - 8.5	7.7	7.8	7.6
Suspended Solids	mg/l	-	20	40	30
Phenol	mg/L	-	0.05	*0.025*	*0.025*
VFA	mg/L	-	24	*2.5*	*2.5*
TOC	mg/L	17.2 - 822	803	657	805
Alkalinity	mg $CaCO_3$/L	264 – 6,820	5,310	**7,310**	**7,340**
Conductivity	mS/m	308 – 27,900	1,630	1,600	1,680
COD	mg/L	84 – 5,090	2,720	4,410	4,080
$scBOD_5$	mg/L	12 – 3,867	117	91	119
E-Coli	CFU/100mL	-	1,000	100	ND
Chloride	mg/L	45 – 2,584	1,430	958	646
Nitrate-N	mg/L	0.1 – 50**	*0.5*	*0.5*	***0.005***
Sulphate	mg/L	1 - 780	53.7	13	26.1
Ammonia-N	mg/L	3.4 – 1,440	**1,610**	**1,520**	**1,550**
Hardness	mg $CaCO_3$/L	300 – 11,500**	503	440	475
Calcium	mg/L	20 – 600***	107	99	100
Magnesium	mg/L	40 – 350***	57.3	46.7	54.7
Potassium	mg/L	10 – 2,500**	563	742	784
Sodium	mg/L	50 – 4,000**	845	920	1,090
D.R. Phosphorus	mg/L	-	16.6	14.7	15.5
Dissolved Aluminium	mg/L	-	0.947	0.828	0.711
Dissolved Arsenic	mg/L	0.006 – 0.191	**0.331**	**0.31**	**0.289**
Dissolved Boron	mg/L	0.54 – 20	7.2	7.11	6.9
Dissolved Cadmium	mg/L	0.0005 – 0.140**	*0.001*	***0.0001***	***0.0001***
Dissolved Chromium	mg/L	0.005 – 50.4	0.951	0.71	0.605
Dissolved Copper	mg/L	0.004 – 1.4**	0.0089	***0.00025***	**0.0038**

Determinant	Units	Typical Leachate Characteristics* (range)	August	September	October
Dissolved Iron	mg/L	1.6 – 220	7.3	7.57	9.07
Dissolved Lead	mg/L	0.001 - 0.42	0.0025	0.0021	0.0019
Dissolved Manganese	mg/L	0.03 - 45***	1.23	1.17	1.23
Dissolved Mercury	mg/L	0.2 – 50**	***0.0025***	***0.00025***	***0.00025***
Dissolved Nickel	mg/L	0.02 – 2.05**	0.14	0.111	0.129
Dissolved Zinc	mg/L	0.015 – 24.2	0.071	0.098	0.047

Notes:

* for Class 1-type landfills, Table 5-5, p60, Technical Guidelines for Disposal to Land, WasteMINZ September 2023 (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, p59 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, p59 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

'ND' indicates where *E. coli* and other parameters were not detected at or above the laboratory detection limit

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

2.7 Northern Farm Drain (Tatana Property)

A drain is located on the Northern Farm, previously known as 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) respectively.

The revised consent conditions have since 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 August 2023, September 2023 and October 2023 sampling rounds are presented in Table 2-8 and have been compared with the ANZECC[2] 95%ile DGVs, as per the revised resource consent conditions.

There have been **eight exceedances of the resource consent conditions** for three monitored parameters in samples from the Northern Farm property at the TD1 location during the August 2023, September 2023, and October 2023 sampling rounds.

- The concentration of nitrate-N in August 2023 (2.27 mg/L), September 2023 (2.22 mg/L), and October 2023 (1.98 mg/L) exceeded the ANZECC (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- The concentration of ammoniacal-N in August 2023 (5.63 mg/L), September 2023 (17.1 mg/L), and October 2023 (10.1 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 mg/L.
- The concentration of dissolved zinc in August 2023 (0.017 mg/L) and September 2023 (0.015 mg/L) exceeded the ANZECC (95%ile) DGV of 0.008 mg/L.

Whilst relatively high, these results are not uncharacteristic of results within the last two years. Localised conditions, such as having stock in the paddock next to Northern Farm Drain and the slow flow of water in the drain, may contribute to some of the elevated parameters.

Table 2-8 Northern Farm Drain Monitoring Results for August 2023, September 2023, and October 2023.

Determinant	Units	ANZECC DGV (95%ile species protection)	TD1 (formerly SW3)		
			August	September	October
Sampling date			15/08/2023	19/09/2023	10/10/2023
pH	pH units	-	7.2	7.9	7.8
Suspended Solids	mg/L	-	1.5	18	100

[2]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

Determinant	Units	ANZECC DGV (95%ile species protection)	TD1 (formerly SW3)		
			August	September	October
Phenol	mg/L	-	*0.025*	*0.025*	*0.025*
VFA	mg/L	-	*2.5*	*2.5*	*2.5*
TOC	mg/L	-	20.6	19.4	20
Alkalinity	mg $CaCO_3$/L	-	188	480	359
Conductivity	mS/m	-	60.3	120	93.7
COD	mg/L	-	82	75	101
scBOD5	mg/L	2	*0.5*	*0.5*	*0.5*
E-Coli	CFU/100ml	-	200	100	100
Chloride	mg/L	-	67.5	89.6	77.2
Nitrate-N	mg/L	0.16	**2.27**	**2.22**	**1.98**
Sulphate	mg/L	-	7.54	1.06	1.07
Ammoniacal-N	mg/L	2.1	**5.63**	**17.1**	**10.1**
Hardness	mg $CaCO_3$/L	-	152	371	271
Calcium	mg/L	-	31.2	90.5	64.8
Magnesium	mg/L	-	17.9	35	26.5
Potassium	mg/L	-	22.2	26.3	21.9
Sodium	mg/L	-	60	82.7	67.2
D.R. Phosphorus	mg/L	-	0.014	0.023	0.02
Dissolved Aluminium	mg/L	0.055	0.029	0.007	0.009
Dissolved Arsenic	mg/L	0.024	*0.0005*	0.001	*0.0005*
Dissolved Boron	mg/L	-	0.31	0.33	0.3
Dissolved Cadmium	mg/L	0.0002	*0.0001*	*0.0001*	*0.0001*
Dissolved Chromium	mg/L	-	*0.0005*	0.002	0.001
Dissolved Copper	mg/L	0.0014	0.0012	0.0011	*0.00025*
Dissolved Iron	mg/L	-	0.45	0.12	0.2
Dissolved Lead	mg/L	0.0034	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	1.9	0.133	0.851	0.598
Dissolved Mercury	mg/L	0.0006	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.011	0.002	0.0024	0.0018
Dissolved Zinc	mg/L	0.008	**0.017**	**0.015**	0.004

Notes:
Bold – denotes an exceedance of the ANZECC DGV for 95%ile species protection
All `<' values have been reported as half the detection limit for statistical purposes and are expressed in italics

2.8 Hokio Stream

Surface water grab samples are obtained monthly from Hokio Stream at sites HS1A, HS1, HS2 and HS3 (refer to Appendix A) to investigate whether groundwater containing leachate is having an adverse environmental effect on the stream. Sites HS1A and HS1 are situated up-stream of the old landfill, HS2 is situated alongside the old landfill and up-stream of the Northern Farm Drain discharge, and HS3 is located approximately 50m down-stream of the landfill site property boundary and the Northern Farm 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 August 2023, September 2023, and October 2023 monitoring rounds are presented in Table 2-9 and have been compared with the ANZECC AE 95%ile DGVs, as per the revised resource consent conditions (2019). Sampling of HS1A commenced April 2020.

There were **fifteen exceedances** of the resource consent conditions in samples from the Hokio Stream during the August 2023, September 2023, and October 2023 sampling rounds.

The exceedances are summarised as follows:

- Nitrate-N exceeded both the ANZECC (95%ile) DGV and consent trigger value of 0.16 mg/L at all sites in September 2023 and October 2023, with values ranging between 0.92 mg/L and 1.52 mg/L.
- Ammoniacal-N exceeded both the ANZECC (95%ile) DGV and consent trigger value maximum of 2.1 mg/L in September 2023 at HS2 (2.71 mg/L).
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.055 mg/L in August 2023 at HS1A (0.114 mg/L) and September 2023 at HS2 (0.066 mg/L).
- Dissolved copper exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.0014 mg/L in September 2023 at HS1A (0.0017 mg/L), HS1 (0.0048 mg/L), and HS2 (0.0018 mg/L), and in October 2023 at HS3 (0.0015 mg/L). However, these exceedances are not uncharacteristic given historical data which shows copper frequently exceeding 0.0014 mg/L for all surface water sampling locations since 1994.

Overall, the differences in monitoring results between the sites are generally marginal and for most determinants there is little to no change in concentrations between upstream and downstream sites on the Hokio Stream. Ammoniacal-N, dissolved aluminium, and dissolved copper provided minor exceptions to this trend – which have been observed in recent quarterly reports. However, for these exceedance events, concentrations downstream were generally still within normal ranges. *E. coli* counts have shown some significant differences between sites and sampling rounds. However, the *E. coli* counts noted in this report are within the historical range since sampling began in 1994.

Consecutive monthly sampling has occurred at all Hokio Stream sites since October 2021. It is recommended that HDC assess the results of these 25 sampling events, as required by the conditions of the consent, to determine the significance of the results, and to ascertain, in conjunction with HRC, if a reduction in sampling frequency can be made.

If it is permitted for the sampling frequency to be reduced to quarterly, then it is also proposed that the sampling frequency at the Northern Farm Drain (TD1) and the manhole next to the leachate pond be similarly reduced.

Table 2-9: Hokio Stream Monitoring Results for August 2023, September 2023, and October 2023.

Determinant	Units	ANZECC DGV (95%ile species protection)	Consent Trigger Values (Table C1)	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3
				August				September				October			
Sampling date				15/08/23	15/08/23	15/08/23	15/08/23	19/09/23	19/09/23	19/09/23	19/09/23	10/10/23	10/10/23	10/10/23	10/10/23
pH	pH units	-	-	9.1	9.2	9.1	8.9	7.7	7.5	7.6	7.6	7.5	7.6	7.5	7.5
Suspended Solids	mg/l	-	-	79	25	26	24	41	36	32	34	29	16	21	23
Phenol	mg/l			*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*	*0.025*
VFA	mg/l			*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
TOC	mg/L	-	-	9	9	8.7	9.1	4.4	4.4	5.8	4.5	4.7	5.3	5.2	5.2
Alkalinity	mg $CaCO_3$/L	-	-	52	52	53	53	52	53	67	59	54	54	58	60
Conductivity	mS/m	-	-	21.7	21.7	21.9	22.2	23.3	23.8	27.6	25.4	23.6	23.9	24.9	25.3
COD	mg/L	-	-	48	39	50	54	40	38	45	38	22	27	187	85
$scBOD_5$	mg/L	2	Monthly Avg. 2	1	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
E. coli	CFU/100 ml	-	-	ND	ND	100	ND	200	100	100	200	ND	100	ND	100
Chloride	mg/L	-	-	23.2	23.3	23.8	24.4	22.9	47.1	26	25	23.7	9.36	25.2	25.7
Nitrate-N	mg/L	0.16	0.16	0.07	0.06	0.12	0.14	**1.31**	**1.52**	**1.29**	**1.31**	**0.94**	**0.94**	**0.94**	**0.92**
Sulphate	mg/L	-	-	18.9	18.8	18.8	18.9	18.4	13.9	18	17.8	18.6	11.2	18.9	18.3
Ammoniacal-N	mg/L	2.1	Max. 2.1 Avg. 0.400	*0.005*	0.01	0.01	0.01	0.17	0.18	**2.71**	0.37	0.09	0.08	0.19	0.39
Hardness	mg $CaCO_3$/L	-	-	61	61	62	62	66	67	65	70	64	65	69	74
Calcium	mg/L	-	-	13.3	13.4	13.5	13.5	13.5	13.7	13.1	14.7	13.1	13.2	13.8	15.3
Magnesium	mg/L	-	-	6.63	6.67	6.77	6.76	7.87	7.92	7.81	8.22	7.6	7.73	8.27	8.65
Potassium	mg/L	-	-	2.95	3.04	3.1	3.27	3.3	3.49	4.91	3.72	2.77	2.87	3.02	3.3
Sodium	mg/L	-	-	20.7	21	21.3	21.3	22.5	22.8	24.1	23.6	20.9	21.3	22.7	23.8
D.R. Phosphorus	mg/L	-	-	*0.0025*	*0.0025*	*0.0025*	*0.0025*	0.04	0.037	0.064	0.039	0.019	0.023	0.036	0.053
Dissolved Aluminium	mg/L	0.055	Med. 0.055	**0.114**	0.01	0.011	0.01	0.031	0.027	**0.066**	0.019	0.021	0.023	0.012	0.025

Determinant	Units	ANZECC DGV (95%ile species protection)	Consent Trigger Values (Table C1)	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3
				August				September				October			
Dissolved Arsenic	mg/L	0.024	Med. 0.024	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*
Dissolved Boron	mg/L	0.370	-	0.05	0.05	0.06	0.06	0.05	0.05	0.07	0.06	0.06	0.08	0.07	0.07
Dissolved Cadmium	mg/L	0.0002	Med. 0.0002	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*
Dissolved Chromium (VI)	mg/L	0.001	-	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	0.001	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*
Dissolved Copper	mg/L	0.0014	Med. 0.0014	0.0011	0.0012	0.001	0.0011	**0.0017**	**0.0048**	**0.0018**	0.001	0.001	0.0011	0.001	**0.0015**
Dissolved Iron	mg/L	-	-	0.33	0.03	0.04	0.04	0.09	0.08	0.2	0.06	0.07	0.08	0.06	0.11
Dissolved Lead	mg/L	0.0034	Med. 0.0034	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	1.9	-	0.0116	0.0021	0.0029	0.0026	0.0319	0.0335	0.0221	0.0429	0.0413	0.04	0.0516	0.0554
Dissolved Mercury	mg/L	0.0006	Med. 0.0006	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.011	Med. 0.011	*0.00025*	0.0006	*0.00025*	*0.00025*	*0.00025*	0.0016	0.0011	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Zinc	mg/L	0.008	Med. 0.008	*0.001*	*0.001*	*0.001*	*0.001*	0.003	0.011	0.007	*0.001*	0.002	*0.001*	0.002	*0.001*

Notes:

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

Underlined – denotes exceedance of the Consent Trigger Value.

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

3 Landfill Gas Detection in Monitoring Wells

Condition 4 of Discharge Permit ATH-2002003984.02 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, landfill gas monitoring results were only reported in the Annual Report. A recommendation of the 2019 - 2020 Annual Report was that these results should be included in every quarterly monitoring report so that if any results are unusually high, appropriate action can be promptly undertaken, including putting safeguards in place at the monitoring bores.

Appendix E summarises the results of landfill gas monitoring undertaken on the 4, 5, 10, and 13 of October 2023. It is noted that G1d was sampled twice.

Out of the 27 groundwater monitoring bores:

- Methane was recorded at three bores – D6 (concentration of 0.02%), Xd1 (0.04%), and Xs1 (0.02%). These concentrations are well below the explosive limit of 5%, and therefore represent a 'safe' level. Methane is commonly detected at the landfill site, and its detection reinforces the need for sampling staff to take the necessary precautions for gas safety, generally applicable at landfill sites.
- Carbon dioxide was recorded at all bores, but at relatively minor concentrations – the highest being 1% at bore B2. Historically, fluctuations have been seen across the bores, and October concentrations are within historical ranges. In January 2023, B2 presented a significantly high concentration of 7.01%, but the following July and now October samples have demonstrated a reduction.
- Hydrogen sulphide was detected at one bore – G1s (2 ppm), which is around the threshold at which a 'rotten egg' smell (commonly associated with H_2S) can be detected.
- The landfill gas levels in October 2023 appear to reinforce the July 2023 period's observed reduction in measured gases in comparison to previous quarters. Gas results may be due to season variations (e.g., different ground temperatures and/or groundwater levels), or may be related to prevailing weather conditions (e.g., different air pressures).

The possibility of encountering methane (and hydrogen sulphide) in groundwater bores endorses the need for appropriate health and safety measures to be adopted during monitoring. No smoking should be permitted when personnel undertake groundwater sampling and when in the vicinity of the groundwater monitoring wells, or in fact anywhere else on the Levin Landfill site. For sake of safety a personal gas detector should be worn by all staff when working in the vicinity of the landfill.

4 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 more infrequent (or erratic) sampling can make it difficult to compare results between rounds and determine trends at individual monitoring locations.

Whilst the surface water and groundwater samples were collected within a 7-day period, a number of samples were received by the laboratory outside the normally accepted 24-hour timeframe between sampling and reception. Meeting the monitoring timeframe is important because it means that there can be greater confidence in reliability of results, and comparisons with historical data.

The level of detection used in the laboratory for testing *E. coli* varied between 100 cfu/100mL and 1 cfu/100mL. These variations are conducive to assessing compliance, as different sites are measured against different standards. For the shallow bores, a detection level of 100 cfu/100mL is appropriate, as results are compared against the ANZECC LDW of 100 cfu/100mL. For the deep aquifer bores, results are compared against the DWSNZ MAV, which is NIL, so a detection level of 1 cfu/100mL is acceptable. It appears that for the most part, the laboratory has undertaken the correct procedures – except for the D3rd sample. D3rd sits in the deep gravel aquifer but was analysed against a detection level of 100 cfu/100mL, and thus has resulted in a non-compliance which could have been avoided. Checks should be undertaken by the sampling personnel before submitting samples for analysis, including on the Chain of Custody documentation, to ensure that the correct tests are requested and performed, with appropriate limits of detection.

5 Consent Compliance

Discharge permit ATH-2002003983.02 states that quarterly and annual monitoring results for the shallow groundwater aquifer (sand aquifer) shall comply with the ANZECC LDW trigger values, and samples from the deep groundwater (gravel aquifer) shall comply with the applicable DWSNZ values. Furthermore, samples taken from surface water bodies shall comply with ANZECC AE 95%ile DGVs. 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.

Background Groundwater Quality

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

Shallow Aquifer and Irrigation Area

There were **no exceedances** of consent conditions hydraulically up-gradient of the old landfill and down-gradient of the new landfill during the October 2023 monitoring period.

There were **no exceedances** of consent conditions hydraulically down-gradient of the old landfill during the October 2023 monitoring period.

There were **no exceedances** of the resource consent conditions during the October 2023 sampling round for samples obtained from bores within the irrigation area.

Deeper Gravel Aquifer

There were **five exceedances** of the DWSNZ limits in samples from the deep gravel aquifer during the October 2023 monitoring round, as follows:

- *E. coli* at D3rd was analysed at a laboratory detection level of 100 cfu/100mL, and was not detected, thus has been represented as *50* cfu/100mL as per standard practice. However, this level detection is not acceptable – all other deep gravel aquifer bores were analysed against a detection level of 1 cfu/100mL, because the comparative DWSNZ MAV is NIL. Therefore, the *E. coli* result at D3rd has been considered a non-compliance.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.02 mg/L). This is characteristic of D3rd.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2DD (0.741 mg/L), Xd1 (0.482 mg/L), and D3rd (0.455 mg/L). The results for C2DD (from 1997), Xd1 (from March 2021 when sampling started) and D3rd (from October 2021 when sampling started) are within the historical range of concentrations observed. Dissolved manganese is generally elevated in the deep aquifer bores.

Leachate Effluent

Leachate effluent from the Levin Landfill is not subject to any water quality consent conditions and is sent to the Levin Wastewater Treatment Plant for treatment.

However, there were sixteen outliers from the typical leachate characteristics in the August 2023, September 2023, and October 2023 results. Across all months, ammoniacal-N was detected at elevated levels, whereas dissolved mercury was not detected, and therefore, less than its respective minimum typical value.

Northern Farm Drain

There were **eight exceedances** of the resource consent conditions for samples from the Northern Farm property at the TD1 location during the August 2023, September 2023, and October 2023 sampling.

- The concentration of Nitrate-N in August 2023 (2.27 mg/L), September 2023 (2.22 mg/L), and October 2023 (1.98 mg/L) exceeded the ANZECC (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- The concentration of Ammoniacal-N in August 2023 (5.63 mg/L), September 2023 (17.1 mg/L), and October 2023 (10.1 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 mg/L.
- The concentration of dissolved zinc in August 2023 (0.017 mg/L) and September 2023 (0.015 mg/L) exceeded the ANZECC (95%ile) DGV of 0.008 mg/L.

Hokio Stream

There were **fifteen exceedances** of the resource consent conditions in samples from the Hokio Stream during the August 2023, September 2023, and October 2023 sampling rounds.

- Nitrate-N exceeded both the ANZECC (95%ile) DGV and consent trigger value of 0.16 mg/L at all sites in September 2023 and October 2023, with values ranging between 0.92 mg/L and 1.52 mg/L.
- Ammoniacal-N exceeded both the ANZECC (95%ile) DGV and consent trigger value maximum of 2.1 mg/L in September 2023 at HS2 (2.71 mg/L).
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.055 mg/L in August 2023 at HS1A (0.114 mg/L) and September 2023 at HS2 (0.066 mg/L).
- Dissolved copper exceeded the ANZECC (95%ile) DGV and consent trigger value median of 0.0014 mg/L in September 2023 at HS1A (0.0017 mg/L), HS1 (0.0048 mg/L), and HS2 (0.0018 mg/L), and in October 2023 at HS3 (0.0015 mg/L). However, these exceedances are not uncharacteristic given historical data which shows copper frequently exceeding 0.0014 mg/L for all surface water sampling locations since 1994.

6 Conclusions

Monitoring results obtained in the August 2023 to October 2023 sampling rounds suggest that the groundwater at the background monitoring sites at the Levin Landfill is being impacted by local ground conditions and/or activities up-gradient of the landfill.

During the August 2023 to October 2023 monitoring period, there were 28 exceedances of resource consent conditions: five from the deep gravel aquifer, eight in the samples from the Northern Farm Drain (formerly known as Tatana Property Drain), and the remaining fifteen from surface water monitoring locations along the Hokio Stream.

Methane was detected in three of the bores in October 2023, with the greatest reading at Xd1 (0.04%). These concentrations were well below the explosive limit of 5%, and therefore represent a ‘safe’ level. Methane is commonly detected at this landfill site, and its detection reinforces the need for sampling staff to take the necessary precautions for gas safety, generally applicable at landfill sites. Minor concentrations of carbon dioxide were recorded at all bores, with the highest being 1% at bore B2. Hydrogen sulphide was detected at one bore – G1s (2 ppm), which is around the threshold at which a ‘rotten egg’ smell (commonly associated with H2S) can be detected.

The possibility of encountering methane (and hydrogen sulphide) in groundwater bores endorses the need for appropriate health and safety measures to be adopted during monitoring.

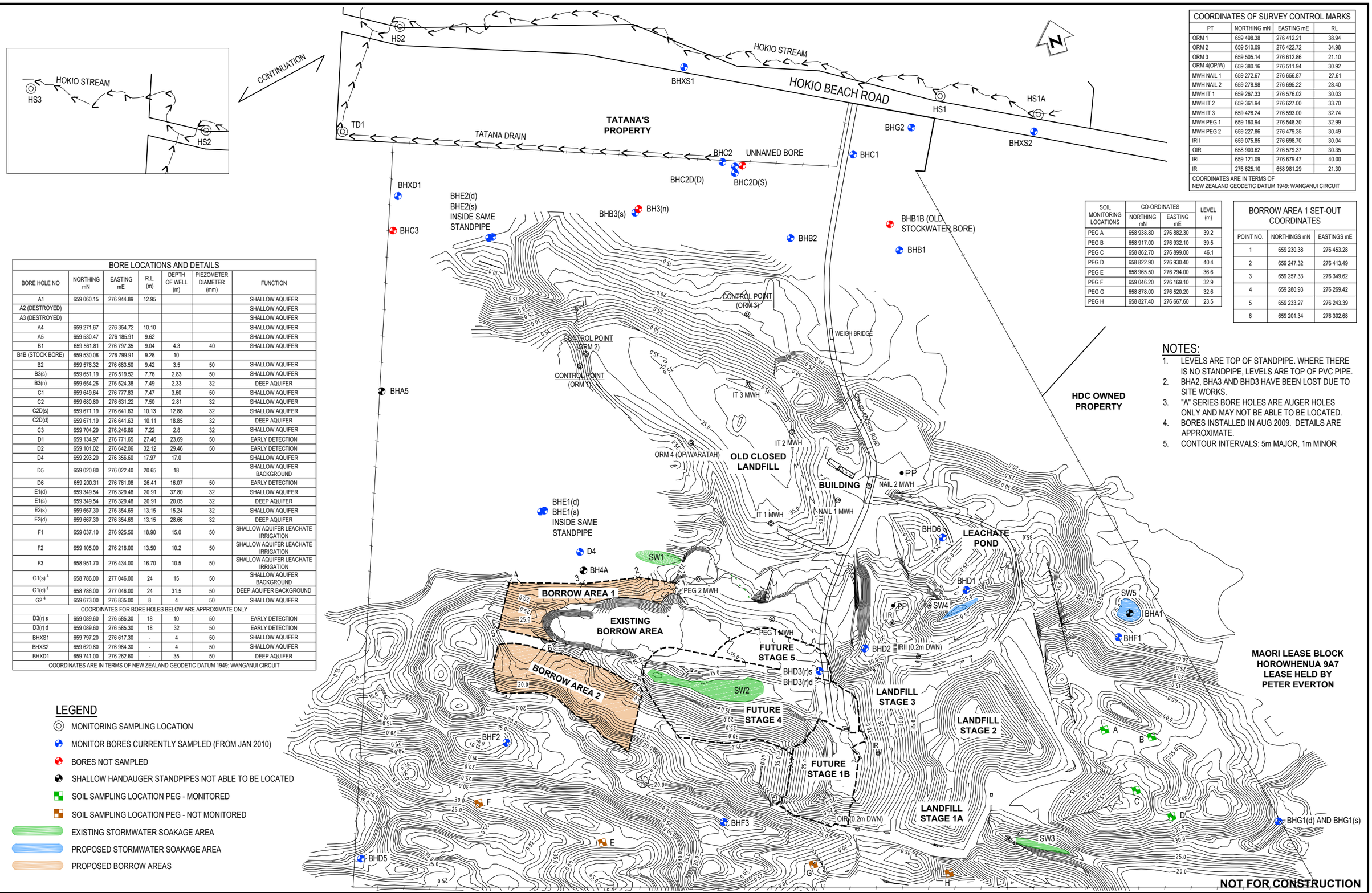
Consecutive monthly sampling has occurred at all Hokio Stream sites for since October 2021. It is recommended that HDC assess the results of these 25 sampling events, as required by the conditions of the consent, to determine the significance of the results, and to ascertain, in conjunction with HRC, if a reduction in sampling frequency can be made.

If it is permitted for the sampling frequency to be reduced to quarterly, then it is also proposed that the sampling frequency at the Northern Farm Drain (TD1) and the manhole next to the leachate pond be similarly reduced.

Appendices

We design with community in mind

Appendix A Site Plan



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
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
COORDINATES FOR BORE HOLES BELOW ARE APPROXIMATE ONLY						
D3(r) s	659 089.60	276 585.30	18	10	50	EARLY DETECTION
D3(r) d	659 089.60	276 585.30	18	32	50	EARLY DETECTION
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
E	FOR INFORMATION - BHD3(r)s AND BHD3(r)d ADDED, AND CONTOURS UPDATED FROM JULY 2021 SURVEY	BCJ	PSL	PSL	24.09.21
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	23.09.21
APPROVED	Phil Landmark	23.09.21
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: 24.09.21
Scales: 1:2000 (A1) 1:4000 (A3)
Drawing No.: 310101088-19-001-G001
Rev.: E

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 2023 - April 2026).

(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, ATH-2002003983.02, formerly DP 6010)						Table B (Condition 3, ATH-2002003983.02, formerly DP 6010)																				Table C (Condition 3, ATH-2002003983.02, formerly DP 6010)					
			Deep Aquifer Bores						Shallow Aquifer Bores																				Irrigation Bores				Hokio Stream[4], [8]				Northern Farm Drain[9]	Leachate Pond[5]
Annual	Quarterly		C2dd	E1d	E2d	G1d	Xd1	D3rd[1]	C1	C2[6]	C2ds[6]	D4	B1	B2	B3s	E1s	E2s	D1[2]	D2[2]	D3rs[1,2]	D6[2]	G1s	G2s	Xs1[6]	Xs2[6]	D5[3]	F1[3]	F2[3]	F3[3]	HS1	HS1A	HS2	HS3	TD1[7]	
Sep-23	**Aug-23**	**Jul-23**	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.	Monthly Compre.	Monthly Compre.	Monthly Compre.	Monthly Compre.	Monthly Compre.
	Nov-23	**Oct-23**	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						
	Feb-24	**Jan-24**	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						
	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 + A
Sep-24	**Aug-24**	**Jul-24**	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
	Nov-24	**Oct-24**	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-25	**Jan-25**	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-25	**Apr-25**	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-25	**Aug-25**	**Jul-25**	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-25	**Oct-25**	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-26	**Jan-26**	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-26	**Apr-26**	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

Sampling at HS1 to be discontinued when HRC advises.

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 called D3rs and D3rd. Testing for comprehensive to continue to provide 2 year's of comprehensive monitoring.
(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
(6) Measure water level at C2, C2ds, Xs1 and Xs2 when taking monthly samples at TD1 and within the Hokio Stream. Testing of X-series bores to continue at comprehensive to provide 2 year's of comprehensive data.
(7) Start taking comprehensive samples at TD1 every month when sampling the Hokio Stream sites. Also note the depth of water in the drain invert at TD1. Continue monthly comprehensive sampling to October 2023 to give 24 month's continuous data.
(8) Start measuring approximately the depth of flow in the Hokio Stream at each sampling site when sampling monthly. Monthly sampling at comprehensive level to continue to, and including, October 2023, to give a full continuous 24 months of data.
(9) Northern Farm Drain is a name change from the former 'Tatana Drain'
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

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055544-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139555

Client Reference: 311286-0
Product: Ground water
Sampling Point code: WIL-B1
Sampling Point name: Levin B1
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:19
Analysis Ending Date: 22/10/2023
Sampled Date & Time 11/10/2023 10:58
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	7.70	(± 1.15) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	73	(± 12) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	126	(± 6.29) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	238	(± 4.8) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.011	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	1.61	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	4.50	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0042	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	28.5	(± 1.42) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.4 (± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

①Test is not accredited
②Test is subcontracted within Eurofins group and is accredited
③Test is subcontracted within Eurofins group and is not accredited
④Test is subcontracted outside Eurofins group and is accredited
⑤Test is subcontracted outside Eurofins group and is not accredited
⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
⑩Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

The test result(s) in this report apply only to the sample as received.
This document can only be reproduced in full.
The tests are identified by a five-digit code, their description is available on request.
Accreditation does not apply to comments or graphical representations.
Unless otherwise stated, all tests in this analytical report (except for subcontracted tests) are performed at 85 Port Road, Seaview, Lower Hutt, Wellington, NEW ZEALAND.
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.
This report issued by Eurofins relates exclusively to the samples provided by the Customer and does not relate to the lot / batch from which the samples have been obtained.
Eurofins may subcontract the performance of part or all of the Services to a third party and the Customer authorises the release of all information necessary to the third party for the provision of the Services.
All samples become the property of Eurofins to the extent necessary for the performance of the Services.
Eurofins will not be required to store samples and may destroy or otherwise dispose of the samples or return the samples to the Customer (at the Customer's cost in all respects) immediately following analysis of the samples.
If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The Customer acknowledges and accepts that: (a) it is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the sample.
The Eurofins water sampling services uses IANZ approved methodology based on AS/NZS 5667 and / or best practice to collect and transport samples that are fit for the purpose of analytical testing. Eurofins shall have no liability if the sample collected is not representative of the source from which it has been taken. The laboratory is not responsible for sampling activities unless explicitly indicated by the statement "Sampled by Eurofins" on the report for water samples.
The Customer acknowledges that the Services are provided using the then current state of technology and methods developed and generally applied by Eurofins and involve analysis, interpretations, consulting work and conclusions. Eurofins shall use commercially reasonable degree of care in providing the Services.
This report is produced and issued on the basis of information, documents and/or samples provided by, or on behalf of, the Customer and solely for the benefit of the Customer who is responsible for acting as it sees fit on the basis of this report. Neither Eurofins nor any of its officers, employees, agents or subcontractors shall be liable to the Customer nor any third party for any actions taken or not taken on the basis of this report nor for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to Eurofins.
Eurofins shall have no liability for any indirect or consequential loss including, without limitation, loss of production, loss of contracts, loss of profits, loss of business or costs incurred from business interruption, loss of opportunity, loss of goodwill or damage to reputation and cost of product recall (including any losses suffered as a result of distribution of the Customer's products subject of the Services prior to the report being released by Eurofins). It shall further have no liability for any loss, damage or expenses arising from the claims of any third party (including, without limitation, product liability claims) that may be incurred by the Customer.
Eurofins General Terms and Conditions apply.

END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055545-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139556

Client Reference: 311287-0
Product: Ground water
Sampling Point code: WIL-B2
Sampling Point name: Levin B2
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:19
Analysis Ending Date: 22/10/2023
Sampled Date & Time 11/10/2023 11:47
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	72.1	(± 7.21) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	87	(± 14) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	65.1	(± 3.25) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	198	(± 4.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.008	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	2.18	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	2.81	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0022	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	8.79	(± 0.88) mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.4	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	17.0	(± 0.85) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	780	(± 78) mg CaCO3/l	1

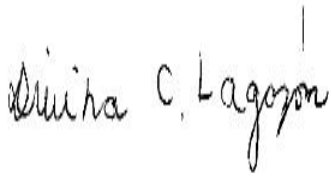
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055542-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139553

Client Reference: 311288-0
Product: Ground water
Sampling Point code: WIL-B3
Sampling Point name: Levin B3s
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:16
Analysis Ending Date: 22/10/2023
Sampled Date & Time 11/11/2023 12:36
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	121	(± 12.1) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	144	(± 15) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	65.1	(± 3.26) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	243	(± 4.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.007	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	1.00	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	3.22	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0081	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

Food & Water Testing

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	1110	(± 110) mg CaCO3/l	1

LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

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Marylou Cabral Laboratory Manager

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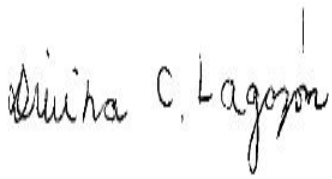

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055540-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139551

Client Reference: 311282-0
Product: Ground water
Sampling Point code: WIL-C1
Sampling Point name: Levin C1
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:16
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/11/2023 07:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	11.6	(± 1.16) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	91	(± 15) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	85.5	(± 4.27) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	141	(± 2.8) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.021	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.87	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.240	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0014	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.2 (± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055543-01	REPORT DATE	22/10/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139554

Client Reference: 311283-0
Product: Ground water
Sampling Point code: WIL-C2
Sampling Point name: Levin C2
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:18
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 10:10
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	182	(± 18.2) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	429	(± 43) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	72.4	(± 3.62) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	276	(± 5.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.020	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	1.49	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.143	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0045	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.2	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	1200	(± 120) mg CaCO3/l	1

LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
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NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

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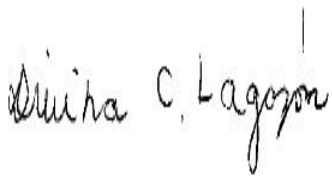

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055031-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138770

Client Reference: 311278-0
Product: Ground water
Sampling Point code: WIL-C2dd
Sampling Point name: Levin C2dd
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:34
Analysis Ending Date: 20/10/2023
Sampled Date & Time 10/10/2023 06:50
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.33	(± 0.10) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	37	(± 7) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	47.2	(± 2.36) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	65.1	(± 1.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.09	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.741	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0007	mg/l	0.0005
ZMF1E	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<1	cfu/100 ml	1
NW010	**Nitrate-N**			
	Nitrate-N	0.01	(± 0.004) mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	272	(± 27) mg CaCO3/l	1

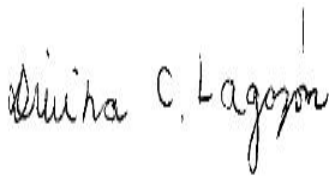
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZMF1E	**Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) Ml Agar-F:** SMEWW 9222K; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055546-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139557

Client Reference: 311284-0
Product: Ground water
Sampling Point code: WIL-C2ds
Sampling Point name: Levin C2ds
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:19
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 10:15
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1.35	(± 0.20) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	63	(± 11) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	56.4	(± 2.82) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	127	(± 2.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.62	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	2.00	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0019	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	556	(± 56) mg CaCO3/l	1

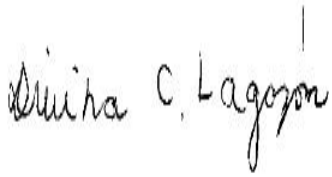
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055029-01	REPORT DATE	20/10/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138767

Client Reference: 311291-0
Product: Ground water
Sampling Point code: WIL-D1
Sampling Point name: Levin D1
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:32
Analysis Ending Date: 20/10/2023
Sampled Date & Time 10/10/2023 09:58
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.003) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	17.9	(± 0.90) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	43.0	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	<0.0005	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	5.61	(± 0.56) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.1 (± 0.2)	0.1

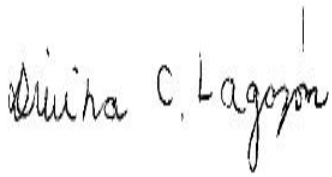
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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Leo Cleave Senior Analyst Microbiology

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055538-01	REPORT DATE	22/10/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138772

Client Reference: 311292-0
Product: Ground water
Sampling Point code: WIL-D2
Sampling Point name: Levin D2
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:36
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 10:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.74	(± 0.22) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	85	(± 14) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	17.1	(± 0.86) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	54.0	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.07	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	12.4	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.470	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	50.6	mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**		
Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**		
Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	6.7	(± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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②Test is subcontracted within Eurofins group and is accredited
③Test is subcontracted within Eurofins group and is not accredited
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⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

Eurofins ELS Limited
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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056022-01	REPORT DATE	25/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138771

Client Reference: 311353-0
Product: Ground water
Sampling Point code: WIL-D3rd
Sampling Point name: Levin D3rd
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:34
Analysis Ending Date: 25/10/2023
Sampled Date & Time 10/10/2023 11:59
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.40	(± 0.12) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	15	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	26.6	(± 1.33) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	53.2	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.026	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.020	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	56.1	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.02	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	12.8	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.455	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	6.62	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	1.23	(± 0.123) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.6	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	26	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	226	(± 23) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	193	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.9	(± 0.6) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

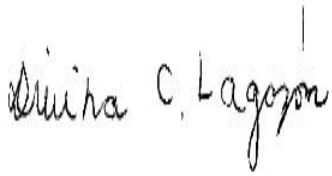
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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⑨Test is RLP accredited
⑩Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056020-01	REPORT DATE	25/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138759

Client Reference: 311354-0
Product: Ground water
Sampling Point code: WIL-D3rs
Sampling Point name: Levin D3rs
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:17
Analysis Ending Date: 25/10/2023
Sampled Date & Time 10/10/2023 11:36
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.76	(± 0.23) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	74	(± 12) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	17.3	(± 0.87) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.6	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.078	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.03	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	9.6	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.004	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	15.7	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	4.68	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.343	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0006	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	4.44	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.198	(± 0.040) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.4	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.007	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	6.5	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	1.07	(± 0.11) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	79	(± 8) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	43	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	24.4	(± 2.4) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

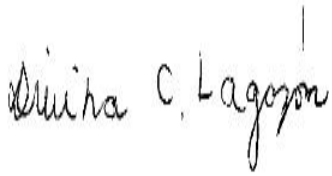
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055541-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139552

Client Reference: 311285-0
Product: Ground water
Sampling Point code: WIL-D4
Sampling Point name: Levin D4
Reception Date & Time: 11/10/2023 17:00
Analysis Start Date & Time: 11/10/2023 19:16
Analysis Ending Date: 22/10/2023
Sampled Date & Time 11/11/2023 06:48
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.26	(± 0.08) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	19	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	29.8	(± 1.49) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	27.1	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.03	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	1.88	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.169	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	28.4	mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**		
Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**		
Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	7.4	(± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.	NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
www.eurofins.co.nz

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056395-01	REPORT DATE	26/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138104

Client Reference: 311296-0
Product: Ground water
Sampling Point code: WIL-D5
Sampling Point name: Levin D5
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:38
Analysis Ending Date: 26/10/2023
Sampled Date & Time 08/10/2023 22:08
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.02	(± 0.006) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	17	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	31.8	(± 1.59) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	31.8	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0245	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.91	(± 0.09) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.2 (± 0.2)	0.1

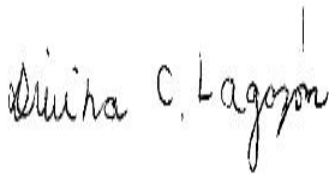
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055028-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138761

Client Reference: 311293-0
Product: Ground water
Sampling Point code: WIL-D6
Sampling Point name: Levin D6
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:20
Analysis Ending Date: 20/10/2023
Sampled Date & Time 10/10/2023 12:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.003) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	25.1	(± 1.26) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	43.1	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0022	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	11.6	(± 0.58) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.0 (± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
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NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

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Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055030-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138769

Client Reference: 311279-0
Product: Ground water
Sampling Point code: WIL-E1d
Sampling Point name: Levin E1d
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:32
Analysis Ending Date: 20/10/2023
Sampled Date & Time 10/10/2023 07:42
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.20	(± 0.06) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	39.3	(± 1.97) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	45.0	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	0.03	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.232	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	36.1	mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
ZMF1E	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<1	cfu/100 ml	1
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1

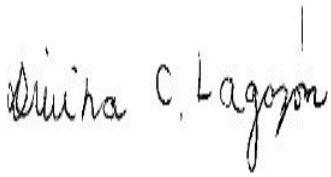
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.	NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZMF1E	**Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI Agar-F:** SMEWW 9222K; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055535-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138762

Client Reference: 311289-0
Product: Ground water
Sampling Point code: WIL-E1s
Sampling Point name: Levin E1s
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:20
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 13:06
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.17	(± 0.05) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	26.1	(± 1.31) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	24.8	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.006	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	<0.03	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	4.35	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.210	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	24.4	mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**		
Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**		
Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	7.2	(± 0.2)	0.1

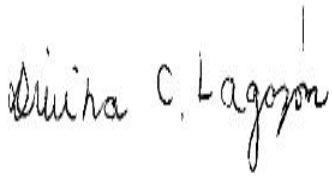
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055537-01	REPORT DATE	22/10/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138768

Client Reference: 311280-0
Product: Ground water
Sampling Point code: WIL-E2d
Sampling Point name: Levin E2d
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:32
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 08:43
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.25	(± 0.08) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	41.1	(± 2.06) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	44.3	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.382	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZMF1E	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<1	cfu/100 ml	1
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.7 (± 0.2)	0.1

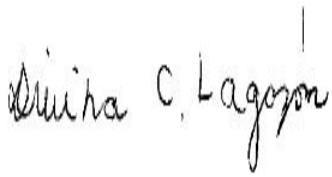
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZMF1E	**Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI Agar-F:** SMEWW 9222K; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055536-01	REPORT DATE	22/10/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138763

Client Reference: 311290-0
Product: Ground water
Sampling Point code: WIL-E2s
Sampling Point name: Levin E2s
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:21
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 13:34
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.29	(± 0.09) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	15	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	12.9	(± 0.65) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	34.7	(± 0.7) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	<0.03	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	0.09	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.234	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	27.8	mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**		
Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**		
Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	7.8	(± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055175-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138105

Client Reference: 311297-0
Product: Ground water
Sampling Point code: WIL-F1
Sampling Point name: Levin F1
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:41
Analysis Ending Date: 20/10/2023
Sampled Date & Time 09/10/2023 10:48
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.003) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	47.0	(± 2.35) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	42.2	(± 0.8) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0060	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.51	(± 0.15) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.2 (± 0.2)	0.1

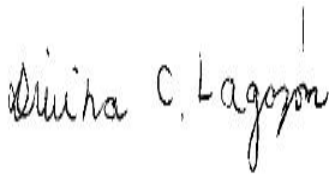
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055210-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138106

Client Reference: 311298-0
Product: Ground water
Sampling Point code: WIL-F2
Sampling Point name: Levin F2
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:41
Analysis Ending Date: 20/10/2023
Sampled Date & Time 09/10/2023 11:31
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.003) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.8	(± 1.19) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	22.5	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0059	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.53	(± 0.13) mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.3 (± 0.2)	0.1

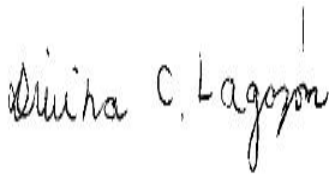
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
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NEW ZEALAND

Phone +64 4 576 5016
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055011-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138103

Client Reference: 311299-0
Product: Ground water
Sampling Point code: WIL-F3
Sampling Point name: Levin F3
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:37
Analysis Ending Date: 20/10/2023
Sampled Date & Time 09/10/2023 12:02
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.003) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	20	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.2	(± 1.16) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	20.0	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.074	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	0.02	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0031	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	0.0006	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0008	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	32.9	mg/l	0.01

Food & Water Testing

		RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.68	(± 0.17) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.4	(± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.	NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
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NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
www.eurofins.co.nz

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055177-01	REPORT DATE	20/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138109

Client Reference: 311281-0
Product: Ground water
Sampling Point code: WIL-G1D
Sampling Point name: Levin G1D
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:45
Analysis Ending Date: 20/10/2023
Sampled Date & Time 09/10/2023 07:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.08	(± 0.03) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	32.8	(± 1.64) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	27.5	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0728	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZMF1E	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<1	cfu/100 ml	1
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.3 (± 0.2)	0.1

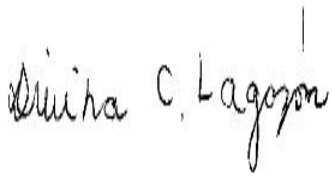
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZMF1E	**Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI Agar-F:** SMEWW 9222K; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-23-NW-055527-01** REPORT DATE **22/10/2023**

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00138107**

Client Reference: 311294-0
Product: Ground water
Sampling Point code: WIL-G1S
Sampling Point name: Levin G1S
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:45
Analysis Ending Date: 22/10/2023
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.01	(± 0.005) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	32	(± 7) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	148	(± 7.39) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	62.9	(± 1.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.045	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW109	**Dissolved Iron**			
	Iron (Fe)	1.37	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0733	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0006	mg/l	0.0005
NW120	**Dissolved Sodium**			
	Sodium (Na)	60.4	mg/l	0.01
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			

		RESULTS (UNCERTAINTY)		LOQ
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.29	(± 0.07) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	6.7	(± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.	NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055176-01	REPORT DATE	20/10/2023

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P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146604
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138108

Client Reference: 311295-0
Product: Ground water
Sampling Point code: WIL-G2
Sampling Point name: Levin G2s
Reception Date & Time: 09/10/2023 16:20
Analysis Start Date & Time: 09/10/2023 16:45
Analysis Ending Date: 20/10/2023
Sampled Date & Time 09/10/2023 09:20
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.03	(± 0.009) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	31	(± 7) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	288	(± 14.4) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	134	(± 2.7) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.64	mg/l	0.03
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.280	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0019	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.4 (± 0.2)	0.1

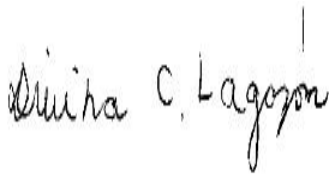
LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044693-01	REPORT DATE	31/08/2023

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NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00111242

Client Reference: 305526-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 16/08/2023 15:45
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 20:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.01	(± 0.005) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	39	(± 8) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.3	(± 1.17) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.7	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.010	(± 0.001) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	(± 0.0004) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.4	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	(± 0.0003) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0012	(± 0.0003) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	0.03	(± 0.006) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	(± 0.0002) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.67	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0021	(± 0.0005) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0006	(± 0.0003) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.04	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	<0.005	(± 0.002) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.0	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	(± 0.0007) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.06	(± 0.02) mg/l	0.01
NW195	**pH**			
	pH	9.2	(± 0.2)	0.1
⑤VQ088	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.8	(± 0.94) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	25	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	52	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	61	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	9.0	(± 0.9) mg/l	0.1
④VQ876	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

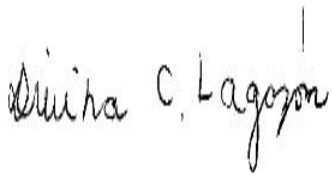
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Gordon McArthur Senior Laboratory Analyst

Ivan Imamura Laboratory Analyst

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

Leo Cleave Senior Analyst Microbiology

EXPLANATORY NOTE

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②Test is subcontracted within Eurofins group and is accredited
③Test is subcontracted within Eurofins group and is not accredited
④Test is subcontracted outside Eurofins group and is accredited
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⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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Accreditation does not apply to comments or graphical representations.
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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053227-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
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4741 Levin
NEW ZEALAND

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Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128374

Client Reference: 307305-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 20/09/2023 14:54
Analysis Start Date & Time: 20/09/2023 14:54
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 11:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.18	(± 0.05) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	38	(± 8) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	47.1	(± 2.35) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.8	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.027	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.7	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0048	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.08	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.92	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0335	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0016	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.49	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.037	(± 0.008) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	22.8	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.011	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.52	(± 0.15) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	13.9	(± 0.69) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	36	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	53	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	67	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	4.4	(± 0.4) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

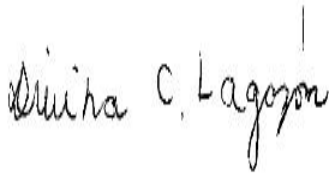
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

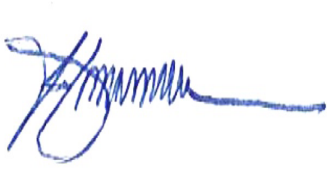
Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Ivan Imamura Laboratory Analyst

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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⑤ Test is subcontracted outside Eurofins group and is not accredited
⑥ Test result is provided by the customer and is not accredited
⑦ Tested at the sampling point by Eurofins and is not accredited
⑧ Tested at the sampling point by Eurofins and is accredited
⑨ Test is RLP accredited
⑩ Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The Customer acknowledges and accepts that: (a) it is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the sample.
The Eurofins water sampling services uses IANZ approved methodology based on AS/NZS 5667 and / or best practice to collect and transport samples that are fit for the purpose of analytical testing. Eurofins shall have no liability if the sample collected is not representative of the source from which it has been taken. The laboratory is not responsible for sampling activities unless explicitly indicated by the statement "Sampled by Eurofins" on the report for water samples.
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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055539-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

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Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139003

Client Reference: 311302-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 11/10/2023 8:00
Analysis Start Date & Time: 11/10/2023 09:46
Analysis Ending Date: 22/10/2023
Sampled Date & Time 10/10/2023 20:55
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.08	(± 0.02) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	27	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	9.36	(± 0.94) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.9	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.023	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.08	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.2	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0011	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.08	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.73	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0400	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	2.87	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.023	(± 0.005) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.94	(± 0.24) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	11.2	(± 0.56) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	16	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	54	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	65	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.3	(± 0.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

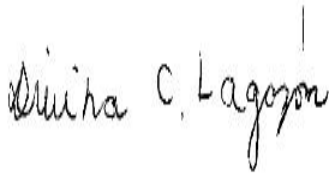
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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③Test is subcontracted within Eurofins group and is not accredited
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⑤Test is subcontracted outside Eurofins group and is not accredited
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⑧Tested at the sampling point by Eurofins and is accredited
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⑩Test is subcontracted within Eurofins group and is RLP accredited

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LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044694-01	REPORT DATE	31/08/2023

Attention Downer NZ Ltd (EDI Levin)
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P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00111243**

Client Reference: 305528-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 16/08/2023 15:46
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 20:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.004) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	48	(± 9) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.2	(± 1.16) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.7	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.114	(± 0.011) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	(± 0.0004) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.3	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	(± 0.0003) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0011	(± 0.0003) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	0.33	(± 0.07) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	(± 0.0002) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.63	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0116	(± 0.0023) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	(± 0.0002) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	2.95	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	<0.005	(± 0.002) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	20.7	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	(± 0.0007) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.07	(± 0.02) mg/l	0.01
NW195	**pH**			
	pH	9.1	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.9	(± 0.94) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	79	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	52	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	61	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	9.0	(± 0.9) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Gordon McArthur Senior Laboratory Analyst

Ivan Imamura Laboratory Analyst

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

Leo Cleave Senior Analyst Microbiology

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⑧Tested at the sampling point by Eurofins and is accredited

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053228-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
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4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128375

Client Reference: 307306-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 20/09/2023 14:56
Analysis Start Date & Time: 20/09/2023 14:56
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 10:50
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.17	(± 0.05) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	40	(± 8) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	22.9	(± 1.14) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.3	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.031	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.5	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0017	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.09	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.87	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0319	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.30	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.040	(± 0.008) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	22.5	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.003	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	200	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.31	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.4	(± 0.92) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	41	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	52	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	66	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	4.4	(± 0.4) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Ivan Imamura Laboratory Analyst

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055422-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139004

Client Reference: 311303-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 11/10/2023 8:00
Analysis Start Date & Time: 11/10/2023 09:49
Analysis Ending Date: 21/10/2023
Sampled Date & Time 10/10/2023 20:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.09	(± 0.03) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	22	(± 6) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.7	(± 1.19) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.6	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.021	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.1	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0010	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.07	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.60	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0413	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	2.77	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.019	(± 0.004) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	20.9	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.94	(± 0.23) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.6	(± 0.93) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	29	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	54	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	64	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	4.7	(± 0.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

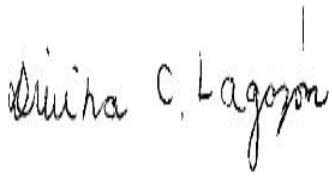
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044692-01	REPORT DATE	31/08/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00111239

Client Reference: 305530-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 16/08/2023 15:40
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 21:20
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.01	(± 0.005) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	50	(± 9) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.8	(± 1.19) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.9	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.011	(± 0.001) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	(± 0.0004) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.5	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	(± 0.0003) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0010	(± 0.0003) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	0.04	(± 0.008) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	(± 0.0002) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.77	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0029	(± 0.0006) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	(± 0.0002) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.10	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	<0.005	(± 0.002) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	(± 0.0007) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.12	(± 0.03) mg/l	0.01
NW195	**pH**			
	pH	9.1	(± 0.2)	0.1
⑤VQ088	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.8	(± 0.94) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	26	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	53	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	62	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	8.7	(± 0.9) mg/l	0.1
④VQ876	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

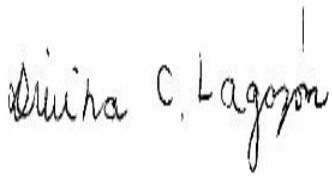
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Gordon McArthur Senior Laboratory Analyst

Ivan Imamura Laboratory Analyst

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

Leo Cleave Senior Analyst Microbiology

Eurofins ELS Limited
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Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
www.eurofins.co.nz

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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The Eurofins water sampling services uses IANZ approved methodology based on AS/NZS 5667 and / or best practice to collect and transport samples that are fit for the purpose of analytical testing. Eurofins shall have no liability if the sample collected is not representative of the source from which it has been taken. The laboratory is not responsible for sampling activities unless explicitly indicated by the statement "Sampled by Eurofins" on the report for water samples.
The Customer acknowledges that the Services are provided using the then current state of technology and methods developed and generally applied by Eurofins and involve analysis, interpretations, consulting work and conclusions. Eurofins shall use commercially reasonable degree of care in providing the Services.
This report is produced and issued on the basis of information, documents and/or samples provided by, or on behalf of, the Customer and solely for the benefit of the Customer who is responsible for acting as it sees fit on the basis of this report. Neither Eurofins nor any of its officers, employees, agents or subcontractors shall be liable to the Customer nor any third party for any actions taken or not taken on the basis of this report nor for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to Eurofins.
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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053224-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128371

Client Reference: 307307-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 20/09/2023 14:49
Analysis Start Date & Time: 20/09/2023 14:49
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 12:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	2.71	(± 0.41) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	45	(± 8) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	26.0	(± 1.30) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	27.6	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.066	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.07	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.1	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0018	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.20	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.81	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0221	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0011	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	4.91	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.064	(± 0.013) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	24.1	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.007	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.29	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.0	(± 0.90) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	32	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	67	(± 7) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	65	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.8	(± 0.6) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

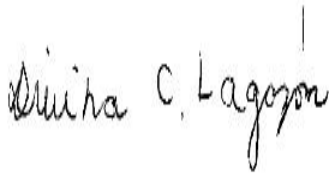
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Ivan Imamura Laboratory Analyst

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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② Test is subcontracted within Eurofins group and is accredited
③ Test is subcontracted within Eurofins group and is not accredited
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⑤ Test is subcontracted outside Eurofins group and is not accredited
⑥ Test result is provided by the customer and is not accredited
⑦ Tested at the sampling point by Eurofins and is not accredited
⑧ Tested at the sampling point by Eurofins and is accredited
⑨ Test is RLP accredited
⑩ Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

The test result(s) in this report apply only to the sample as received.
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The Customer acknowledges that the Services are provided using the then current state of technology and methods developed and generally applied by Eurofins and involve analysis, interpretations, consulting work and conclusions. Eurofins shall use commercially reasonable degree of care in providing the Services.
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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056024-01	REPORT DATE	25/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138994

Client Reference: 311304-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 11/10/2023 8:00
Analysis Start Date & Time: 11/10/2023 09:43
Analysis Ending Date: 25/10/2023
Sampled Date & Time 10/10/2023 21:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.19	(± 0.06) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	187	(± 19) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	25.2	(± 1.26) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	24.9	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.012	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.07	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.8	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0010	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.06	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	8.27	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0516	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.02	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.036	(± 0.007) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	22.7	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.94	(± 0.23) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.9	(± 0.95) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	21	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	58	(± 6) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	69	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.2	(± 0.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

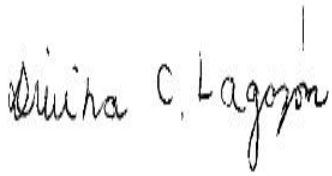
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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⑧ Tested at the sampling point by Eurofins and is accredited
⑨ Test is RLP accredited
⑩ Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
www.eurofins.co.nz

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044691-01	REPORT DATE	31/08/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00111237

Client Reference: 305532-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 16/08/2023 15:39
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 21:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.01	(± 0.004) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	54	(± 10) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	24.4	(± 1.22) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	22.2	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.010	(± 0.001) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	(± 0.0004) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.5	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	(± 0.0003) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0011	(± 0.0003) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	0.04	(± 0.008) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	(± 0.0002) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.76	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0026	(± 0.0005) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	(± 0.0002) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.27	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	<0.005	(± 0.002) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	(± 0.0007) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.14	(± 0.04) mg/l	0.01
NW195	**pH**			
	pH	8.9	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.9	(± 0.94) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	24	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	53	(± 5) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	62	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	9.1	(± 0.9) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

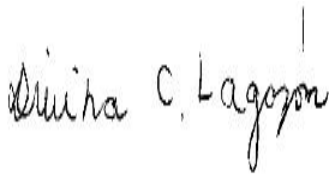
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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⑧Tested at the sampling point by Eurofins and is accredited

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053225-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
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P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128372

Client Reference: 307308-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 20/09/2023 14:51
Analysis Start Date & Time: 20/09/2023 14:51
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 12:15
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.37	(± 0.11) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	38	(± 8) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	25.0	(± 1.25) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	25.4	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.019	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.06	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	14.7	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0010	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.06	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	8.22	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0429	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.72	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.039	(± 0.008) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	23.6	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	200	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.31	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	17.8	(± 0.89) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	34	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	59	(± 6) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	70	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	4.5	(± 0.4) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

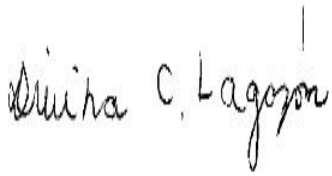
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Ivan Imamura Laboratory Analyst

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-055423-01	REPORT DATE	22/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00139005

Client Reference: 311305-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 11/10/2023 8:00
Analysis Start Date & Time: 11/10/2023 09:52
Analysis Ending Date: 21/10/2023
Sampled Date & Time 10/10/2023 21:45
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.39	(± 0.12) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	85	(± 14) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	25.7	(± 1.29) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	25.3	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.025	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.07	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	15.3	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0015	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.11	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	8.65	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0554	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.30	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.053	(± 0.011) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	23.8	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.92	(± 0.23) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	18.3	(± 0.91) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	23	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	60	(± 6) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	74	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.2	(± 0.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

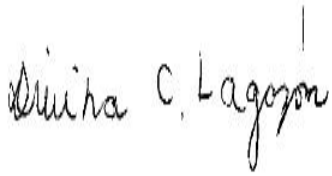
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044689-01	REPORT DATE	31/08/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00111235

Client Reference: 305534-0
Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 16/08/2023 15:33
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 10:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1610	(± 160) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	117	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	2720	(± 140) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	1430	(± 70.0) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1630	(± 30.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.947	(± 0.095) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.331	(± 0.033) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	7.20	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	107	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.951	(± 0.095) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0089	(± 0.0018) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	7.30	(± 1.46) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0025	(± 0.0003) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	57.3	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.23	(± 0.123) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.140	(± 0.0140) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	563	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	16.6	(± 1.66) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	845	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.071	(± 0.007) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	1000	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<1.00	(± 0.10) mg/l	0.01
NW195	**pH**			
	pH	7.7	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	0.050	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	53.7	(± 2.69) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	20	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	5310	(± 530) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	503	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	803	(± 80.3) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	21	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	24	mg/l	5

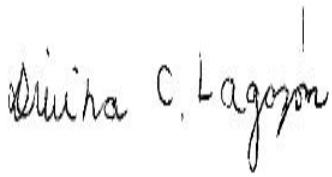
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



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Gordon McArthur Senior Laboratory Analyst

Ivan Imamura Laboratory Analyst

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053223-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128370

Client Reference: 307304-0
Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 20/09/2023 14:46
Analysis Start Date & Time: 20/09/2023 14:46
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 11:20
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1520	(± 150) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	91	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	4410	(± 220) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	958	(± 47.9) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1600	(± 30.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.828	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.310	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	7.11	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	99.0	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.710	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	7.57	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0021	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	46.7	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.17	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.111	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	742	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	14.7	(± 1.47) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	920	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.098	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.10	(± 0.02) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.8	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	13.0	(± 0.65) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	40	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	7310	(± 730) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	440	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	657	(± 65.7) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor

Divina Cunanan Lagazon Supervisor

Ivan Imamura Laboratory Analyst

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

Eurofins ELS Limited
85 Port Road
Seaview
Lower Hutt
Wellington 5010
NEW ZEALAND

Phone +64 4 576 5016
www.eurofins.co.nz

The test result(s) in this report apply only to the sample as received.
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The tests are identified by a five-digit code, their description is available on request.
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END OF REPORT

eurofins

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056021-01	REPORT DATE	25/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146835
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138760

Client Reference: 311301-0
Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 10/10/2023 17:20
Analysis Start Date & Time: 10/10/2023 19:17
Analysis Ending Date: 25/10/2023
Sampled Date & Time 05/10/2023 21:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1550	(± 160) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	119	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	4080	(± 200) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	646	(± 32.3) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1680	(± 30.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.711	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.289	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	6.90	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	100	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.605	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0038	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	9.07	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0019	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	54.7	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.23	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.129	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	784	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	15.5	(± 1.55) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	1090	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.047	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	26.1	(± 1.31) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	30	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	7340	(± 730) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	475	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	805	(± 80.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

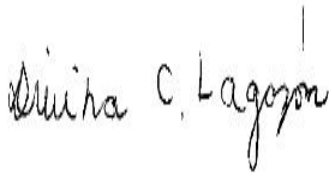
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-044690-01	REPORT DATE	31/08/2023

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Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00137803
Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00111236**

Client Reference: 305536-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 16/08/2023 15:37
Analysis Start Date & Time: 16/08/2023 15:48
Analysis Ending Date: 31/08/2023
Sampled Date & Time 15/08/2023 10:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	5.63	(± 0.84) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	82	(± 13) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	67.5	(± 3.38) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	60.3	(± 1.2) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.029	(± 0.003) mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	(± 0.0004) mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.31	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	(± 0.0001) mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	31.2	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	(± 0.0004) mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0012	(± 0.0003) mg/l	0.0005

		RESULTS	(UNCERTAINTY)	LOQ
NW109	**Dissolved Iron**			
	Iron (Fe)	0.45	(± 0.09) mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	(± 0.0002) mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	17.9	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.133	(± 0.0133) mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0020	(± 0.0006) mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	22.2	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.014	(± 0.003) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	60.0	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.017	(± 0.002) mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	200	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	2.27	(± 0.23) mg/l	0.01
NW195	**pH**			
	pH	7.2	(± 0.2)	0.1
⑤VQ088	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	7.54	(± 0.75) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	<3	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	188	(± 19) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	152	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	20.6	(± 2.1) mg/l	0.1
④VQ876	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5

	RESULTS (UNCERTAINTY)		LOQ
④VQ876 **Volatile Fatty Acids (VFA) by GC-MS**			
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

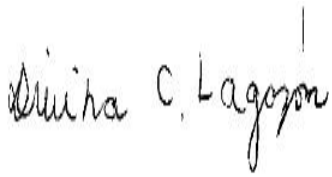
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B	NW011	**Sulphate:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA Online Edition 2510 B
NW030	**Total Hardness:** APHA Online Edition 2340 B	NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.	NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.	NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.	NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.	NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.	NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW195	**pH:** APHA Online Edition 4500-H B	NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B	NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.	VQ088	**Phenolics (Total):** APHA 5530
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA Online

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Gordon McArthur Senior Laboratory Analyst

Ivan Imamura Laboratory Analyst

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

Leo Cleave Senior Analyst Microbiology

EXPLANATORY NOTE

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-053226-01	REPORT DATE	12/10/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
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Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00143461
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00128373

Client Reference: 307303-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 20/09/2023 14:53
Analysis Start Date & Time: 20/09/2023 14:53
Analysis Ending Date: 12/10/2023
Sampled Date & Time 19/09/2023 12:15
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	17.1	(± 1.71) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	75	(± 12) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	89.6	(± 4.48) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	120	(± 2.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.007	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.33	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	90.5	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.002	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0011	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.12	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	35.0	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.851	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0024	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	26.3	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.023	(± 0.005) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	82.7	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.015	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	2.22	(± 0.22) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.9	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	1.06	(± 0.11) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	18	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	480	(± 48) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	371	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	19.4	(± 1.9) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

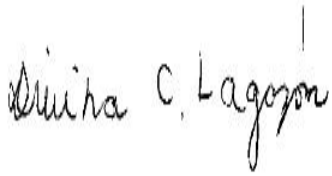
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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② Test is subcontracted within Eurofins group and is accredited
③ Test is subcontracted within Eurofins group and is not accredited
④ Test is subcontracted outside Eurofins group and is accredited
⑤ Test is subcontracted outside Eurofins group and is not accredited
⑥ Test result is provided by the customer and is not accredited
⑦ Tested at the sampling point by Eurofins and is not accredited
⑧ Tested at the sampling point by Eurofins and is accredited
⑨ Test is RLP accredited
⑩ Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-056023-01	REPORT DATE	25/10/2023

Attention Downer NZ Ltd (EDI Levin)
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Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00146889
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00138993

Client Reference: 311300-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 11/10/2023 8:00
Analysis Start Date & Time: 11/10/2023 09:39
Analysis Ending Date: 25/10/2023
Sampled Date & Time 10/10/2023 21:55
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	10.1	(± 1.01) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	101	(± 11) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	77.2	(± 3.86) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	93.7	(± 1.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.009	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.30	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	64.8	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.20	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	26.5	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.598	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0018	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	21.9	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.020	(± 0.004) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	67.2	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.004	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.98	(± 0.20) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.8	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	1.07	(± 0.11) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	100	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	359	(± 36) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	271	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	20.0	(± 2.0) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

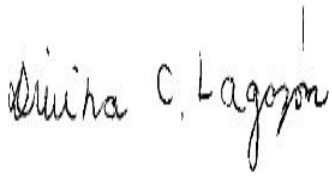
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
⑩Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit

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If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The Customer acknowledges and accepts that: (a) it is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the sample.
The Eurofins water sampling services uses IANZ approved methodology based on AS/NZS 5667 and / or best practice to collect and transport samples that are fit for the purpose of analytical testing. Eurofins shall have no liability if the sample collected is not representative of the source from which it has been taken. The laboratory is not responsible for sampling activities unless explicitly indicated by the statement "Sampled by Eurofins" on the report for water samples.
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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-057742-01	REPORT DATE	01/11/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
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4741 Levin
NEW ZEALAND

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Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00147377
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00140557

Client Reference: 311350-0
Product: Ground water
Sampling Point code: WIL-Xd1
Sampling Point name: Levin Xd1
Reception Date & Time: 12/10/2023 17:23
Analysis Start Date & Time: 12/10/2023 17:23
Analysis Ending Date: 01/11/2023
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.38	(± 0.11) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	39.0	(± 1.95) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	53.6	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.05	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	34.0	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.05	mg/l	0.01
NW110	**Dissolved Lead**			

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	16.5	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.482	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	5.00	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.119	(± 0.024) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	49.8	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.8	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	25	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	184	(± 18) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	153	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	4.6	(± 0.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

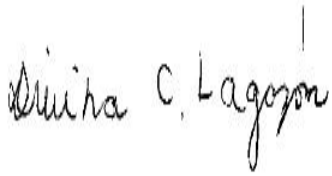
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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③Test is subcontracted within Eurofins group and is not accredited
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⑨Test is RLP accredited
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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-057743-01	REPORT DATE	01/11/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00147377
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00140560

Client Reference: 311352-0
Product: Ground water
Sampling Point code: WIL-Xs1
Sampling Point name: Levin Xs1
Reception Date & Time: 12/10/2023 17:27
Analysis Start Date & Time: 12/10/2023 17:27
Analysis Ending Date: 01/11/2023
Sampled Date & Time 10/10/2023 21:10
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	14.2	(± 1.42) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	76	(± 12) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	49.6	(± 2.48) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	112	(± 2.2) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.24	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	80.3	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	5.58	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	30.2	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.58	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0015	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	14.4	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.014	(± 0.003) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	73.0	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.003) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.0	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	4.77	(± 0.48) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	42	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	464	(± 46) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	325	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	25.5	(± 2.5) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

LIST OF METHODS

NW003 **Total Alkalinity:** APHA Online Edition 2320 B

NW010 **Nitrate-N:** APHA Online Edition 4110 B

NW020 **Chemical Oxygen Demand:** APHA Online Edition 5220 D

NW030 **Total Hardness:** APHA Online Edition 2340 B

NW103 **Dissolved Boron:** APHA Online Edition 3125 B mod.

NW105 **Dissolved Calcium:** APHA Online Edition 3125 B mod.

NW108 **Dissolved Copper:** APHA Online Edition 3125 B mod.

NW110 **Dissolved Lead:** APHA Online Edition 3125 B mod.

NW113 **Dissolved Manganese:** APHA Online Edition 3125 B mod.

NW116 **Dissolved Nickel:** APHA Online Edition 3125 B mod.

NW120 **Dissolved Sodium:** APHA Online Edition 3125 B mod.

NW179 **Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H

NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

NW210 **Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B

NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

VQ876 **Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D

NW007 **Chloride:** APHA Online Edition 4110 B

NW011 **Sulphate:** APHA Online Edition 4110 B

NW023 **Conductivity:** APHA 24th Edition 2510 B

NW098 **Dissolved Aluminium:** APHA Online Edition 3125 B mod.

NW104 **Dissolved Cadmium:** APHA Online Edition 3125 B mod.

NW106 **Dissolved Chromium:** APHA Online Edition 3125 B mod.

NW109 **Dissolved Iron:** APHA Online Edition 3125 B mod.

NW112 **Dissolved Magnesium:** APHA Online Edition 3125 B mod.

NW114 **Dissolved Mercury:** APHA Online Edition 3125 B mod.

NW117 **Dissolved Potassium:** APHA Online Edition 3125 B mod.

NW125 **Dissolved Zinc:** APHA Online Edition 3125 B mod.

NW193 **Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G

NW206 **Suspended Solids:** APHA Online Edition 2540 D

NW341 **BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B

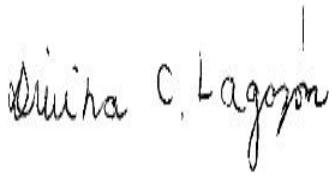
VQ088 **Phenolics (Total):** APHA 5530

ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-23-NW-057741-01	REPORT DATE	01/11/2023

Attention Downer NZ Ltd (EDI Levin)
Horowhenua Admin
P O Box 642
4741 Levin
NEW ZEALAND

Phone (06) 367 2705
Email horowhenuaadmin@downer.co.nz

Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Parkes

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00147377
Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00140531

Client Reference: 311351-0
Product: Ground water
Sampling Point code: WIL-Xs2
Sampling Point name: Levin Xs2
Reception Date & Time: 12/10/2023 17:17
Analysis Start Date & Time: 12/10/2023 17:17
Analysis Ending Date: 01/11/2023
Sampled Date & Time 10/10/2023 20:20
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.02	(± 0.007) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	(± 5) mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	13.3	(± 0.66) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	18.0	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.004	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	10.2	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0009	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.08	mg/l	0.01

		RESULTS	(UNCERTAINTY)	LOQ
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	5.29	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0542	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0007	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.31	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.018	(± 0.004) mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	16.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.004	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli By Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.84	(± 0.21) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.0	(± 0.2)	0.1
⑤**VQ088**	**Phenolics (Total)**			
	Total phenols	<0.05	mg/l	0.05
NW011	**Sulphate**			
	Sulphate	8.35	(± 0.84) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	26	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	57	(± 6) mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	47	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	2.0	(± 0.2) mg/l	0.1
④**VQ876**	**Volatile Fatty Acids (VFA) by GC-MS**			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic Acid C7:0	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Iso caproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

RESULTS (UNCERTAINTY)	LOQ

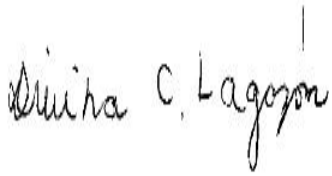
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
VQ876	**Volatile Fatty Acids (VFA) by GC-MS:** APHA 5560-D
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
VQ088	**Phenolics (Total):** APHA 5530
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager

Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor

Leo Cleave Senior Analyst Microbiology

Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

①Test is not accredited
②Test is subcontracted within Eurofins group and is accredited
③Test is subcontracted within Eurofins group and is not accredited
④Test is subcontracted outside Eurofins group and is accredited
⑤Test is subcontracted outside Eurofins group and is not accredited
⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
⑩Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

The Customer acknowledges and accepts that: (a) where Eurofins is not responsible for sampling, the test result(s) in this report apply only to the sample as received. Customer is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the product.
This document can only be reproduced in full.
The tests are identified by a five-digit code, their description is available on request.
Accreditation does not apply to comments or graphical representations.
Unless otherwise stated, all tests in this analytical report (except for subcontracted tests) are performed at 85 Port Road, Seaview, Lower Hutt, Wellington, NEW ZEALAND.
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.
Eurofins may subcontract the performance of part or all of the Services to a third party and the Customer authorises the release of all information necessary to the third party for the provision of the Services.
All samples become the property of Eurofins to the extent necessary for the performance of the Services.
Eurofins will not be required to store samples and may destroy or otherwise dispose of the samples or return the samples to the Customer (at the Customer's cost in all respects) immediately following analysis of the samples.
If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The Eurofins water sampling services uses IANZ approved methodology based on AS/NZS 5667 and / or best practice to collect and transport samples that are fit for the purpose of analytical testing. The laboratory is not responsible for sampling activities unless explicitly indicated by the statement "Sampled by Eurofins" on the report for water samples.
The Customer acknowledges that the Services are provided using the current state of technology and methods developed and generally applied by Eurofins and involve analysis, interpretations, consulting work and conclusions. Eurofins shall use commercially reasonable degree of care in providing the Services.
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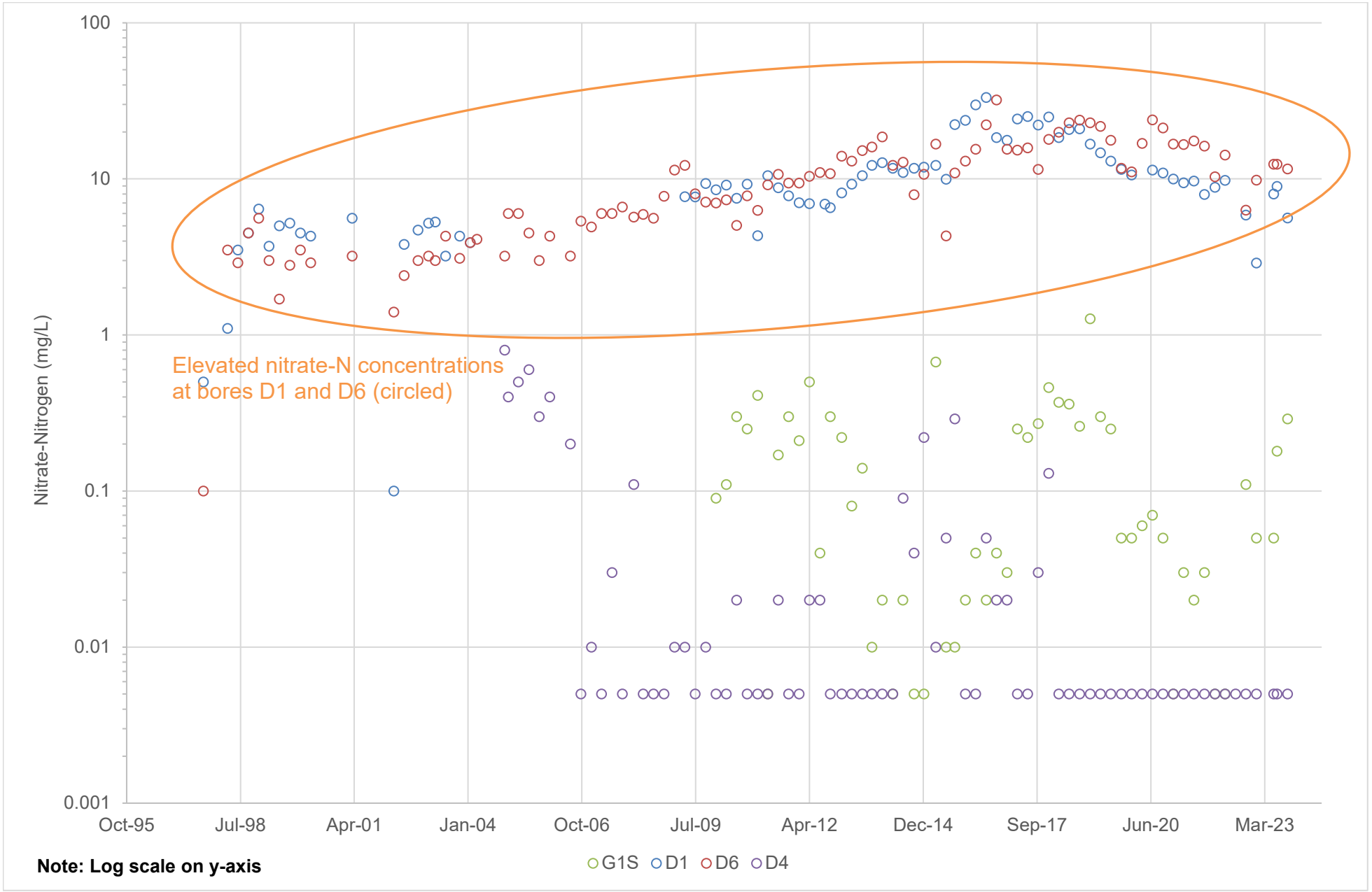
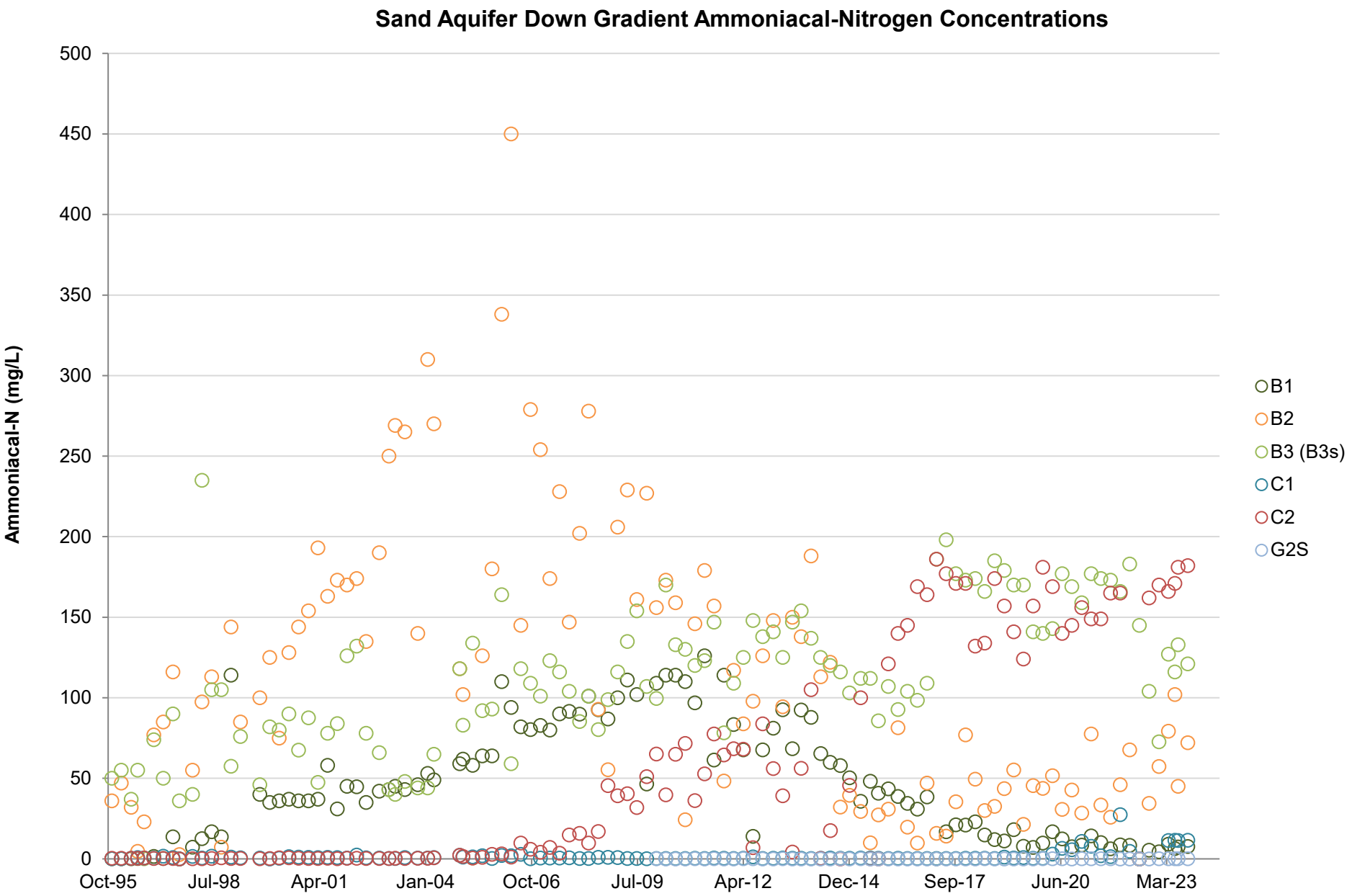
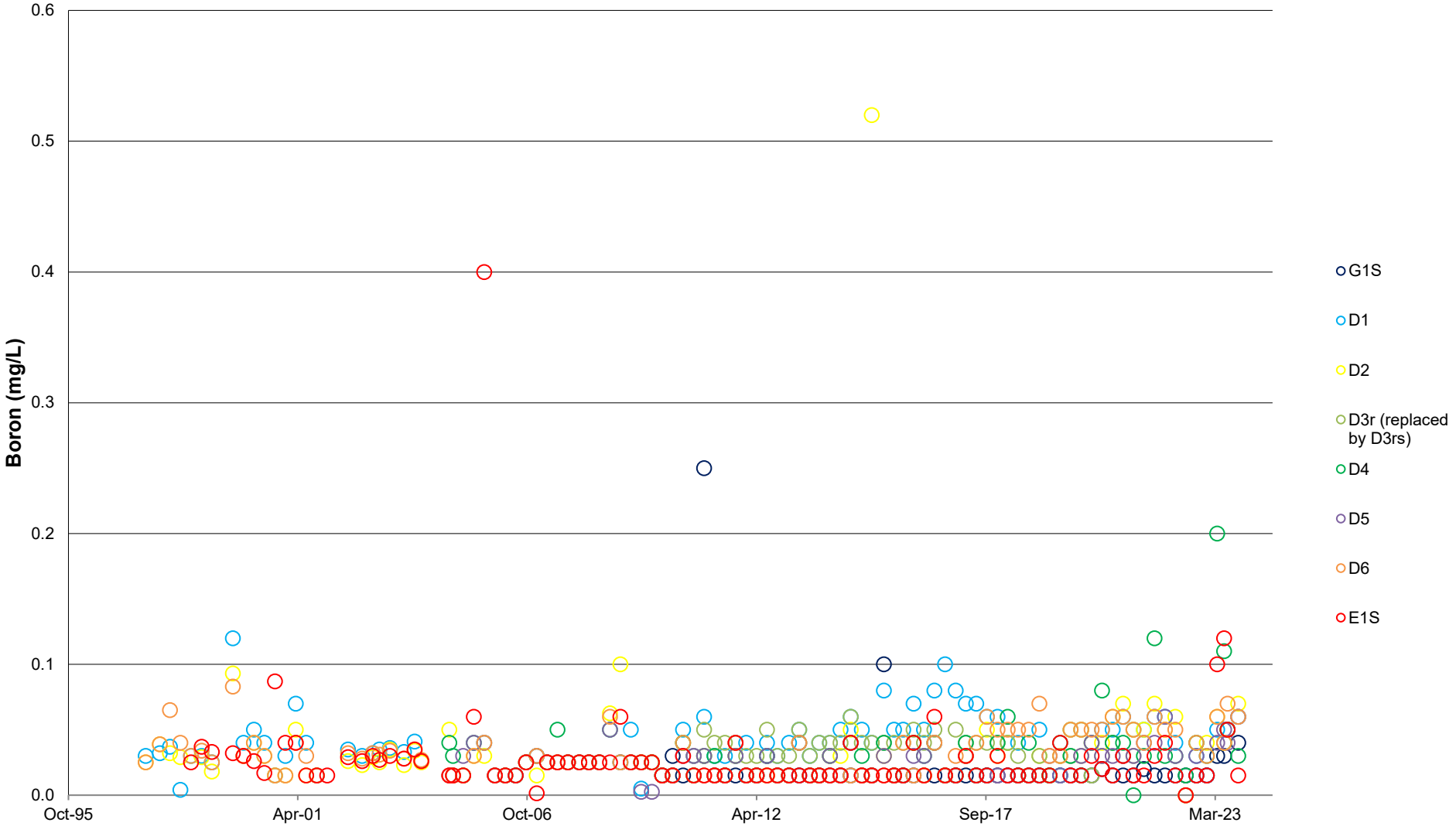
END OF REPORT

Appendix D Historical Results Graphs

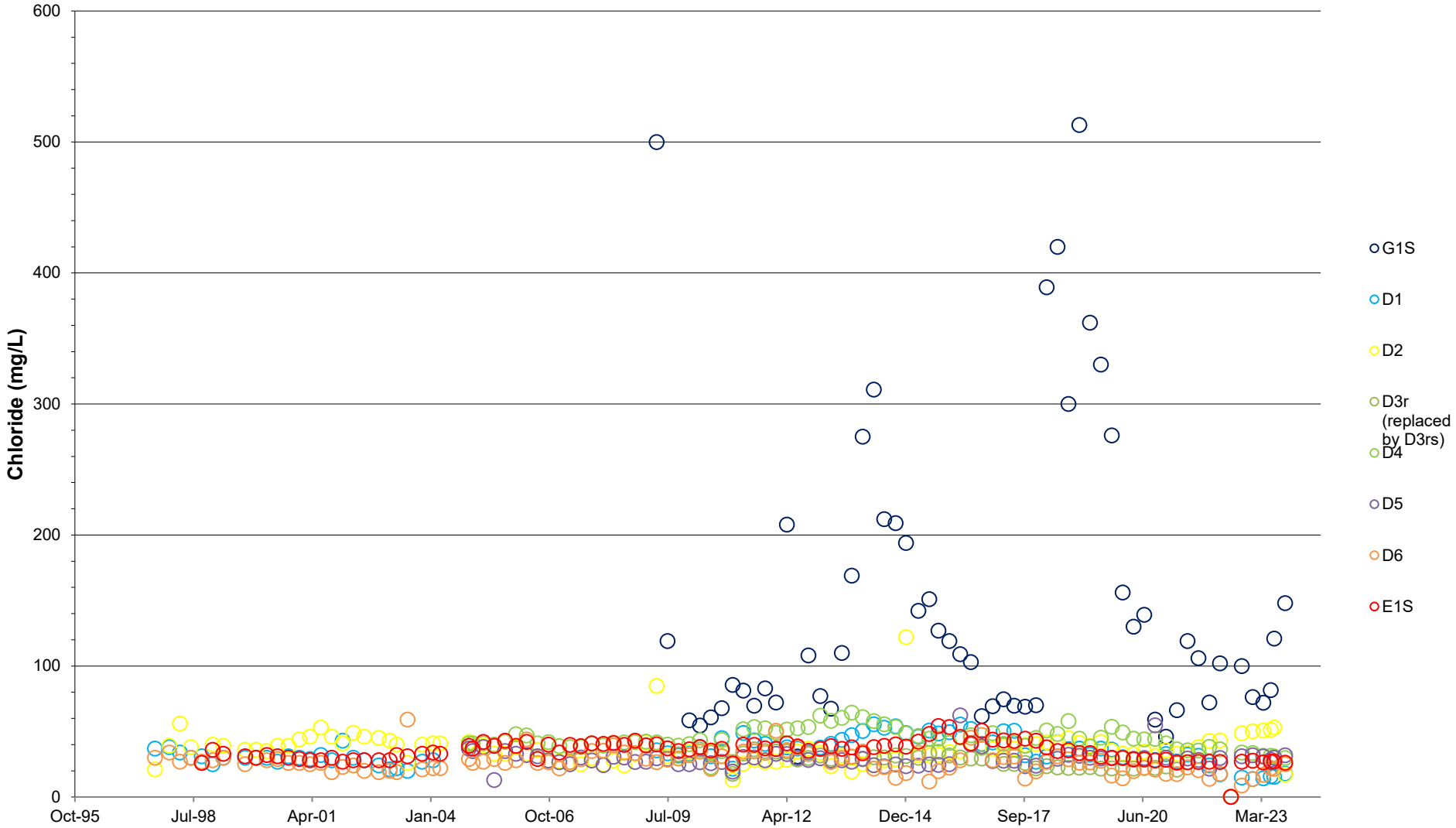

100
10
1
0.1
0.01
0.001
Nitrate-Nitrogen (mg/L)
Elevated nitrate-N concentrations
at bores D1 and D6 (circled)
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
G1S
D1
D6
D4
Note: Log scale on y-axis


Sand Aquifer Down Gradient Ammoniacal-Nitrogen Concentrations
Ammoniacal-N (mg/L)
500
450
400
350
300
250
200
150
100
50
0
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

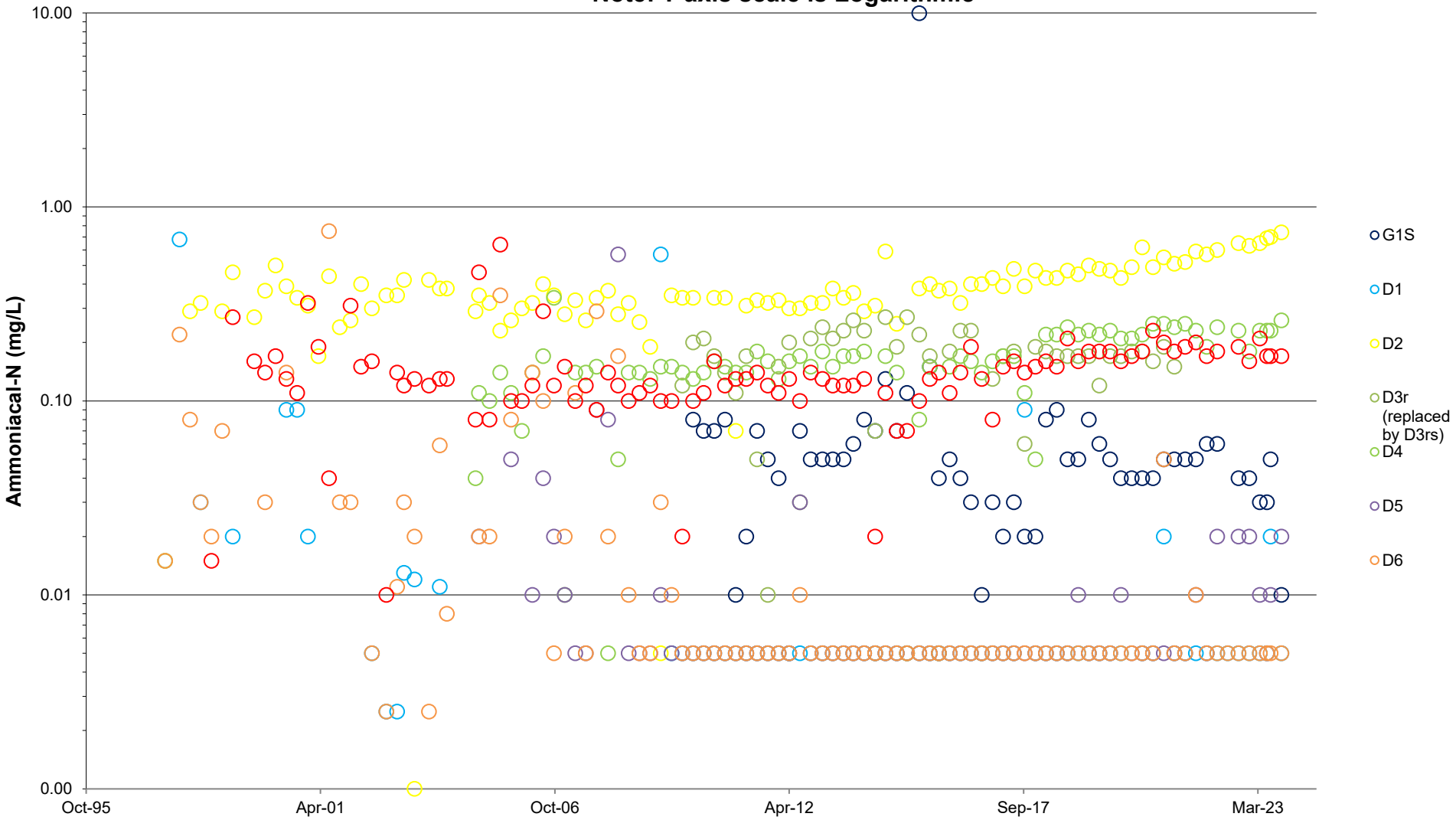
Sand Aquifer Downgradient of New Landfill - Boron Concentrations



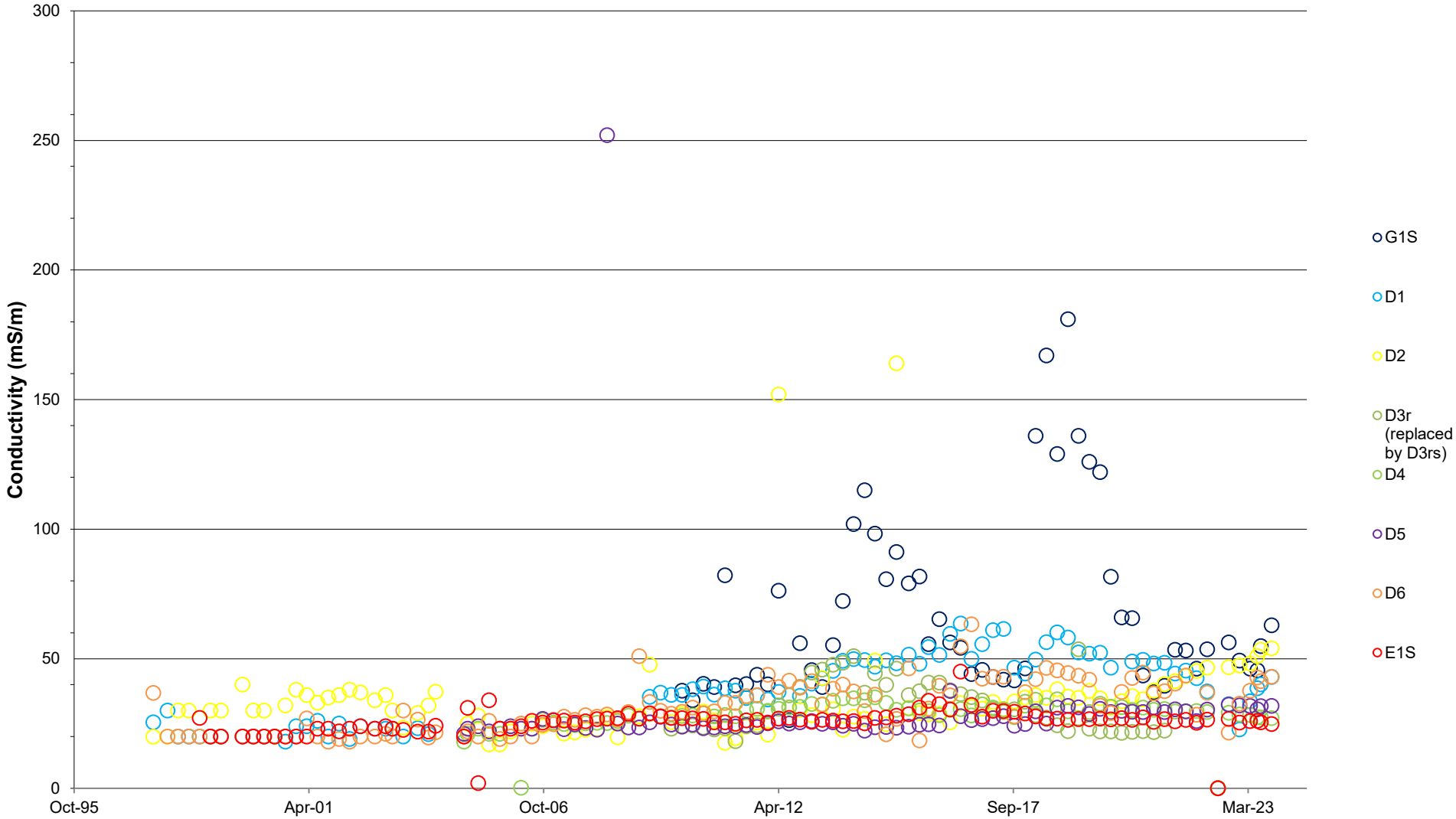
Sand Aquifer Downgradient of New Landfill - Chloride Concentrations



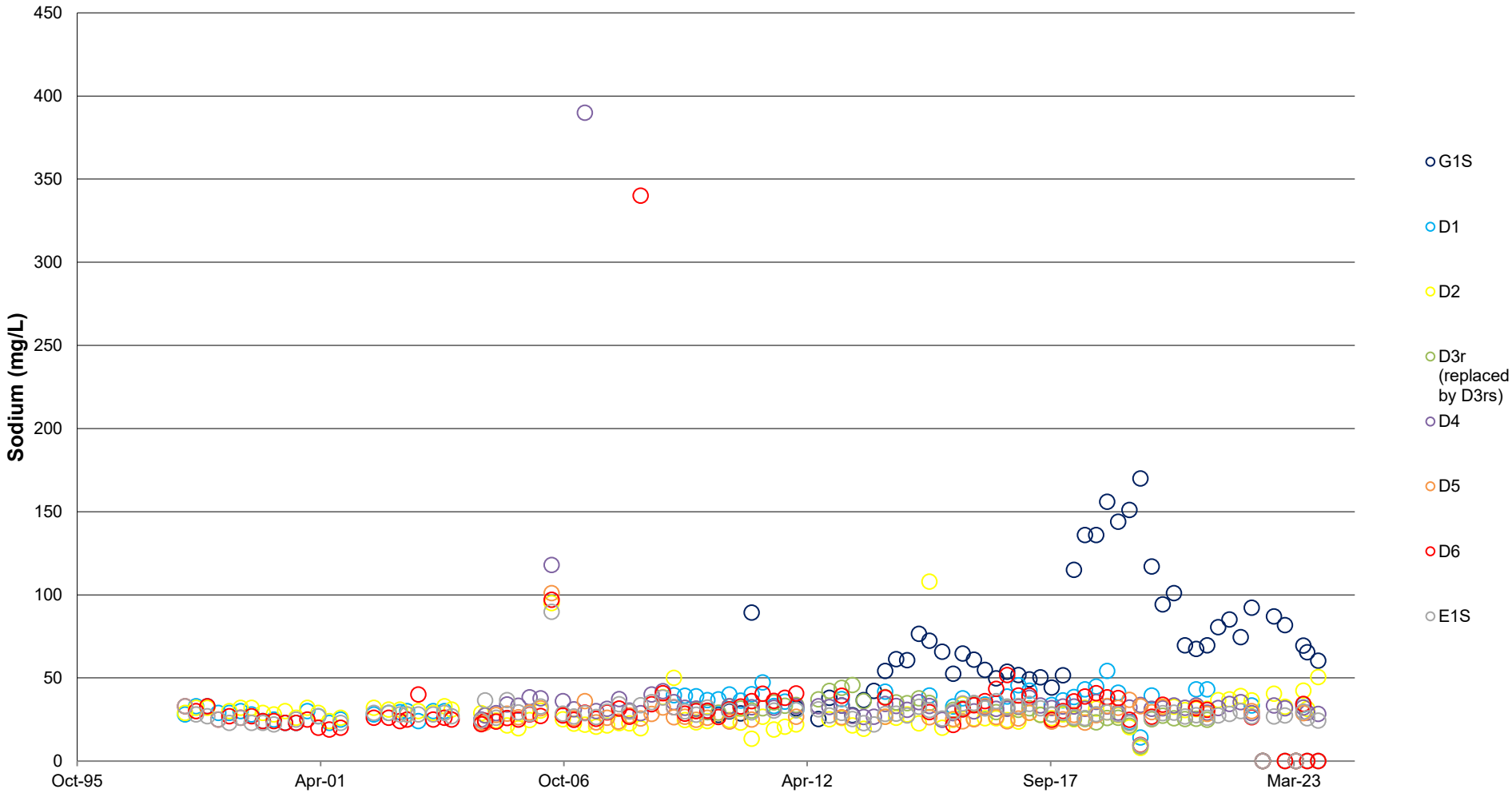
Sand Aquifer Downgradient of New Landfill - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic

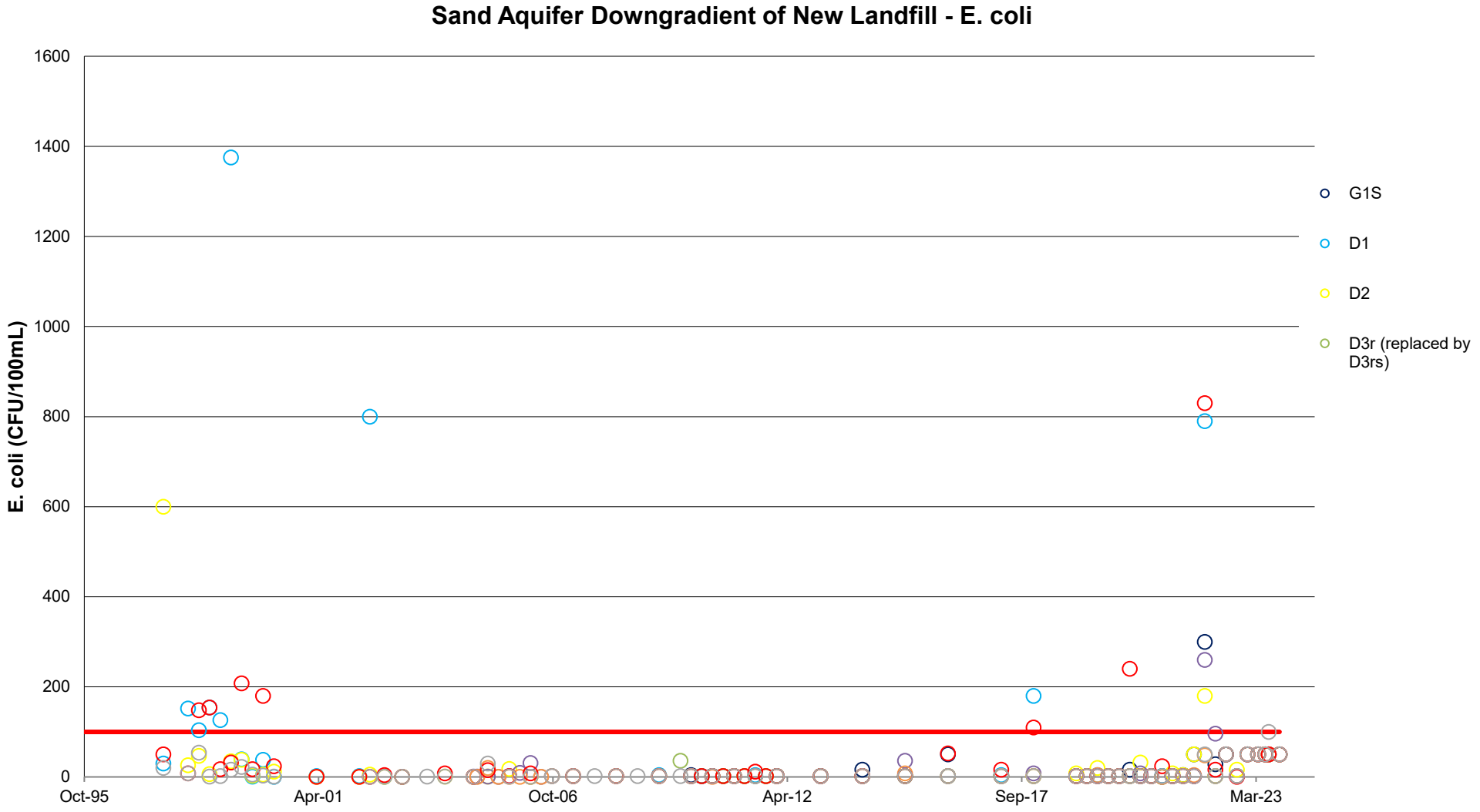


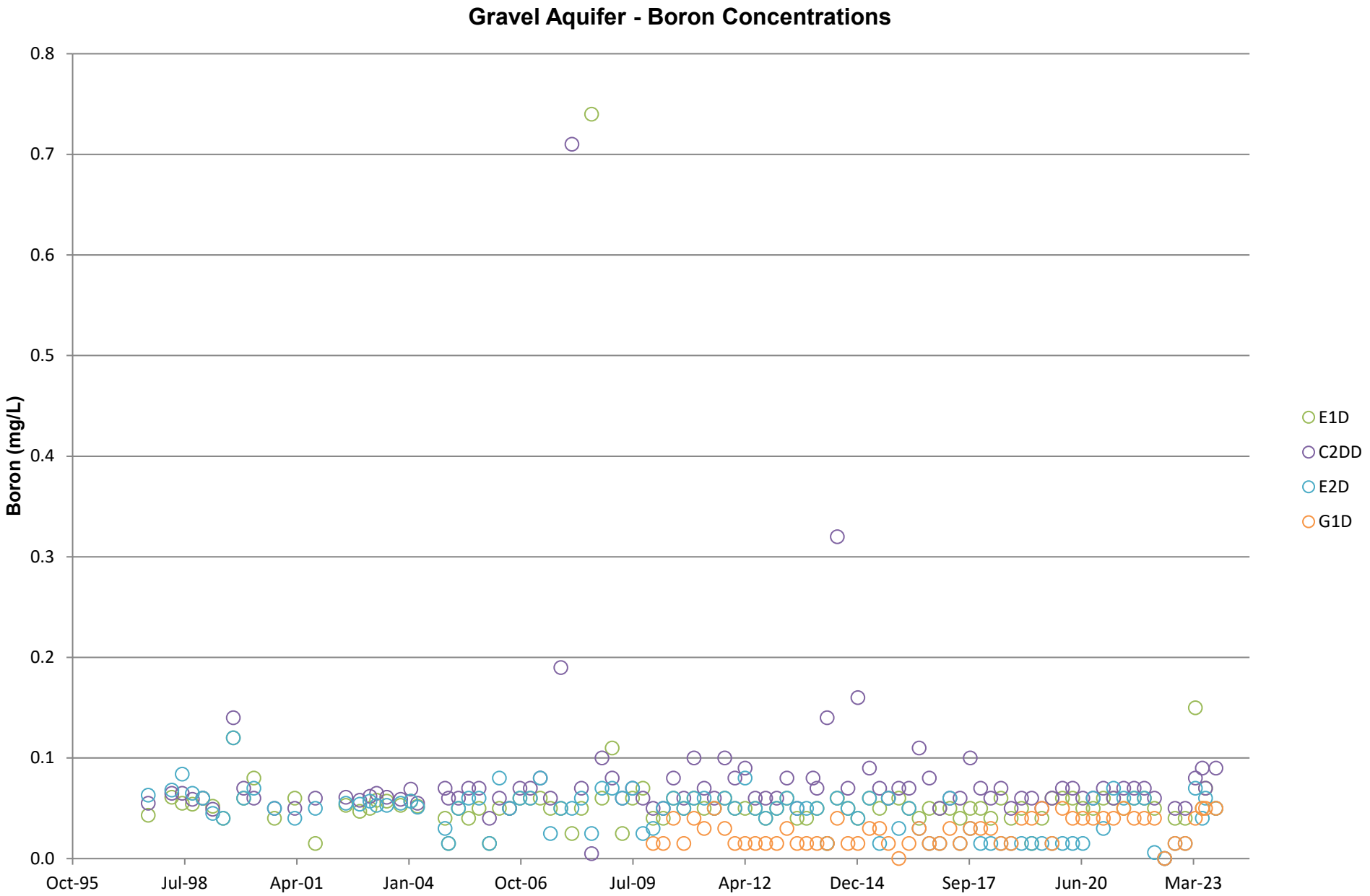
Sand Aquifer Downgradient of New Landfill - Conductivity Levels

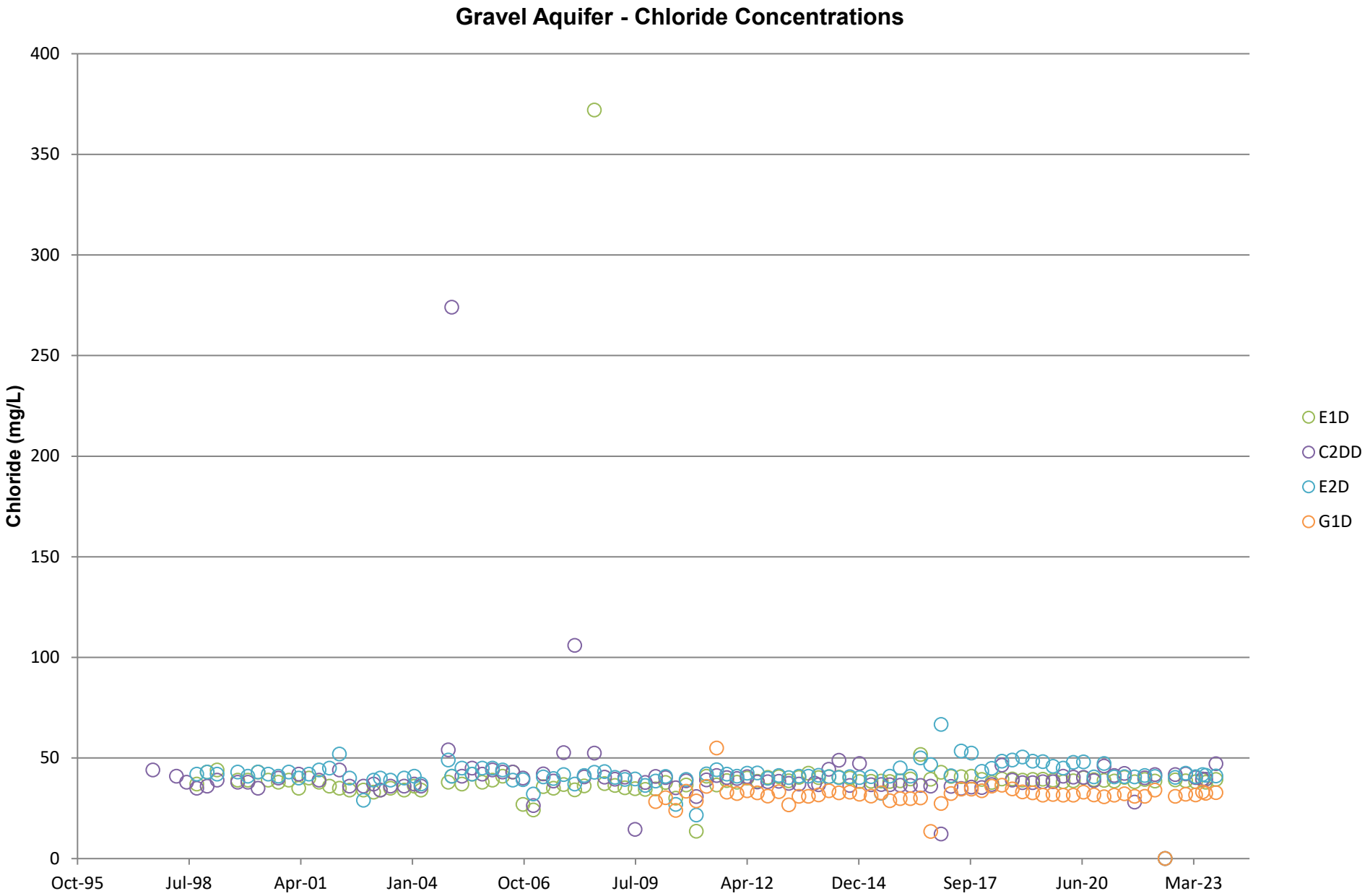


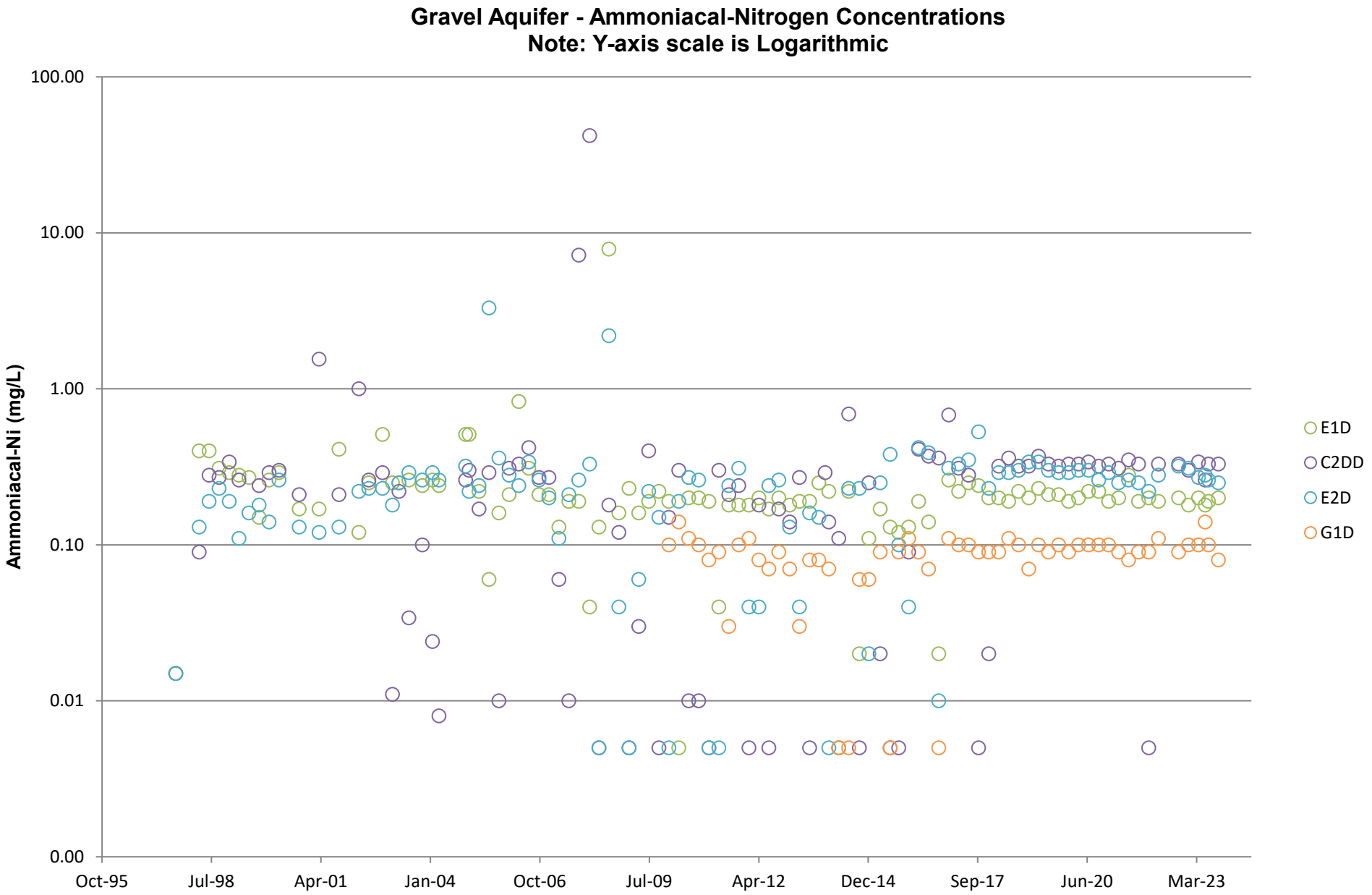
Sand Aquifer Downgradient of New Landfill - Sodium Concentrations

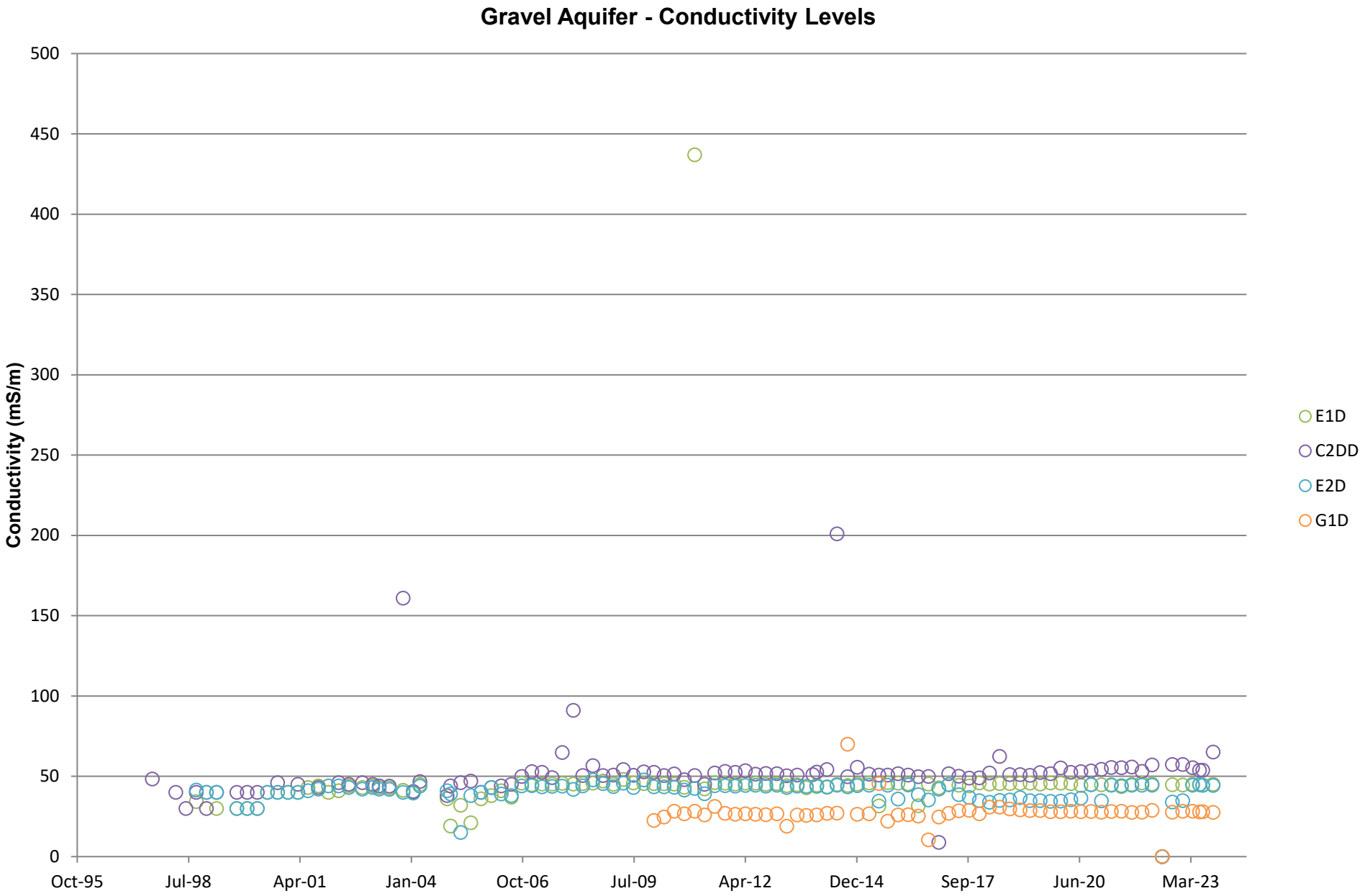


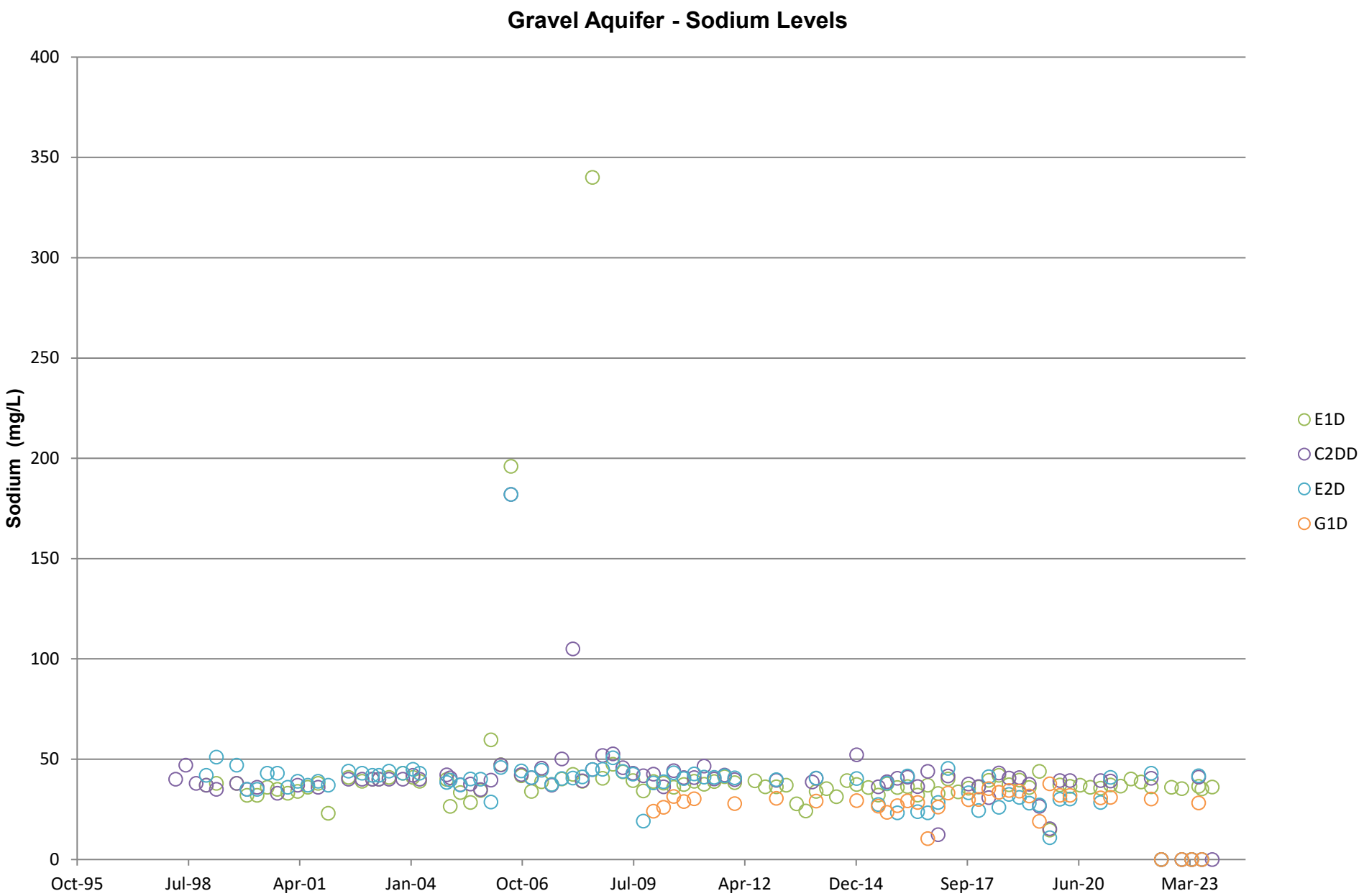

Sand Aquifer Downgradient of New Landfill - E. coli
E. coli (CFU/100mL)
1600
1400
1200
1000
800
600
400
200
0
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
G1S
D1
D2
D3r (replaced by D3rs)

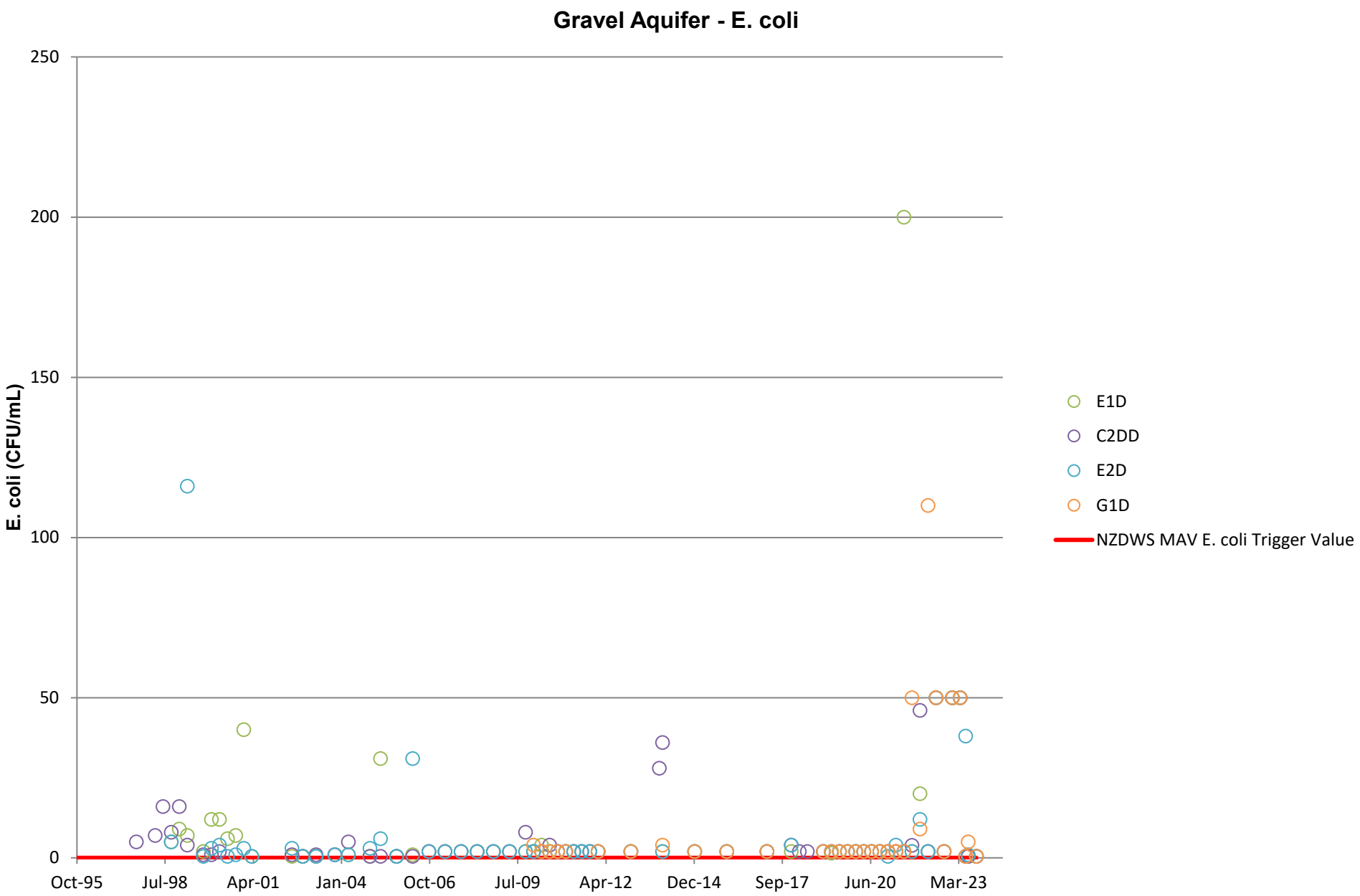

Gravel Aquifer - Boron Concentrations
Boron (mg/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

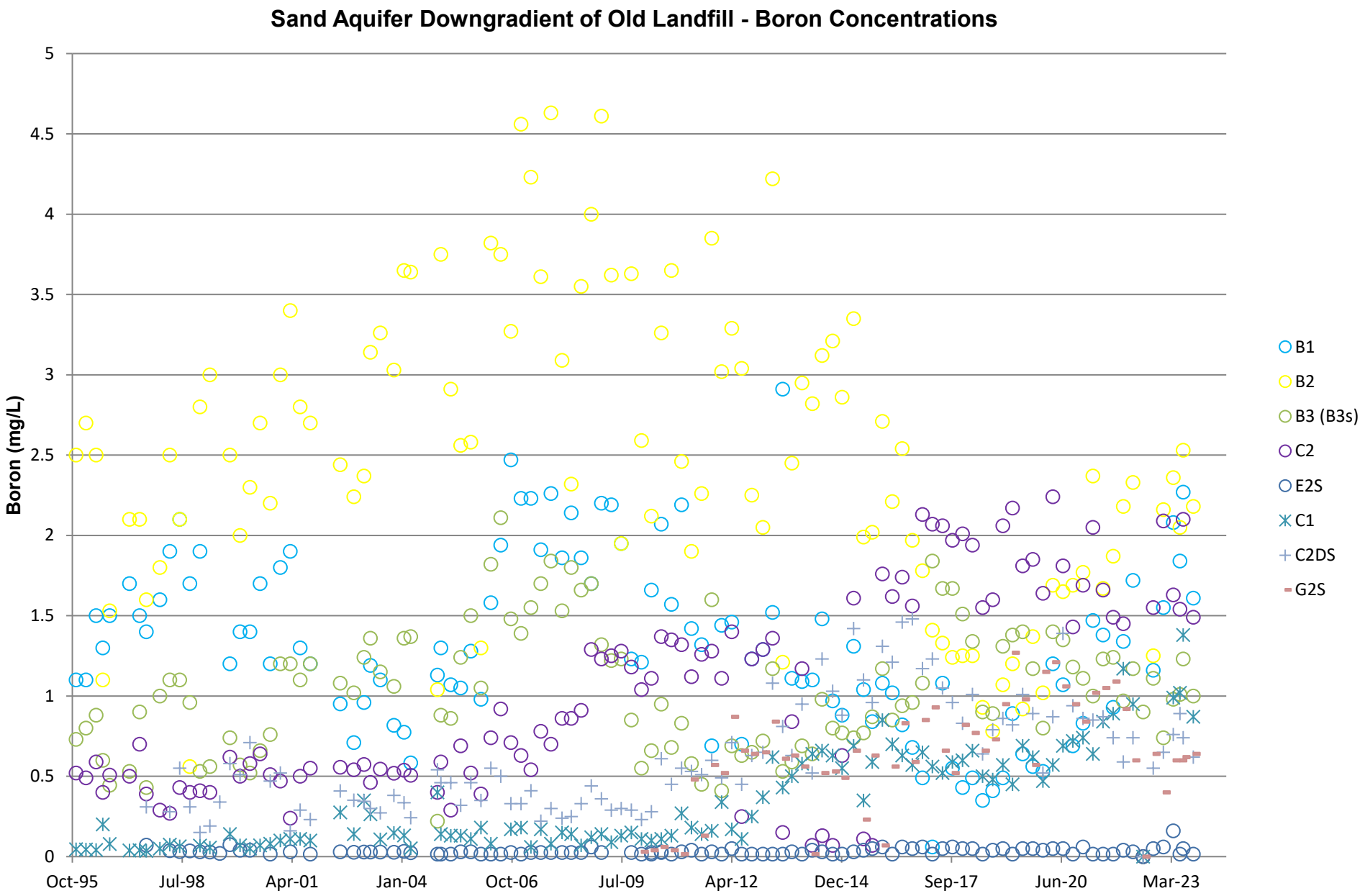

Gravel Aquifer - Chloride Concentrations
Chloride (mg/L)
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

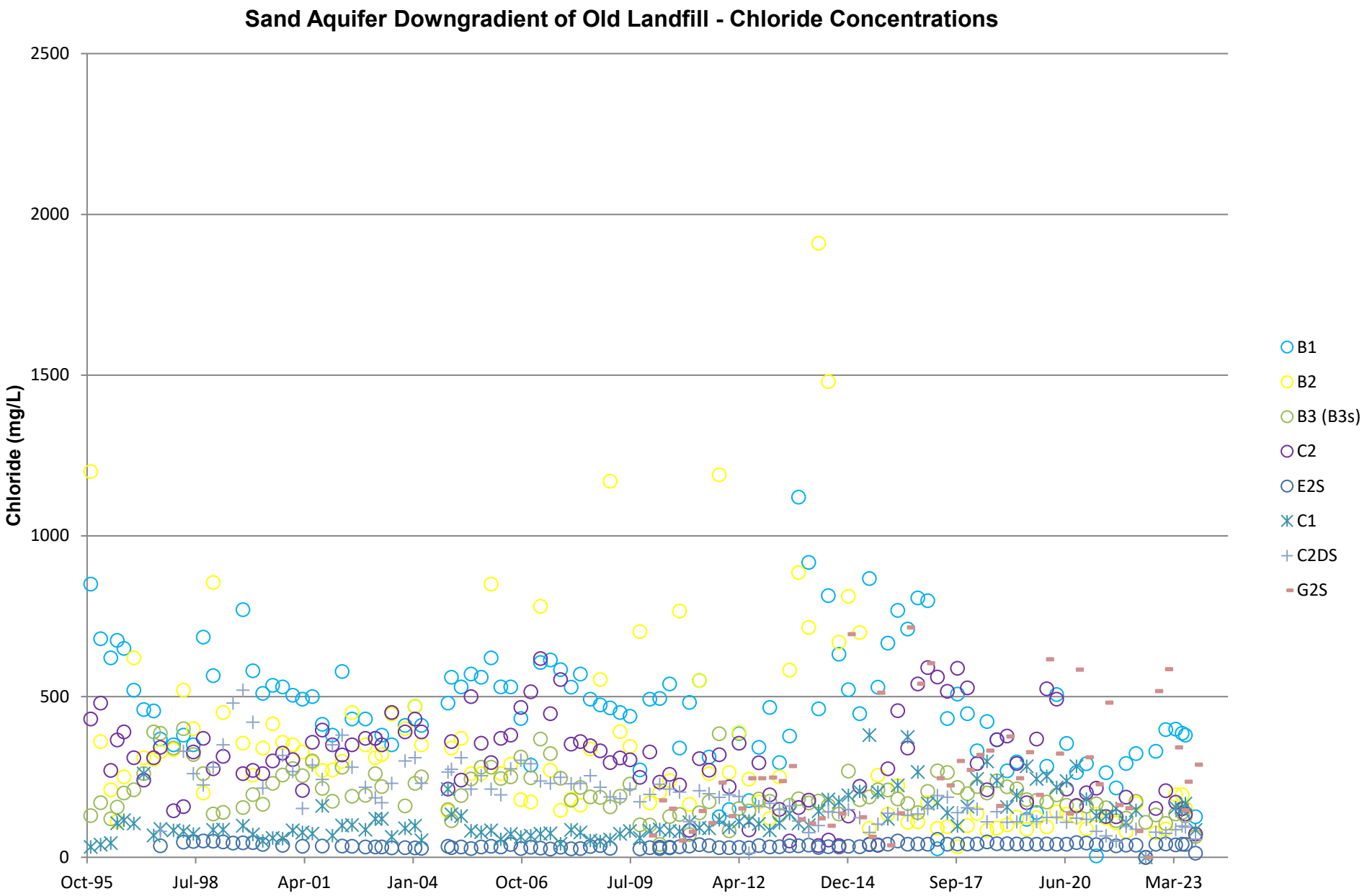

Gravel Aquifer - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic
Ammoniacal-Ni (mg/L)
100.00
10.00
1.00
0.10
0.01
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

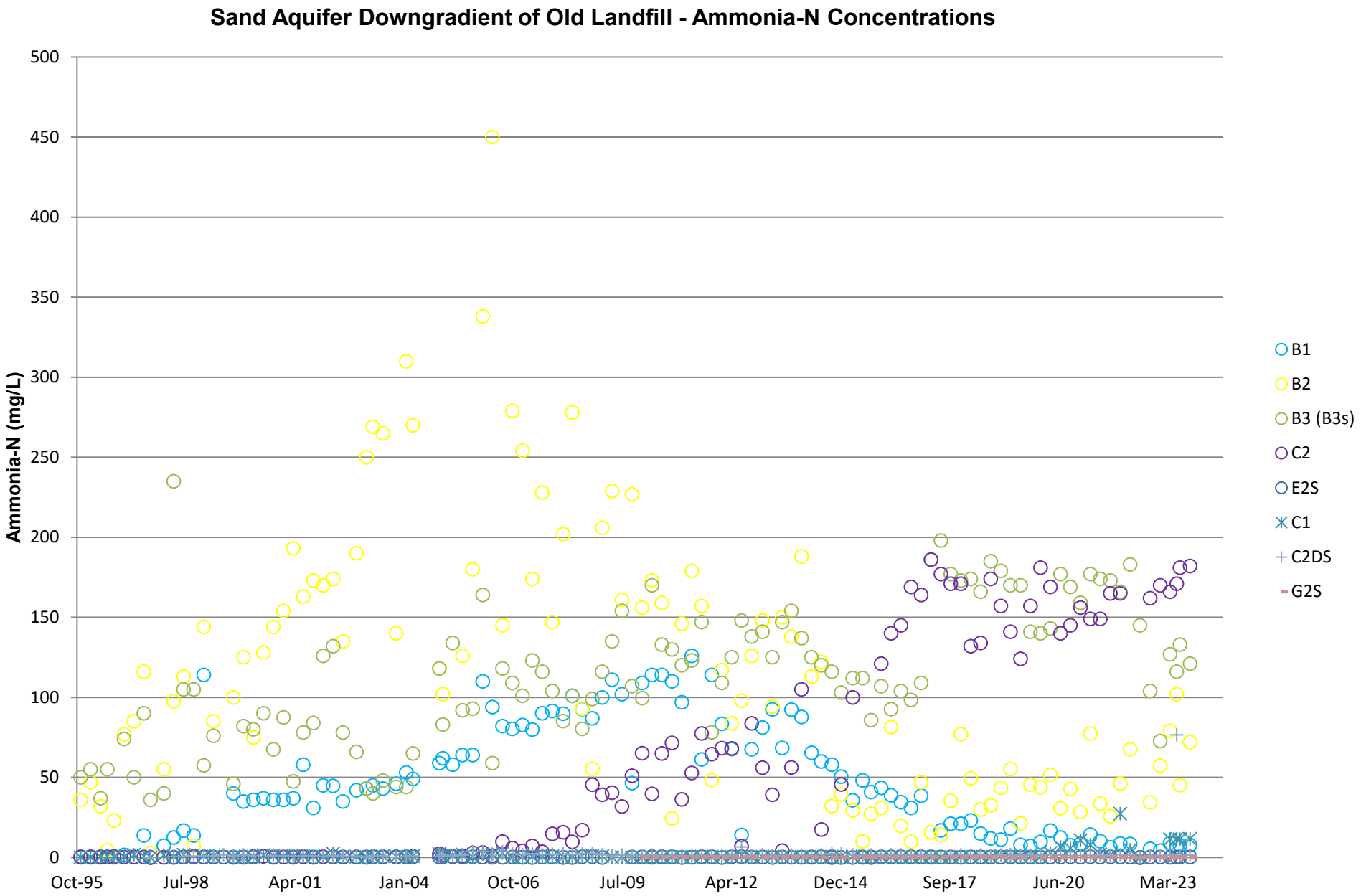

Gravel Aquifer - Conductivity Levels
Conductivity (mS/m)
500
450
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

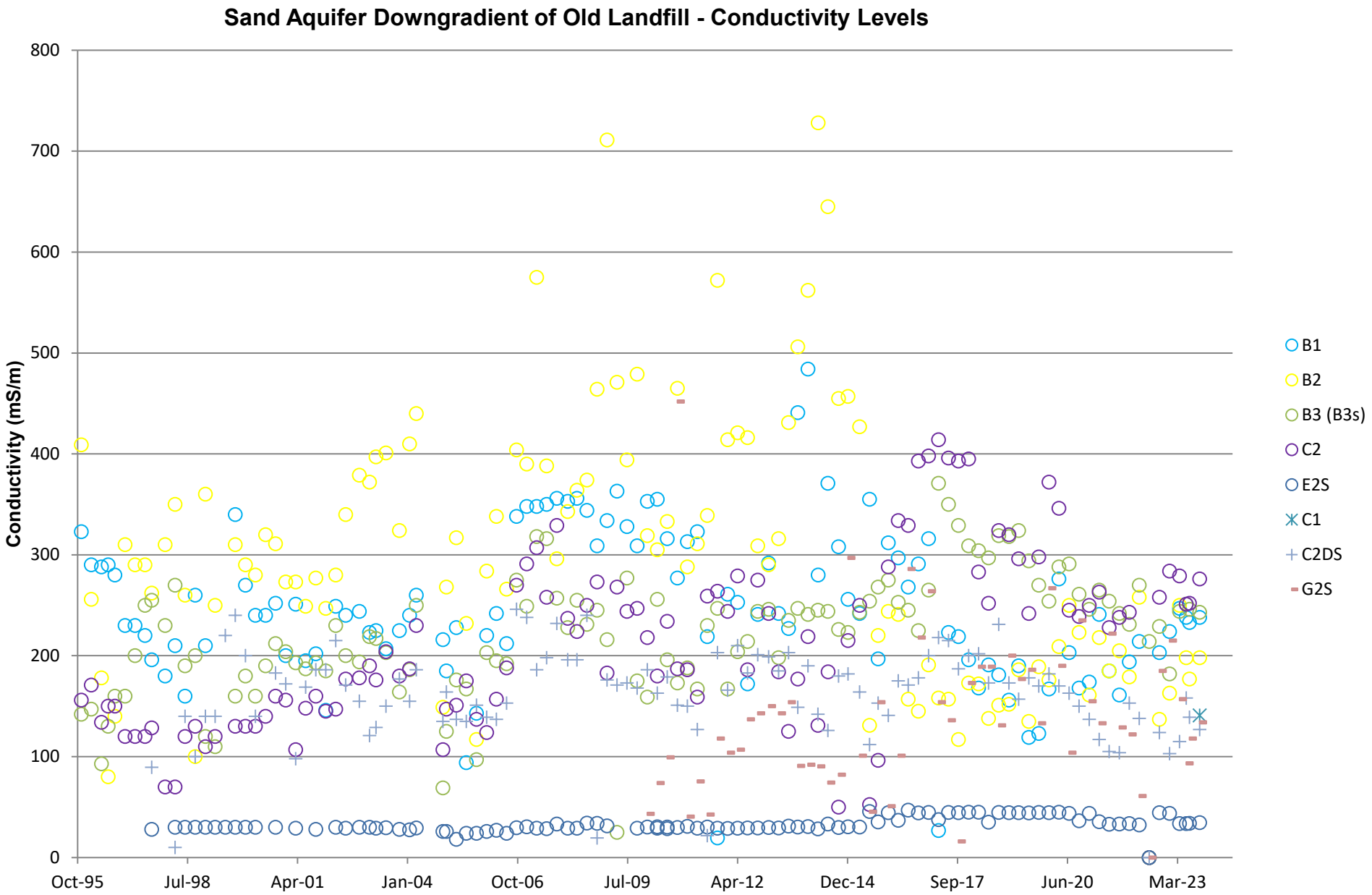

Gravel Aquifer - Sodium Levels
Sodium (mg/L)
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D

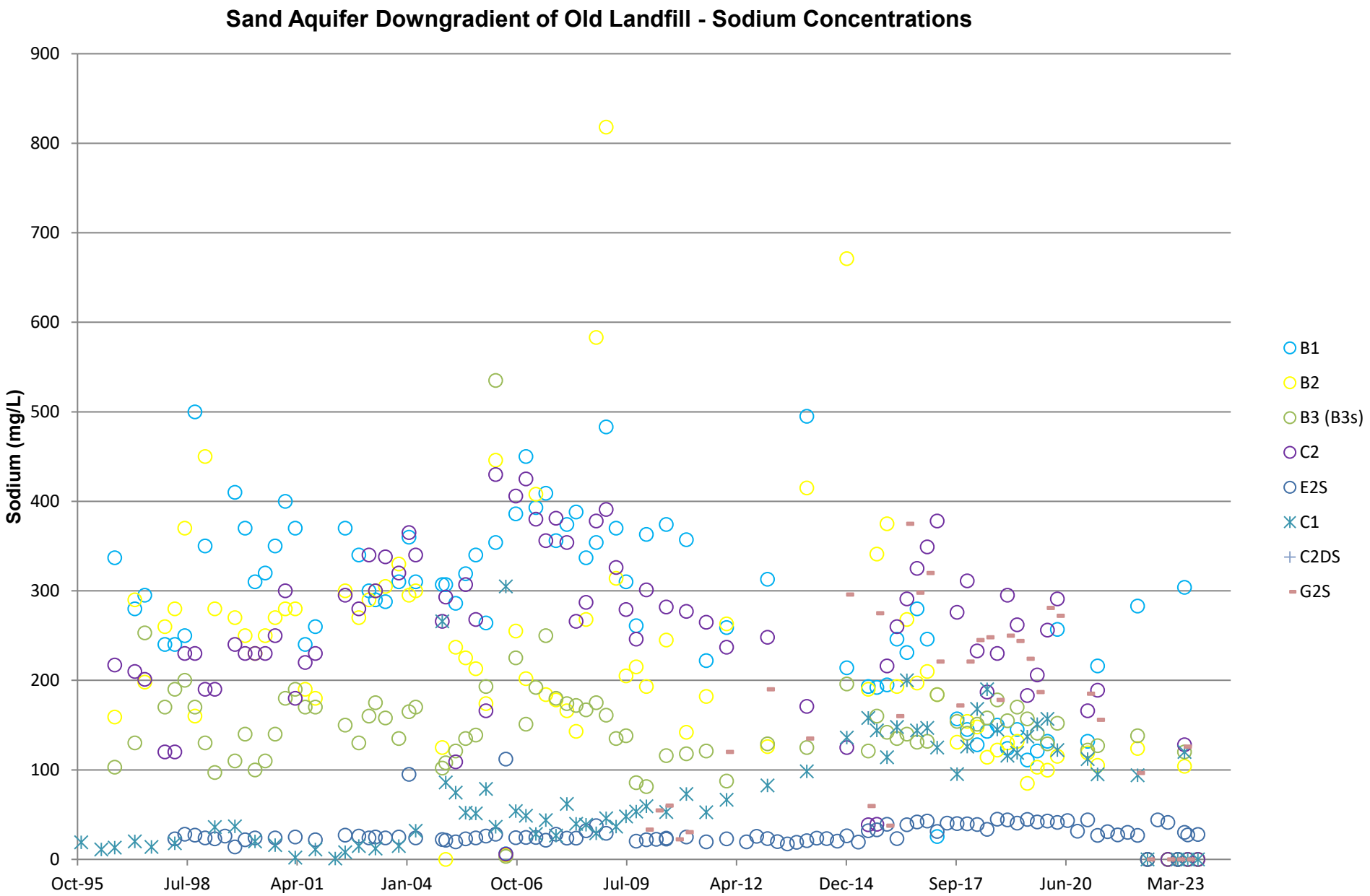

Gravel Aquifer - E. coli
E. coli (CFU/mL)
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
E1D
C2DD
E2D
G1D
NZDWS MAV E. coli Trigger Value

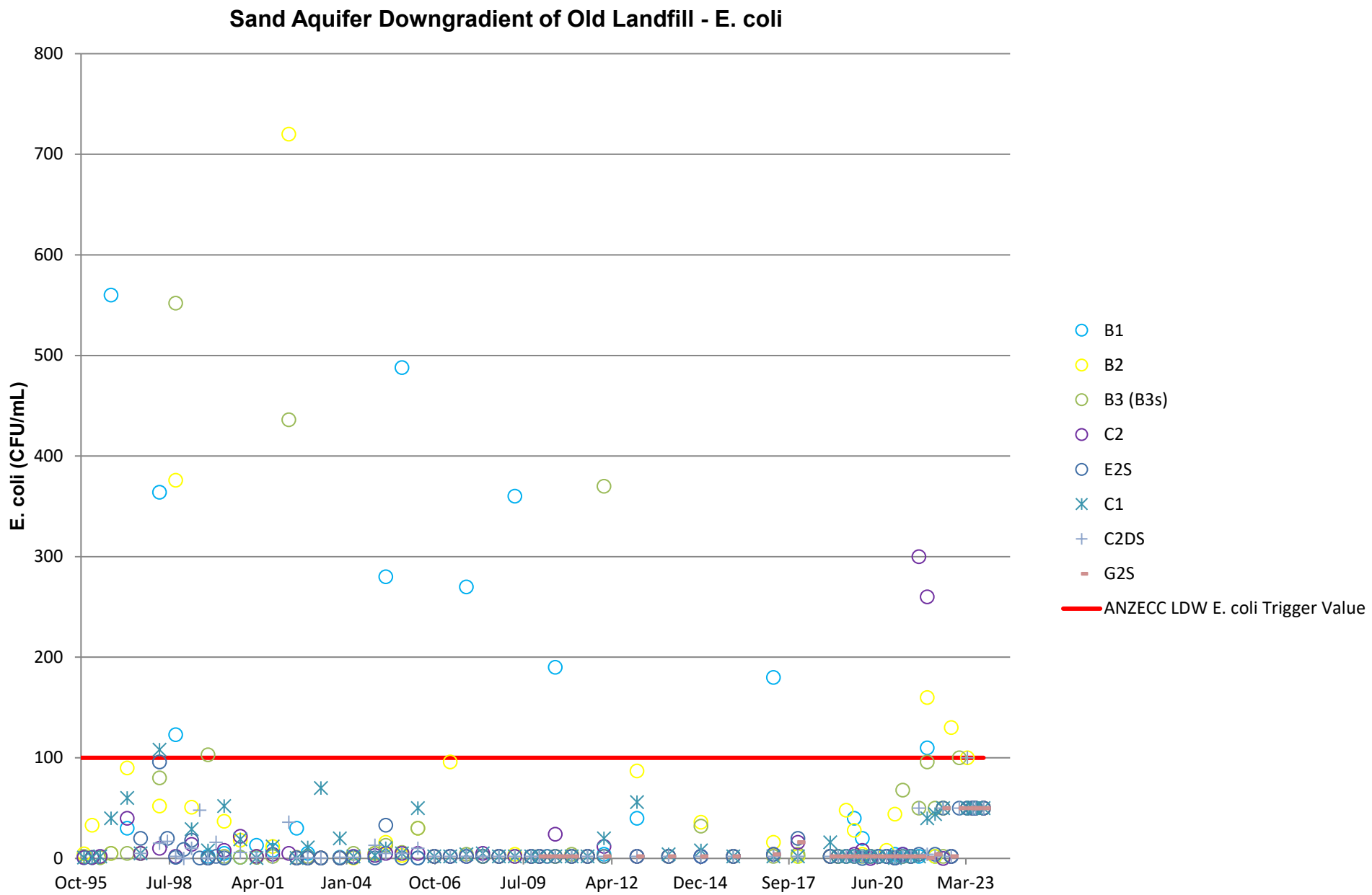

Sand Aquifer Downgradient of Old Landfill - Boron Concentrations
Boron (mg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S


Sand Aquifer Downgradient of Old Landfill - Chloride Concentrations
Chloride (mg/L)
2500
2000
1500
1000
500
0
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)
C2
E2S
C1
C2DS
G2S

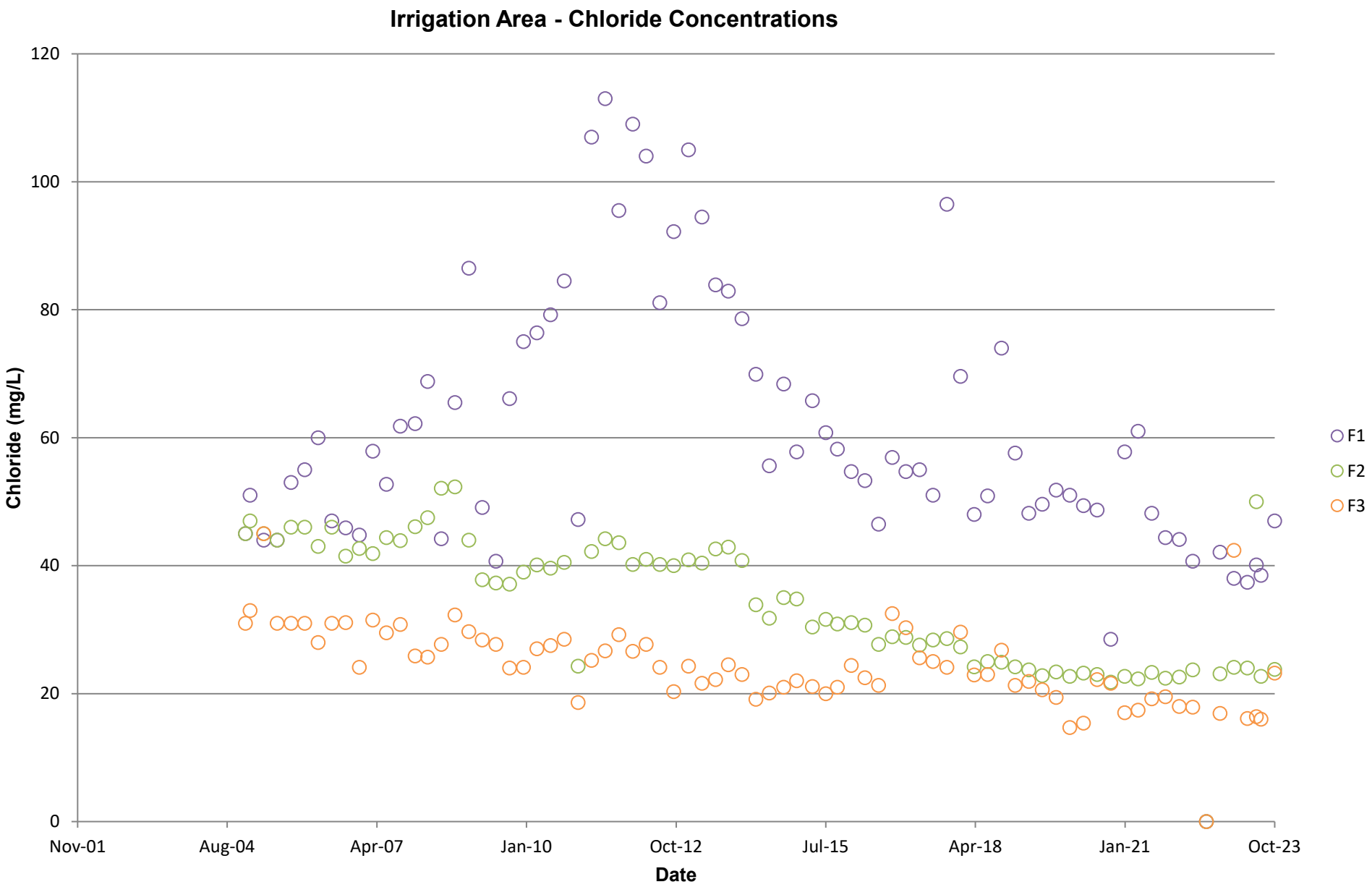

Sand Aquifer Downgradient of Old Landfill - Ammonia-N Concentrations
Ammonia-N (mg/L)
500
450
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

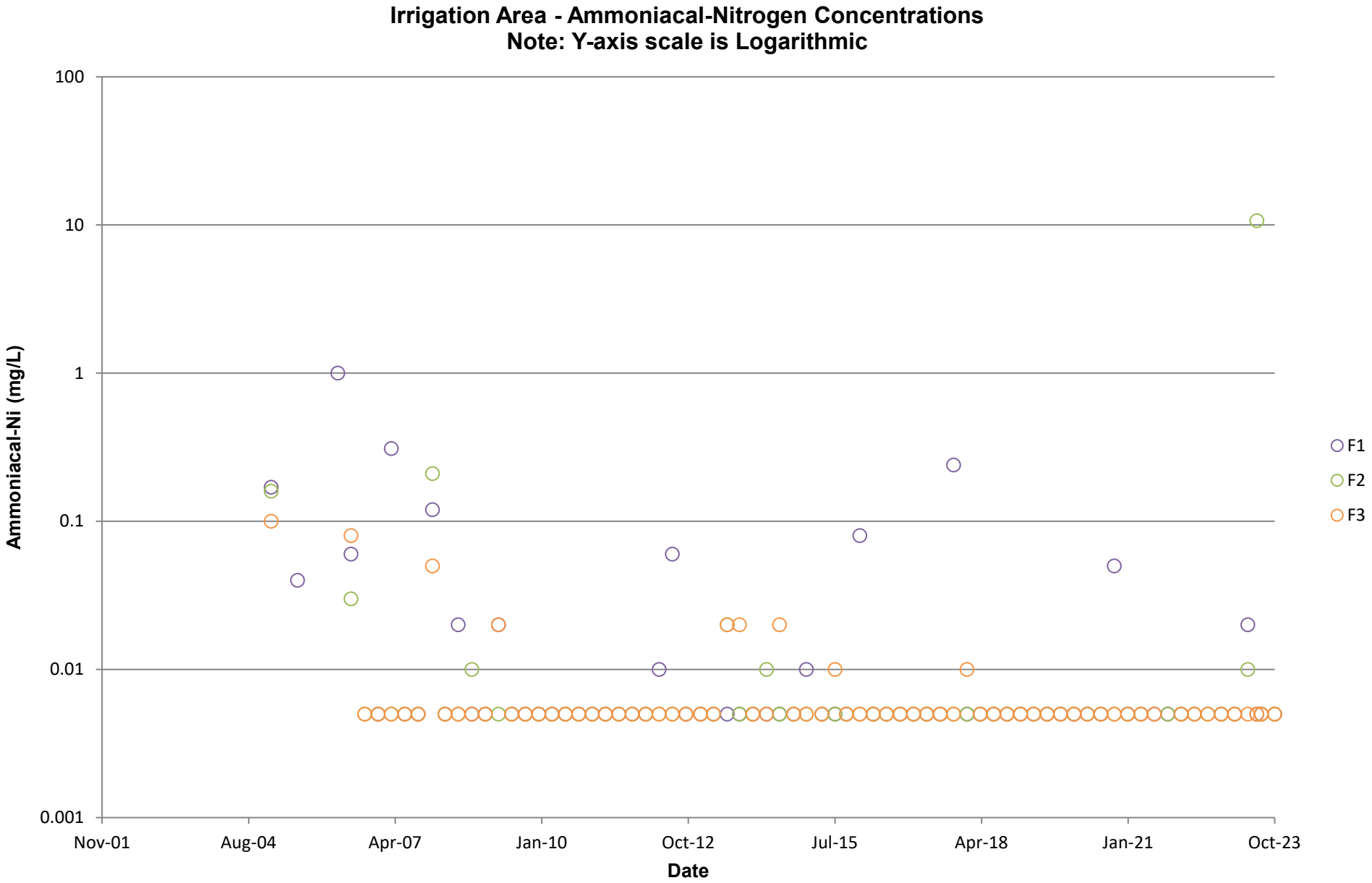

Sand Aquifer Downgradient of Old Landfill - Conductivity Levels
Conductivity (mS/m)
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

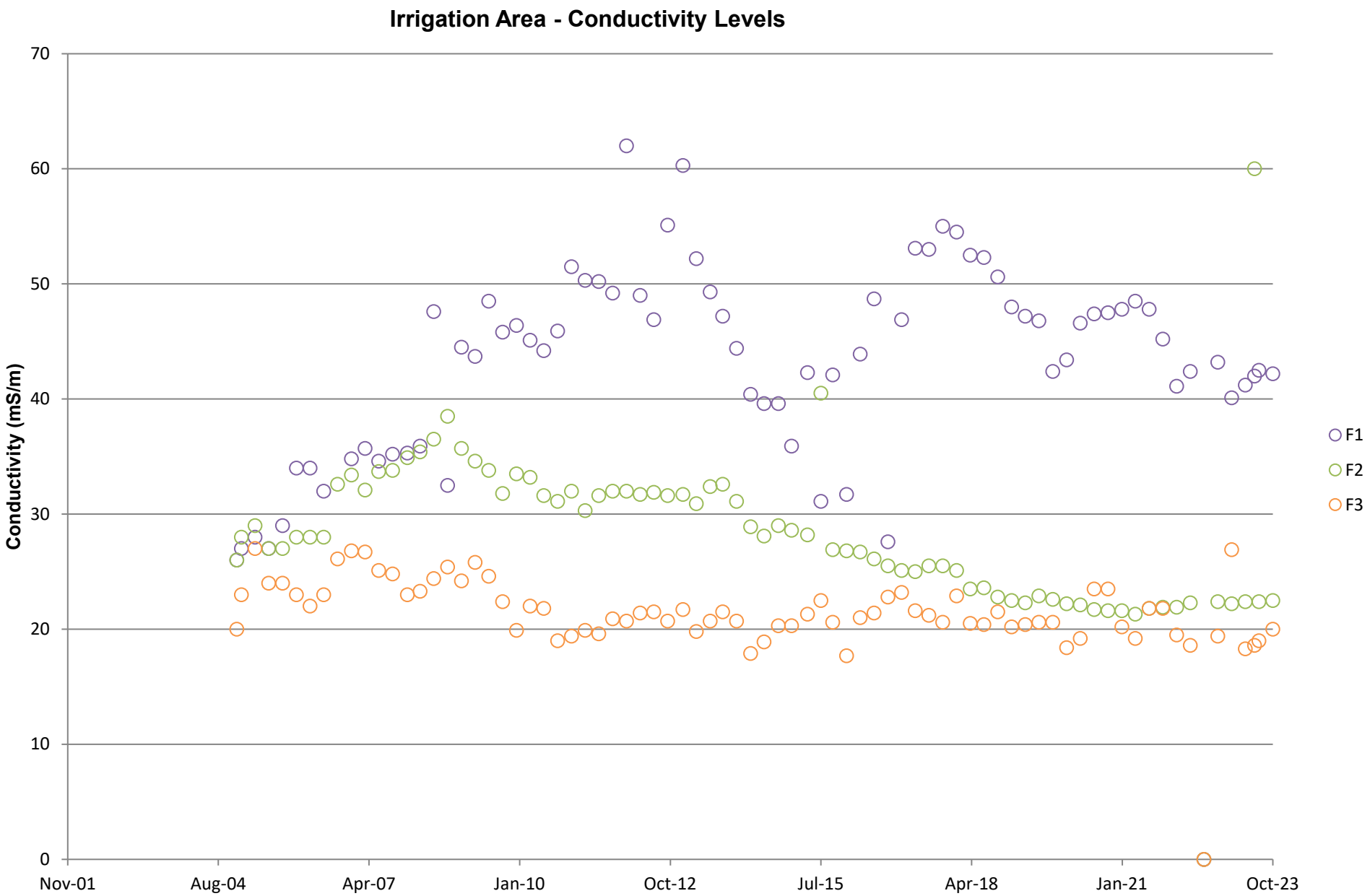

Sand Aquifer Downgradient of Old Landfill - Sodium Concentrations
Sodium (mg/L)
900
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S

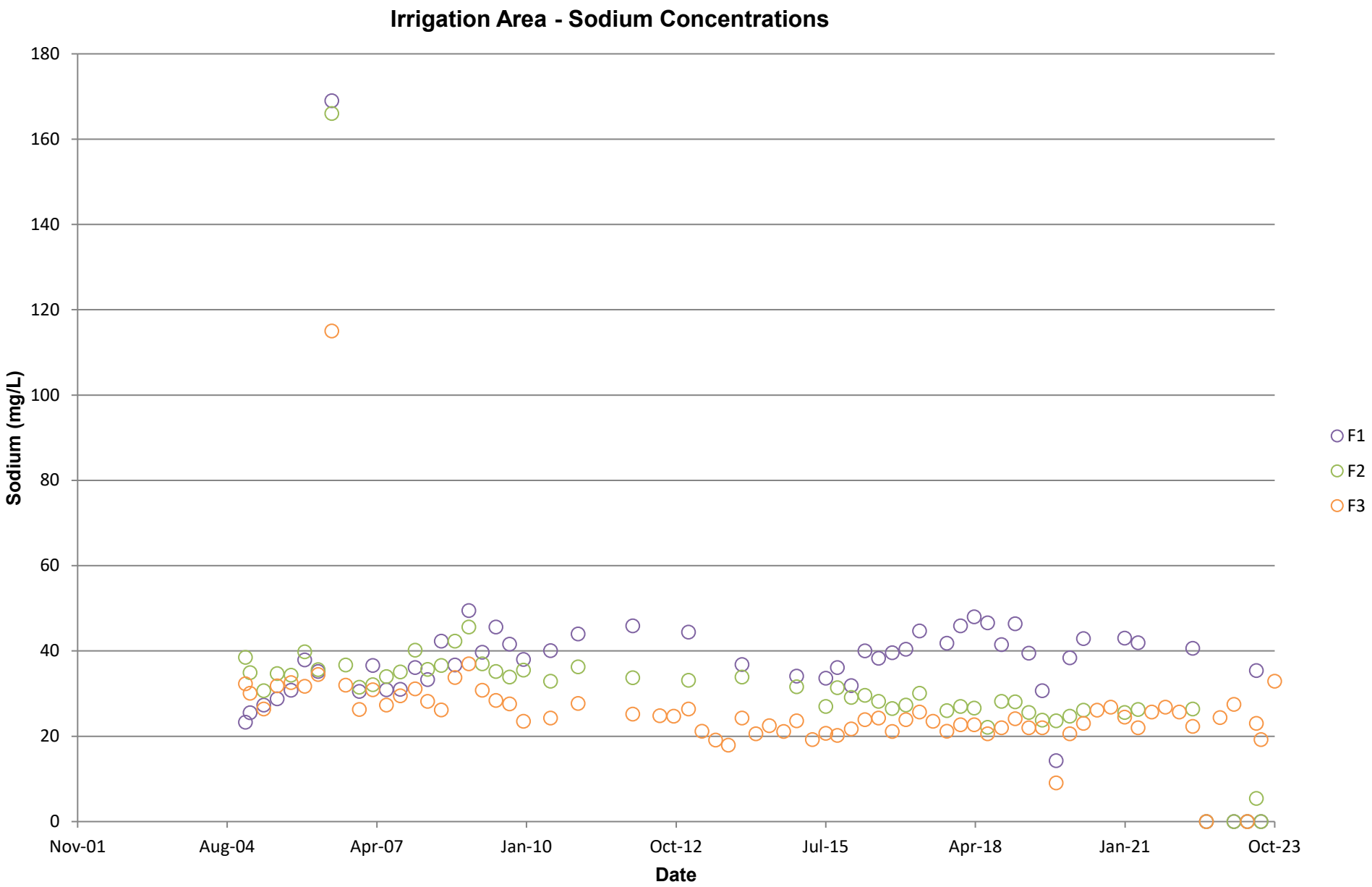

Sand Aquifer Downgradient of Old Landfill - E. coli
E. coli (CFU/mL)
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
ANZECC LDW E. coli Trigger Value

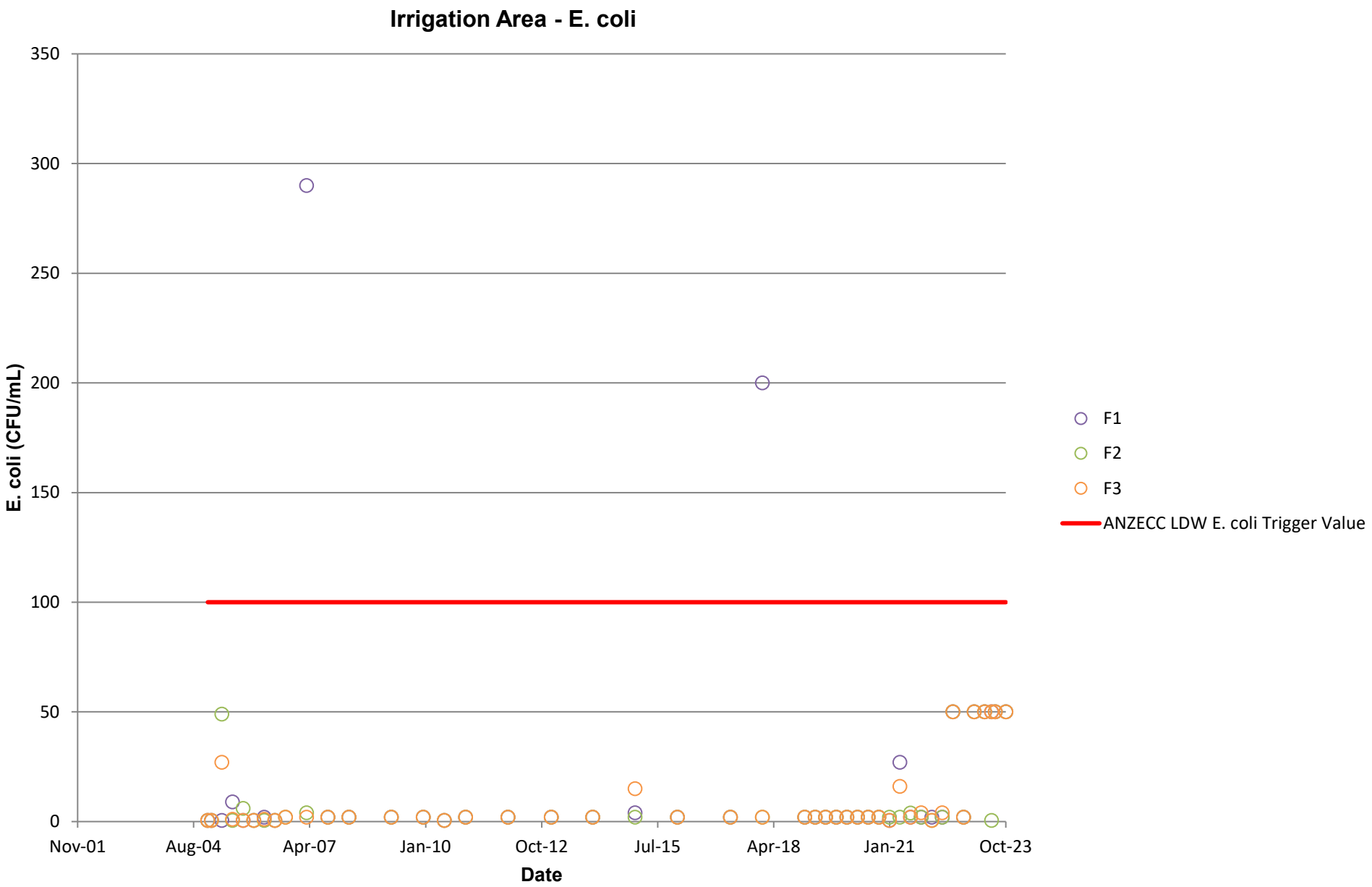

Irrigation Area - Boron Concentrations
Boron (mg/L)
400
350
300
250
200
150
100
50
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
F1
F2
F3

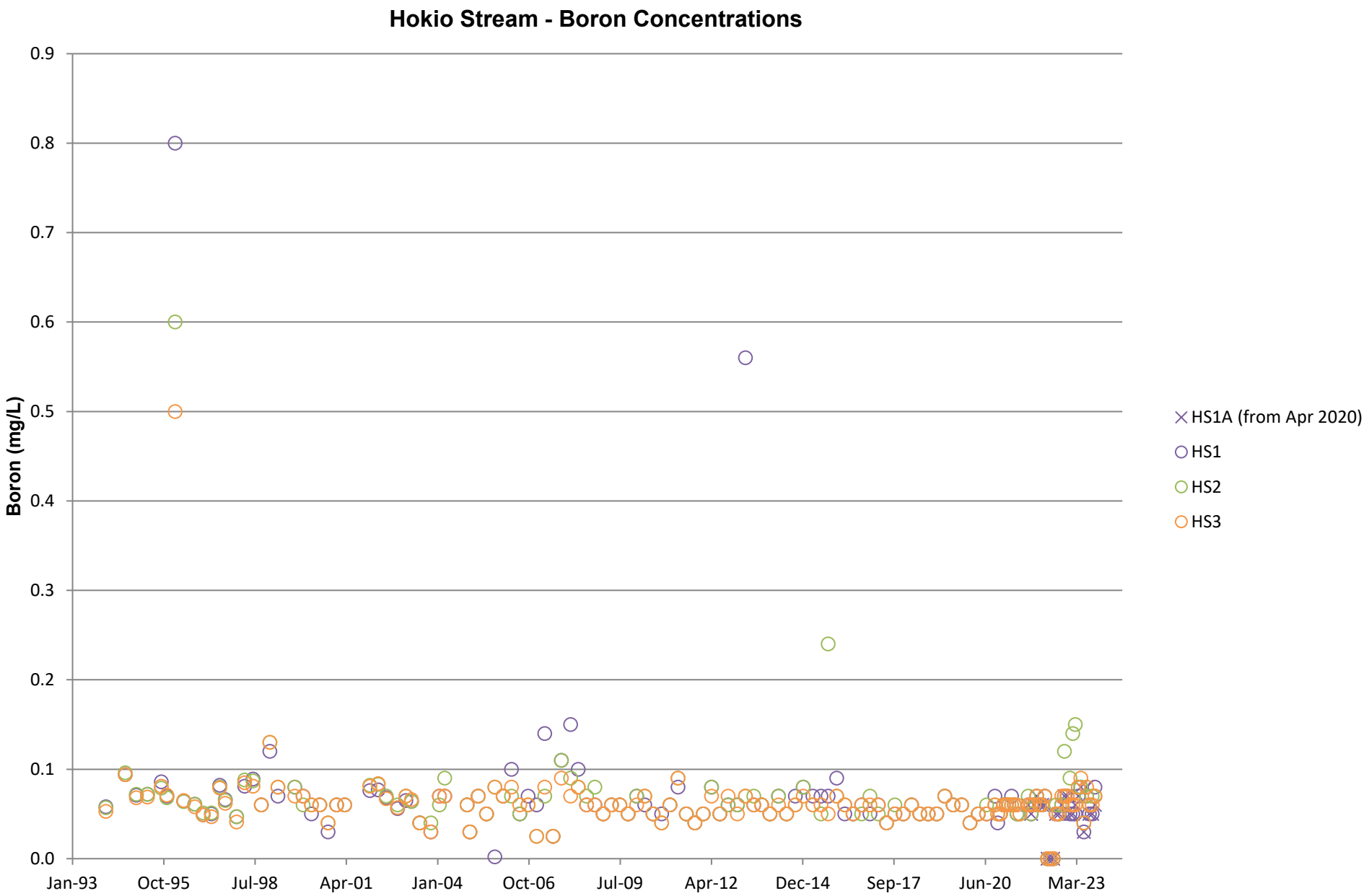

Irrigation Area - Chloride Concentrations
Chloride (mg/L)
120
100
80
60
40
20
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Date
F1
F2
F3

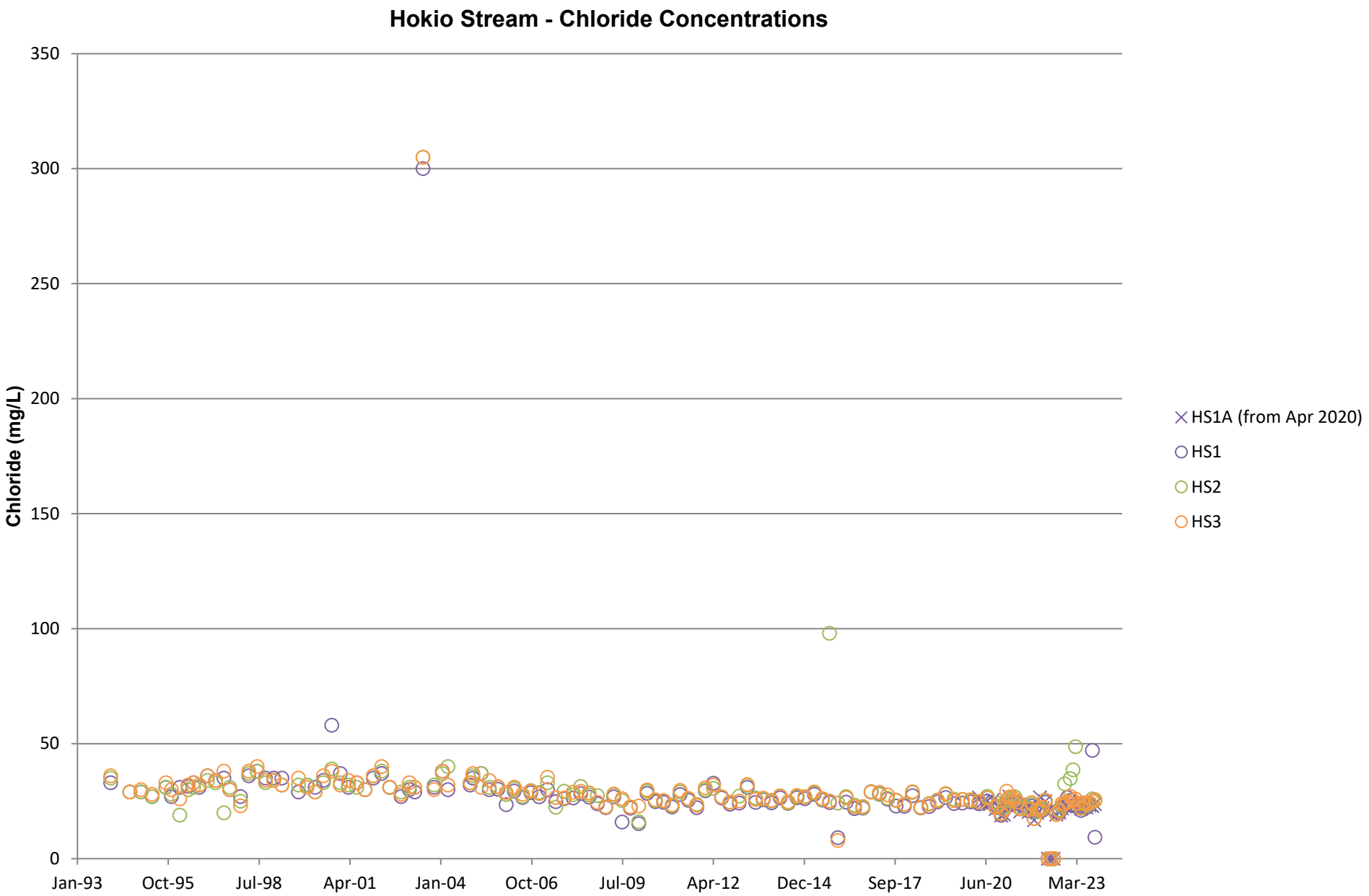

Irrigation Area - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic
Ammoniacal-Ni (mg/L)
100
10
1
0.1
0.01
0.001
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Date
F1
F2
F3

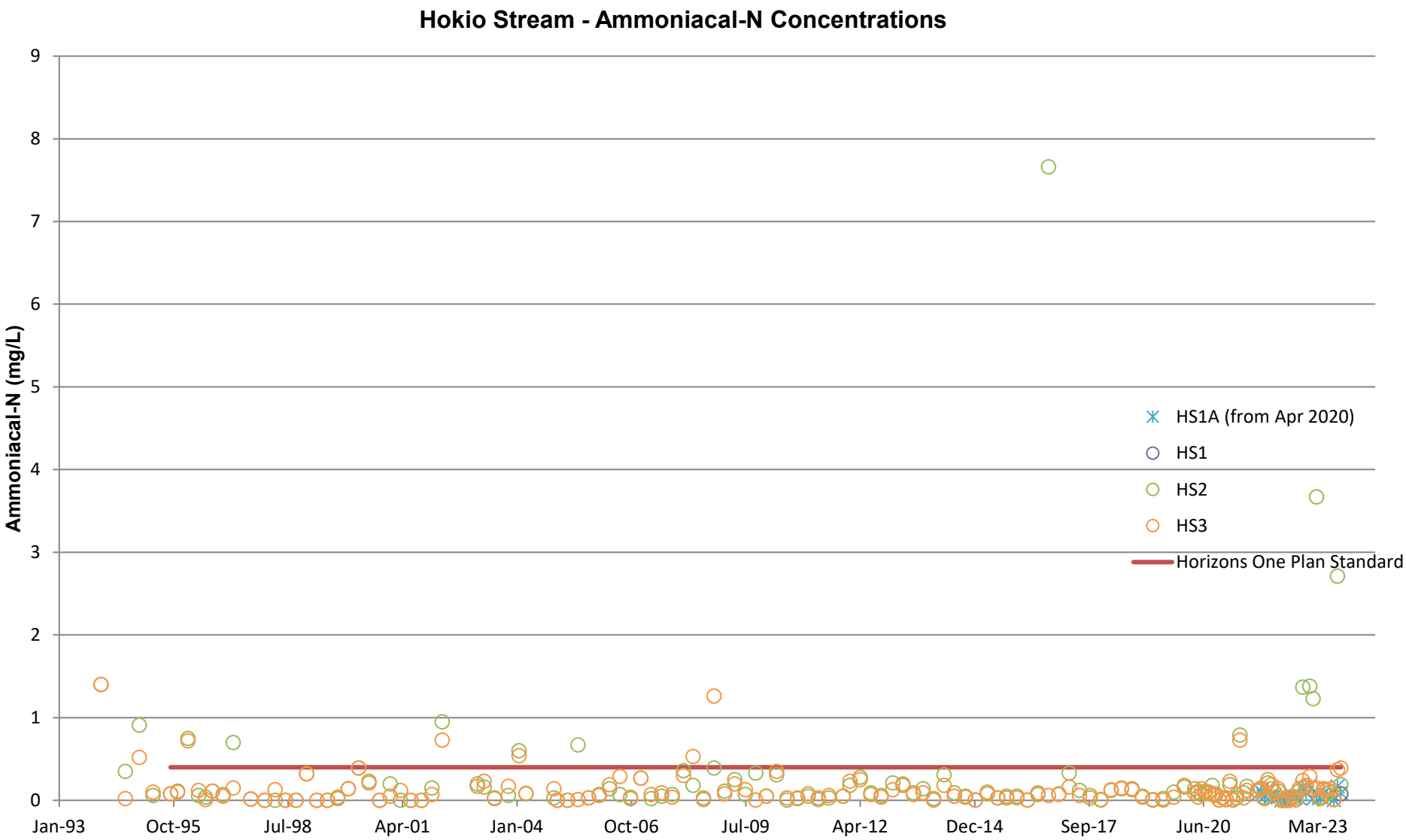

Irrigation Area - Conductivity Levels
Conductivity (mS/m)
70
60
50
40
30
20
10
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
F1
F2
F3

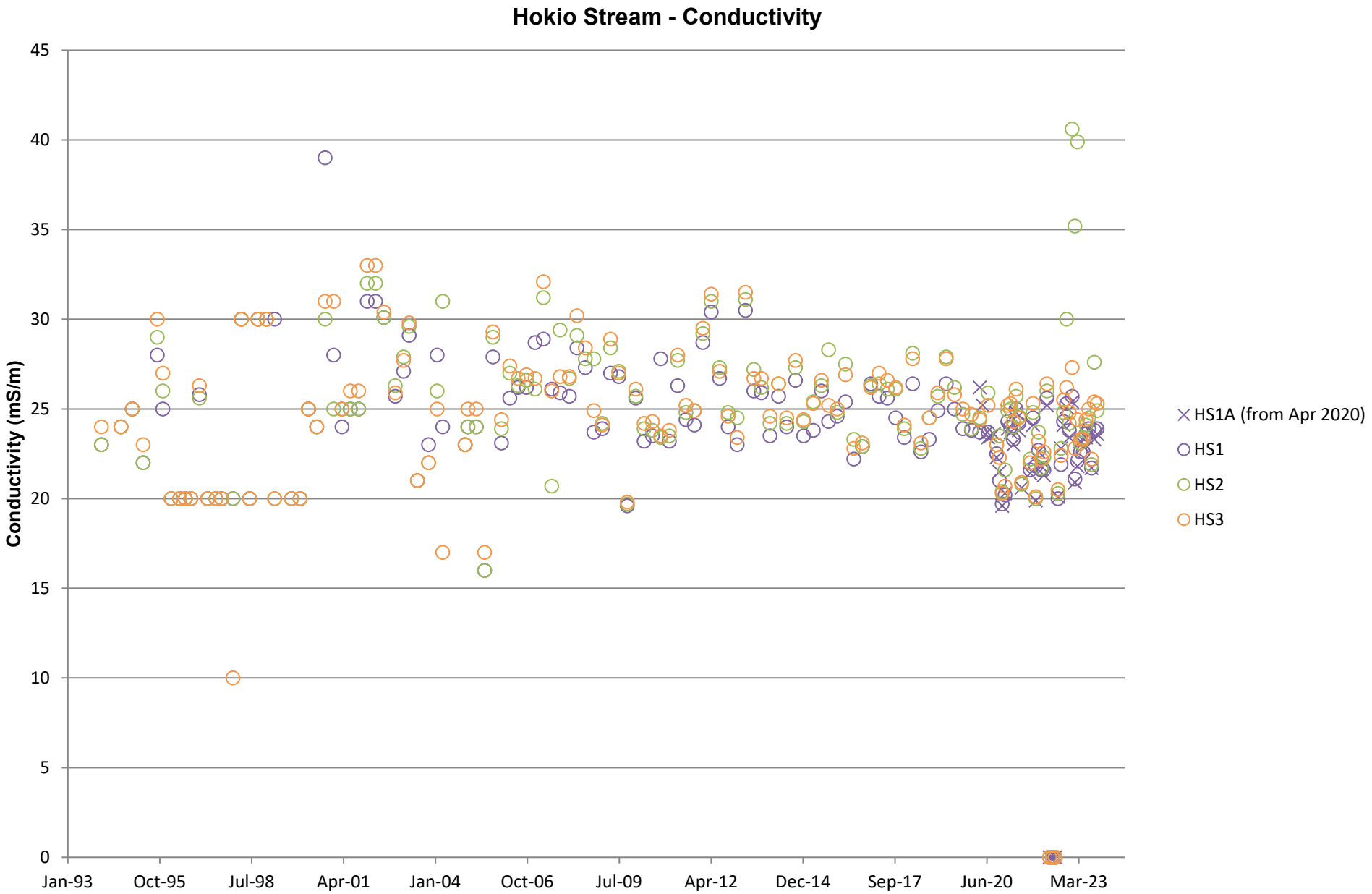

Irrigation Area - Sodium Concentrations
Sodium (mg/L)
180
160
140
120
100
80
60
40
20
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Date
F1
F2
F3

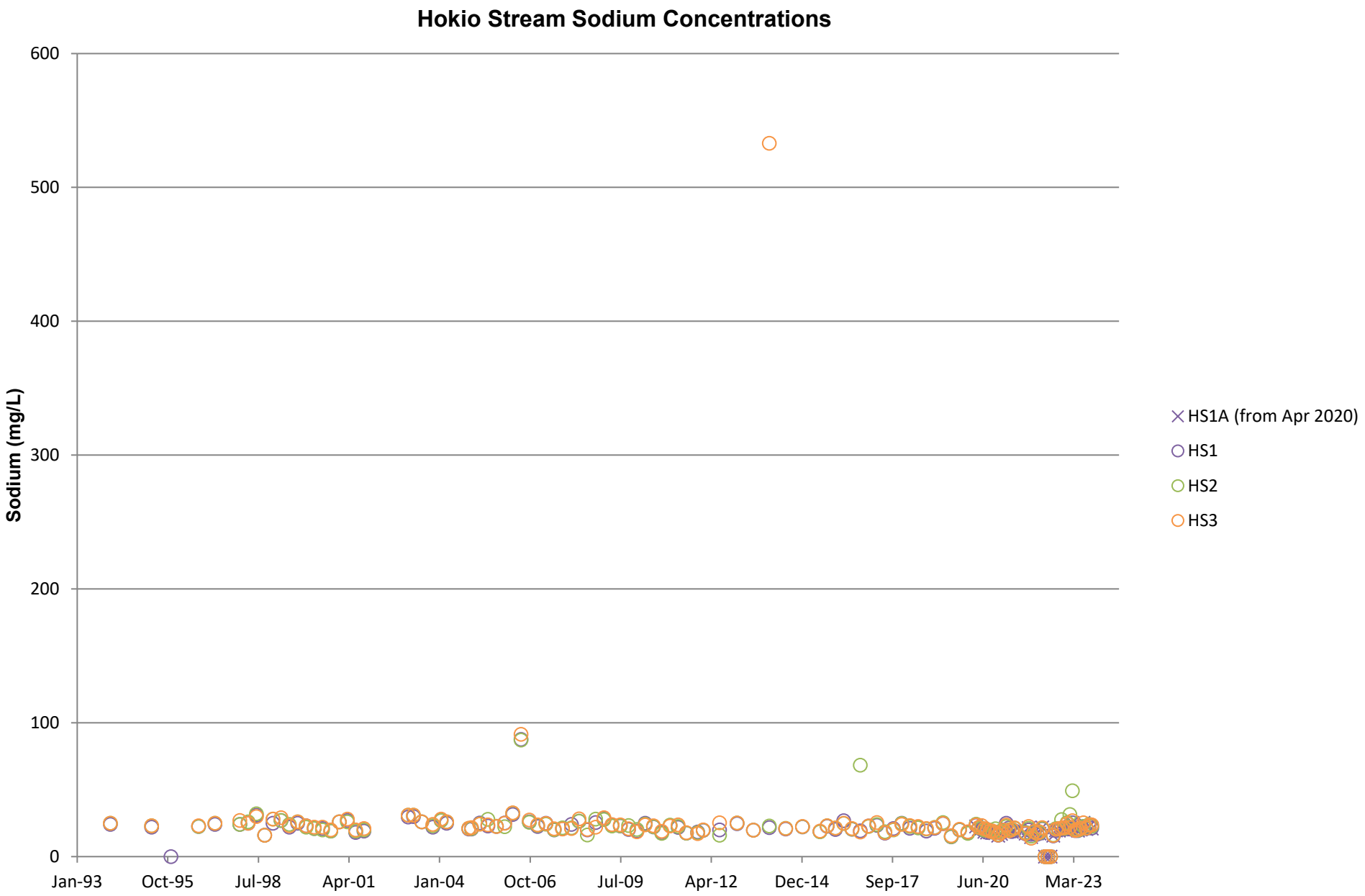

Irrigation Area - E. coli
E. coli (CFU/mL)
350
300
250
200
150
100
50
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Date
F1
F2
F3
ANZECC LDW E. coli Trigger Value

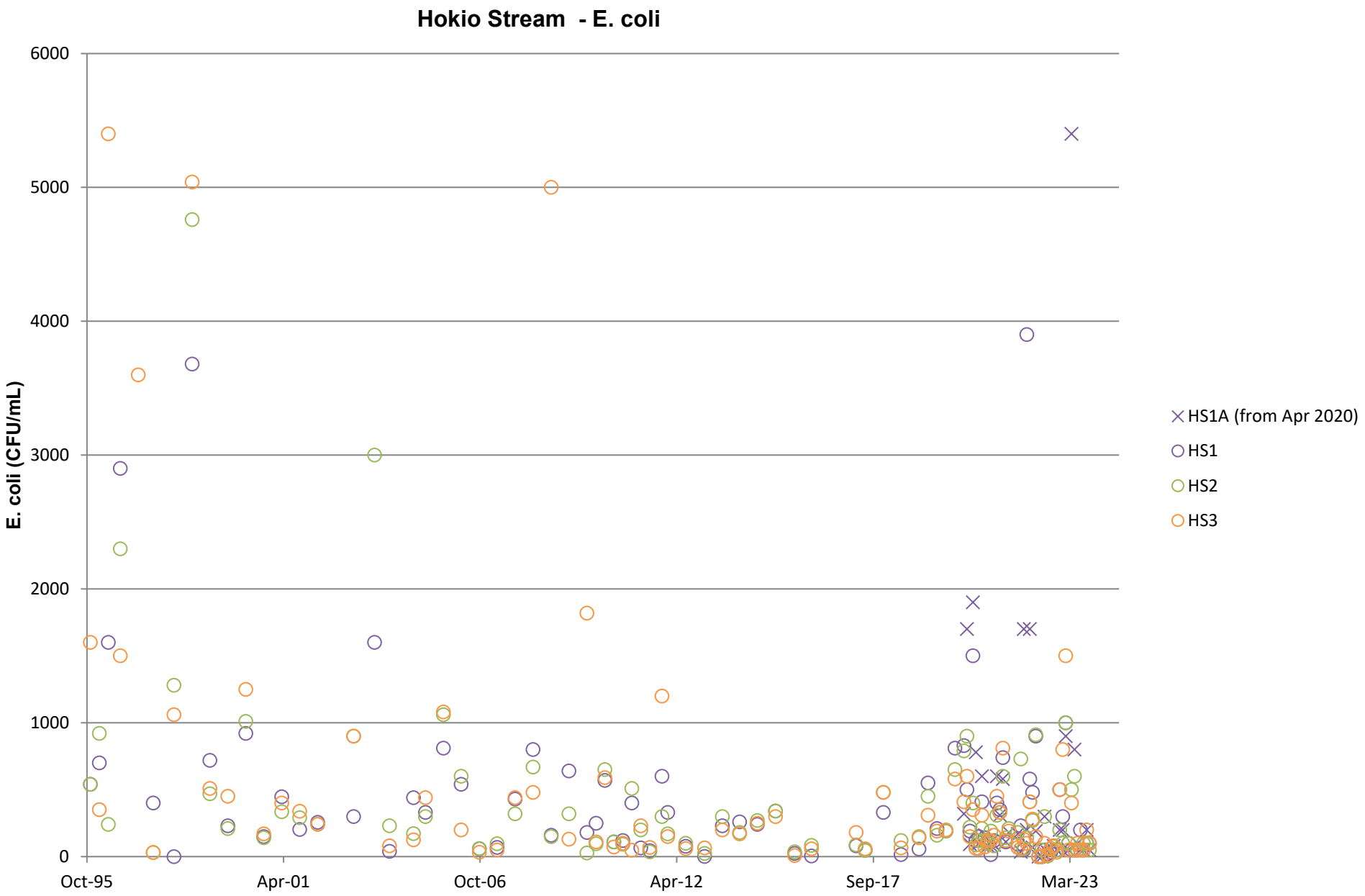

Hokio Stream - Boron Concentrations
Boron (mg/L)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - Chloride Concentrations
Chloride (mg/L)
350
300
250
200
150
100
50
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - Ammoniacal-N Concentrations
Ammoniacal-N (mg/L)
9
8
7
6
5
4
3
2
1
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3
Horizons One Plan Standard


Hokio Stream - Conductivity
Conductivity (mS/m)
45
40
35
30
25
20
15
10
5
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream Sodium Concentrations
Sodium (mg/L)
600
500
400
300
200
100
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - E. coli
E. coli (CFU/mL)
6000
5000
4000
3000
2000
1000
0
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
HS1A (from Apr 2020)
HS1
HS2
HS3

Appendix E Landfill Gas Monitoring Results at GW Bores for October 2023

Entry Date	User	Borehole	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Hydrogen Sulphide (H_2S) ppm	Oxygen (O_2) %	AIR TEMPERATURE °C
13/10/2023 8:39	Thomas Huria	Levin Landfill: Levin G1d	0	0.5	0	21.04	9
10/10/2023 12:30	Robert Cramer	Levin Landfill: BH102	0	0.03	0	20	16
10/10/2023 12:15	Robert Cramer	Levin Landfill: BH101B	0	0.02	0	20.1	16
10/10/2023 12:11	Robert Cramer	Levin Landfill: BH101A	0	0.03	0	20.6	16
10/10/2023 9:55	Robert Cramer	Levin Landfill: BH104	0	0.07	0	20.8	15
10/10/2023 9:20	Robert Cramer	Levin Landfill: BH103	0	0.06	0	20.8	15
5/10/2023 9:50	Robert Cramer	Levin Landfill: Levin B2	0	1	0	19	13
5/10/2023 9:40	Robert Cramer	Levin Landfill: Levin D6	0.02	0.05	0	20.4	14
5/10/2023 9:25	Robert Cramer	Levin Landfill: Levin C1	0	0.1	0	20.6	12
5/10/2023 9:10	Robert Cramer	Levin Landfill: Levin Xd1	0.04	0.19	0	20.6	12
5/10/2023 8:55	Robert Cramer	Levin Landfill: Levin Xs1	0.02	0.05	0	20.9	12
4/10/2023 15:15	Robert Cramer	Levin Landfill: Levin C2ds	0	0.1	0	20.8	12
4/10/2023 15:10	Thomas Huria	Levin Landfill: Levin C2dd	0	0.12	0	20.9	12
4/10/2023 15:00	Robert Cramer	Levin Landfill: Levin C2	0	0.5	0	20.6	12
4/10/2023 14:55	Robert Cramer	Levin Landfill: Levin B3s	0	0.07	0	21	12
4/10/2023 14:45	Thomas Huria	Levin Landfill: Levin E2d	0	0.12	0	20.9	12
4/10/2023 14:35	Robert Cramer	Levin Landfill: Levin E2s	0	0.06	0	20.9	11
4/10/2023 14:15	Thomas Huria	Levin Landfill: Levin E1d	0	0.04	0	20.8	12
4/10/2023 14:10	Robert Cramer	Levin Landfill: Levin E1s	0	0.05	0	20.9	12
4/10/2023 14:00	Robert Cramer	Levin Landfill: Levin D4	0	0.05	0	20.8	12
4/10/2023 13:40	Thomas Huria	Levin Landfill: Levin D5	0	0.07	0	20.9	11
4/10/2023 12:55	Robert Cramer	Levin Landfill: Levin D3rs	0	0.04	0	20.6	12
4/10/2023 12:50	Robert Cramer	Levin Landfill: Levin D3rd	0	0.04	0	20.8	11
4/10/2023 12:45	Thomas Huria	Levin Landfill: Levin F3	0	0.06	0	20.8	11
4/10/2023 12:30	Thomas Huria	Levin Landfill: Levin F2	0	0.06	0	20.5	11
4/10/2023 12:10	Thomas Huria	Levin Landfill: Levin D1	0	0.07	0	20.2	11
4/10/2023 12:00	Robert Cramer	Levin Landfill: Levin D2	0	0.11	0	20.7	10
4/10/2023 11:47	Thomas Huria	Levin Landfill: Levin F1	0	0.04	0	21.1	10
4/10/2023 11:30	Thomas Huria	Levin Landfill: Levin G1d	0	0.5	0	21.4	9
4/10/2023 11:07	Robert Cramer	Levin Landfill: Levin B1	0	0.18	0	20.8	9
4/10/2023 10:48	Thomas Huria	Levin Landfill: Levin G2s	0	0.25	0	20.6	9
4/10/2023 10:40	Thomas Huria	Levin Landfill: Levin G1s	0	0.4	2	21.2	9
4/10/2023 10:35	Robert Cramer	Levin Landfill: Levin Xs2	0	0.58	0	20.6	9

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