

Levin Landfill January 2024

Quarterly Groundwater, Surface Water and Leachate Monitoring Report

PREPARED FOR HOROWHENUA DISTRICT COUNCIL | FEBRUARY 2024

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Revision Schedule

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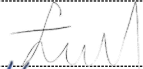




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Abbreviations

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
NH₃-N	Ammoniacal-nitrogen
NO₃-N	Nitrate nitrogen
ppm	Parts per million
scBOD₅	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 third quarter (i.e., November 2023 to January 2024) 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 third 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 January 2024, and landfill leachate was sampled at a manhole next to the leachate pond. Additionally, five surface water sites were each sampled during November 2023, December 2023, and January 2024. 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 January 2024 quarter, time between sampling and reception at the laboratory was slightly longer than the normally accepted timeframe of <24 hours. Generally, the timeframes have reduced significantly compared to previous sampling rounds. However, of concern is that for many samples, the laboratory reports record the "Reception Date & Time" as being before the recorded "Sampled Date & Time", which is nonsensical and this needs to be reviewed and corrected by the laboratory.

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 2000¹ 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 November 2023 to January 2024 monitoring results have been assessed against these limits, where they are applicable.

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

- *E. coli* at Xd1 and 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* results at Xd1 and D3rd have been considered as non-compliances. This has been noted previously – it is recommended that Downer contact the laboratory to ensure the correct analysis request is made for all sampling locations.
- Hardness exceeded the aesthetic GV of 200 mg CaCO₃/L at bore D3rd (214 mg CaCO₃/L). This is characteristic of D3rd.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.022 mg/L). This is characteristic of D3rd.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2DD (0.553 mg/L), E2D (0.406 mg/L), Xd1 (0.515 mg/L), and D3rd (0.446 mg/L). The results for C2DD and E2D (from 1997), Xd1 (from

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.



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 November 2023 (2.78 mg/L), and December 2023 (13 mg/L) exceeded the ANZECC (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- Ammoniacal-N at TD1 in November 2023 (7.87 mg/L), December 2023 (2.59 mg/L), and January 2024 (22.7 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 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 November 2023 and at sites HS2 and HS3 in December 2023 and January 2024, with values ranging between 0.18 mg/L and 0.46 mg/L.
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value of 0.055 mg/L at HS1A in January 2024, with 0.106 mg/L.

The November 2023 to January 2024 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 twenty-three 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. Sixteen of these outliers were for parameters having less concentration than the typical minimal concentrations. 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 five of the bores in January 2024, with the greatest readings at B3 and D1 (0.07%). 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 0.43% at bore B2. Hydrogen sulphide was detected at three bores, F2, D2 and D3rs, all at 1 ppm.

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 27 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. Capping of the site is currently underway and will be completed by the end of summer.

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 is currently under construction and will be completed this summer.

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 November 2023 - January 2024 quarterly monitoring period.

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 07 November 2023, 12 December 2023, and 17 January 2024, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. The timeframe between sample collection and laboratory reception varied between 22 and 24 hours, within the normally accepted range of within 24 hours, which is a significant improvement in regard to past occurrences.

Groundwater samples were collected by Downer on 15, 16, and 17 January 2024, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. The laboratory reports for many of the groundwater samples showed that the recorded "Reception Date & Time" was before the recorded "Sampled Date & Time", which is nonsensical. So, the "Analysis Start Date & Time" has been compared against the recorded "Sampled Date & Time". In most instances the timeframe was < 24 hours, but for seven of the samples, the time varied between 25 and 28 hours. Again, this is a significant improvement on what has been achieved in the past, but the recording of all dates needs to be done accurately to avoid the noted anomalies.

The monitoring schedule for July 2023 - April 2026 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 and the Northern Farm Drain were analysed for the comprehensive list of parameters (see Table 2-1), with a sample of the leachate effluent being analysed for the indicator suite of parameters.

Note that, following the revision of the resource consent conditions which were approved in December 2019, 5-day soluble carbonaceous Biochemical Oxygen Demand (scBOD₅) 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 scBOD₅ and *E. coli* parameters replace BOD₅ 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)***
Biological+	<i>E. coli</i>	<i>E. coli</i>
Organics	Not required	Total organic carbon, total phenols, volatile acids

Note:

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

** scBOD₅ 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.

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

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 January 2024 (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 bores G1D and F3 were within the ANZECC LDW trigger values and DWSNZ limits during the January 2024 monitoring round.

For bore G1s the following results were outside the range of relevant guidelines:

- pH (6.5) was below the lower DWSNZ limit of 7.0.
- Dissolved iron (2.42 mg/L) exceeded the DWSNZ limit of 0.2 mg/L, in line with historical reporting.

E. coli was 'not detected' at any of the background monitoring locations, but it is noted that the laboratory detection level changed between sites – 1 cfu/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. This matter should be reviewed as part of the Annual Report.

Table 2-2: Background Monitoring Results for January 2024

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Sampling date				15/01/24	15/01/24	15/01/24
Water level	mbgl	-	-	13.78	14.34	5.8
pH	pH units	7 to 8.5*	6 to 9	6.5	7	7.1
Conductivity	mS/m	-	-	55.3	27.5	18.9
COD	mg/L	-	-	39	7.5	7.5
scBOD ₅	mg/L	-	-	0.5	0.5	0.5
<i>E. Coli</i>	CFU/100ml	NIL	100	ND	ND	ND
Chloride	mg/L	250*	-	101	30.3	17.1
Nitrate-N	mg/L	11.3	90.3	0.04	0.005	2.37
Ammoniacal-N	mg/L	1.17	-	0.04	0.09	0.005
Sodium	mg/L	200*	-	77.2	n/r	24.8
Dissolved Aluminium	mg/L	0.1*	5	0.04	0.001	0.001



Determinant	Units	DWSNZ MAV	ANZECC LDW	G1S	G1D	F3
Dissolved Boron	mg/L	1.4	5	0.04	0.06	0.04
Dissolved Iron	mg/L	0.2*	-	2.42	n/r	<i>0.005</i>
Dissolved Lead	mg/L	0.01	0.1	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Manganese	mg/L	0.4	-	0.0545	0.0706	0.0005
Dissolved Mercury	mg/L	0.007	0.002	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Nickel	mg/L	0.08	1	0.0007	<i>0.00025</i>	<i>0.00025</i>

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

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 January 2024 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 quarterly (January 2024) monitoring round** in samples from the shallow aquifer.



Table 2-3: D-Series and E1S Monitoring Bore Results for January 2024

Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1S
Sampling date			16/01/24	16/01/24	16/01/2024	17/01/24	15/01/24	16/01/24	17/01/24
Water Level	mbgl	-	16.57	21.1	5.6	7.55	8.9	16.3	11.1
pH	pH units	6 to 9	6.7	6.3	6.4	7.1	7.0	6.7	7.0
Suspended Solids	mg/l	-	n/r	n/r	2.5	n/r	n/r	n/r	n/r
Phenol	mg/l	-	n/r	n/r	n/p	n/r	n/r	n/r	n/r
VFA	mg/l	-	n/r	n/r	6.4	n/r	n/r	n/r	n/r
TOC	mg/L	-	n/r	n/r	21.5	n/r	n/r	n/r	n/r
Alkalinity	mg CaCO ₃ /L	-	n/r	n/r	90	n/r	n/r	n/r	n/r
Conductivity	mS/m	-	50.3	61.1	23.6	27.5	29.1	49.7	24.3
COD	mg/L	-	7.5	47	54	38	7.5	7.5	17
scBOD ₅	mg/L	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5
<i>E. coli</i>	CFU/100ml	100	ND	ND	ND	ND	ND	ND	ND
Chloride	mg/L	-	26.9	73.2	15.7	30.9	28.9	34.1	29.4
Nitrate-N	mg/L	90.3	6.48	0.05	0.05	0.005	1.04	23.9	0.005
Sulphate	mg/L	1000	n/r	n/r	1.8	n/r	n/r	n/r	n/r
Ammoniacal-N	mg/L	-	0.005	0.75	0.76	0.23	0.005	0.005	0.11
Hardness	mg CaCO ₃ /L	-	n/r	n/r	49	n/r	n/r	n/r	n/r
Calcium	mg/L	1000	n/r	n/r	10.6	n/r	n/r	n/r	n/r
Magnesium	mg/L	-	n/r	n/r	5.5	n/r	n/r	n/r	n/r
Potassium	mg/L	-	n/r	n/r	4.36	n/r	n/r	n/r	n/r
Sodium	mg/L	-	n/r	48.4	22.4	32.2	n/r	n/r	27.2
D.R. Phosphorus	mg/L	-	n/r	n/r	0.085	n/r	n/r	n/r	n/r
Dissolved Aluminium	mg/L	5	0.001	0.003	0.056	0.003	0.001	0.001	0.008
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	0.07	0.05	0.04	0.03	0.05	0.06	0.04
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	0.003	n/r	n/r	n/r	n/r



Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1S
Dissolved Copper	mg/L	0.4	n/r	n/r	<i>0.00025</i>	n/r	n/r	n/r	n/r
Dissolved Iron	mg/L	-	n/r	12.1	14.0	1.61	n/r	n/r	3.91
Dissolved Lead	mg/L	0.1	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	0.0014
Dissolved Manganese	mg/L	-	0.0036	0.521	0.352	0.206	0.0088	0.0011	0.207
Dissolved Mercury	mg/L	0.002	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Nickel	mg/L	1	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Zinc	mg/L	20	n/r	n/r	<i>0.001</i>	n/r	n/r	n/r	n/r

Notes:

'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 quarterly (January 2024) 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 **eight exceedances of the DWSNZ limits** in samples from the deep gravel aquifer during the January 2024 monitoring round, as follows:

- *E. coli* at Xd1 and 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* results at Xd1 and D3rd have been considered as non-compliances.
- Hardness exceeded the aesthetic GV of 200 mg CaCO₃/L at bore D3rd (214 mg CaCO₃/L). This is characteristic of D3rd.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.022 mg/L). This is characteristic of D3rd.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2DD (0.553 mg/L), E2D (0.406 mg/L), Xd1 (0.515 mg/L) and D3rd (0.446 mg/L). The results for C2DD and E2D (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 January 2024

Determinant	Units	DWSNZ MAV	E1D	C2DD	E2D	Xd1	D3rd
Sampling date			16/01/24	16/01/24	16/01/24	18/01/24	16/01/24
Water Level	mbgl	-	11.01	2.75	4.58	2.3	5.94
pH	pH units	7 to 8.5*	7.5	7.5	7.4	7.5	7.5
Suspended Solids	mg/l	-	n/r	n/r	n/r	24	6
Phenol	mg/l	-	n/r	n/r	n/r		n/p
VFA	mg/l	-	n/r	n/r	n/r	2.5	6.6
TOC	mg/L	-	n/r	n/r	n/r	4.3	6.4
Alkalinity	mg CaCO ₃ /L	-	n/r	224	n/r	186	225
Conductivity	mS/m	-	45.2	55.6	44.7	53.7	52.9
COD	mg/L	-	7.5	26	7.5	43	7.5
scBOD ₅	mg/L	-	1	0.5	0.5	0.5	0.5
<i>E. coli</i>	CFU/100ml	NIL	ND	ND	ND	50	50
Chloride	mg/L	250*	40.1	39.6	42.2	58	31.7
Nitrate-N	mg/L	11.3	0.005	0.1	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	0.17	0.25	0.23	0.39	0.39
Hardness	mg CaCO ₃ /L	200*	n/r	n/r	n/r	152	214
Calcium	mg/L	-	n/r	n/r	n/r	34.5	61.3
Magnesium	mg/L	-	n/r	n/r	n/r	15.9	14.8
Potassium	mg/L	-	n/r	n/r	n/r	5.6	6.65
Sodium	mg/L	200*	36.5	n/r	n/r	49.6	21.8
D.R. Phosphorus	mg/L	-	n/r	n/r	n/r	0.155	1.21
Dissolved Aluminium	mg/L	0.1*	0.003	0.007	0.002	0.001	0.003
Dissolved Arsenic	mg/L	0.01	n/r	n/r	n/r	0.0005	0.022
Dissolved Boron	mg/L	1.4	0.05	0.07	0.05	0.04	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*	0.06	n/r	n/r	0.05	0.03
Dissolved Lead	mg/L	0.01	0.00025	0.0005	0.0009	0.00025	0.00025
Dissolved Manganese	mg/L	0.4	0.211	0.553	0.406	0.515	0.446
Dissolved Mercury	mg/L	-	0.00025	0.00025	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.08	0.00025	0.0012	0.00025	0.00025	0.00025
Dissolved Zinc	mg/L	1.5*	n/r	n/r	n/r	0.001	0.001

Notes:

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

Bold – denotes an exceedance of the DWSNZ MAV

'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 quarterly (January 2024) 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 January 2024 monitoring round.

Table 2-5: Monitoring Results for Shallow Boreholes Down-Gradient from the Old Landfill for January 2024

Determinant	Units	ANZECC LDW	E2S	B1	B2	B3s	C1	C2	C2DS	G2S	Xs1	Xs2
Sampling date			17/01/24	17/01/24	17/01/24	18/01/24*	17/01/24	17/10/24	17/01/24	15/01/24	18/01/24	18/01/24
Water level	mbgl	-	5.46	1.06	1.23	0.23	0.62	0.32	2.7	2.2	0.64	2.6
pH	pH units	6 to 9	7.7	7.0	6.8	7.0	7.0	6.9	6.6	6.7	7.0	6.7
Suspended Solids	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	67	2.5
Phenol	mg/l	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/p	n/p
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	24.6	2.3
Alkalinity	mg CaCO ₃ /L	-	n/r	n/r	1020	1250	n/r	1030	684	n/r	576	60
Conductivity	mS/m	-	34.6	233	236	285	126	245	160	110	139	20.6
COD	mg/L	-	44	271	132	129	126	195	122	37	95	29
scBOD5	mg/L	-	0.5	0.5	0.5	1	0.5	1.5	0.5	0.5	1.5	0.5
<i>E-Coli</i>	CFU/100ml	100	50	50	50	50	50	50	50	50	50	50
Chloride	mg/L	-	42.4	350	157	138	154	139	106	173	112	17.3
Nitrate-N	mg/L	90.3	0.005	2.41	1.23	0.05	0.05	0.39	0.05	0.005	0.05	0.63
Sulphate	mg/L	1000	n/r	n/r	8.56	0.01	n/r	1.3	0.01	n/r	0.01	8.73
Ammoniacal-N	mg/L	-	0.26	15.3	87.4	159	15	151	31.2	0.03	12.8	0.05
Hardness	mg CaCO ₃ /L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	341	64
Calcium	mg/L	1000	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	74.7	13.9
Magnesium	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	37.4	7.14
Potassium	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	26.3	5.66
Sodium	mg/L	-	28.1	n/r	n/r	n/r	n/r	n/r	n/r	n/r	78.6	18.6
D. R. Phosphorus	mg/L	-	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	0.046	0.034
Dissolved Aluminium	mg/L	5	0.005	0.139	0.007	0.005	0.019	0.018	0.003	0.001	0.005	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	0.04	1.61	1.97	1.63	0.89	1.57	0.92	0.61	0.63	0.05
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	0.001	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	0.0016
Dissolved Iron	mg/L	-	0.1	n/r	n/r	n/r	n/r	n/r	n/r	n/r	3.48	0.22



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	-	0.26	3.61	3.45	2.96	0.274	0.317	1.18	0.216	0.774	0.094
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	0.0067	0.003	0.0075	0.0012	0.0045	0.0025	0.002	0.0023	0.00025
Dissolved Zinc	mg/L	20	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	0.003	0.005

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

* - Sampling time and date are given in the laboratory report as being after the date and time when the laboratory analysis started. It is suspected that the sampling date should be 17/01/24.



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 January 2024 (quarterly) monitoring round.

Table 2-6: Results from Monitoring Bores in the Irrigation Area for January 2024

Determinant	Units	ANZECC LDW	F1	F2	F3
Sampling Date			15/01/24	15/01/24	15/01/24
Water Level	mbgl	-	7.56	2.3	5.8
pH	pH units	6 to 9	6.9	7.0	7.1
Conductivity	mS/m	-	48.5	22.2	18.9
COD	mg/L	-	16	7.5	7.5
scBOD5	mg/L	-	0.5	0.5	0.5
<i>E-Coli</i>	CFU/100ml	100	ND	ND	ND
Chloride	mg/L	-	56.7	23.3	17.1
Nitrate-N	mg/L	90.3	2.11	0.54	2.37
Ammoniacal-N	mg/L	-	0.005	0.005	0.005
Sodium	mg/L	-	n/r	n/r	24.8
Dissolved Aluminium	mg/L	5	0.001	0.001	0.001
Dissolved Boron	mg/L	5	0.05	0.06	0.04
Dissolved Iron	mg/L	-	n/r	n/r	0.005
Dissolved Lead	mg/L	0.1	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	-	0.0077	0.0049	0.0005
Dissolved Mercury	mg/L	0.002	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	1	0.0006	0.00025	0.00025

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 November 2023, December 2023, and January 2024.

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, though the January 2024 round was tested for the indicator suite of parameters, and not the comprehensive suite.

There were **twenty-three outliers from the typical leachate characteristics in the November 2023, December 2023, and January 2024 results**. Sixteen of these were for parameters having **less** concentration than the typical minimal concentrations.

- TOC exceeded the maximum typical concentration in December 2023.
- Alkalinity exceeded the maximum typical concentration in November and December 2023.
- Nitrate-N was less than the minimum typical concentration in January 2024.
- Ammonia-N exceeded the maximum typical concentration across all months.
- Dissolved arsenic exceeded the maximum typical concentration in November 2023.
- Hardness, calcium, and magnesium were all less than the minimum typical concentrations in December 2023.
- Dissolved cadmium was not detected in November and December 2023 and therefore less than the minimum typical concentrations.
- Dissolved copper, iron, nickel, and zinc were all less than the minimum typical concentrations in December 2023.
- Dissolved mercury was not detected in any of the months and was therefore less than the minimum typical concentrations.
- Dissolved lead was less than the minimum typical concentrations across all months.

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 November 2023, December 2023 and January 2024

Determinant	Units	Typical Leachate Characteristics* (range)	November 2023	December 2023	January 2024
Sampling Date			07/11/2023	11/12/2023	17/01/2024
pH		5.9 - 8.5	7.8	7.8	7.8
Suspended Solids	mg/l	-	66	47	n/p
Phenol	mg/L	-	0.025	n/p	n/p
VFA	mg/L	-	16	n/p	n/p
TOC	mg/L	17.2 - 822	796	2,370	n/p
Alkalinity	mg CaCO ₃ /L	264 – 6,820	7,480	7,670	n/p
Conductivity	mS/m	308 – 27,900	1,700	1,650	1,680
COD	mg/L	84 – 5,090	3,620	3,210	2,800
scBOD ₅	mg/L	12 – 3,867	98	93	103
E-Coli	CFU/100mL	-	4,000	200	8,000
Chloride	mg/L	45 – 2,584	1,210	1,230	1,200
Nitrate-N	mg/L	0.1 – 50**	2.11	0.5	0.01
Sulphate	mg/L	1 - 780	19.2	26.8	n/p
Ammonia-N	mg/L	3.4 – 1,440	1,500	1,600	1,480
Hardness	mg CaCO ₃ /L	300 – 11,500**	457	46	n/p
Calcium	mg/L	20 – 600***	98.3	9.4	n/p



Determinant	Units	Typical Leachate Characteristics* (range)	November 2023	December 2023	January 2024
Magnesium	mg/L	40 – 350***	51.4	5.39	n/p
Potassium	mg/L	10 – 2,500**	694	762	n/p
Sodium	mg/L	50 – 4,000**	934	1,130	n/p
D.R. Phosphorus	mg/L	-	13.7	15.6	n/p
Dissolved Aluminium	mg/L	-	0.613	0.073	0.892
Dissolved Arsenic	mg/L	0.006 – 0.191	0.276	0.029	n/p
Dissolved Boron	mg/L	0.54 – 20	5.05	10.2	7.14
Dissolved Cadmium	mg/L	0.0005 – 0.140**	0.0001	0.0001	n/p
Dissolved Chromium	mg/L	0.005 – 50.4	0.75	0.077	n/p
Dissolved Copper	mg/L	0.004 – 1.4**	0.0057	0.0022	n/p
Dissolved Iron	mg/L	1.6 – 220	5.34	0.83	n/p
Dissolved Lead	mg/L	0.001 - 0.42	0.0008	0.0007	0.00025
Dissolved Manganese	mg/L	0.03 - 45***	1.11	0.115	1.12
Dissolved Mercury	mg/L	0.2 – 50**	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.02 – 2.05**	0.116	0.0134	0.106
Dissolved Zinc	mg/L	0.015 – 24.2	0.11	0.01	n/p

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

n/p – not provided

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'. The resource consent conditions require six monthly comprehensive and quarterly indicator sampling at TD1. However, HDC has been sampling at TD1 monthly, in line with the surface water sampling of the Hokio Stream. In January 2024, testing was done for the indicator suite of parameters, rather than the comprehensive suite. This is not a non-compliance.

Results from the November 2023, December 2023 and January 2024 sampling rounds are presented in Table 2-8 and have been compared with the ANZECC² 95%ile DGVs, as per the revised resource consent conditions.

There have been **five exceedances of the resource consent conditions** for two monitored parameters in samples from the Northern Farm property at the TD1 location during the November 2023, December 2023, and January 2024 sampling rounds.

- The concentration of nitrate-N in November 2023 (2.78 mg/L), and December 2023 (13 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 November 2023 (7.87 mg/L), December 2023 (2.59 mg/L), and January 2024 (22.7 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 mg/L.

²Australian 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



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 November 2023, December 2023, and January 2024.

Determinant	Units	ANZECC DGV (95%ile species protection)	TD1 (formerly SW3)		
			November 2023	December 2023	January 2024
Sampling date			07/11/2023	12/12/2023	17/01/2024
pH	pH units	-	7.7	7.4	7.1
Suspended Solids	mg/L	-	220	390	n/p
Phenol	mg/L	-	0.025	n/p	n/p
VFA	mg/L	-	5.6	n/p	n/p
TOC	mg/L	-	43.2	18.2	n/p
Alkalinity	mg CaCO ₃ /L	-	340	204	n/p
Conductivity	mS/m	-	90.3	62.2	122
COD	mg/L	-	278	142	93
scBOD5	mg/L	2	0.5	1.5	0.5
<i>E-Coli</i>	CFU/100ml	-	50	50	36
Chloride	mg/L	-	76.2	61	90.9
Nitrate-N	mg/L	0.16	2.78	1.3	0.14
Sulphate	mg/L	-	1.01	0.86	n/p
Ammoniacal-N	mg/L	2.1	7.87	2.59	22.7
Hardness	mg CaCO ₃ /L	-	248	170	n/p
Calcium	mg/L	-	57.3	36.5	n/p
Magnesium	mg/L	-	25.4	19.1	n/p
Potassium	mg/L	-	16.9	15.6	n/p
Sodium	mg/L	-	57.3	51.4	n/p
D.R. Phosphorus	mg/L	-	0.028	0.025	n/p
Dissolved Aluminium	mg/L	0.055	0.014	0.024	0.006
Dissolved Arsenic	mg/L	0.024	0.001	0.001	n/p
Dissolved Boron	mg/L	-	0.35	0.19	0.32
Dissolved Cadmium	mg/L	0.0002	0.0001	0.0001	n/p
Dissolved Chromium	mg/L	-	0.001	0.0005	n/p
Dissolved Copper	mg/L	0.0014	0.0006	0.0006	n/p
Dissolved Iron	mg/L	-	0.36	2.69	n/p
Dissolved Lead	mg/L	0.0034	0.00025	0.00025	0.00025
Dissolved Manganese	mg/L	1.9	0.776	0.73	0.537
Dissolved Mercury	mg/L	0.0006	0.00025	0.00025	0.00025
Dissolved Nickel	mg/L	0.011	0.0015	0.0011	0.0021
Dissolved Zinc	mg/L	0.008	0.001	0.003	n/p

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 November 2023, December 2023, and January 2024 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 in April 2020.

There were **nine exceedances** of the resource consent conditions in samples from the Hokio Stream during the November 2023, December 2023, and January 2024 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 November 2023 and at sites HS2 and HS3 in December 2023 and January 2024, with values ranging between 0.18 mg/L and 0.46 mg/L.
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value of 0.055 mg/L at HS1A in January 2024, with 0.106 mg/L.

For this monitoring period 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. *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 and testing for the comprehensive suite of parameters has occurred at all Hokio Stream sites since October 2021. It is recommended that HDC assess the results of these 27 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.

It is noted that in January 2024 testing was done for the indicator suite of parameters. Given the extensive data set available, this is not considered to be a critical matter, though it is recommended that HDC gets agreement from HRC about the frequency and range of test parameters to be applied at the Hokio Stream sampling locations, going forward.

Table 2-9: Hokio Stream Monitoring Results for November 2023, December 2023, and January 2024.

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
				November 2023				December 2023				January 2024			
Sampling date				07/11/23	07/11/23	07/11/23	07/11/23	12/12/23	12/12/23	12/12/23	12/12/23	17/01/24	17/01/24	17/01/24	17/01/24
pH	pH units	-	-	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.3	7.3	5.2	7.3
Suspended Solids	mg/l	-	-	19	13	298	20	11	8	7	12	n/p	10	n/p	n/p
Phenol	mg/l			0.025	0.025	0.025	0.025	n/p	n/p	n/p	n/p	n/p	n/p	n/p	n/p
VFA	mg/l			2.5	2.5	2.5	7.4	n/p	n/p	n/p	n/p	n/p	2.5	n/p	n/p
TOC	mg/L	-	-	6.1	5.8	6.3	5.6	4.8	4.5	5	5.2	n/p	6.1	n/p	n/p
Alkalinity	mg CaCO ₃ /L	-	-	60	61	64	66	55	56	60	62	n/p	58	n/p	n/p
Conductivity	mS/m	-	-	24.3	24.9	25.6	26	23.7	24	25	25.5	25.1	25.3	1.7	25.8
COD	mg/L	-	-	34	34	30	42	35	42	47	146	51	49	42	48
scBOD ₅	mg/L	2	Monthly Avg. 2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
<i>E. coli</i>	CFU/100 ml	-	-	100	200	100	50	600	300	100	100	0.5	300	41	64
Chloride	mg/L	-	-	23.8	24.9	25.4	26.1	23.1	24.5	27.8	25.4	27.3	26.6	29.2	27.3
Nitrate-N	mg/L	0.16	0.16	0.42	0.44	0.46	0.46	0.13	0.14	0.2	0.22	0.14	0.14	0.28	0.18
Sulphate	mg/L	-	-	19.1	19.5	18.9	18.6	19.9	20.1	19.5	19.1	n/p	20.7	n/p	n/p
Ammoniacal-N	mg/L	2.1	Max. 2.1 Avg. 0.400	0.13	0.16	0.23	0.26	0.06	0.16	0.13	0.12	0.05	0.04	0.1	0.01
Hardness	mg CaCO ₃ /L	-	-	57	58	63	62	59	57	62	65	n/p	61	n/p	n/p
Calcium	mg/L	-	-	11.6	12.1	13.3	13.2	12	11.9	12.8	13.8	n/p	11.8	n/p	n/p
Magnesium	mg/L	-	-	6.75	6.74	7.15	7.16	6.94	6.7	7.3	7.51	n/p	7.66	n/p	n/p
Potassium	mg/L	-	-	2.52	2.71	2.78	2.77	2.71	2.66	2.78	2.96	n/p	2.41	n/p	n/p
Sodium	mg/L	-	-	19	19.3	20.2	20.4	20.3	19.9	20.8	21.7	n/p	24	n/p	n/p
D.R. Phosphorus	mg/L	-	-	0.04	0.044	0.052	0.047	0.045	0.048	0.047	0.053	n/p	0.089	n/p	n/p
Dissolved Aluminium	mg/L	0.055	Med. 0.055	0.023	0.025	0.033	0.018	0.017	0.017	0.012	0.014	0.106	0.015	0.013	0.02



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
				November 2023				December 2023				January 2024			
Dissolved Arsenic	mg/L	0.024	Med. 0.024	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	n/p	0.001	n/p	n/p
Dissolved Boron	mg/L	0.370	-	0.06	0.06	0.07	0.07	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.09
Dissolved Cadmium	mg/L	0.0002	Med. 0.0002	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	<i>0.0001</i>	n/p	<i>0.0001</i>	n/p	n/p
Dissolved Chromium (VI)	mg/L	0.001	-	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	<i>0.0005</i>	n/p	<i>0.0005</i>	n/p	n/p
Dissolved Copper	mg/L	0.0014	Med. 0.0014	0.0011	0.0013	0.0009	0.0008	0.0009	0.001	0.0009	0.0008	n/p	0.0011	n/p	n/p
Dissolved Iron	mg/L	-	-	0.07	0.08	0.12	0.08	0.06	0.06	0.06	0.07	n/p	0.07	n/p	n/p
Dissolved Lead	mg/L	0.0034	Med. 0.0034	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	0.0006	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Manganese	mg/L	1.9	-	0.0386	0.0255	0.0563	0.0547	0.0252	0.0264	0.0319	0.0263	0.0946	0.0024	0.0088	0.0143
Dissolved Mercury	mg/L	0.0006	Med. 0.0006	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Nickel	mg/L	0.011	Med. 0.011	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>	0.0007	<i>0.00025</i>	<i>0.00025</i>	<i>0.00025</i>
Dissolved Zinc	mg/L	0.008	Med. 0.008	0.002	0.003	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	<i>0.001</i>	n/p	<i>0.001</i>	n/p	n/p

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

n/p – not provided



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 12, 15, 16, and 17 of January 2024.

Out of the 27 groundwater monitoring bores:

- Methane was recorded at five bores – C1 (concentration of 0.01%), E2d (0.01%), B3 (0.07%), D3rd (0.01%), and D1 (0.07%). 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 0.43% at bore B1. Historically, fluctuations have been seen across the bores, and January concentrations are within historical ranges.
- Hydrogen sulphide was detected at three bores (F2, D2 and D3rs) – all at 1 ppm.
- The landfill gas levels in January 2024 appear to reinforce the October 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.

The surface water and groundwater samples were collected within a 7-day period, though a small 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 laboratory reports for many of the groundwater samples showed that the recorded "Reception Date & Time" was before the recorded "Sampled Date & Time", which is nonsensical. So, the "Analysis Start Date & Time" has been compared against the recorded "Sampled Date & Time". In most instances the timeframe was < 24 hours, but for seven of the samples, the time varied between 25 and 28 hours. Again, this is a significant improvement on what has been achieved in the past, but the recording of all dates needs to be done accurately to avoid the noted anomalies.

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 Xd1 and D3rd samples, as has occurred previously. Xd1 and D3rd sit in the deep gravel aquifer but were analysed against a detection level of 100 cfu/100mL, and this has resulted in non-compliances 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 this quarterly (January 2024) monitoring period.

There were **no exceedances** of consent conditions hydraulically down-gradient of the old landfill during the January 2024 monitoring period.

There were **no exceedances** of the resource consent conditions during this quarterly (January 2024) sampling round for samples obtained from bores within the irrigation area.

Deeper Gravel Aquifer

There were **eight exceedances** of the DWSNZ limits in samples from the deep gravel aquifer during this quarterly (January 2024) monitoring round, as follows:

- *E. coli* at Xd1 and 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* results at Xd1 and D3rd have been considered as non-compliances.

- Hardness exceeded the aesthetic GV of 200 at bore D3rd (214 mg CaCO₃/L). This is characteristic of D3rd.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.022 mg/L). This is characteristic of D3rd.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2DD (0.553 mg/L), E2D (0.406 mg/L), Xd1 (0.515 mg/L), and D3rd (0.446 mg/L). The results for C2DD and E2D (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 twenty-three outliers from the typical leachate characteristics in the November 2023, December 2023, and January 2024 results. Sixteen of these outliers were for parameters having less concentration than the typical minimal concentrations.

Northern Farm Drain

There were **five exceedances** of the resource consent conditions for samples from the Northern Farm property at the TD1 location during the November 2023, December 2023, and January 2024 sampling.

- The concentration of nitrate-N in November 2023 (2.78 mg/L), and December 2023 (13 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 November 2023 (7.87 mg/L), December 2023 (2.59 mg/L), and January 2024 (22.7 mg/L) exceeded the ANZECC (95%ile) DGV of 2.1 mg/L.

Hokio Stream

There were **nine exceedances** of the resource consent conditions in samples from the Hokio Stream during the November 2023, December 2023, and January 2024 sampling rounds.

- Nitrate-N exceeded both the ANZECC (95%ile) DGV and consent trigger value of 0.16 mg/L at all sites in November 2023 and at sites HS2 and HS3 in December 2023 and January 2024, with values ranging between 0.18 mg/L and 0.46 mg/L.
- Dissolved aluminium exceeded the ANZECC (95%ile) DGV and consent trigger value of 0.055 mg/L at HS1A in January 2024, with 0.106 mg/L.

6 Conclusions

Monitoring results obtained in the November 2023 to January 2024 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 November 2023 to January 2024 monitoring period, there were twenty-two exceedances of resource consent conditions: eight from the deep gravel aquifer, five in the samples from the Northern Farm Drain (formerly known as Tatana Property Drain), and the remaining nine from surface water monitoring locations along the Hokio Stream.

Methane was detected in five of the bores in January 2024, with the greatest readings at B3 and D1 (0.07%). 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 0.43% at bore B2. Hydrogen sulphide was detected at three bores, F2, D2 and D3rs, all at 1 ppm.

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 27 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.

Appendices

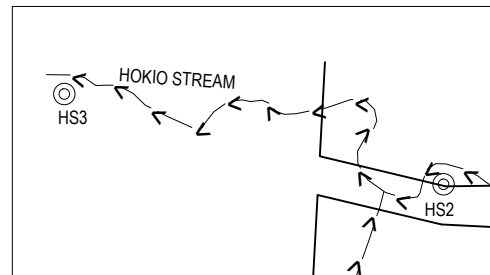
We design with community in mind












Appendix A Site Plan

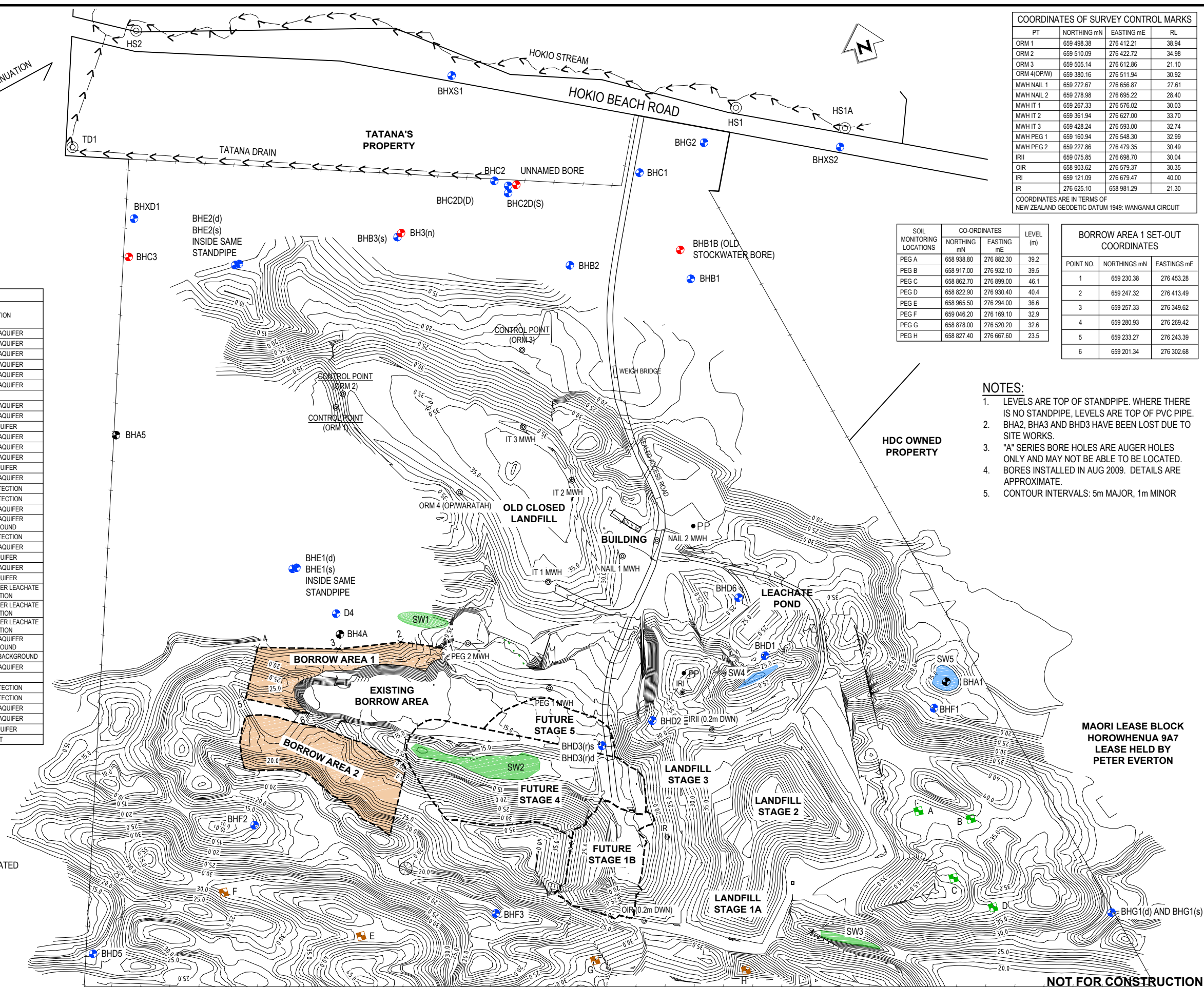


26/08/2019 9:35 a.m.

[illegible]

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



NOT FOR CONSTRUCTION

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:		



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

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).

			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)														
Reports Due		Sampling Month	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	I + SW	Month ly Compr e. Sampling at HS1 to be discontinued when HRC advises.	Month ly Compr e.	Month ly Compr e.	Month ly Compr e.	Month ly Compr e.	Month ly Compr e.					
	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 + A							C + A	C + A	C + A	C + A	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												
	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												
	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												
	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 + A							C + A	C + A	C + A	C + A	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												
	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												
	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												
	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 + A							C + A	C + A	C + A	C + A	C + A
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 significant increases in the concentrations between monitoring sites HS1A and HS3, for parameters exceeding the trigger values contained in Table C1 at Site HS3.

J. A statistical analysis approach is to be used to determine if there is a significant increase in contaminant levels between HS1A and HS3.

K. Following the 24 month monitoring period, there shall be no significant increases in concentrations between monitoring sites HS1A and HS3.

L. If the Hokio Stream monitoring locations are being sampled on a conditional frequency and do not meet condition K, the monitoring frequency for all three monitoring locations (HS1A, HS2 and HS3) shall return to the base case intensive monitoring until conditions J and K are again being fulfilled.

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

M. Completion of the initial 2 year monitoring program;

N. Good consistency of water sample analysis results, or a clearly identified reason for inconsistent results;

O. No decline in water quality over a period of four consecutive sampling rounds;

P. If the leachate pond outlet is being sampled on a conditional frequency and becomes non-compliant with condition O, the monitoring frequency should return to the base case intensive monitoring until conditions N and O are again being fulfilled.

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

Characterising parameters	pH
	electrical conductivity (EC)
	alkalinity
	total hardness
Oxygen demand	suspended solids
	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-24-NW-004728-01** REPORT DATE **26/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008252**

Client Reference: 323443-0

Product: Ground water

Sampling Point code: WIL-B1

Sampling Point name: Levin B1

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 26/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 11:00

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 15.3 (± 1.53) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 271 (± 28) mg/l 15

NW007 Chloride

Chloride (Cl) 350 (± 35.0) mg/l 0.02

NW023 Conductivity

Conductivity 233 (± 4.7) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.139 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) 3.61 mg/l 0.0005

NW114 Dissolved Mercury

Mercury (Hg) <0.0005 mg/l 0.0005

NW116 Dissolved Nickel

Nickel (Ni) 0.0067 mg/l 0.0005

ZM2GA Enumeration of Escherichia coli By Membrane Filtration

Escherichia coli <100 cfu/100 ml 100

NW010 Nitrate-N

Nitrate-N 2.41 (± 0.24) mg/l 0.01

Food & Water Testing

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
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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



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

✗ (Unsatisfactory) means does not meet the specification

✓ (Satisfactory) means meets the specification

Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-005526-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008261**

Client Reference: 323444-0

Product: Ground water

Sampling Point code: WIL-B2

Sampling Point name: Levin B2

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 11:13

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	87.4	(± 8.74) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	132	(± 14) mg/l	15
NW007 Chloride			
Chloride (Cl)	157	(± 15.7) mg/l	0.02
NW023 Conductivity			
Conductivity	236	(± 4.7) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.007	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	1.97	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	3.45	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0030	mg/l	0.0005
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	1.23	(± 0.12) mg/l	0.01

Food & Water Testing

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	6.8 (± 0.2)	0.1
NW011 Sulphate		
Sulphate	8.56 (± 0.86) mg/l	0.02
NW003 Total Alkalinity		
Alkalinity total	1020 (± 100) mg CaCO ₃ /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-NH ₃ 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 92221; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



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-24-NW-005510-01** REPORT DATE **29/01/2024**

Attention Downer NZ Ltd (EDI Levin)
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P O Box 642
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Phone (06) 367 2705

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Copy to: Water and Waste Team

(waterandwasteteam@horowhenua.govt.nz), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008680**

Client Reference: 323445-0

Product: Ground water

Sampling Point code: WIL-B3

Sampling Point name: Levin B3s

Reception Date & Time: 18/01/2024 14:31

Analysis Start Date & Time: 18/01/2024 14:38

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 18/01/2024 18:36

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 159 (± 15.9) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 129 (± 14) mg/l 15

NW007 Chloride

Chloride (Cl) 138 (± 13.8) mg/l 0.02

NW023 Conductivity

Conductivity 285 (± 5.7) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.005 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 1.63 mg/l 0.03

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 2.96 mg/l 0.0005

NW114 Dissolved Mercury

Mercury (Hg) <0.0005 mg/l 0.0005

NW116 Dissolved Nickel

Nickel (Ni) 0.0075 mg/l 0.0005

ZM2GA Enumeration of Escherichia coli By Membrane Filtration

Escherichia coli <100 cfu/100 ml 100

NW010 Nitrate-N

Nitrate-N <0.1 mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.0	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003 Total Alkalinity			
Alkalinity total	1250	(± 130) mg CaCO ₃ /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-NH ₃ 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 92221; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-005854-01** REPORT DATE **01/02/2024**

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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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008229**

Client Reference: 323439-0

Product: Ground water

Sampling Point code: WIL-C1

Sampling Point name: Levin C1

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 01/02/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 07:28

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 15.0 (± 1.50) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 126 (± 14) mg/l 15

NW007 Chloride

Chloride (Cl) 154 (± 15.4) mg/l 0.02

NW023 Conductivity

Conductivity 126 (± 2.5) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.019 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 0.89 mg/l 0.03

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.274 mg/l 0.0005

NW114 Dissolved Mercury

Mercury (Hg) <0.0005 mg/l 0.0005

NW116 Dissolved Nickel

Nickel (Ni) 0.0012 mg/l 0.0005

ZM2GA Enumeration of Escherichia coli By Membrane Filtration

Escherichia coli <100 cfu/100 ml 100

NW010 Nitrate-N

Nitrate-N <0.1 mg/l 0.01

Food & Water Testing

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

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

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

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

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

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

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

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

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

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

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

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

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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



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-24-NW-005349-01** REPORT DATE **29/01/2024**

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4741 Levin
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Copy to: Water and Waste Team
(waterandwasteteam@horowhenua.govt.nz), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008231**

Client Reference: 323440-0

Product: Ground water

Sampling Point code: WIL-C2

Sampling Point name: Levin C2

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 09:08

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	151	(± 15.1) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<3	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	195	(± 20) mg/l	15
NW007 Chloride			
Chloride (Cl)	139	(± 13.9) mg/l	0.02
NW023 Conductivity			
Conductivity	245	(± 4.9) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.018	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	1.57	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.317	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	0.39	(± 0.04) mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	6.9	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	1.30	(± 0.13) mg/l	0.02
NW003 Total Alkalinity			
Alkalinity total	1030	(± 100) mg CaCO ₃ /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-NH ₃ 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 92221; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004199-01** REPORT DATE **24/01/2024**

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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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007368**

Client Reference: 323435-0

Product: Ground water

Sampling Point code: WIL-C2dd

Sampling Point name: Levin C2dd

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 24/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 18:29

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.25	(± 0.07) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	26	(± 6) mg/l	15
NW007 Chloride			
Chloride (Cl)	39.6	(± 3.96) mg/l	0.02
NW023 Conductivity			
Conductivity	55.6	(± 1.1) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.007	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	0.07	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.553	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0012	mg/l	0.0005
ZMF1E Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	<1	cfu/100 ml	1
NW010 Nitrate-N			
Nitrate-N	0.10	(± 0.01) mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003 Total Alkalinity			
Alkalinity total	224	(± 22) mg CaCO ₃ /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-NH ₃ 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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004727-01** REPORT DATE **26/01/2024**

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(waterandwasteteam@horowhenua.govt.nz), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008232**

Client Reference: 323441-0

Product: Ground water

Sampling Point code: WIL-C2ds

Sampling Point name: Levin C2ds

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 26/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 09:25

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	31.2	(± 3.12) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	122	(± 13) mg/l	15
NW007 Chloride			
Chloride (Cl)	106	(± 10.6) mg/l	0.02
NW023 Conductivity			
Conductivity	160	(± 3.2) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.003	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	0.92	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	1.18	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0025	mg/l	0.0005
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	<0.1	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW195	pH (Tested beyond 15 minute APHA holding time)		
	pH	6.6 (± 0.2)	0.1
NW011	Sulphate		
	Sulphate	<0.02 (± 0.01) mg/l	0.02
NW003	Total Alkalinity		
	Alkalinity total	684 (± 68) mg CaCO ₃ /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-NH ₃ 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 92221; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-003966-01** REPORT DATE **23/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007356**

Client Reference: 323448-0

Product: Ground water

Sampling Point code: WIL-D1

Sampling Point name: Levin D1

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 08:57

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) 26.9 (± 2.69) mg/l 0.02

NW023 Conductivity

Conductivity 50.3 (± 1.0) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium <0.002 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 0.07 mg/l 0.03

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.0036 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 6.48 (± 0.65) mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

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

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

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

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

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

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

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

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

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

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

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

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

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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water
Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-003967-01** REPORT DATE **23/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007362**

Client Reference: 323449-0

Product: Ground water

Sampling Point code: WIL-D2

Sampling Point name: Levin D2

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 09:20

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 0.75 (± 0.22) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 47 (± 9) mg/l 15

NW007 Chloride

Chloride (Cl) 73.2 (± 7.32) mg/l 0.02

NW023 Conductivity

Conductivity 61.1 (± 1.2) 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

NW109 Dissolved Iron

Iron (Fe) 12.1 mg/l 0.01

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.521 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) 48.4 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	<0.1	mg/l	0.01
NW195	pH (Tested beyond 15 minute APHA holding time)		
pH	6.3	(± 0.2)	0.1

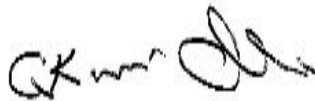
LIST OF METHODS

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.
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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE
AR-24-NW-007734-01
REPORT DATE
09/02/2024

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE
812-2024-00007363

Client Reference: 323506-0

Product: Ground water

Sampling Point code: WIL-D3rd

Sampling Point name: Levin D3rd

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 09:55

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)	<15	(± 5) mg/l	15
NW007 Chloride			
Chloride (Cl)	31.7	(± 3.17) mg/l	0.02
NW023 Conductivity			
Conductivity	52.9	(± 1.1) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.003	mg/l	0.002
NW583 Dissolved Arsenic			
Arsenic (As)	0.022	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)	61.3	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)	0.03	mg/l	0.01

Food & Water Testing

		RESULTS (UNCERTAINTY)		LOQ
NW110	Dissolved Lead			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	Dissolved Magnesium			
	Magnesium (Mg)	14.8	mg/l	0.01
NW113	Dissolved Manganese			
	Manganese (Mn)	0.446	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)	6.65	mg/l	0.01
NW193	Dissolved Reactive Phosphorus			
	Phosphorus (soluble reactive)	1.21	(± 0.121) mg/l	0.005
NW120	Dissolved Sodium			
	Sodium (Na)	21.8	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	(± 0.00) mg/l	0.01
NW195	pH (Tested beyond 15 minute APHA holding time)			
	pH	7.5	(± 0.2)	0.1
NW011	Sulphate			
	Sulphate	<0.02	mg/l	0.02
NW206	Suspended Solids			
	Suspended Solids	6	mg/l	3
NW003	Total Alkalinity			
	Alkalinity total	225	(± 23) mg CaCO ₃ /l	1
NW030	Total Hardness			
	Hardness	214	mg CaCO ₃ /l	1
NW210	Total Non-Purgeable Organic Carbon			
	Total Organic Carbon	6.4	(± 0.6) mg/l	0.1
① NWWG6	Volatile Fatty Acids (VFA)			
	Acetic acid	<5	mg/l	5
	Butyric acid	<5	mg/l	5
	Heptanoic acid	<5	mg/l	5
	Hexanoic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isocaproic 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	6.6	mg/l	5

LIST OF METHODS

Food & Water Testing

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
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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.	NWWG6	Volatile Fatty Acids (VFA): APHA 24th Edition 5560D mod.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

Signature



Jennifer Mont Supervisor Eurofins ELS Limited



Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Ganesh Ilancko Supervisor Eurofins ELS Limited



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



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Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-007735-01** REPORT DATE **09/02/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007364**

Client Reference: 323507-0

Product: Ground water

Sampling Point code: WIL-D3rs

Sampling Point name: Levin D3rs

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 11:11

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)	54	(± 10) mg/l	15
NW007 Chloride			
Chloride (Cl)	15.7	(± 1.57) mg/l	0.02
NW023 Conductivity			
Conductivity	23.6	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.056	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)	10.6	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	0.003	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	<0.0005	mg/l	0.0005
NW109 Dissolved Iron			
Iron (Fe)	14.0	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	5.50	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.352	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)	4.36	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.085	(± 0.017) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	22.4	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	<0.1	mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	6.4	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	1.80	(± 0.18) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	<5	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	90	(± 9) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	49	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	21.5	(± 2.2) mg/l	0.1
① NWWG6 Volatile Fatty Acids (VFA)			
Acetic acid	<5	mg/l	5
Butyric acid	<5	mg/l	5
Heptanoic acid	<5	mg/l	5
Hexanoic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isocaproic 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	6.4	mg/l	5

LIST OF METHODS

Food & Water Testing

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
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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.	NWWG6	Volatile Fatty Acids (VFA): APHA 24th Edition 5560D mod.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

Signature



Jennifer Mont Supervisor Eurofins ELS Limited



Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Ganesh Ilancko Supervisor Eurofins ELS Limited



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-005143-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008260**

Client Reference: 323442-0

Product: Ground water

Sampling Point code: WIL-D4

Sampling Point name: Levin D4

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 07:03

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 0.23 (± 0.07) 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) 30.9 (± 3.09) mg/l 0.02

NW023 Conductivity

Conductivity 27.5 (± 0.6) 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) 1.61 mg/l 0.01

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.206 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) 32.2 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	(± 0.00) mg/l	0.01
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.
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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



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-24-NW-004408-01** REPORT DATE **25/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006278**

Client Reference: 323453-0

Product: Ground water

Sampling Point code: WIL-D5

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin D5

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 11:27

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) <15 (± 5) mg/l 15

NW007 Chloride

Chloride (Cl) 28.9 (± 2.89) mg/l 0.02

NW023 Conductivity

Conductivity 29.1 (± 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) 0.0088 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 1.04 (± 0.10) mg/l 0.01

Food & Water Testing

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
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

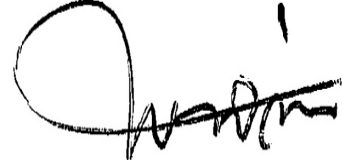
Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Maria Norris Laboratory Manager, Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-003968-01** REPORT DATE **23/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007365**

Client Reference: 323450-0

Product: Ground water

Sampling Point code: WIL-D6

Sampling Point name: Levin D6

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 12:10

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) 34.1 (± 3.41) mg/l 0.02

NW023 Conductivity

Conductivity 49.7 (± 1.0) 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) 0.0011 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 23.9 (± 2.39) mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

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

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

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

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

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

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

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

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

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

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

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

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

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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-003969-01** REPORT DATE **23/01/2024**

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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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007366**

Client Reference: 323436-0

Product: Ground water

Sampling Point code: WIL-E1d

Sampling Point name: Levin E1d

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 06:57

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)	40.1	(± 4.01) mg/l	0.02
NW023 Conductivity			
Conductivity	45.2	(± 0.9) 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
NW109 Dissolved Iron			
Iron (Fe)	0.06	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.211	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)	36.5	mg/l	0.01

Food & Water Testing

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	(± 0.00) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-005142-01	REPORT DATE	29/01/2024
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Attention	Downer NZ Ltd (EDI Levin) Horowhenua Admin P O Box 642 4741 Levin NEW ZEALAND	Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), McMillan
Phone	(06) 367 2705	
Email	horowhenuaadmin@downer.co.nz	

Contact for your orders:	Gabriela Carvalhaes	Order code:	EUNZWE-00163003
Contract:	Landfill	Purchase Order Number:	Landfill

SAMPLE CODE		812-2024-00008259	
Client Reference:		323446-0	
Product:		Ground water	
Sampling Point code:		WIL-E1s	Sampling Point name: Levin E1s
Reception Date & Time:		17/01/2024 0:00	
Analysis Start Date & Time:		18/01/2024 09:50	Analysis Ending Date: 29/01/2024
Product Type		Ground water	Sampled Date & Time 17/01/2024 06:10
Sampler(s)		Client nominated external sampler	Sampled by Eurofins No

RESULTS (UNCERTAINTY)			LOQ
NW179	Ammonia Nitrogen		
	Ammoniacal nitrogen (N)	0.11 (± 0.03) 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)	29.4 (± 2.94) mg/l	0.02
NW023	Conductivity		
	Conductivity	24.3 (± 0.5) mS/m	0.1
NW098	Dissolved Aluminium		
	Aluminium	0.008 mg/l	0.002
NW103	Dissolved Boron		
	Boron (B)	0.04 mg/l	0.03
NW109	Dissolved Iron		
	Iron (Fe)	3.91 mg/l	0.01
NW110	Dissolved Lead		
	Lead (Pb)	0.0014 mg/l	0.0005
NW113	Dissolved Manganese		
	Manganese (Mn)	0.207 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)	27.2 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	(± 0.00) mg/l	0.01
NW195	pH (Tested beyond 15 minute APHA holding time)		
pH	7.0	(± 0.2)	0.1

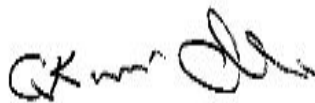
LIST OF METHODS

NW007	Chloride: APHA Online Edition 4110 B	NW010	Nitrate-N: APHA Online Edition 4110 B
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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-003970-01** REPORT DATE **23/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162713

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00007367**

Client Reference: 323437-0

Product: Ground water

Sampling Point code: WIL-E2d

Sampling Point name: Levin E2d

Reception Date & Time: 16/01/2024 4:10

Analysis Start Date & Time: 17/01/2024 10:33

Analysis Ending Date: 23/01/2024

Product Type Ground water

Sampled Date & Time 16/01/2024 07:39

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 0.23 (± 0.07) 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) 42.2 (± 4.22) mg/l 0.02

NW023 Conductivity

Conductivity 44.7 (± 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) 0.0009 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.406 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 (± 0.00) mg/l 0.01

Food & Water Testing

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

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

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

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

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

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

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

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

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

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

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

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


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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

EXPLANATORY NOTE

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ANALYTICAL REPORT

REPORT CODE **AR-24-NW-005144-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008263**

Client Reference: 323447-0

Product: Ground water

Sampling Point code: WIL-E2s

Sampling Point name: Levin E2s

Reception Date & Time: 17/01/2024 0:00

Analysis Start Date & Time: 18/01/2024 09:50

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 06:41

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) 44 (± 8) mg/l 15

NW007 Chloride

Chloride (Cl) 42.4 (± 4.24) mg/l 0.02

NW023 Conductivity

Conductivity 34.6 (± 0.7) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.005 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 0.04 mg/l 0.03

NW109 Dissolved Iron

Iron (Fe) 0.10 mg/l 0.01

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.260 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) 28.1 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 (± 0.00) 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

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

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

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

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

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

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

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

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

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

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

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

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

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

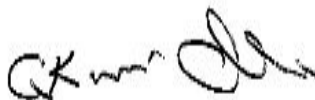
NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

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

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



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-24-NW-004411-01** REPORT DATE **25/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006283**

Client Reference: 323454-0

Product: Ground water

Sampling Point code: WIL-F1

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin F1

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 11:23

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) 16		(± 6) mg/l	15
NW007 Chloride			
Chloride (Cl)	56.7	(± 5.67) mg/l	0.02
NW023 Conductivity			
Conductivity	48.5	(± 1.0) 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)	0.0077	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
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	2.11	(± 0.21) mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

NW195 pH (Tested beyond 15 minute APHA holding time)
pH 6.9 (± 0.2)

0.1

LIST OF METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

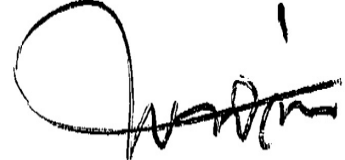
Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Maria Norris Laboratory Manager,
Microbiology



Gabriela Carvalhaes Manager Food and Water
Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004413-01** REPORT DATE **25/01/2024**

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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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006286**

Client Reference: 323455-0

Product: Ground water

Sampling Point code: WIL-F2

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin F2

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 11:43

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) <15 (± 5) mg/l 15

NW007 Chloride

Chloride (Cl) 23.3 (± 2.33) mg/l 0.02

NW023 Conductivity

Conductivity 22.2 (± 0.4) 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) 0.0049 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 0.54 (± 0.05) mg/l 0.01

Food & Water Testing

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

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

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

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

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

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

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

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

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

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

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

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

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

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

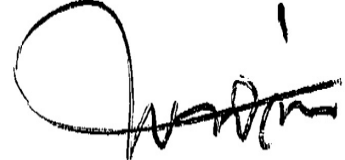
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Gabriela Carvalhaes Manager Food and Water
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004409-01** REPORT DATE **25/01/2024**

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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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006279**

Client Reference: 323456-0

Product: Ground water

Sampling Point code: WIL-F3

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin F3

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 11:59

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) 17.1 (± 1.71) mg/l 0.02

NW023 Conductivity

Conductivity 18.9 (± 0.4) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium <0.002 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 0.04 mg/l 0.03

NW109 Dissolved Iron

Iron (Fe) <0.01 mg/l 0.01

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

NW120 Dissolved Sodium

Sodium (Na) 24.8 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	2.37	(± 0.24) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.1	(± 0.2)	0.1

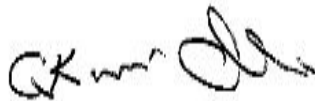
LIST OF METHODS

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.
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

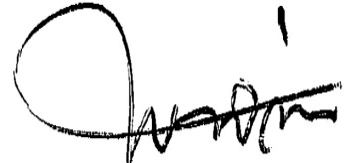
Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Maria Norris Laboratory Manager, Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004410-01** REPORT DATE **25/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006280**

Client Reference: 323438-0

Product: Ground water

Sampling Point code: WIL-G1D

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin G1D

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 07:40

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) <15 (± 5) mg/l 15

NW007 Chloride

Chloride (Cl) 30.3 (± 3.03) 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) 0.06 mg/l 0.03

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 0.0706 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 (± 0.00) mg/l 0.01

Food & Water Testing

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

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

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

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

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

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

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

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

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

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

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

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

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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor
Microbiology



Gabriela Carvalhaes Manager Food and Water
Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-004414-01	REPORT DATE	25/01/2024
Attention	Downer NZ Ltd (EDI Levin) Horowhenua Admin P O Box 642 4741 Levin NEW ZEALAND		
Phone	(06) 367 2705	Copy to: Water and Waste Team	
Email	horowhenuaadmin@downer.co.nz	(waterandwasteteam@horowhenua.govt.nz), McMillan	

Contact for your orders:	Gabriela Carvalhaes	Order code:	EUNZWE-00162371
Contract:	Landfill	Purchase Order Number:	Landfill

SAMPLE CODE	812-2024-00006287		
Client Reference:	323451-0		
Product:	Ground water		
Sampling Point code:	WIL-G1S	Sampling Point name:	Levin G1S
Reception Date & Time:	15/01/2024 17:00	Reception temperature:	8.8
Analysis Start Date & Time:	15/01/2024 17:37	Analysis Ending Date:	25/01/2024
Product Type	Ground water	Sampled Date & Time	15/01/2024 07:53
Sampler(s)	Client nominated external sampler	Sampled by Eurofins	No

RESULTS (UNCERTAINTY)			LOQ
NW179	Ammonia Nitrogen		
	Ammoniacal nitrogen (N)	0.04 (± 0.01) 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)	101 (± 10.1) mg/l	0.02
NW023	Conductivity		
	Conductivity	55.3 (± 1.1) mS/m	0.1
NW098	Dissolved Aluminium		
	Aluminium	0.040 mg/l	0.002
NW103	Dissolved Boron		
	Boron (B)	0.04 mg/l	0.03
NW109	Dissolved Iron		
	Iron (Fe)	2.42 mg/l	0.01
NW110	Dissolved Lead		
	Lead (Pb)	<0.0005 mg/l	0.0005
NW113	Dissolved Manganese		
	Manganese (Mn)	0.0545 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
NW120	Dissolved Sodium		
	Sodium (Na)	77.2 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 0.04 (± 0.01) mg/l 0.01

NW195 pH (Tested beyond 15 minute APHA holding time)

pH 6.5 (± 0.2) 0.1

LIST OF METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

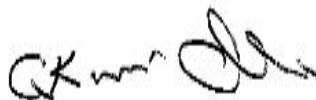
NW195 **pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B

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

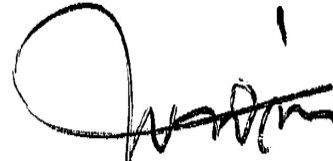
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Maria Norris Laboratory Manager, Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004412-01** REPORT DATE **25/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00162371

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00006284**

Client Reference: 323452-0

Product: Ground water

Sampling Point code: WIL-G2

Reception Date & Time: 15/01/2024 17:00

Analysis Start Date & Time: 15/01/2024 17:37

Product Type Ground water

Sampler(s) Client nominated external sampler

Sampling Point name: Levin G2s

Reception temperature: 8.8

Analysis Ending Date: 25/01/2024

Sampled Date & Time 15/01/2024 08:26

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.03	(± 0.008) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	37	(± 8) mg/l	15
NW007 Chloride			
Chloride (Cl)	173	(± 17.3) mg/l	0.02
NW023 Conductivity			
Conductivity	110	(± 2.2) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	<0.002	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	0.61	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.216	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0020	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	(± 0.00) mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

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

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

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

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

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

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

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

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

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

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

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

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


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

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

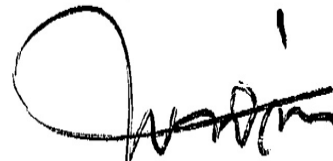
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N/A means Not Applicable

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

Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000555-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000555-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics added

SAMPLE CODE **812-2023-00153990**

Client Reference: 315732-0

Product: Ground water

Sampling Point code: WIL-HS1

Sampling Point name: Levin HS1

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 09:45

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.16	(± 0.05) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD) 34		(± 7) mg/l	15
NW007 Chloride			
Chloride (Cl)	24.9	(± 2.49) mg/l	0.02
NW023 Conductivity			
Conductivity	24.9	(± 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)	0.06	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	12.1	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	<0.001	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	0.0013	mg/l	0.0005
NW109 Dissolved Iron			

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW109 Dissolved Iron			
Iron (Fe)	0.08	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	6.74	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0255	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)	2.71	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.044	(± 0.009) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	19.3	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	0.44	(± 0.04) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.4	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	19.5	(± 1.95) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	13	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	61	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	58	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	5.8	(± 0.6) 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
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

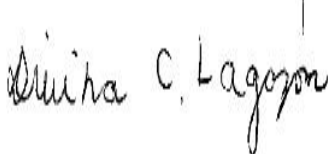
LIST OF METHODS

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 24th 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 (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

Signature



Marylou Cabral Laboratory Manager



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

Food & Water Testing

- ① Test is not accredited
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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-23-NW-069291-01** REPORT DATE **24/12/2023**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00173838**

Client Reference: 319779-0

Product: Ground water

Sampling Point code: WIL-HS1

Sampling Point name: Levin HS1

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 24/12/2023

Product Type Ground water

Sampled Date & Time 12/12/2023 09:00

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.16	(± 0.05) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	42	(± 8) mg/l	15
NW007 Chloride			
Chloride (Cl)	24.5	(± 2.45) mg/l	0.02
NW023 Conductivity			
Conductivity	24.0	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.017	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)	11.9	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

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	6.70	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0264	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)	2.66	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.048	(± 0.010) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	19.9	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	300	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	0.14	(± 0.01) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	20.1	(± 2.01) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	8	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	56	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	57	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	4.5	(± 0.5) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

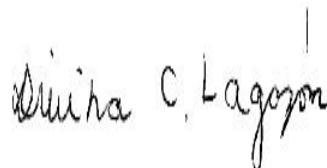
Signature



Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-012307-01** REPORT DATE **29/02/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008277**

Client Reference: 323458-0

Product: Ground water

Sampling Point code: WIL-HS1

Sampling Point name: Levin HS1

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 31/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 07:35

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 0.04 (± 0.01) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 49 (± 9) mg/l 15

NW007 Chloride

Chloride (Cl) 26.6 (± 2.66) mg/l 0.02

NW023 Conductivity

Conductivity 25.3 (± 0.5) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.015 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) 11.8 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) 0.07 mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.66	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0024	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)	2.41	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.089	(± 0.018) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	24.0	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	300	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	0.14	(± 0.01) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.3	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	20.7	(± 2.07) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	10	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	58	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	61	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	6.1	(± 0.6) mg/l	0.1
① NWWG6 Volatile Fatty Acids (VFA)			
Acetic acid	<5	mg/l	5
Butyric acid	<5	mg/l	5
Heptanoic acid	<5	mg/l	5
Hexanoic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isocaproic 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

Food & Water Testing

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
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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.	NWWG6	Volatile Fatty Acids (VFA): APHA 24th Edition 5560 D mod.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

Signature



Jennifer Mont Supervisor Eurofins ELS Limited



Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Ruth Ashton Laboratory Technician Eurofins ELS Limited



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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N/A means Not Applicable

Not Detected means not detected at or above the Limit of Quantification (LOQ)

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Food & Water Testing

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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

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000559-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000559-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics added

SAMPLE CODE **812-2023-00154000**

Client Reference: 315733-0

Product: Ground water

Sampling Point code: WIL-HS1A

Sampling Point name: Levin HS1A

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 09:30

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.13	(± 0.04) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	34	(± 7) mg/l	15
NW007 Chloride			
Chloride (Cl)	23.8	(± 2.38) mg/l	0.02
NW023 Conductivity			
Conductivity	24.3	(± 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)	0.06	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	11.6	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			

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW109 Dissolved Iron			
Iron (Fe)	0.07	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	6.75	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0386	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)	2.52	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.040	(± 0.008) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	19.0	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	0.42	(± 0.04) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.4	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	19.1	(± 1.91) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	19	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	60	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	57	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	6.1	(± 0.6) 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
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

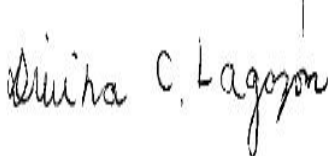
LIST OF METHODS

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 24th 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 (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

Signature



Marylou Cabral Laboratory Manager



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-23-NW-069568-01** REPORT DATE **27/12/2023**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00173839**

Client Reference: 319780-0

Product: Ground water

Sampling Point code: WIL-HS1A

Sampling Point name: Levin HS1A

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 27/12/2023

Product Type Ground water

Sampled Date & Time 12/12/2023 08:40

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.06	(± 0.02) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	35	(± 7) mg/l	15
NW007 Chloride			
Chloride (Cl)	23.1	(± 2.31) mg/l	0.02
NW023 Conductivity			
Conductivity	23.7	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.017	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)	12.0	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)	0.06	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	6.94	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0252	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)	2.71	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.045	(± 0.009) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	20.3	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	600	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	0.13	(± 0.01) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	19.9	(± 1.99) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	11	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	55	(± 5) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	59	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	4.8	(± 0.5) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

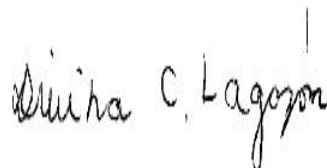
Signature



Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



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-24-NW-005147-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008289**

Client Reference: 323886-0

Product: Ground water

Sampling Point code: WIL-HS1A

Sampling Point name: Levin HS1A

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 07:20

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.05	(± 0.02) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	51	(± 9) mg/l	15
NW007 Chloride			
Chloride (Cl)	27.3	(± 2.73) mg/l	0.02
NW023 Conductivity			
Conductivity	25.1	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.106	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	0.05	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	0.0006	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.0946	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	0.14	(± 0.01) 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

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

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

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

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

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

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

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

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

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

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

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

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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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- 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

✗ (Unsatisfactory) means does not meet the specification

✓ (Satisfactory) means meets the specification

Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000558-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000558-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics added

SAMPLE CODE **812-2023-00153999**

Client Reference: 315734-0

Product: Ground water

Sampling Point code: WIL-HS2

Sampling Point name: Levin HS2

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 10:10

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.23	(± 0.07) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	30	(± 7) mg/l	15
NW007 Chloride			
Chloride (Cl)	25.4	(± 2.54) mg/l	0.02
NW023 Conductivity			
Conductivity	25.6	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.033	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)	13.3	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			

Food & Water Testing

	RESULTS (UNCERTAINTY)		LOQ
NW109 Dissolved Iron			
Iron (Fe)	0.12	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.15	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0563	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)	2.78	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.052	(± 0.011) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	20.2	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	0.46	(± 0.05) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.4	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	18.9	(± 1.89) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	298	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	64	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	63	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	6.3	(± 0.6) 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
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

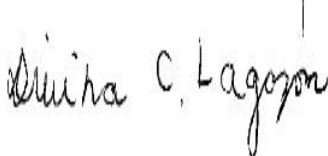
LIST OF METHODS

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 24th 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 (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

Signature



Marylou Cabral Laboratory Manager



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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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-069570-01** REPORT DATE **27/12/2023**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00173861**

Client Reference: 319781-0

Product: Ground water

Sampling Point code: WIL-HS2

Sampling Point name: Levin HS2

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 27/12/2023

Product Type Ground water

Sampled Date & Time 12/12/2023 09:20

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.13	(± 0.04) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	47	(± 9) mg/l	15
NW007 Chloride			
Chloride (Cl)	27.8	(± 2.78) mg/l	0.02
NW023 Conductivity			
Conductivity	25.0	(± 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)	0.05	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	12.8	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)	0.06	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.30	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)	2.78	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.047	(± 0.010) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	20.8	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	0.20	(± 0.02) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	19.5	(± 1.95) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	7	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	60	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	62	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	5.0	(± 0.5) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

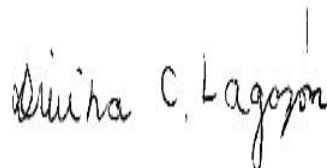
Signature



Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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- ⑤ Test is subcontracted outside Eurofins group and is not 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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Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-005146-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008282**

Client Reference: 323887-0

Product: Ground water

Sampling Point code: WIL-HS2

Sampling Point name: Levin HS2

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 08:35

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 0.10 (± 0.03) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <1 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 42 (± 8) mg/l 15

NW007 Chloride

Chloride (Cl) 29.2 (± 2.92) mg/l 0.02

NW023 Conductivity

Conductivity 1.7 (± 0.05) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.013 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) 0.0088 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 41 cfu/100 ml 1

NW010 Nitrate-N

Nitrate-N 0.28 (± 0.03) mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

NW195 pH (Tested beyond 15 minute APHA holding time)

pH

5.2

(± 0.2)

0.1

LIST OF METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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Food & Water Testing

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000557-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000557-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics added

SAMPLE CODE **812-2023-00153998**

Client Reference: 315735-0

Product: Ground water

Sampling Point code: WIL-HS3

Sampling Point name: Levin HS3

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 10:25

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)	42	(± 8) mg/l	15
NW007 Chloride			
Chloride (Cl)	26.1	(± 2.61) mg/l	0.02
NW023 Conductivity			
Conductivity	26.0	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.018	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)	13.2	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	<0.001	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	0.0008	mg/l	0.0005
NW109 Dissolved Iron			

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW109 Dissolved Iron			
Iron (Fe)	0.08	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.16	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0547	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)	0.047	(± 0.010) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	20.4	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	0.46	(± 0.05) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.4	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	18.6	(± 1.86) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	20	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	66	(± 7) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	62	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	5.6	(± 0.6) 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	7.4	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	7.4	mg/l	5

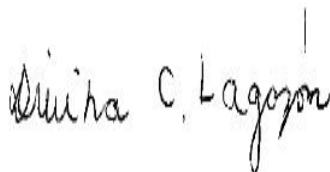
LIST OF METHODS

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 24th 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 (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

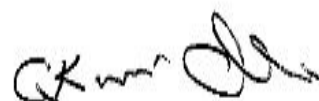
Signature



Marylou Cabral Laboratory Manager



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



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-069571-01

REPORT DATE

27/12/2023

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE 812-2023-00173862

Client Reference: 319782-0

Product: Ground water

Sampling Point code: WIL-HS3

Sampling Point name: Levin HS3

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 27/12/2023

Product Type Ground water

Sampled Date & Time 12/12/2023 09:40

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.12	(± 0.04) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	146	(± 15) mg/l	15
NW007 Chloride			
Chloride (Cl)	25.4	(± 2.54) mg/l	0.02
NW023 Conductivity			
Conductivity	25.5	(± 0.5) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.014	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)	13.8	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	<0.001	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	0.0008	mg/l	0.0005
NW109 Dissolved Iron			
Iron (Fe)	0.07	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.51	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0263	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)	2.96	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.053	(± 0.011) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	21.7	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	0.22	(± 0.02) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	19.1	(± 1.91) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	12	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	62	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	65	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	5.2	(± 0.5) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

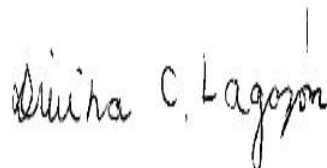
Signature



Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



Arvinder Singh Laboratory Supervisor Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

EXPLANATORY NOTE

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-004729-01** REPORT DATE **26/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008279**

Client Reference: 323888-0

Product: Ground water

Sampling Point code: WIL-HS3

Sampling Point name: Levin HS3

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 26/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 09:00

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) 48 (± 9) mg/l 15

NW007 Chloride

Chloride (Cl) 27.3 (± 2.73) mg/l 0.02

NW023 Conductivity

Conductivity 25.8 (± 0.5) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.020 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) 0.0143 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 64 cfu/100 ml 1

NW010 Nitrate-N

Nitrate-N 0.18 (± 0.02) 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

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

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

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

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

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

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

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

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

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

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

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

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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000560-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000560-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics results added

SAMPLE CODE **812-2023-00153989**

Client Reference: 315731-0

Product: Ground water

Sampling Point code: WIL-LP

Sampling Point name: Levin Leachate Pond

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 11:00

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	1500	(± 150) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	98	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	3620	(± 180) mg/l	15
NW007 Chloride			
Chloride (Cl)	1210	(± 121) mg/l	0.02
NW023 Conductivity			
Conductivity	1700	(± 30.0) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.613	mg/l	0.002
NW583 Dissolved Arsenic			
Arsenic (As)	0.276	mg/l	0.001
NW103 Dissolved Boron			
Boron (B)	5.05	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	98.3	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	0.750	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	0.0057	mg/l	0.0005
NW109 Dissolved Iron			

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW109 Dissolved Iron			
Iron (Fe)	5.34	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	0.0008	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	51.4	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	1.11	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.116	mg/l	0.0005
NW117 Dissolved Potassium			
Potassium (K)	694	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	13.7	(± 1.37) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	934	mg/l	0.01
NW125 Dissolved Zinc			
Zinc (Zn)	0.110	mg/l	0.002
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	4000	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	2.11	(± 0.21) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.8	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	19.2	(± 1.92) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	66	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	7480	(± 750) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	457	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	796	(± 79.6) mg/l	0.1
④VQ876 Volatile Fatty Acids (VFA) by GC-MS			
Acetic acid	14	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

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	16	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 24th 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 (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

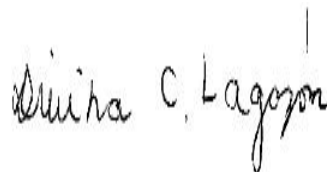
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Gordon McArthur Senior Laboratory Analyst



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-068894-01** REPORT DATE **22/12/2023**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00173837**

Client Reference: 319778-0

Product: Ground water

Sampling Point code: WIL-LP

Sampling Point name: Levin Leachate Pond

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 22/12/2023

Product Type Ground water

Sampled Date & Time 11/12/2023 22:20

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 1600 (± 160) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 93 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 3210 (± 160) mg/l 15

NW007 Chloride

Chloride (Cl) 1230 (± 123) mg/l 0.02

NW023 Conductivity

Conductivity 1650 (± 30.0) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.073 mg/l 0.002

NW583 Dissolved Arsenic

Arsenic (As) 0.029 mg/l 0.001

NW103 Dissolved Boron

Boron (B) 10.2 mg/l 0.03

NW104 Dissolved Cadmium

Cadmium (Cd) <0.0002 mg/l 0.0002

NW105 Dissolved Calcium

Calcium (Ca) 9.4 mg/l 0.1

NW106 Dissolved Chromium

Chromium (Cr) 0.077 mg/l 0.001

NW108 Dissolved Copper

Copper (Cu) 0.0022 mg/l 0.0005

NW109 Dissolved Iron

Iron (Fe) 0.83 mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	0.0007	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	5.39	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.115	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0134	mg/l	0.0005
NW117 Dissolved Potassium			
Potassium (K)	762	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	15.6	(± 1.56) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	1130	mg/l	0.01
NW125 Dissolved Zinc			
Zinc (Zn)	0.010	mg/l	0.002
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	200	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	<1.0	mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.8	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	26.8	(± 2.68) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	47	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	7670	(± 770) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	46	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	2370	(± 240) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

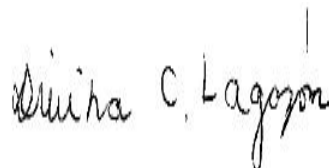
Signature



Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



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-24-NW-005145-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008278**

Client Reference: 323457-0

Product: Ground water

Sampling Point code: WIL-LP

Sampling Point name: Levin Leachate Pond

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 09:35

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 1480 (± 150) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 103 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 2800 (± 140) mg/l 15

NW007 Chloride

Chloride (Cl) 1200 (± 120) mg/l 0.02

NW023 Conductivity

Conductivity 1680 (± 30.0) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.892 mg/l 0.002

NW103 Dissolved Boron

Boron (B) 7.14 mg/l 0.03

NW110 Dissolved Lead

Lead (Pb) <0.0005 mg/l 0.0005

NW113 Dissolved Manganese

Manganese (Mn) 1.12 mg/l 0.0005

NW114 Dissolved Mercury

Mercury (Hg) <0.0005 mg/l 0.0005

NW116 Dissolved Nickel

Nickel (Ni) 0.106 mg/l 0.0005

ZM2GA Enumeration of Escherichia coli By Membrane Filtration

Escherichia coli 8000 cfu/100 ml 100

NW010 Nitrate-N

Nitrate-N 0.01 (± 0.00) mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

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.
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



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Arvinder Singh Laboratory Supervisor
Microbiology



Gabriela Carvalhaes Manager Food and Water
Testing Chemistry



Cody Forbes Laboratory Analyst
Laboratory Analyst

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-000556-02 #** REPORT DATE **12/01/2024**

This amended report supersedes Analytical Report number AR-24-NW-000556-01, dated 06/01/2024.

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00151680

Purchase Order Number: Landfill

Comments: VFA and phenolics added

SAMPLE CODE **812-2023-00153991**

Client Reference: 315730-0

Product: Ground water

Sampling Point code: WIL-TD1

Sampling Point name: Levin TD1

Reception Date & Time: 08/11/2023 8:45

Analysis Start Date & Time: 08/11/2023 13:25

Analysis Ending Date: 12/01/2024

Sampled Date & Time 07/11/2023 10:40

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	7.87	(± 1.18) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	278	(± 28) mg/l	15
NW007 Chloride			
Chloride (Cl)	76.2	(± 7.62) mg/l	0.02
NW023 Conductivity			
Conductivity	90.3	(± 1.8) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.014	mg/l	0.002
NW583 Dissolved Arsenic			
Arsenic (As)	0.001	mg/l	0.001
NW103 Dissolved Boron			
Boron (B)	0.35	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	57.3	mg/l	0.1
NW106 Dissolved Chromium			
Chromium (Cr)	0.001	mg/l	0.001
NW108 Dissolved Copper			
Copper (Cu)	0.0006	mg/l	0.0005
NW109 Dissolved Iron			

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW109 Dissolved Iron			
Iron (Fe)	0.36	mg/l	0.01
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	25.4	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.776	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)	16.9	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.028	(± 0.006) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	57.3	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	2.78	(± 0.28) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.7	(± 0.2)	0.1
⑤VQ088 Phenolics (Total)			
Total phenols	<0.05	mg/l	0.05
NW011 Sulphate			
Sulphate	1.01	(± 0.10) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	220	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	340	(± 34) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	248	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	43.2	(± 4.3) 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
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5

Food & Water Testing

RESULTS (UNCERTAINTY) LOQ

④VQ876 Volatile Fatty Acids (VFA) by GC-MS

Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	5.6	mg/l	5

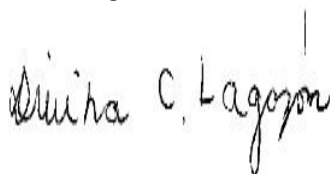
LIST OF METHODS

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 24th Edition 2510 B
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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.
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NW195	pH (Tested beyond 15 minute APHA holding time): APHA 24th 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 24th Edition

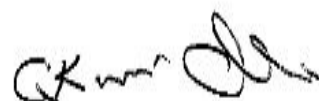
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Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



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-069569-01** REPORT DATE **27/12/2023**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00158086

Purchase Order Number: Landfill

SAMPLE CODE **812-2023-00173860**

Client Reference: 319777-0

Product: Ground water

Sampling Point code: WIL-TD1

Sampling Point name: Levin TD1

Reception Date & Time: 13/12/2023 9:10

Analysis Start Date & Time: 14/12/2023 10:12

Analysis Ending Date: 27/12/2023

Product Type Ground water

Sampled Date & Time 12/12/2023 10:00

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen

Ammoniacal nitrogen (N) 2.59 (± 0.39) mg/l 0.01

NW341 BOD5 - Soluble Carbonaceous

BOD5 <3 mg/l 1

NW020 Chemical Oxygen Demand

Chemical oxygen demand (COD) 142 (± 15) mg/l 15

NW007 Chloride

Chloride (Cl) 61.0 (± 6.10) mg/l 0.02

NW023 Conductivity

Conductivity 62.2 (± 1.2) mS/m 0.1

NW098 Dissolved Aluminium

Aluminium 0.024 mg/l 0.002

NW583 Dissolved Arsenic

Arsenic (As) 0.001 mg/l 0.001

NW103 Dissolved Boron

Boron (B) 0.19 mg/l 0.03

NW104 Dissolved Cadmium

Cadmium (Cd) <0.0002 mg/l 0.0002

NW105 Dissolved Calcium

Calcium (Ca) 36.5 mg/l 0.1

NW106 Dissolved Chromium

Chromium (Cr) <0.001 mg/l 0.001

NW108 Dissolved Copper

Copper (Cu) 0.0006 mg/l 0.0005

NW109 Dissolved Iron

Iron (Fe) 2.69 mg/l 0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	19.1	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.730	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)	15.6	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.025	(± 0.005) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	51.4	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	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	1.30	(± 0.13) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.4	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	0.86	(± 0.09) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	390	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	204	(± 20) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	170	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	18.2	(± 1.8) mg/l	0.1

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
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.

Food & Water Testing

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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

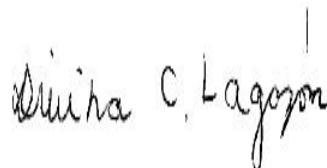
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Marylou Cabral Laboratory Manager



Jennifer Mont Supervisor



Divina Cunanan Lagazon Supervisor



Gordon McArthur Senior Laboratory Analyst



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-24-NW-005509-01** REPORT DATE **29/01/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008281**

Client Reference: 323889-0

Product: Ground water

Sampling Point code: WIL-TD1

Sampling Point name: Levin TD1

Reception Date & Time: 18/01/2024 7:25

Analysis Start Date & Time: 18/01/2024 10:29

Analysis Ending Date: 29/01/2024

Product Type Ground water

Sampled Date & Time 17/01/2024 09:20

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	22.7	(± 2.27) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	93	(± 15) mg/l	15
NW007 Chloride			
Chloride (Cl)	90.9	(± 9.09) mg/l	0.02
NW023 Conductivity			
Conductivity	122	(± 2.4) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.006	mg/l	0.002
NW103 Dissolved Boron			
Boron (B)	0.32	mg/l	0.03
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW113 Dissolved Manganese			
Manganese (Mn)	0.537	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0021	mg/l	0.0005
ZMF1E Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	36	cfu/100 ml	1
NW010 Nitrate-N			
Nitrate-N	0.14	(± 0.01) mg/l	0.01

Food & Water Testing

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

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

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

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

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

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

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

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

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

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

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

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

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

ZMF1E **Escherichia coli E (Water) [NZ] <1 >80 /100 ml (0) MI**
Agar-F: SMEWW 9222K; APHA 24th Edition

Signature



Jennifer Mont Supervisor



Gordon McArthur Senior Laboratory Analyst



Ruth Ashton Laboratory Technician



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-012305-01** REPORT DATE **29/02/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008685**

Client Reference: 323503-0

Product: Ground water

Sampling Point code: WIL-Xd1

Sampling Point name: Levin Xd1

Reception Date & Time: 18/01/2024 14:36

Analysis Start Date & Time: 18/01/2024 14:38

Analysis Ending Date: 26/01/2024

Product Type Ground water

Sampled Date & Time 18/01/2024 09:49

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) 43 (± 8) mg/l 15

NW007 Chloride

Chloride (Cl) 58.0 (± 5.80) mg/l 0.02

NW023 Conductivity

Conductivity 53.7 (± 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) 0.04 mg/l 0.03

NW104 Dissolved Cadmium

Cadmium (Cd) <0.0002 mg/l 0.0002

NW105 Dissolved Calcium

Calcium (Ca) 34.5 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

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	15.9	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.515	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)	5.60	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.155	(± 0.031) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	49.6	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	(± 0.00) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.5	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	<0.02	(± 0.01) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	24	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	186	(± 19) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	152	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	4.3	(± 0.4) mg/l	0.1
① NWWG6 Volatile Fatty Acids (VFA)			
Acetic acid	<5	mg/l	5
Butyric acid	<5	mg/l	5
Heptanoic acid	<5	mg/l	5
Hexanoic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isocaproic 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

Food & Water Testing

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
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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.	NWWG6	Volatile Fatty Acids (VFA): APHA 24th Edition 5560 D mod.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

Signature



Jennifer Mont Supervisor Eurofins ELS Limited



Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Ruth Ashton Laboratory Technician Eurofins ELS Limited



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry



Cody Forbes Laboratory Analyst Laboratory Analyst

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-012304-01** REPORT DATE **29/02/2024**

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), McMillan

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00163003

Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00008681**

Client Reference: 323505-0

Product: Ground water

Sampling Point code: WIL-Xs1

Sampling Point name: Levin Xs1

Reception Date & Time: 18/01/2024 14:32

Analysis Start Date & Time: 18/01/2024 14:38

Analysis Ending Date: 26/01/2024

Product Type Ground water

Sampled Date & Time 18/01/2024 07:23

Sampler(s) Client nominated external sampler

Sampled by Eurofins No

RESULTS (UNCERTAINTY) LOQ

NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	12.8	(± 1.28) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<3	mg/l	1
NW020 Chemical Oxygen Demand			
Chemical oxygen demand (COD)	95	(± 15) mg/l	15
NW007 Chloride			
Chloride (Cl)	112	(± 11.2) mg/l	0.02
NW023 Conductivity			
Conductivity	139	(± 2.8) mS/m	0.1
NW098 Dissolved Aluminium			
Aluminium	0.005	mg/l	0.002
NW583 Dissolved Arsenic			
Arsenic (As)	<0.001	mg/l	0.001
NW103 Dissolved Boron			
Boron (B)	0.63	mg/l	0.03
NW104 Dissolved Cadmium			
Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105 Dissolved Calcium			
Calcium (Ca)	74.7	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)	3.48	mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	37.4	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.774	mg/l	0.0005
NW114 Dissolved Mercury			
Mercury (Hg)	<0.0005	mg/l	0.0005
NW116 Dissolved Nickel			
Nickel (Ni)	0.0023	mg/l	0.0005
NW117 Dissolved Potassium			
Potassium (K)	26.3	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.046	(± 0.009) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	78.6	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	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	<0.1	mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.0	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	<0.02	(± 0.01) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	67	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	576	(± 58) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	341	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	24.6	(± 2.5) mg/l	0.1
① NWWG6 Volatile Fatty Acids (VFA)			
Acetic acid	<5	mg/l	5
Butyric acid	<5	mg/l	5
Heptanoic acid	<5	mg/l	5
Hexanoic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isocaproic 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

Food & Water Testing

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
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 (Tested beyond 15 minute APHA holding time): APHA 24th 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.	NWWG6	Volatile Fatty Acids (VFA): APHA 24th Edition 5560 D mod.
ZM2GA	Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F: SMEWW 9222I; APHA 24th Edition		

Signature



Jennifer Mont Supervisor Eurofins ELS Limited



Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Ruth Ashton Laboratory Technician Eurofins ELS Limited



Leo Cleave Senior Analyst Microbiology



Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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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

✗ (Unsatisfactory) means does not meet the specification

✓ (Satisfactory) means meets the specification

Food & Water Testing

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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 service follows 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.

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

PRELIMINARY REPORT

REPORT CODE	PR-24-NW-000003-01	REPORT DATE	17/02/2024
Attention	Downer NZ Ltd (EDI Levin) Horowhenua Admin P O Box 642 4741 Levin NEW ZEALAND		
Phone	(06) 367 2705	Copy to: Water and Waste Team	
Email	horowhenuaadmin@downer.co.nz	(waterandwasteteam@horowhenua.govt.nz), McMillan	

Contact for your orders:	Gabriela Carvalhaes	Order code:	EUNZWE-00163003
Contract:	Landfill	Purchase Order Number:	Landfill

SAMPLE CODE	812-2024-00008686		
Client Reference:	323504-0		
Product:	Ground water		
Sampling Point code:	WIL-Xs2	Sampling Point name:	Levin Xs2
Reception Date & Time:	18/01/2024 14:36	Analysis Ending Date:	26/01/2024
Analysis Start Date & Time:	18/01/2024 14:38	Sampled Date & Time	18/01/2024 09:07
Product Type	Ground water	Sampled by Eurofins	No
Sampler(s)	Client nominated external sampler		

RESULTS (UNCERTAINTY)			LOQ
NW179	Ammonia Nitrogen		
	Ammoniacal nitrogen (N)	0.05 (± 0.02) mg/l	0.01
NW341	BOD5 - Soluble Carbonaceous		
	BOD5	<1 mg/l	1
NW020	Chemical Oxygen Demand		
	Chemical oxygen demand (COD) 29	(± 7) mg/l	15
NW007	Chloride		
	Chloride (Cl)	17.3 (± 1.73) mg/l	0.02
NW023	Conductivity		
	Conductivity	20.6 (± 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)	0.05 mg/l	0.03
NW104	Dissolved Cadmium		
	Cadmium (Cd)	<0.0002 mg/l	0.0002
NW105	Dissolved Calcium		
	Calcium (Ca)	13.9 mg/l	0.1
NW106	Dissolved Chromium		
	Chromium (Cr)	<0.001 mg/l	0.001
NW108	Dissolved Copper		
	Copper (Cu)	0.0016 mg/l	0.0005
NW109	Dissolved Iron		
	Iron (Fe)	0.22 mg/l	0.01

Food & Water Testing

RESULTS (UNCERTAINTY)			LOQ
NW110 Dissolved Lead			
Lead (Pb)	<0.0005	mg/l	0.0005
NW112 Dissolved Magnesium			
Magnesium (Mg)	7.14	mg/l	0.01
NW113 Dissolved Manganese			
Manganese (Mn)	0.0940	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)	5.66	mg/l	0.01
NW193 Dissolved Reactive Phosphorus			
Phosphorus (soluble reactive)	0.034	(± 0.007) mg/l	0.005
NW120 Dissolved Sodium			
Sodium (Na)	18.6	mg/l	0.01
NW125 Dissolved Zinc			
Zinc (Zn)	0.005	mg/l	0.002
ZM2GA Enumeration of Escherichia coli By Membrane Filtration			
Escherichia coli	<100	cfu/100 ml	100
NW010 Nitrate-N			
Nitrate-N	0.63	(± 0.06) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	6.7	(± 0.2)	0.1
NW011 Sulphate			
Sulphate	8.73	(± 0.87) mg/l	0.02
NW206 Suspended Solids			
Suspended Solids	<5	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	60	(± 6) mg CaCO ₃ /l	1
NW030 Total Hardness			
Hardness	64	mg CaCO ₃ /l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	2.3	(± 0.2) mg/l	0.1
① NWWG6 Volatile Fatty Acids (VFA)			
Acetic acid	<5	mg/l	5
Butyric acid	<5	mg/l	5
Heptanoic acid	<5	mg/l	5
Hexanoic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isocaproic 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

Food & Water Testing

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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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Gabriela Carvalhaes Manager Food and Water Testing Chemistry

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N/A means Not Applicable

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Food & Water Testing

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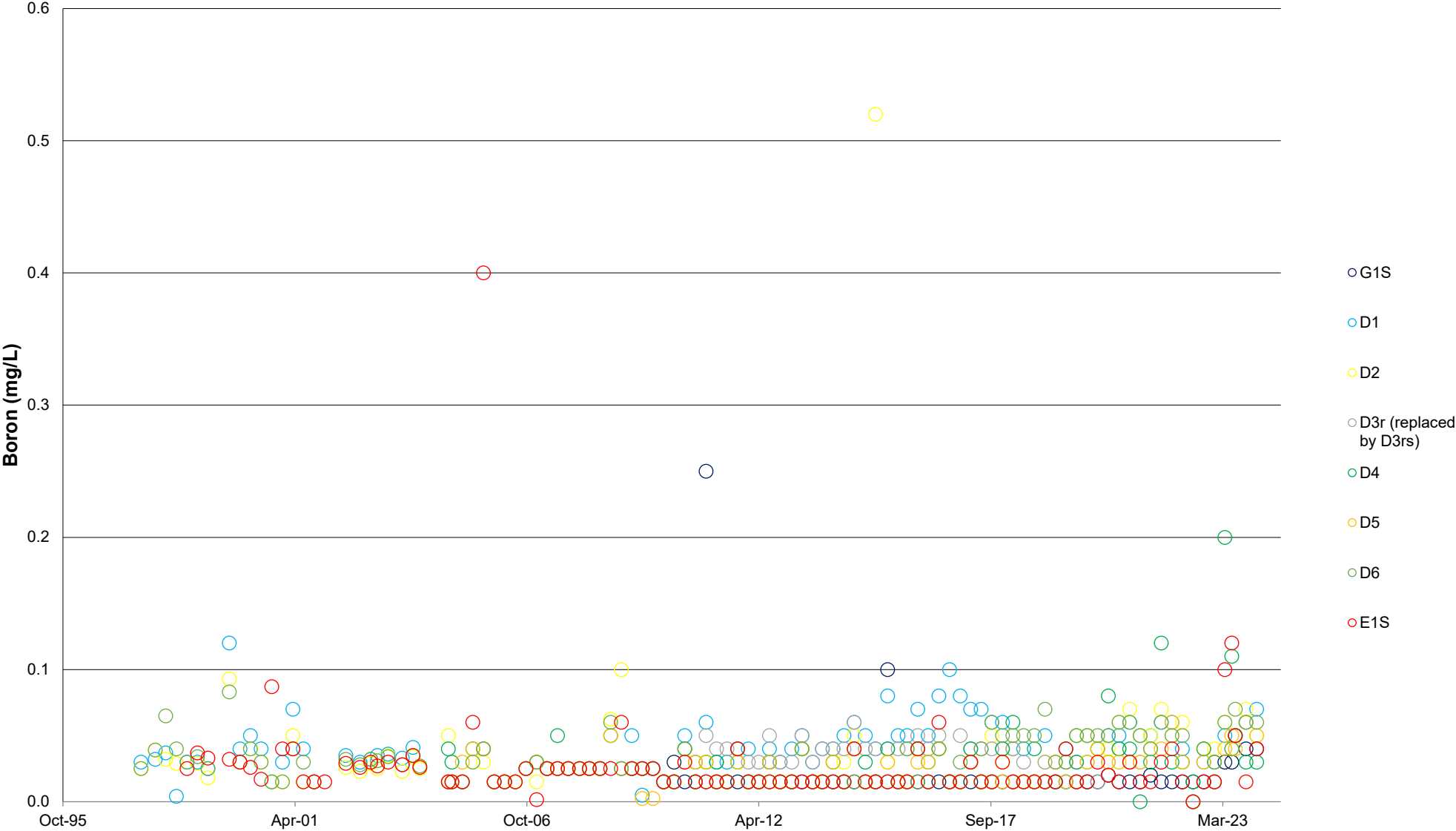
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END OF REPORT

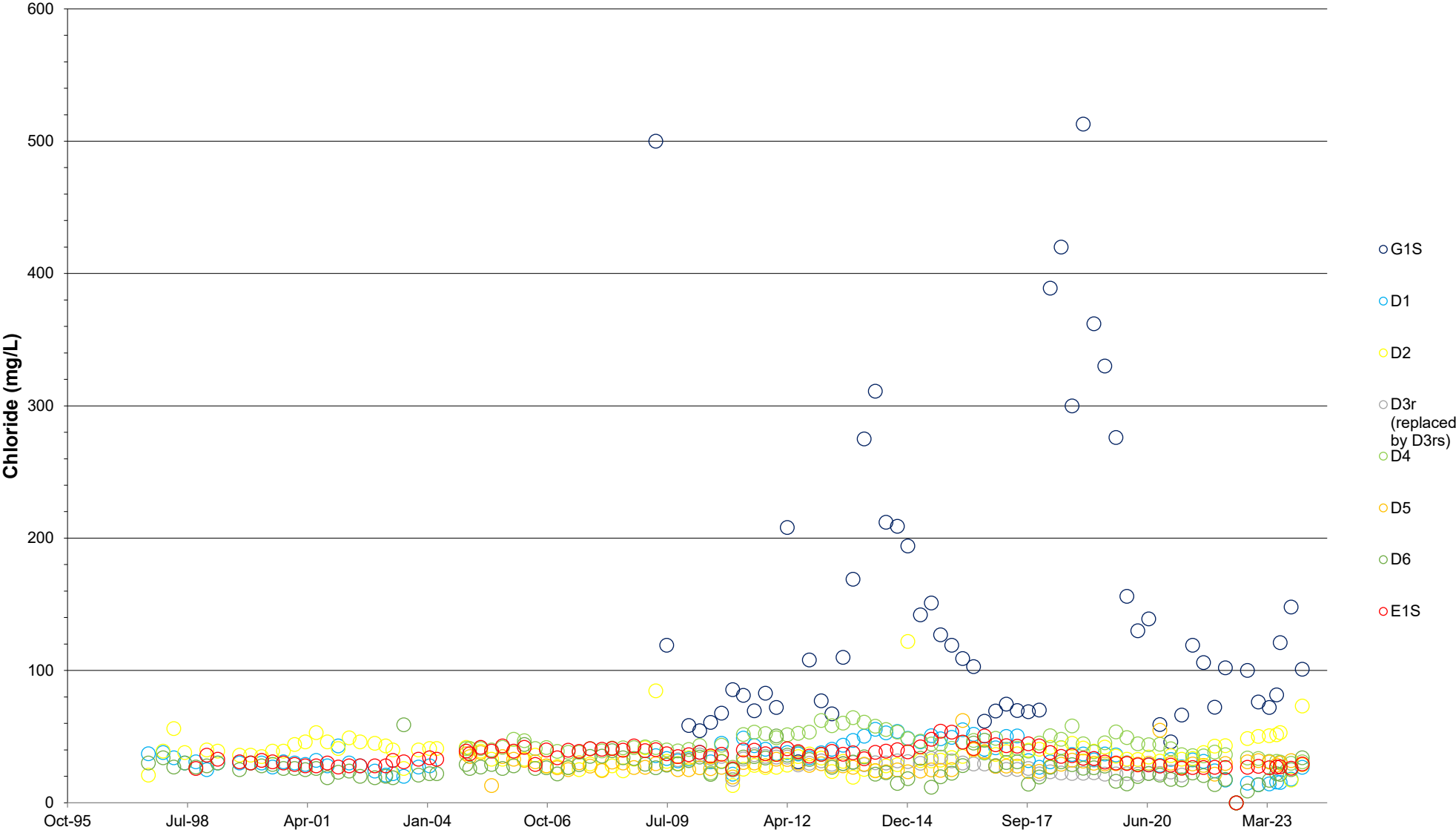
Appendix D Historical Results Graphs



Sand Aquifer Downgradient of New Landfill - Boron Concentrations

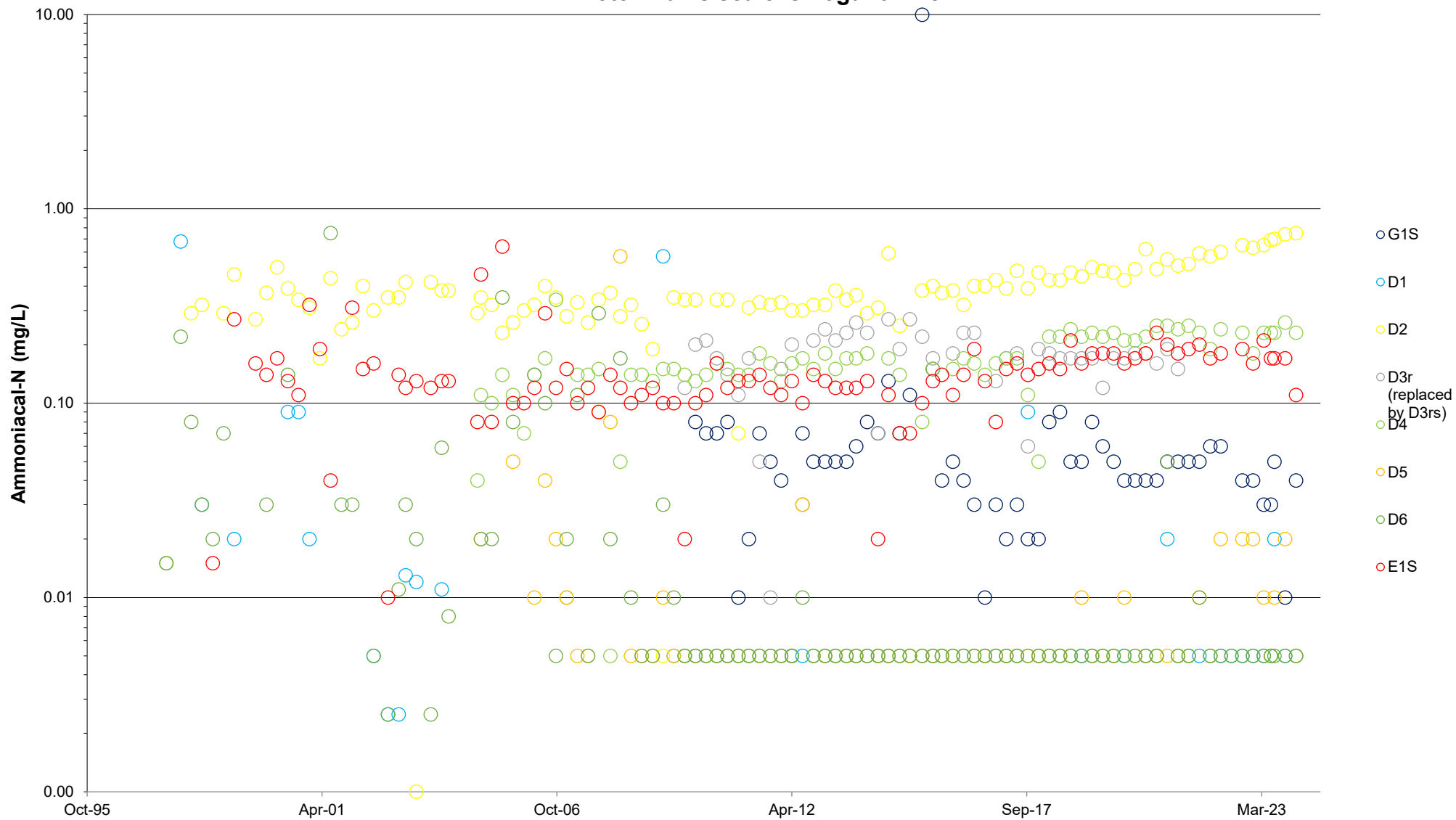


Sand Aquifer Downgradient of New Landfill - Chloride Concentrations

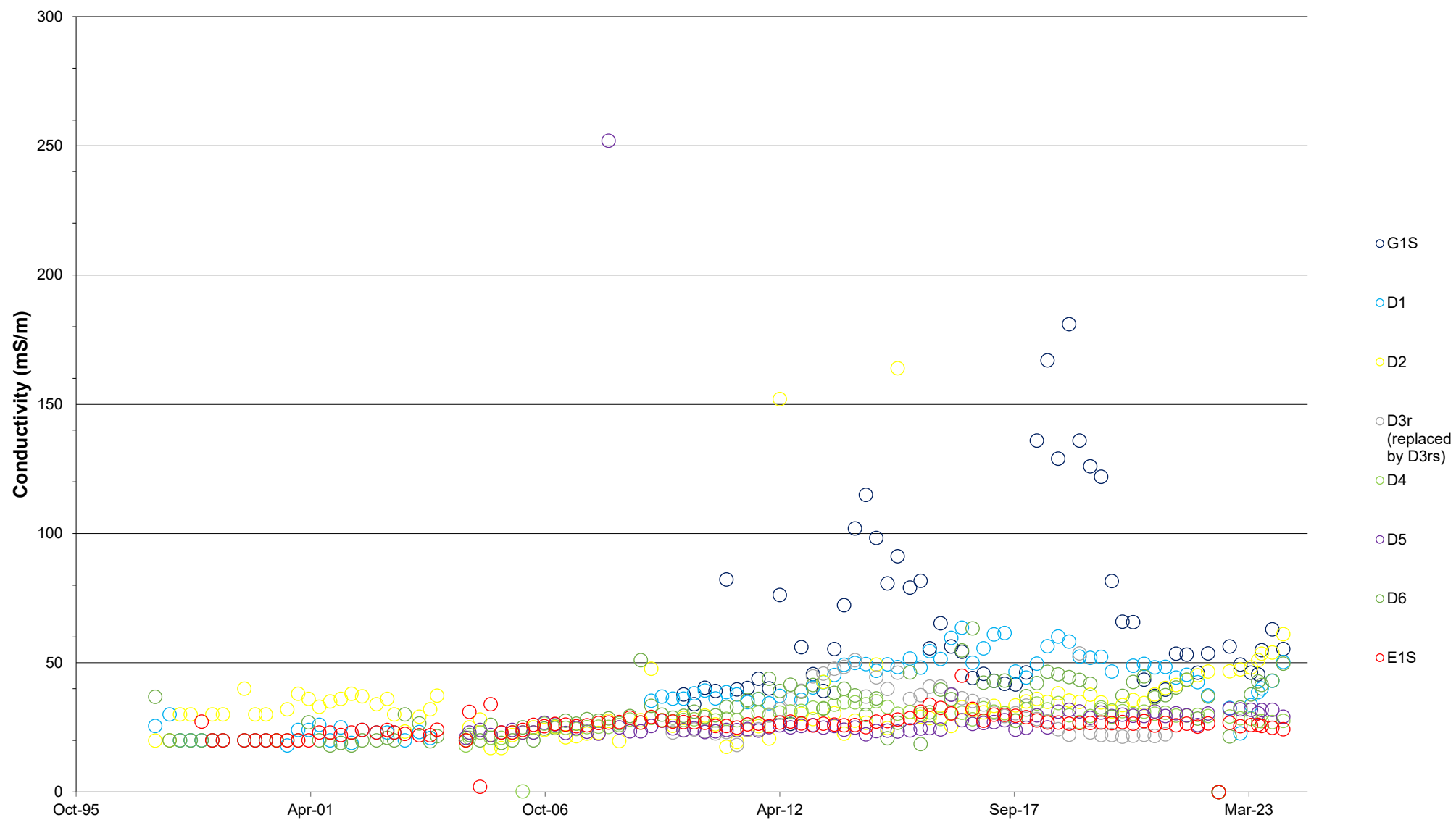


Sand Aquifer Downgradient of New Landfill - Ammoniacal-Nitrogen Concentrations

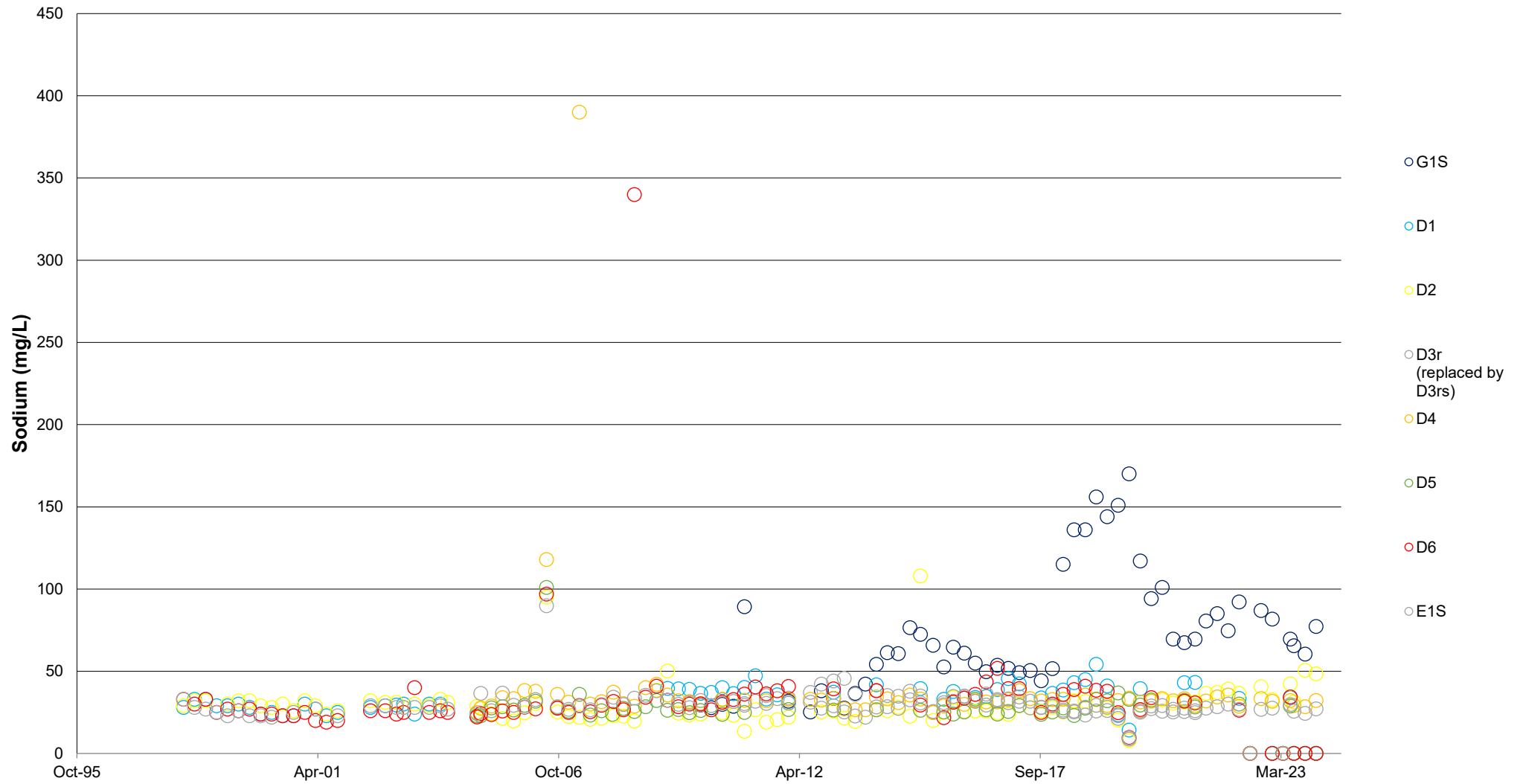
Note: Y-axis scale is Logarithmic



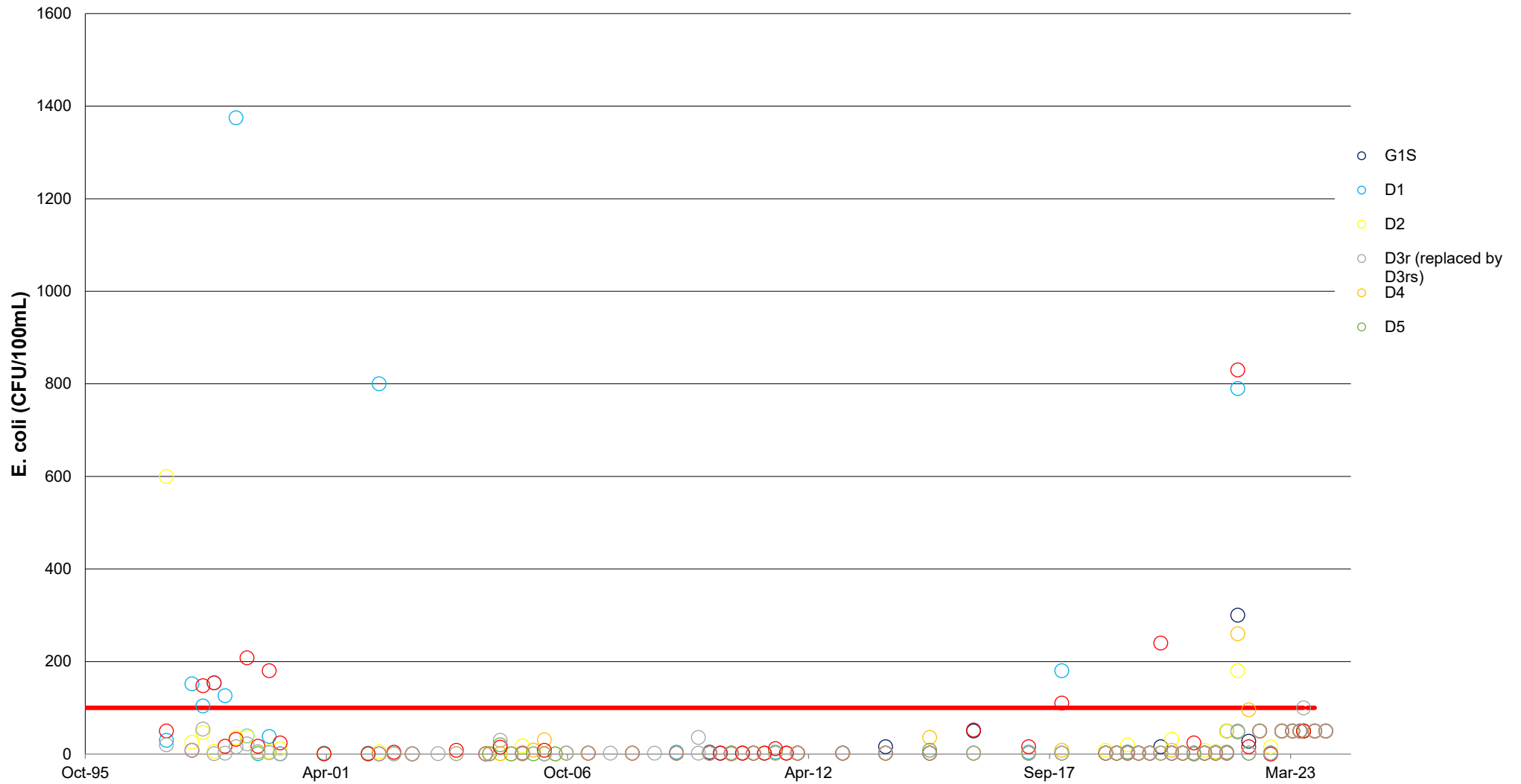
Sand Aquifer Downgradient of New Landfill - Conductivity Levels



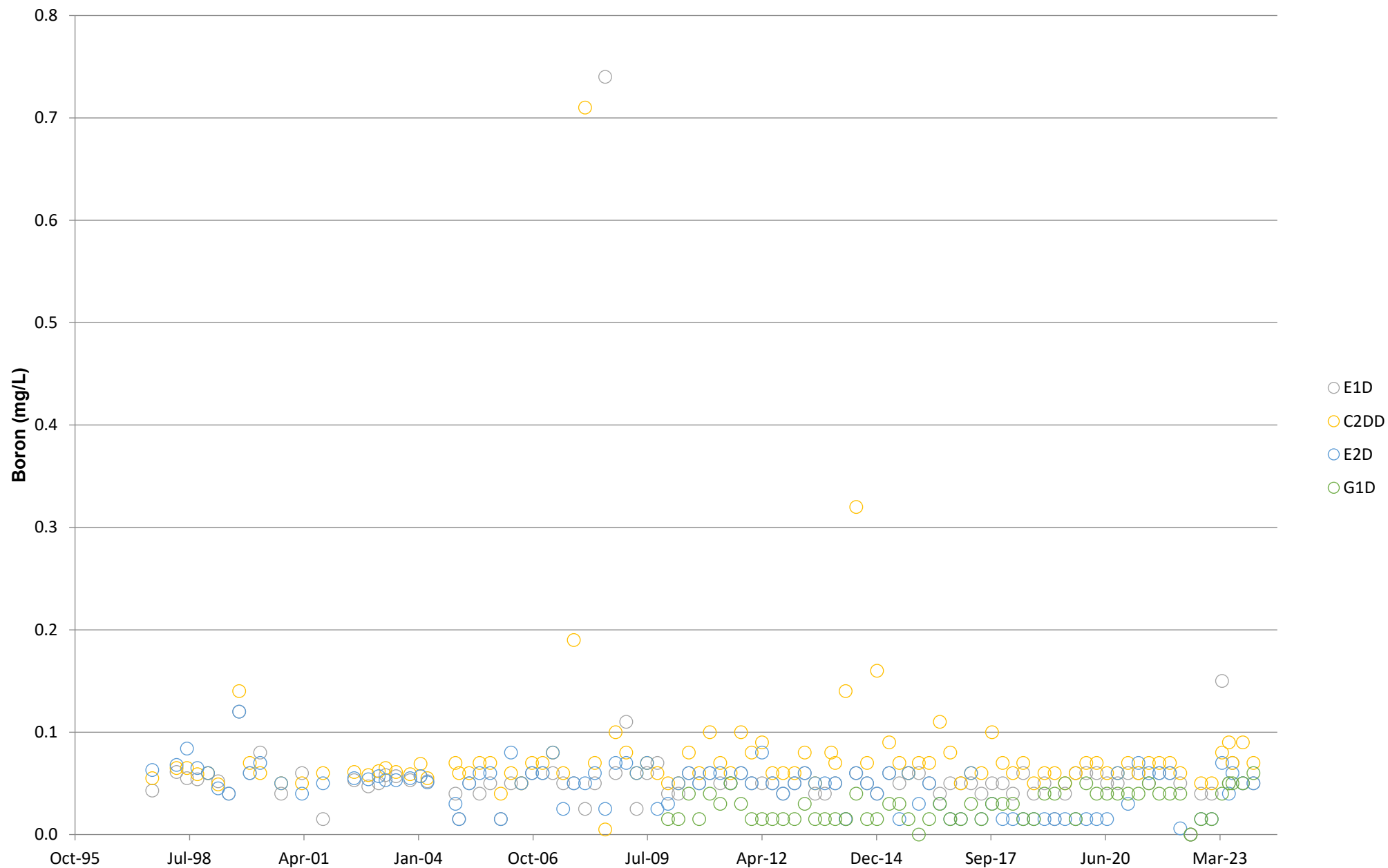
Sand Aquifer Downgradient of New Landfill - Sodium Concentrations



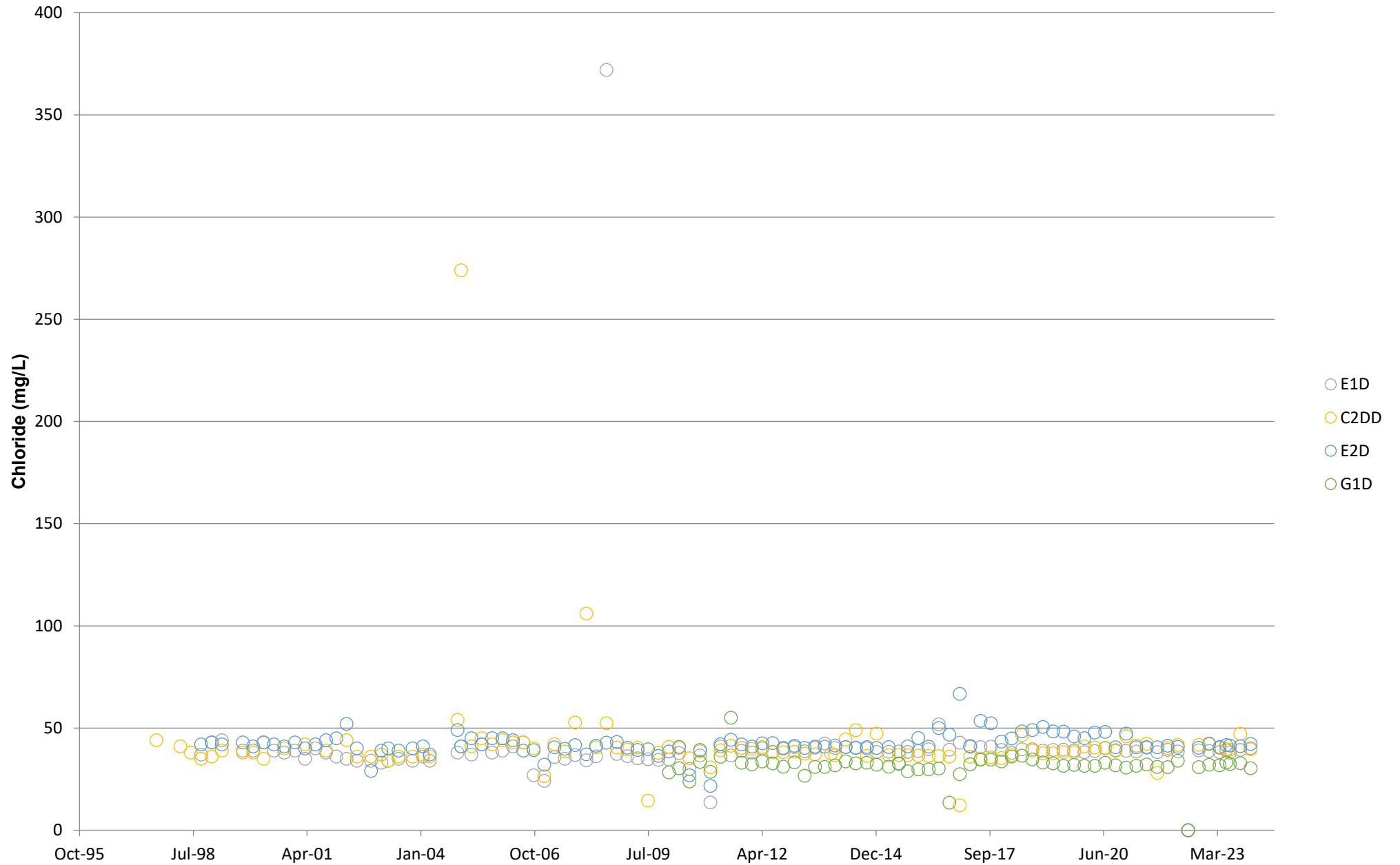
Sand Aquifer Downgradient of New Landfill - E. coli



Gravel Aquifer - Boron Concentrations

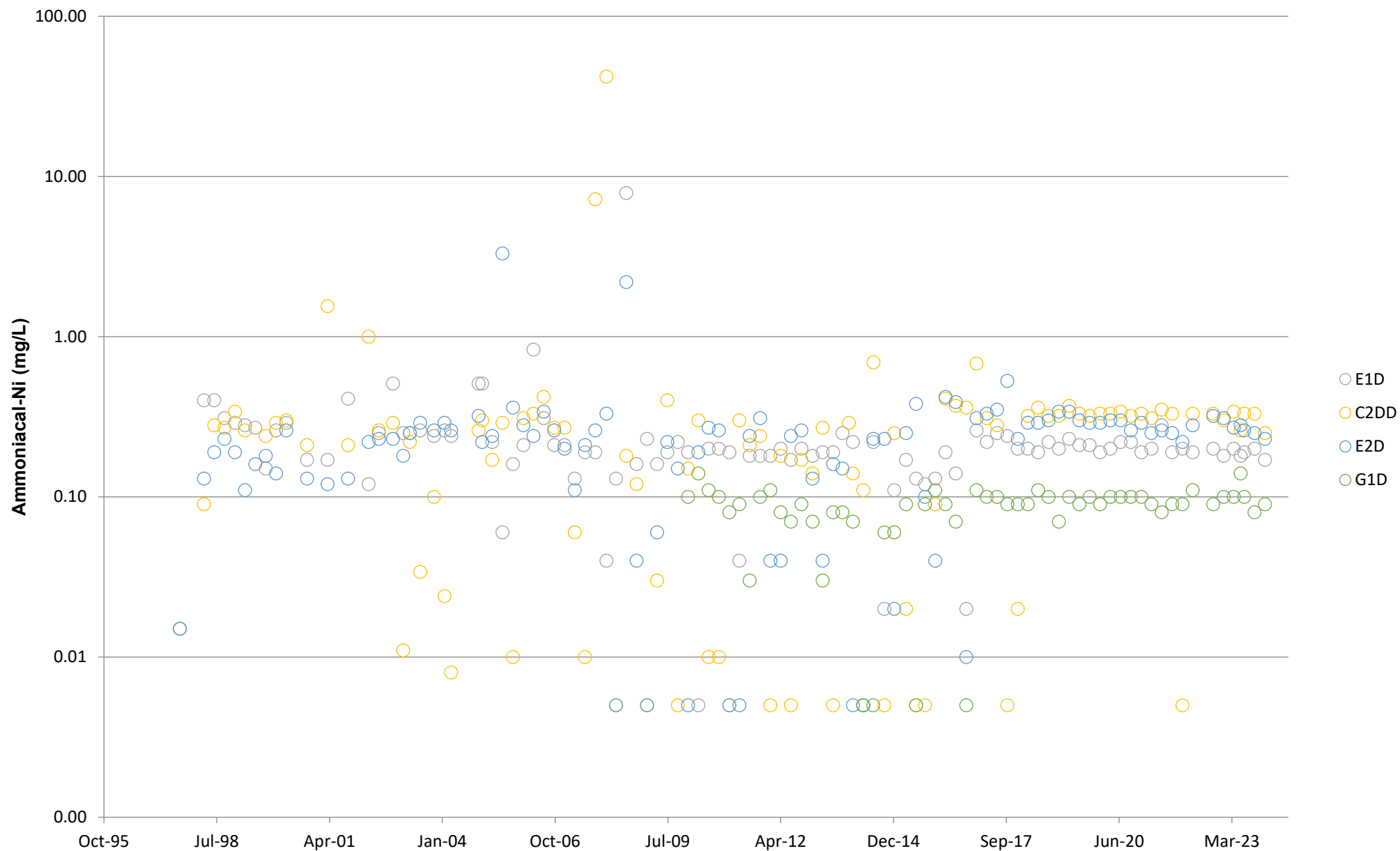


Gravel Aquifer - Chloride Concentrations

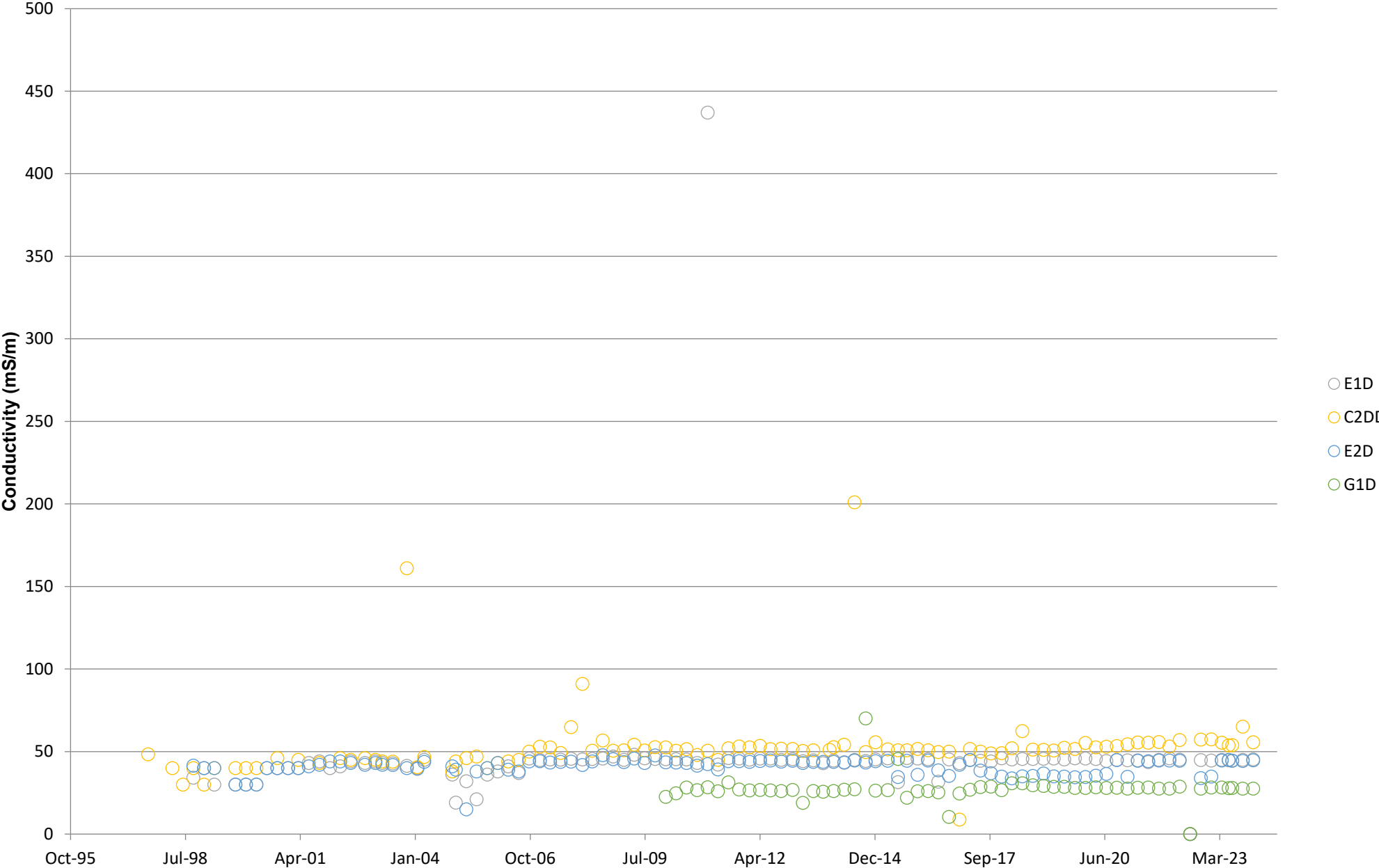


Gravel Aquifer - Ammoniacal-Nitrogen Concentrations

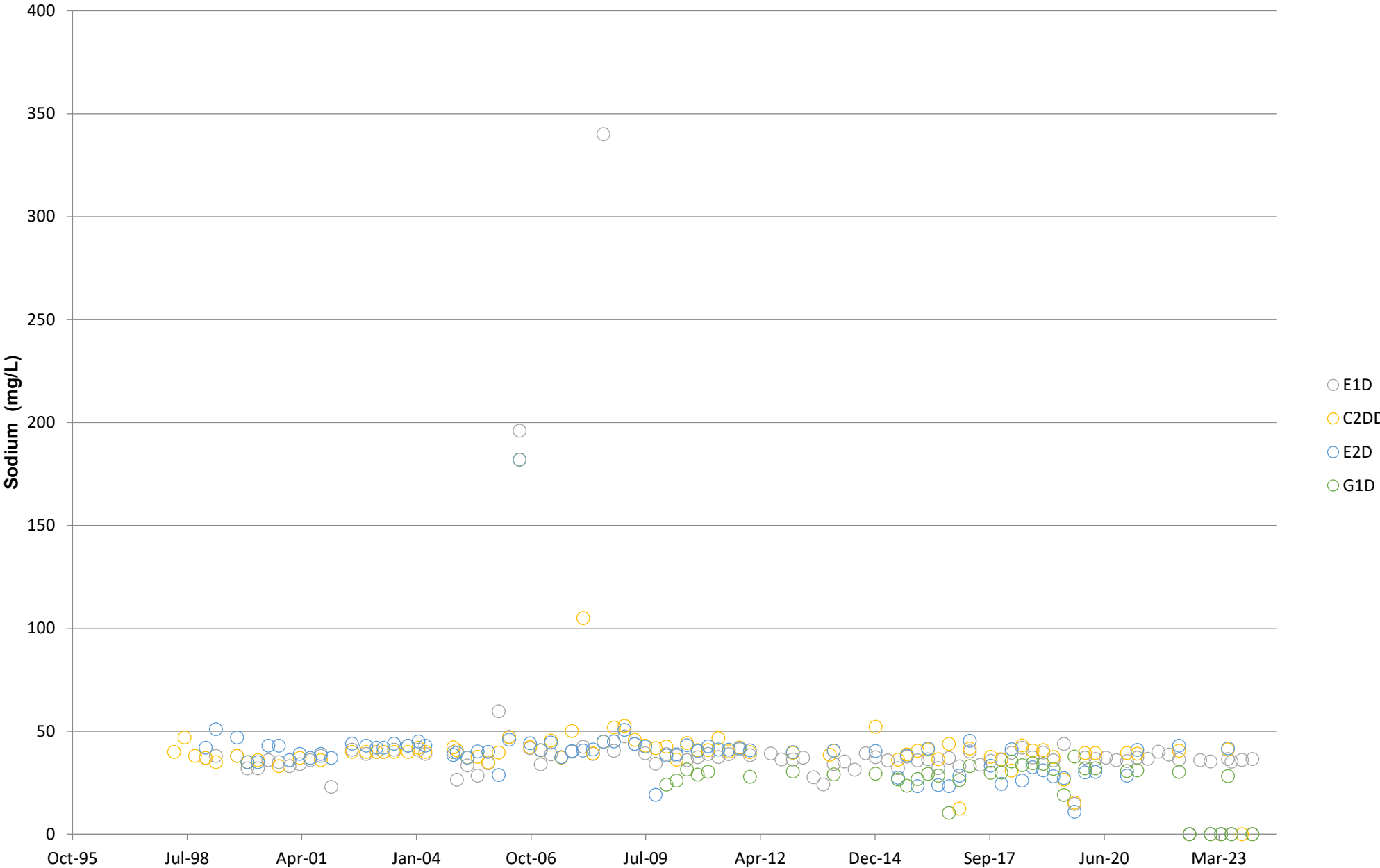
Note: Y-axis scale is Logarithmic



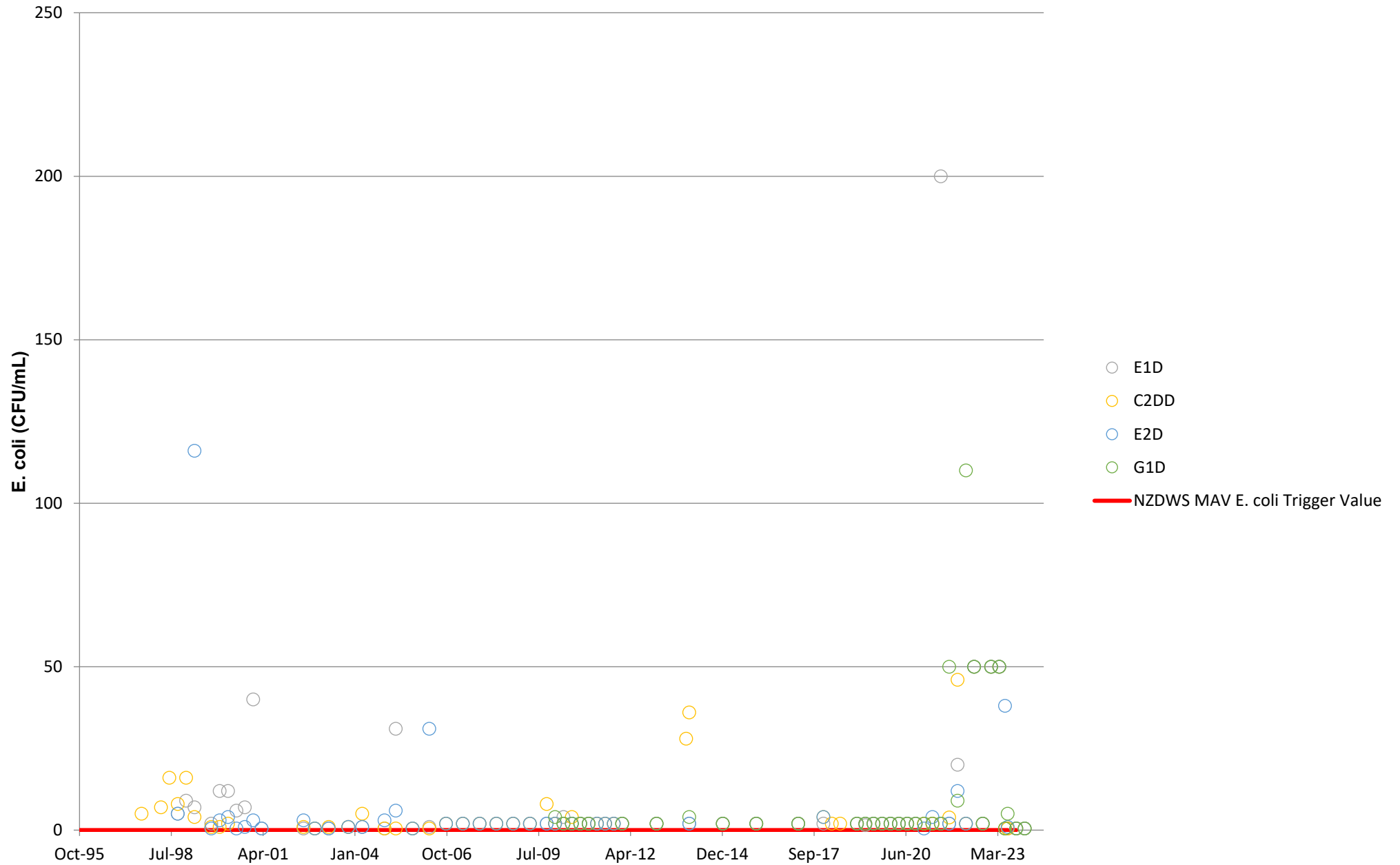
Gravel Aquifer - Conductivity Levels



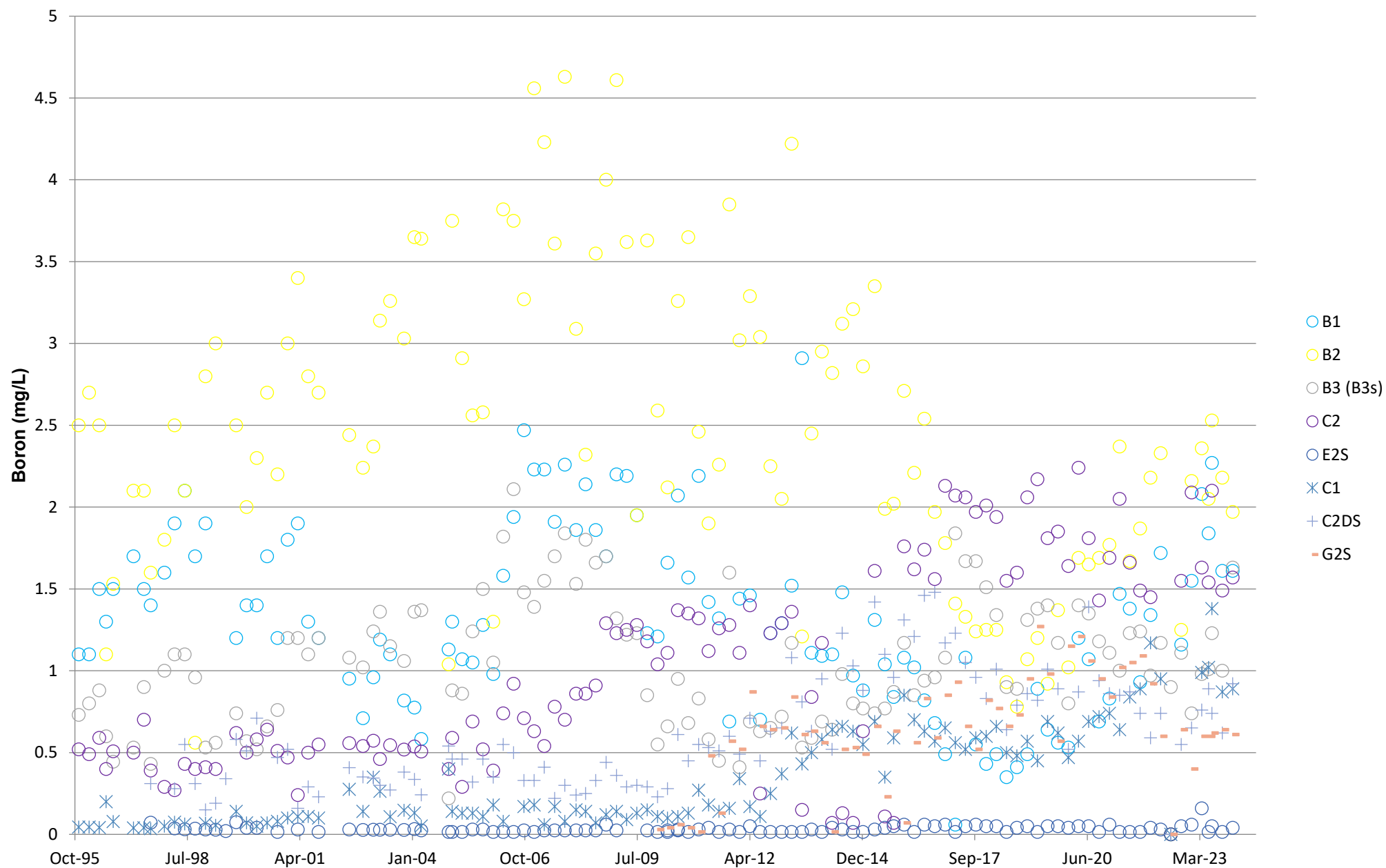
Gravel Aquifer - Sodium Levels



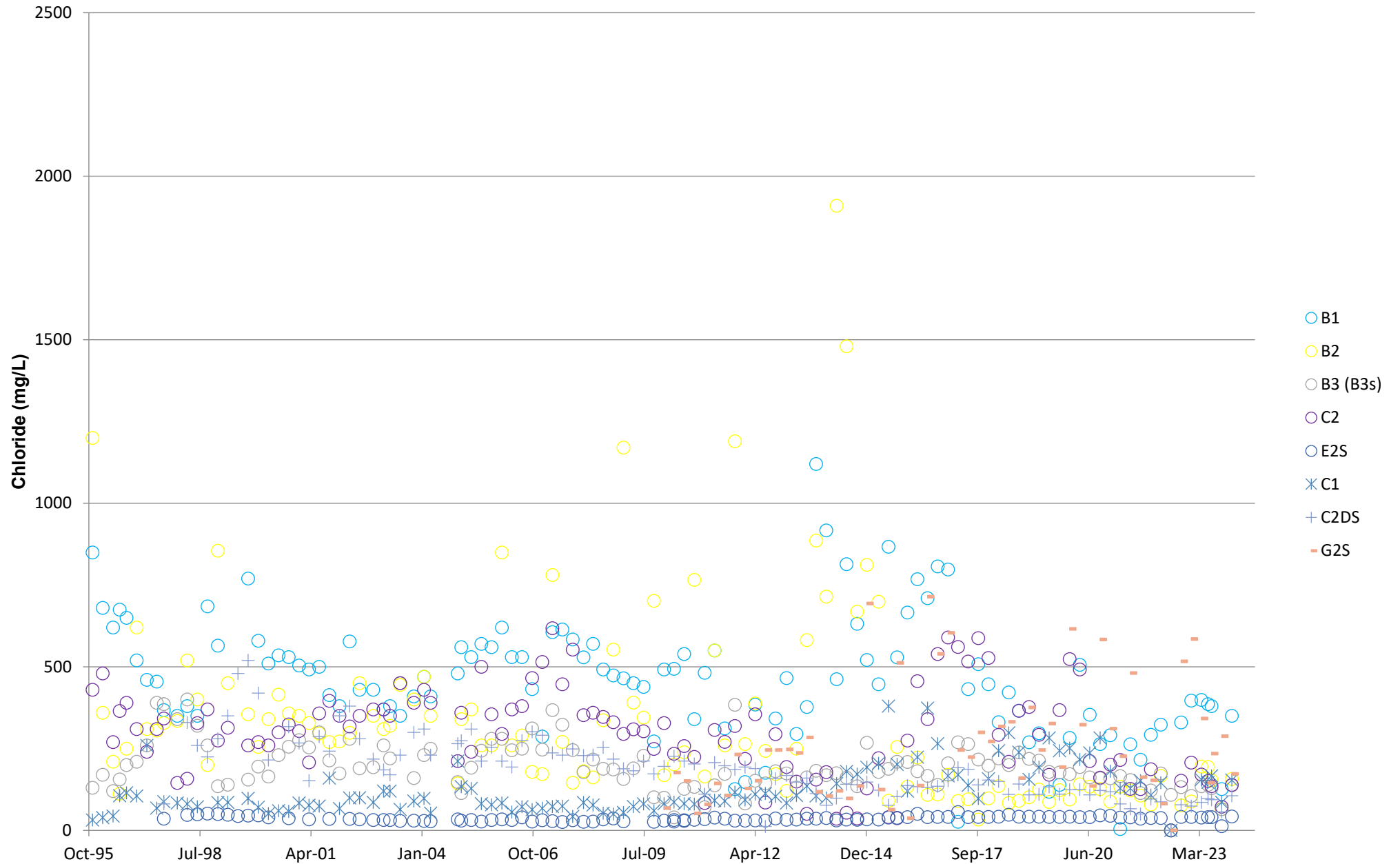
Gravel Aquifer - E. coli



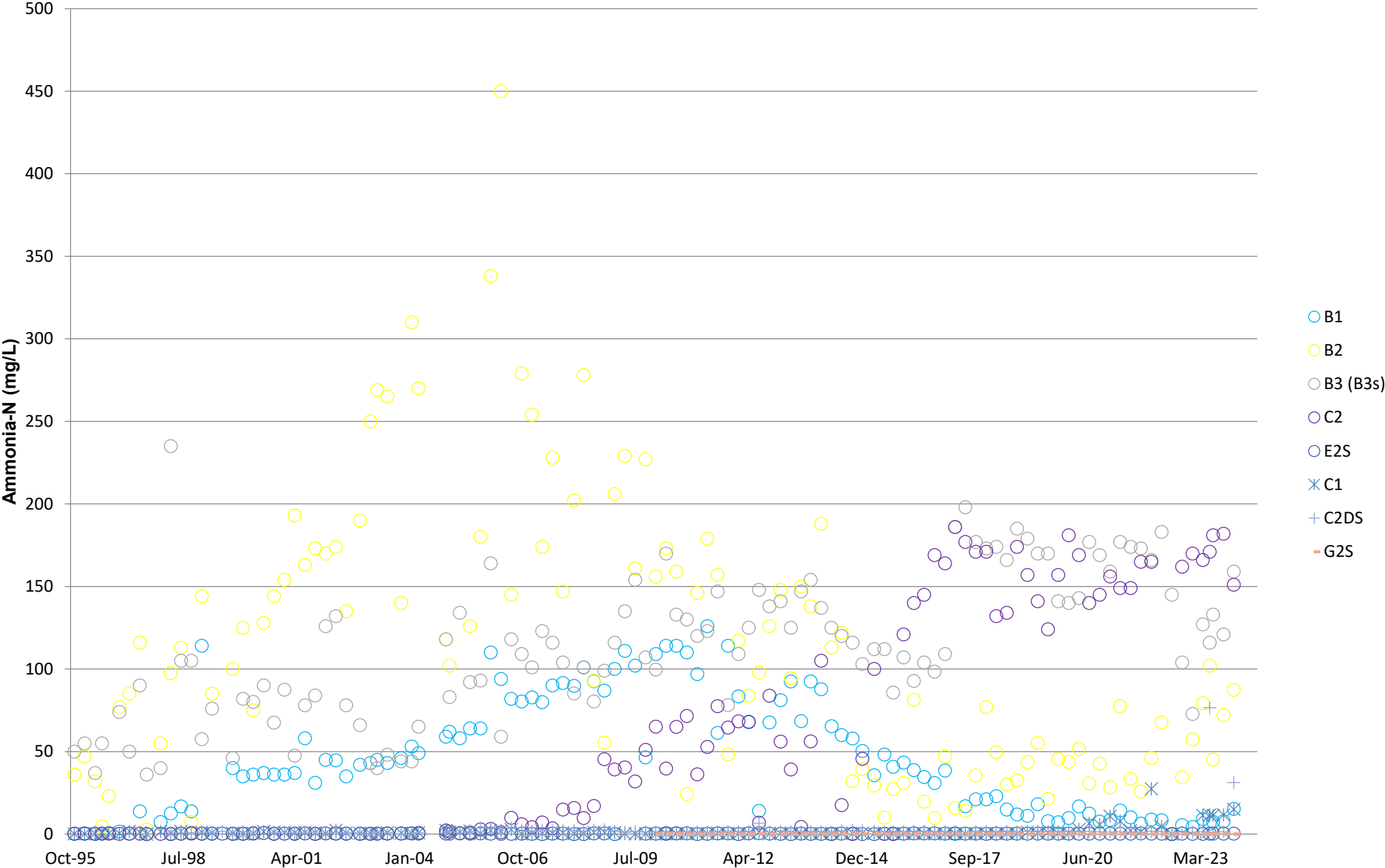
Sand Aquifer Downgradient of Old Landfill - Boron Concentrations



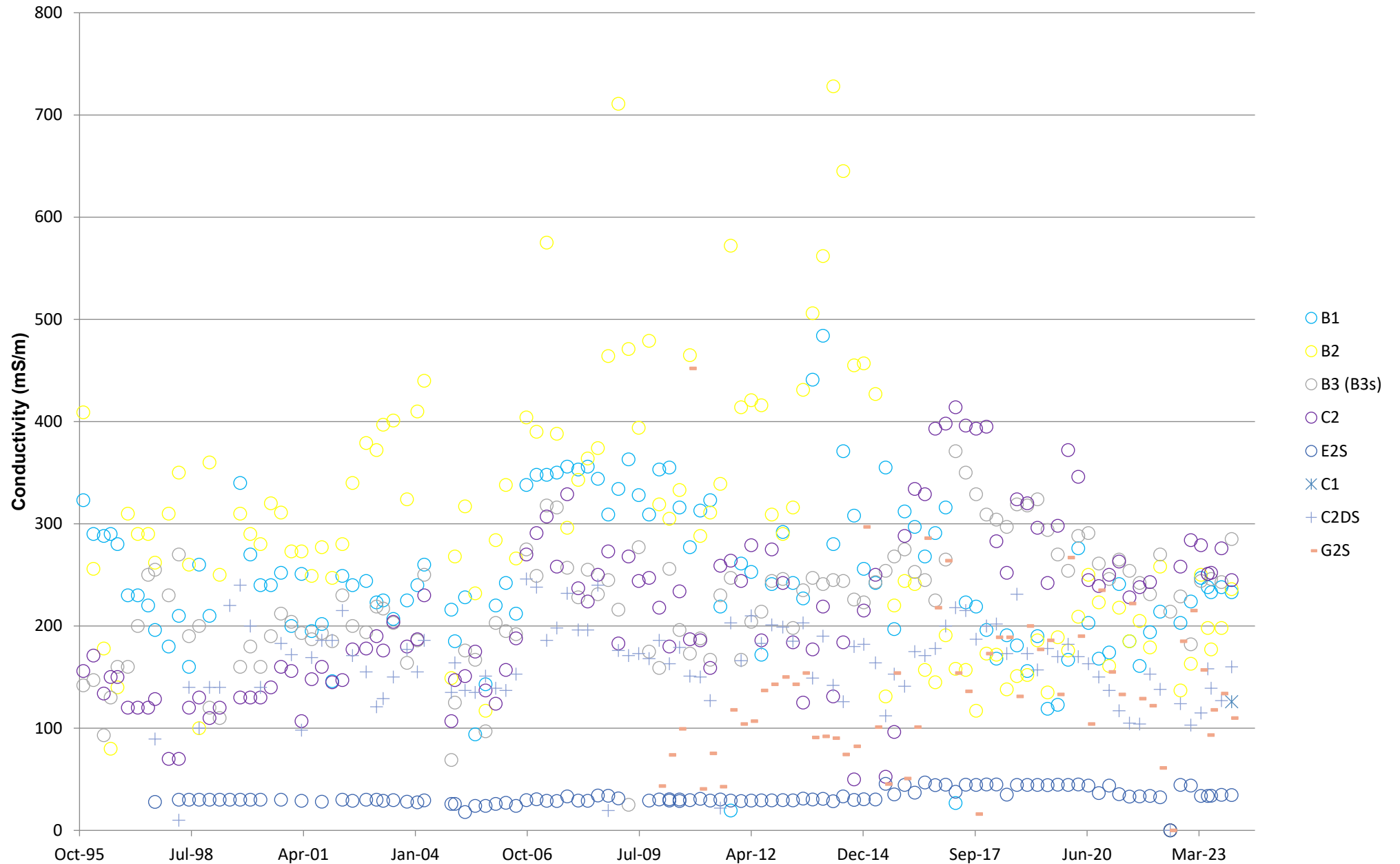
Sand Aquifer Downgradient of Old Landfill - Chloride Concentrations



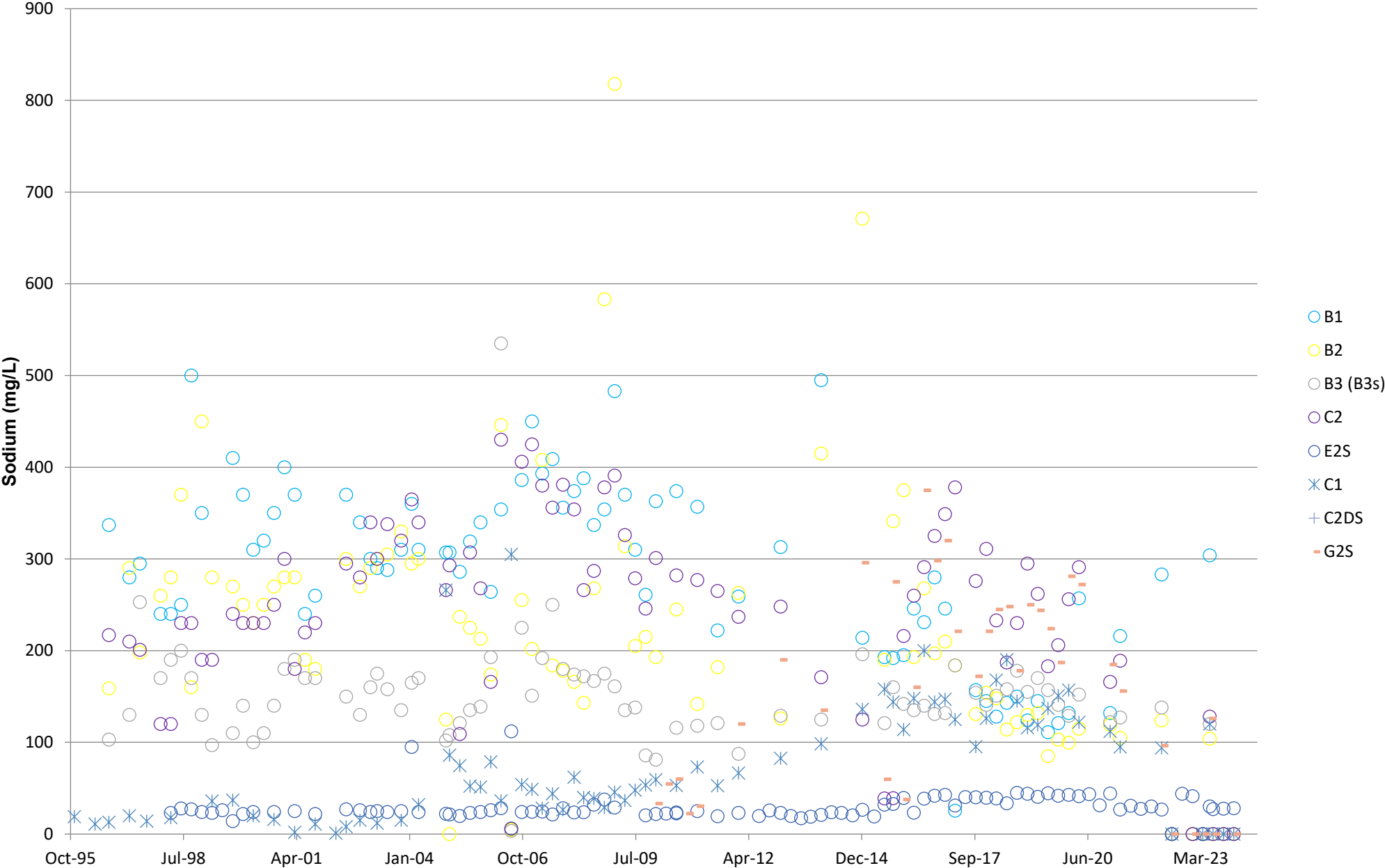
Sand Aquifer Downgradient of Old Landfill - Ammonia-N Concentrations



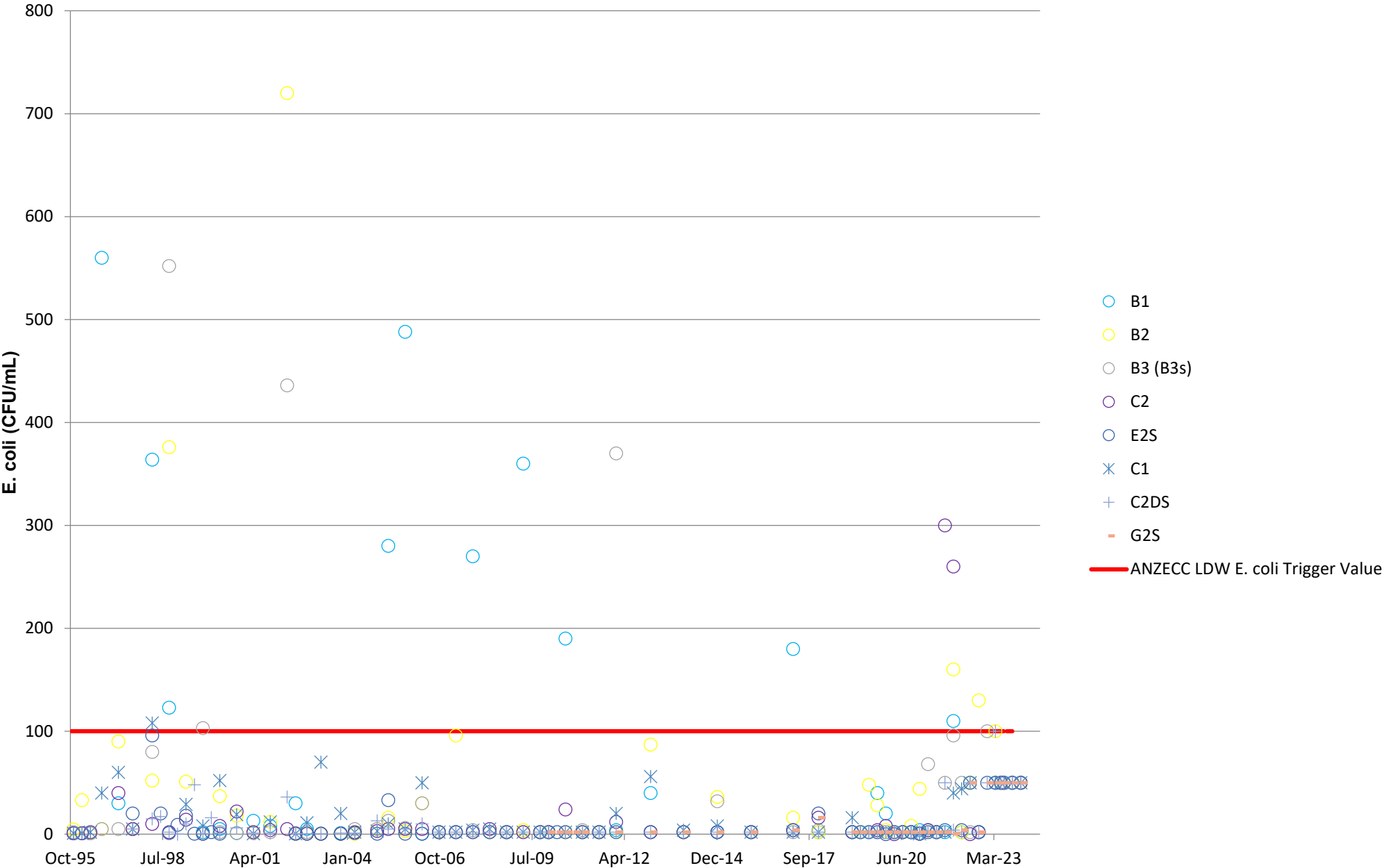
Sand Aquifer Downgradient of Old Landfill - Conductivity Levels



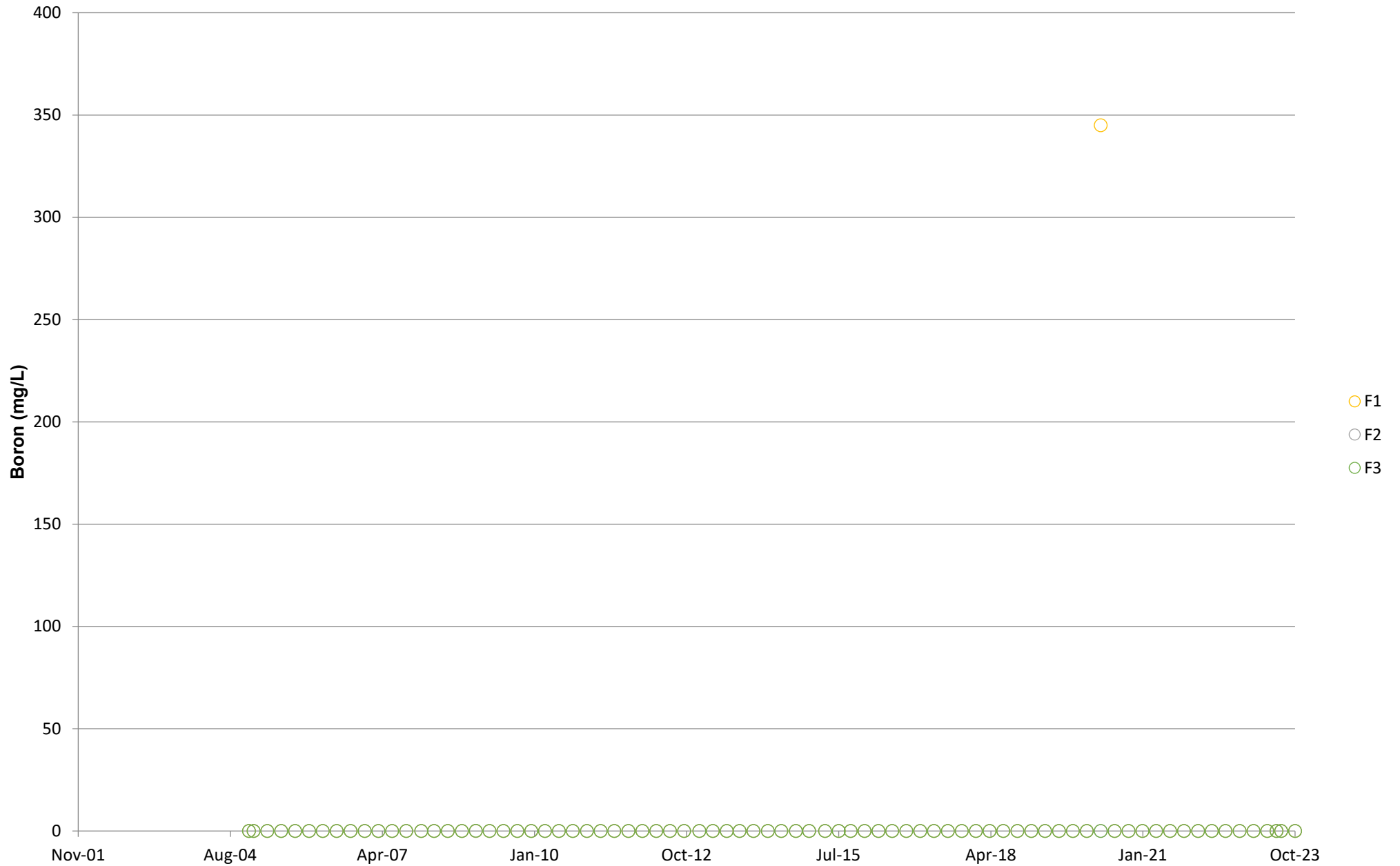
Sand Aquifer Downgradient of Old Landfill - Sodium Concentrations



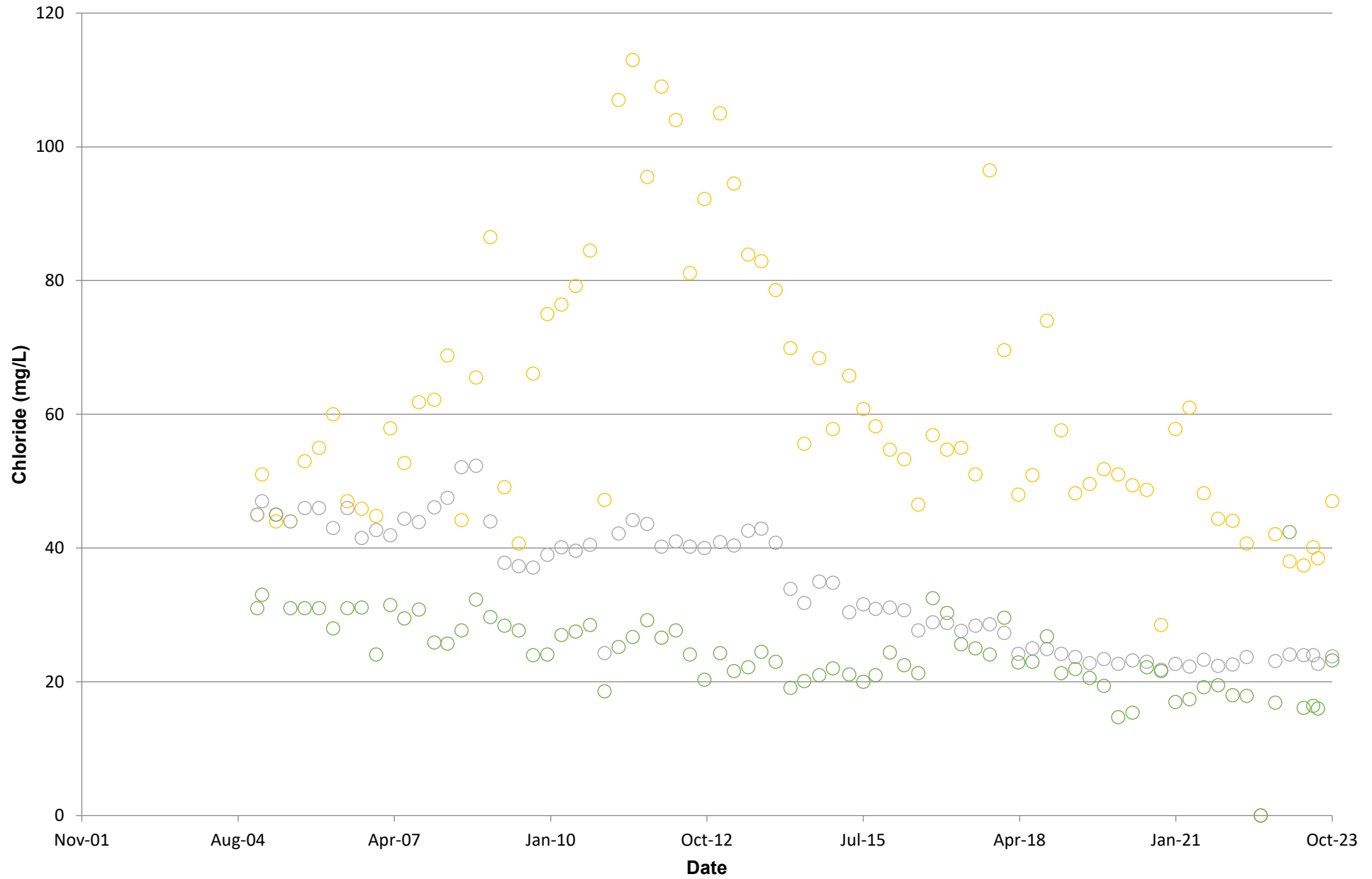
Sand Aquifer Downgradient of Old Landfill - E. coli



Irrigation Area - Boron Concentrations

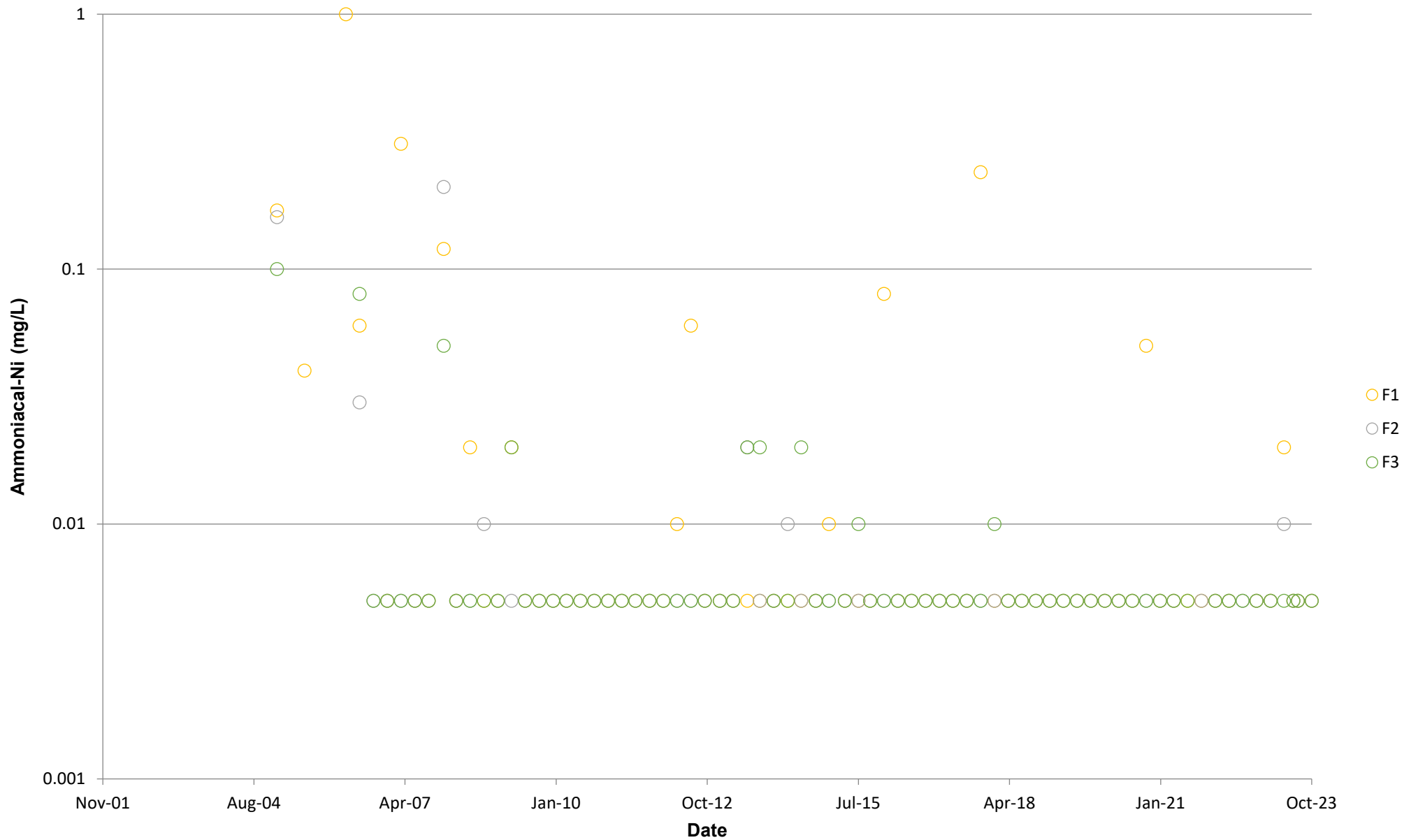


Irrigation Area - Chloride Concentrations

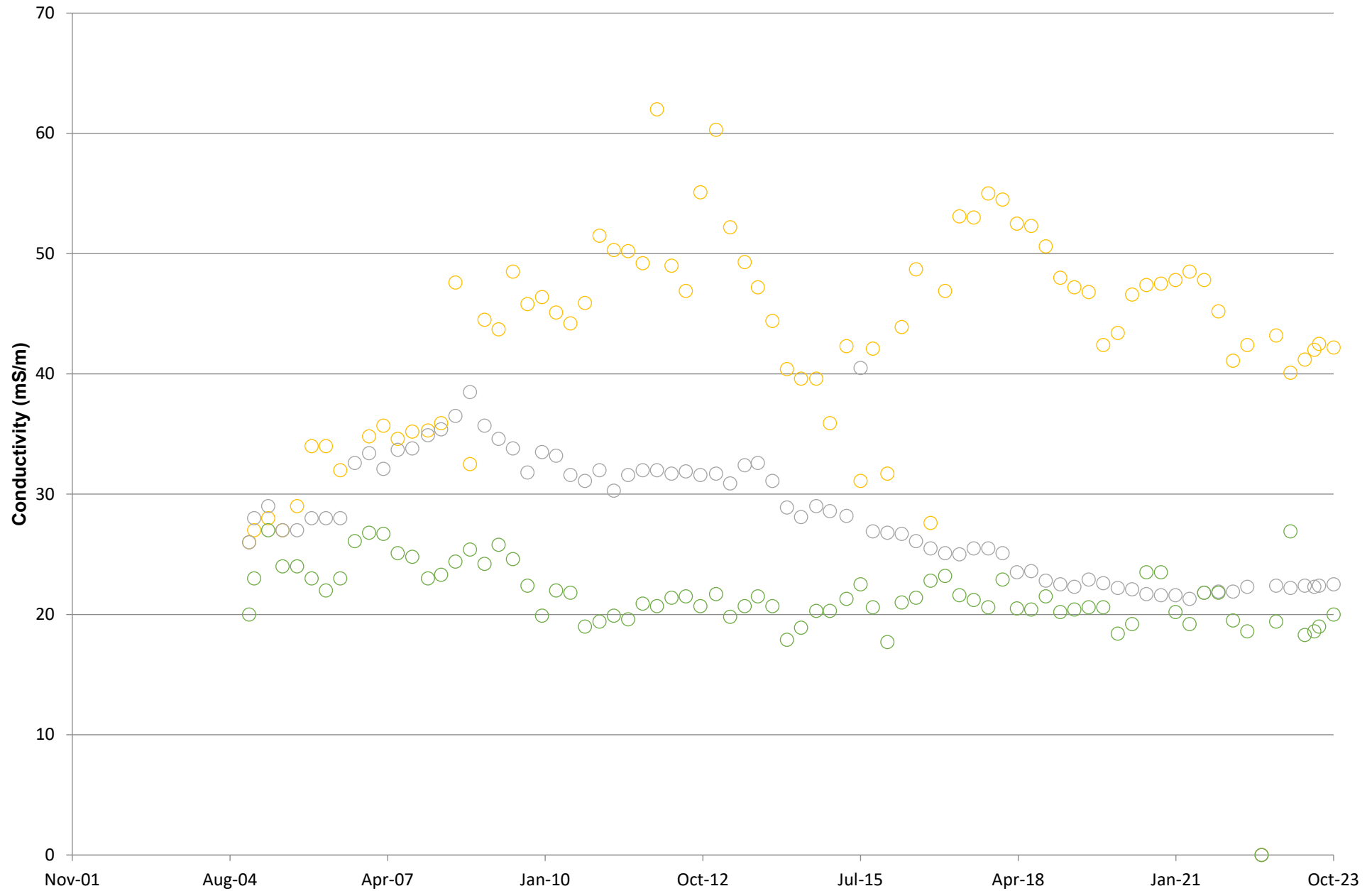


Irrigation Area - Ammoniacal-Nitrogen Concentrations

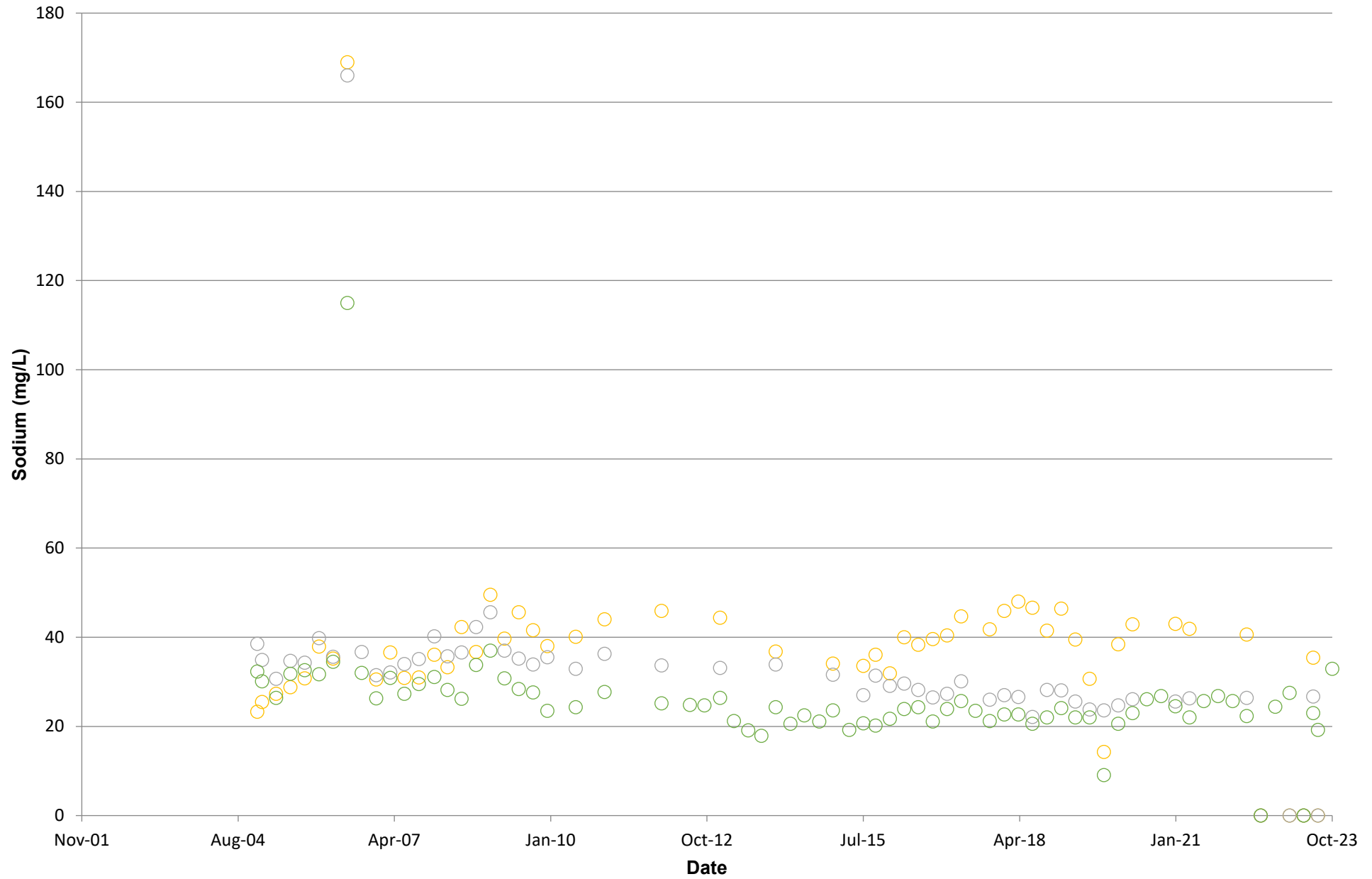
Note: Y-axis scale is Logarithmic



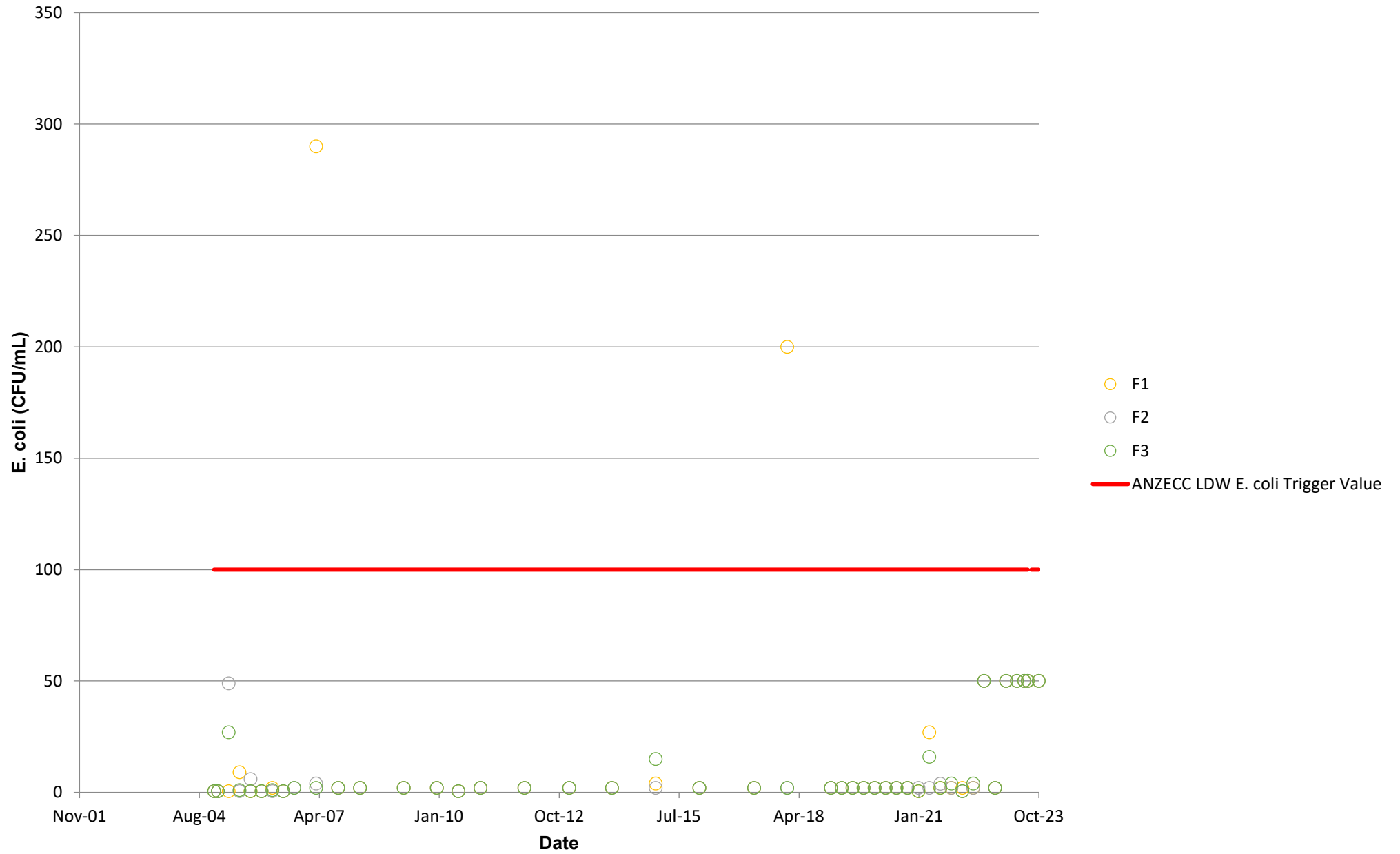
Irrigation Area - Conductivity Levels



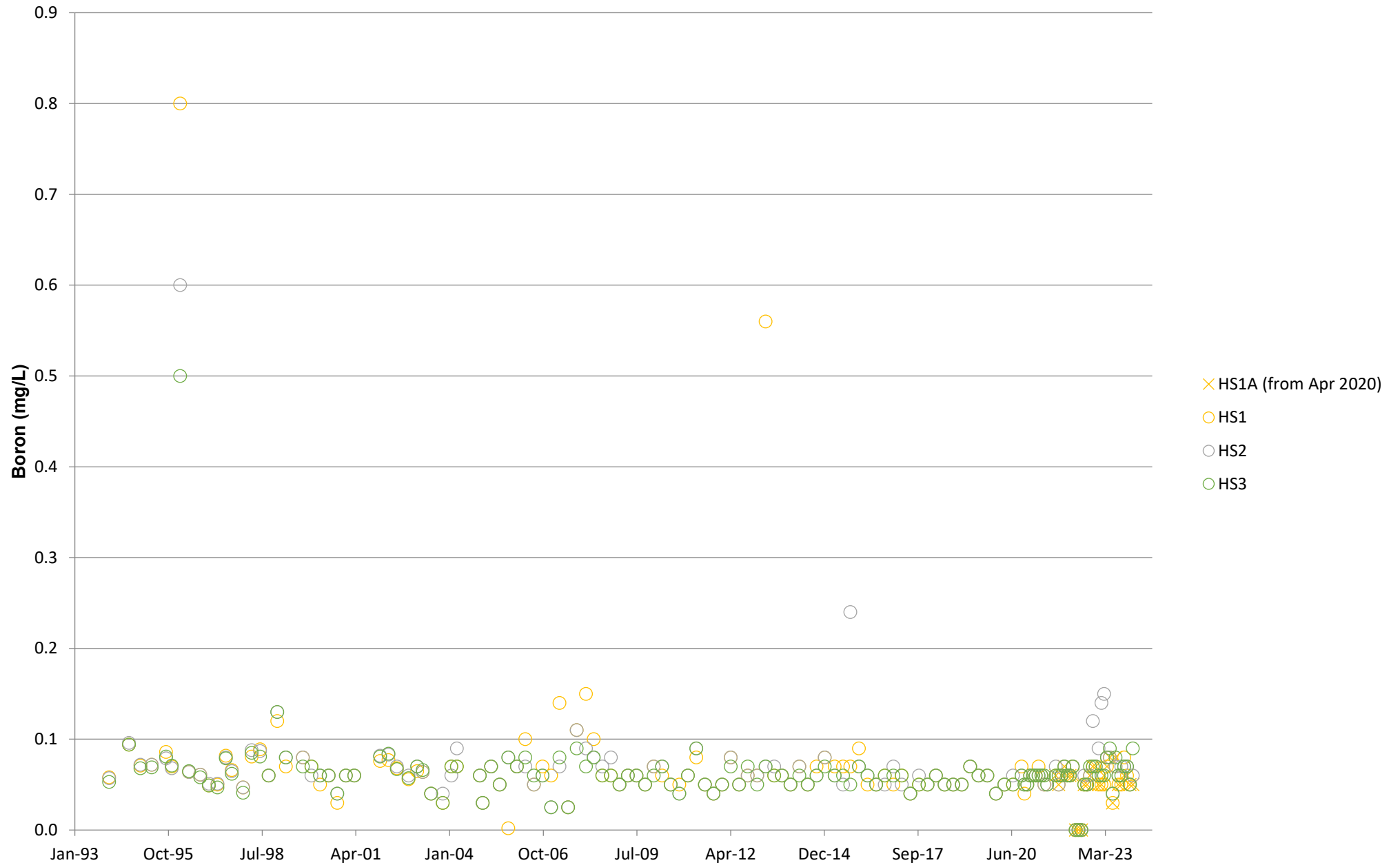
Irrigation Area - Sodium Concentrations



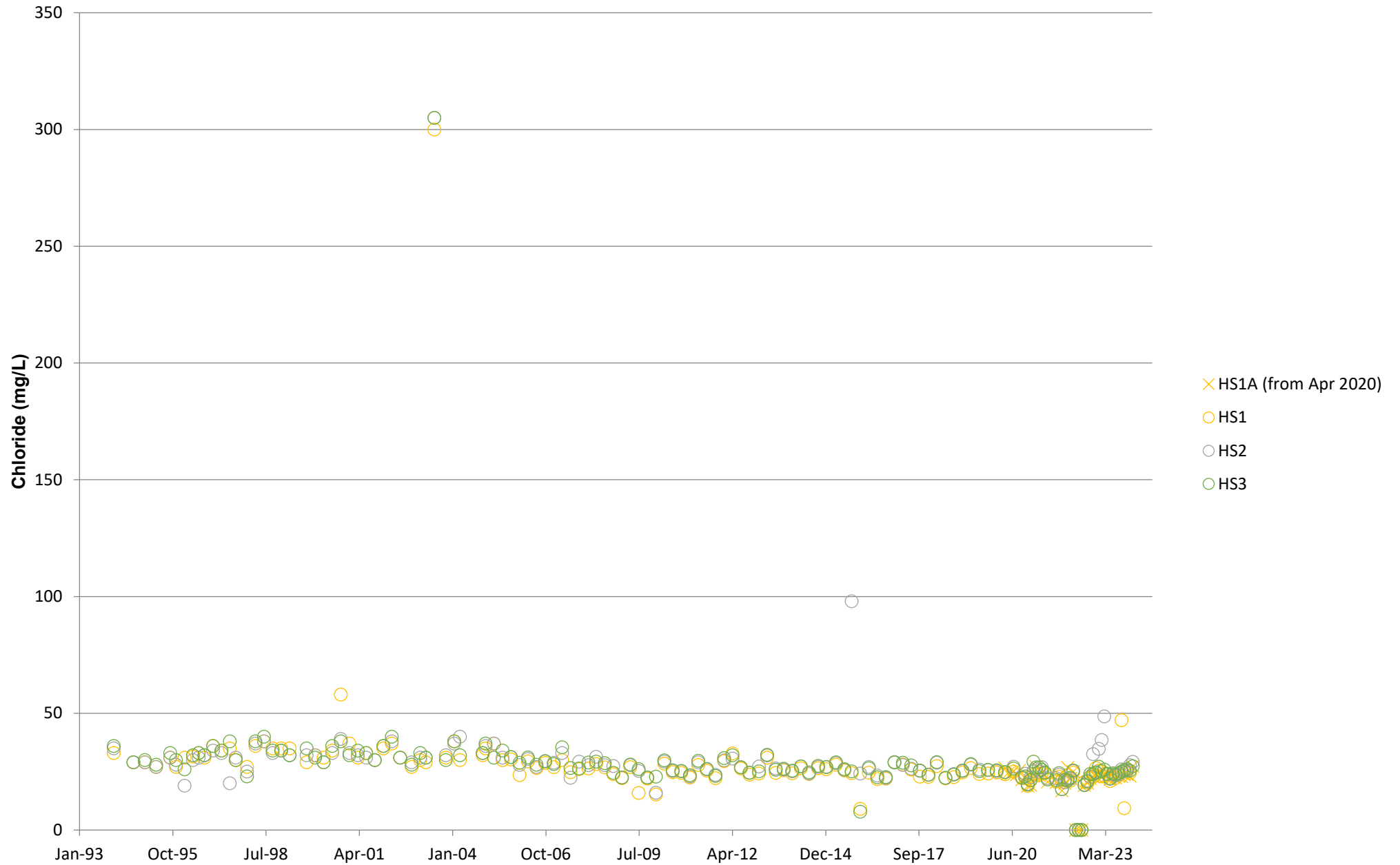
Irrigation Area - E. coli



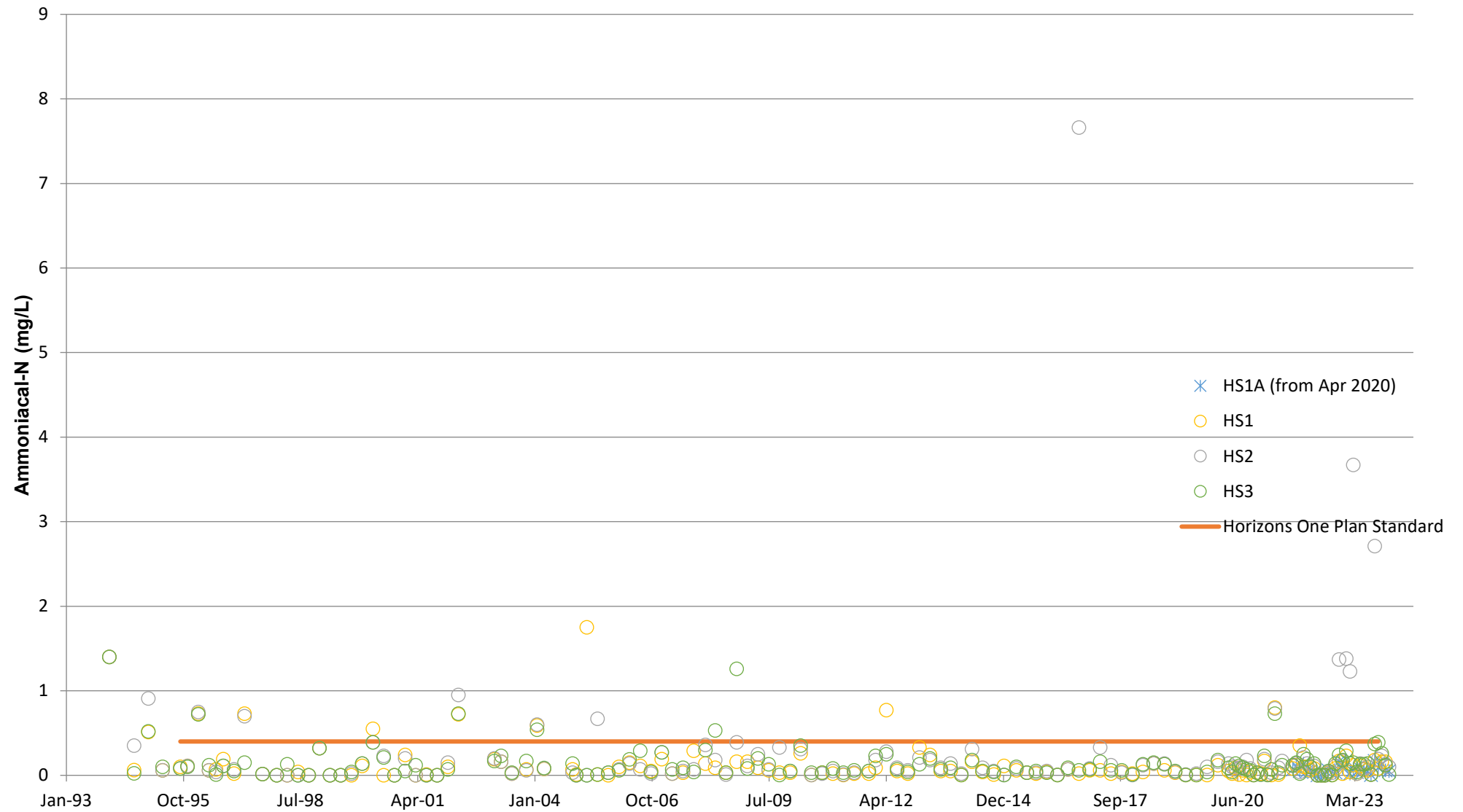
Hokio Stream - Boron Concentrations



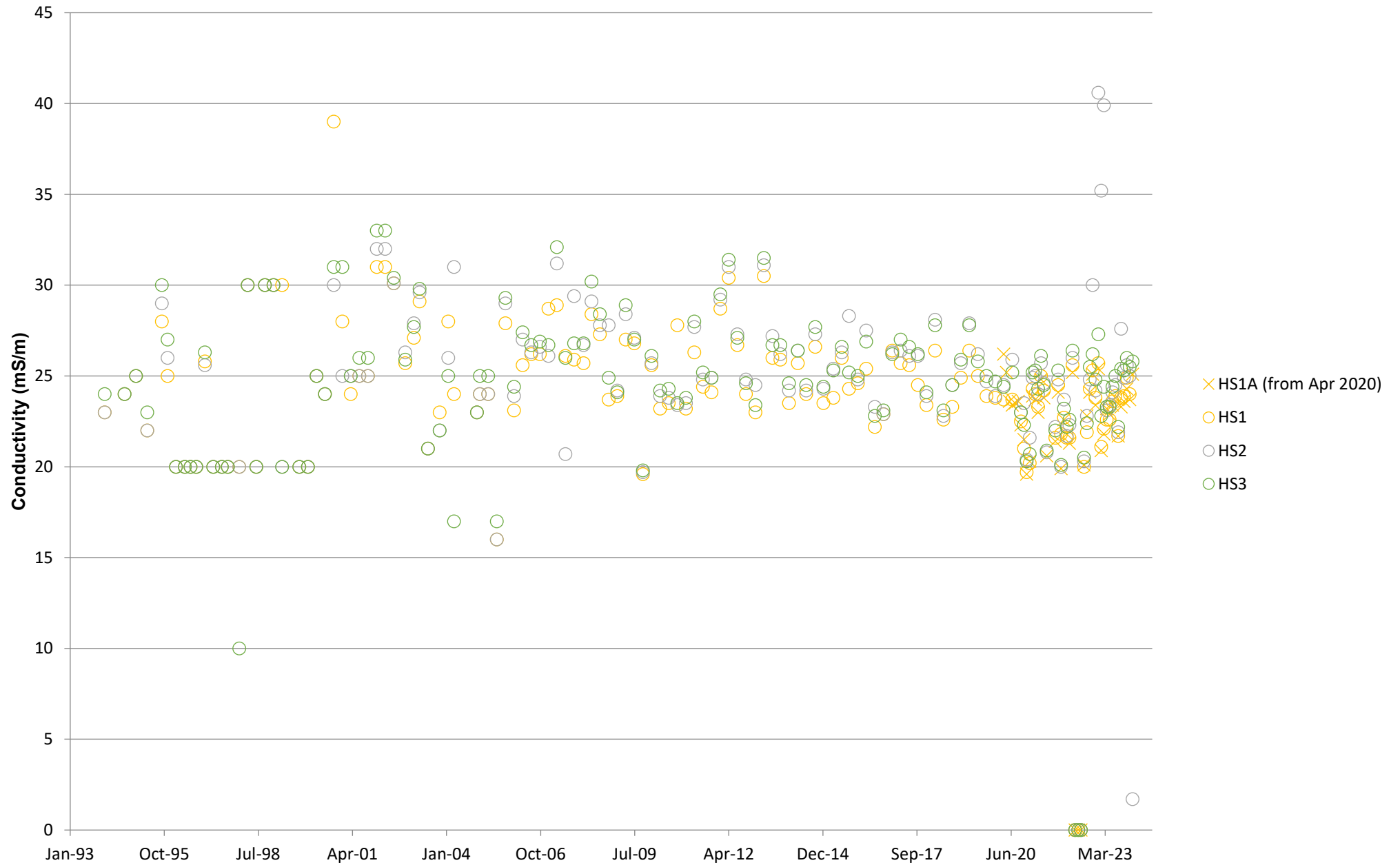
Hokio Stream - Chloride Concentrations



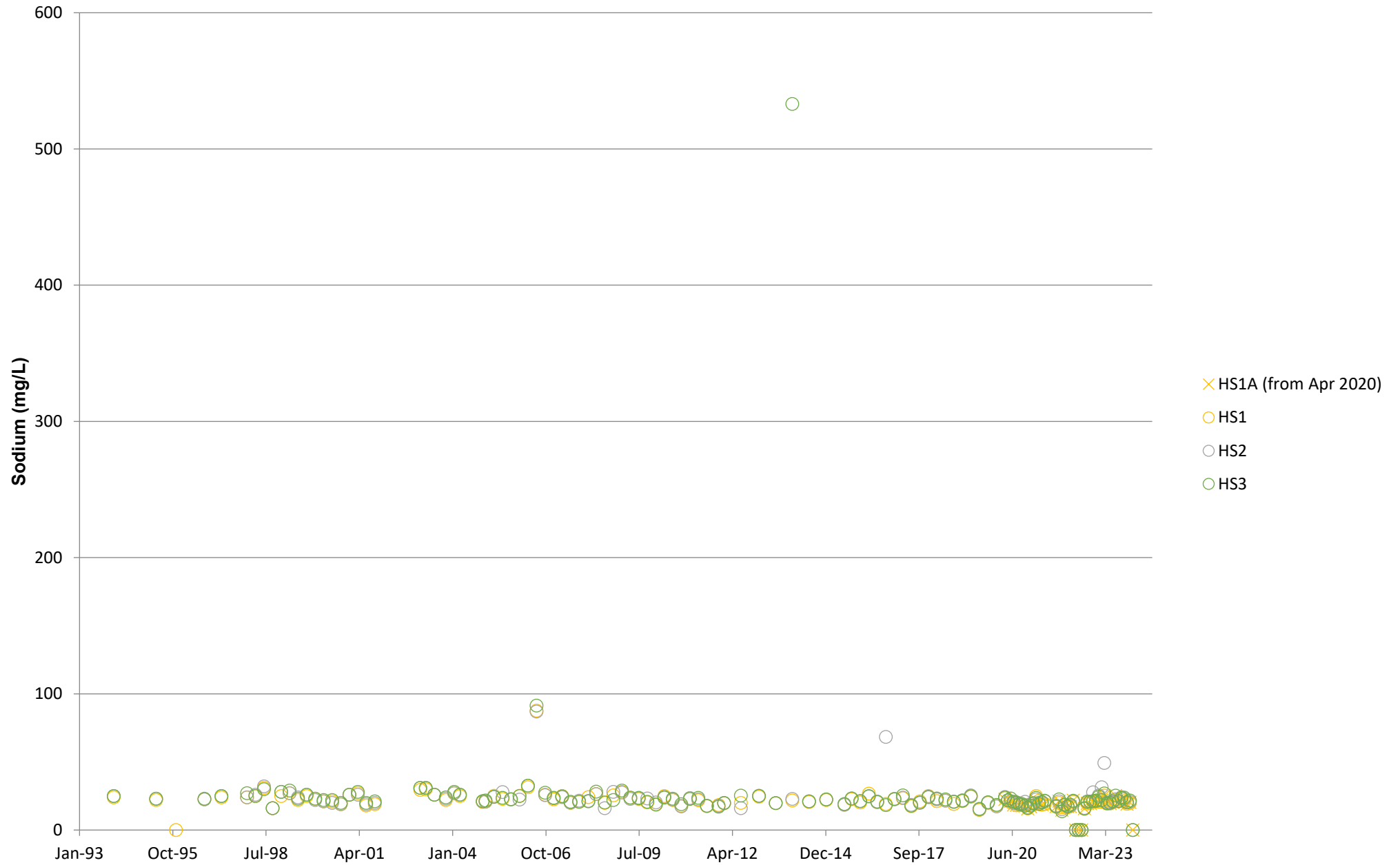
Hokio Stream - Ammoniacal-N Concentrations



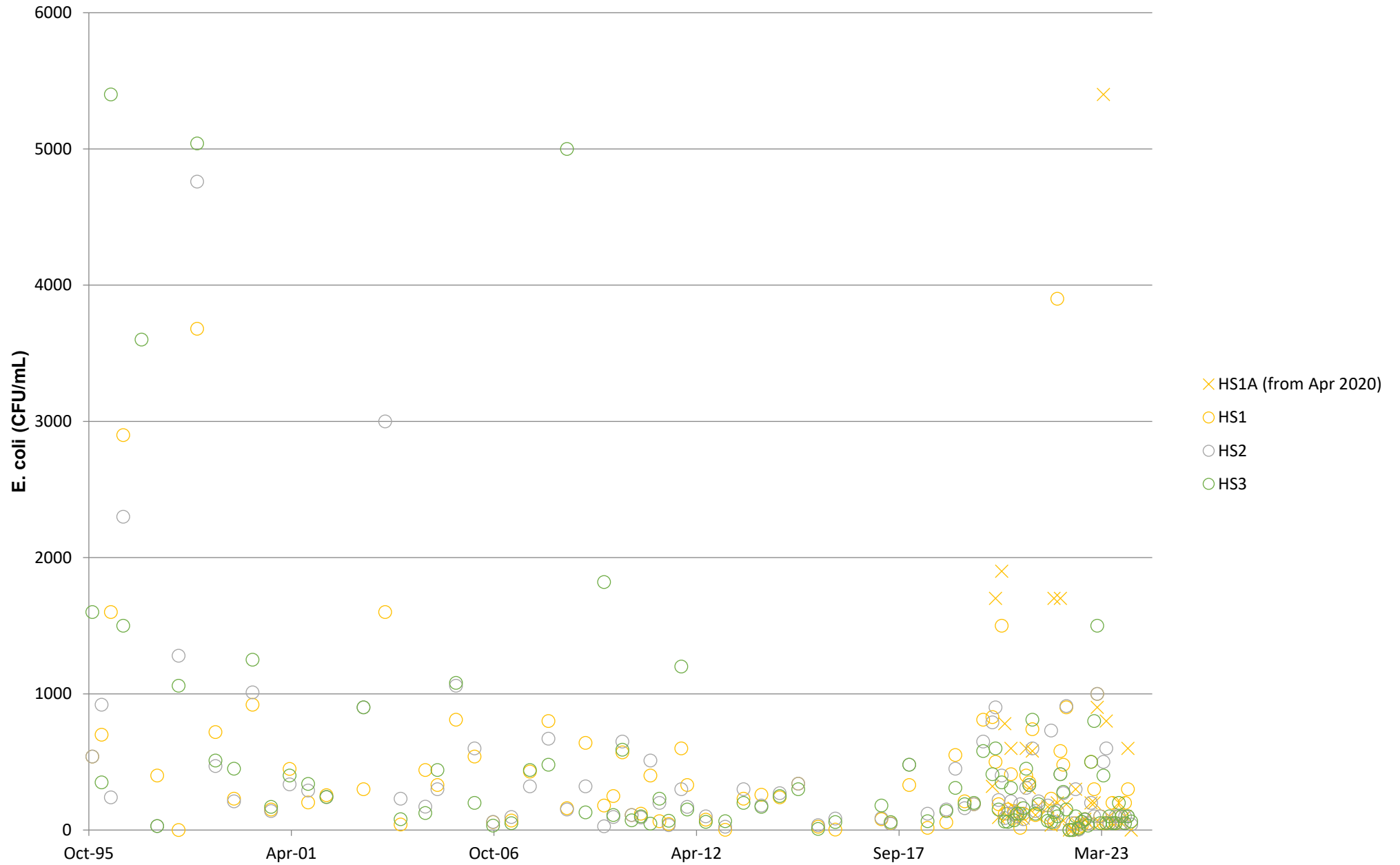
Hokio Stream - Conductivity



Hokio Stream Sodium Concentrations



Hokio Stream - E. coli



Appendix E Landfill Gas Monitoring Results at GW Bores for January 2024



Entry Date	Borehole	Methane (CH4) %	Carbon Dioxide (CO2) %	Hydrogen Sulphide (H2S) ppm	Oxygen (O2) %	Air temperature°C
2024-01-12 07:59:00	Levin Landfill: Levin Xs2	0	0.12	0	20.7	18
2024-01-12 08:10:00	Levin Landfill: Levin C1	0.01	0.12	0	20.5	19
2024-01-12 08:24:00	Levin Landfill: Levin B2	0	0.26	0	21	19
2024-01-12 08:34:00	Levin Landfill: Levin C2ds	0	0.06	0	21	19
2024-01-12 08:38:00	Levin Landfill: Levin C2dd	0	0.06	0	21	19
2024-01-12 09:00:00	Levin Landfill: Levin E2d	0.01	0.06	0	21.1	19
2024-01-12 09:08:00	Levin Landfill: Levin B3s	0.07	0.06	0	21.1	19
2024-01-12 11:28:00	Levin Landfill: Levin F1	0	0.06	0	20.5	19
2024-01-12 13:08:00	Levin Landfill: Levin Xs1	0	0.04	0	20.8	18
2024-01-12 13:18:00	Levin Landfill: Levin Xd1	0	0.05	0	20.6	20.6
2024-01-12 14:10:00	Levin Landfill: Levin D3rd	0.01	0.08	0	20.7	20
2024-01-12 14:13:00	Levin Landfill: Levin D6	0	0.09	0	20.8	19
2024-01-12 14:25:00	Levin Landfill: Levin F2	0	0.13	1	20.7	20
2024-01-12 14:32:00	Levin Landfill: Levin G1d	0	0.06	0	21.5	19
2024-01-12 14:37:00	Levin Landfill: Levin G2s	0	0.27	0	20.7	20.7
2024-01-16 08:45:00	Levin Landfill: Levin E1d	0	0.05	0	20.7	18
2024-01-16 10:30:00	Levin Landfill: Levin D1	0.07	0.07	0	20.8	18
2024-01-16 11:05:00	Levin Landfill: Levin D2	0	0.1	1	20.7	19
2024-01-16 14:15:00	Levin Landfill: Levin E1s	0	0.05	0	20.9	21
2024-01-16 14:25:00	Levin Landfill: Levin D4	0	0.04	0	20.7	21
2024-01-17 14:36:21	Levin Landfill: Levin G1s	0	0.06	0	21.5	19
2024-01-17 14:40:42	Levin Landfill: Levin D5	0	0.04	0	20.9	17
2024-01-17 14:57:55	Levin Landfill: Levin D3rs	0	0.1	1	20.5	20
2024-01-17 15:02:55	Levin Landfill: Levin E2s	0	0.06	0	21.1	19
2024-01-17 15:07:25	Levin Landfill: Levin C2	0	0.07	0	21.1	19
2024-01-17 15:09:29	Levin Landfill: Levin B1	0	0.43	0	20.9	19
2024-02-12 14:33:00	Levin Landfill: Levin F3	0	0.06	0	21	20



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

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

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