Levin Landfill October 2024 Quarterly Groundwater, Surface Water and Leachate Monitoring Report

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Table of Contents

List of Table

List of Appendices

Executive Summary

Horowhenua District Council (HDC) is required to carry out quarterly compliance monitoring of groundwater and monthly sampling at selected surface water monitoring locations at the Levin Landfill, as part of the conditions of Resource Consents ATH-2002003982.03 (formerly DP6009), ATH-2002003983.02 (formerly DP6010), ATH-2002003984.02 (formerly DP6011) and ATH-2002009801.02 (formerly DP102259). This report summarises the findings for the monitoring events from the second quarter (i.e., August 2024 to October 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 Hōkio Stream (HS1A, HS1, HS2 and HS3).

Note that this report also includes the results of a re-test conducted in November 2024 for bore Xd1.

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

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

Samples were collected from 27 groundwater bores from around Levin Landfill during October 2024. Additionally, five surface water sites plus the leachate pond manhole were each sampled during August 2024, September 2024, and October 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.

The surface water samples were all collected on the same day in each month, and groundwater samples were collected within a 2-day period in October, which also included the dates when the surface water sampling was done. Given the number of samples that needed to be taken, this is a significant effort.

However, the August 2024 surface water samples were received by the laboratory outside the normally accepted 24-hour timeframe between sampling and reception. This could affect the reliability of the results, which reduces the confidence in comparing the results with historical data. Also, three groundwater samples are recorded as taking longer than 24 hours between sampling and delivery to the laboratory.

The laboratory reports for all the October 2024 surface water samples and eight of the groundwater bores showed the recorded “Sampled Time” as being at midnight, which is assumed to be incorrect. Additionally, two surface water samples in August 2024 and one of the groundwater bores were recorded as being sampled after 22h00, which is also assumed to be incorrect. The sample time for the leachate pond outlet was not stated for the August 2024 sampling round.

These assumed errors call into question the accuracy of the recording of the sampling time on the custody sheets.

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 Australian and New Zealand Environment and Conservation Council 2000 Livestock Drinking Water (ANZECC LDW) trigger values, respectively. Compliance limits for surface water are based on the ANZECC 2000[1] default guideline values (DGV) for 95th percentile species protection for toxicants in freshwater, as required by the revised Resource Consent condition approved in December 2019.

The August 2024 to October 2024 monitoring results have been assessed against these limits, where they are applicable.

Thirty-one exceedances of resource consent trigger values were recorded across ten monitoring locations, as follows:

- *E.coli* in bore C2 (2,000 CFU/100ml) exceeded the ANZECC LDW trigger value of 100 CFU/100ml.
- pH at Xd1 was recorded as 5.1 which is an extremely low value and is well below the next lowest pH on record for all the deep aquifer wells (pH of 6.5 at C2dd). As such, its accuracy was questioned, and a re-test was requested for this parameter for bore Xd1. The additional test results yielded a pH of 8.4, which is the maximum recorded for this bore, but is still within the DWSNZ MAV.
- As occurred last quarter, *E. coli* at D3rd was tested with an incorrect detection limit of 100 CFU/100mL. Since *E.coli* was not detected, it is recorded as being *50* CFU/100mL. As such is it considered to be non-compliant.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.021 mg/L). This is characteristic of D3rd with the levels varying between 0.017 and 0.022 mg/L on all sampling occasions.
- Hardness at bore D3rd (212 mg $CaCO_3$/L) exceeded the DWSNZ MAV of 200 mg $CaCO_3$/L. This is characteristic of D3rd with the levels varying between 186 and 223 mg $CaCO_3$/L on all sampling occasions.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2dd (0.559 mg/L), E2d (0.431 mg/L), Xd1 (0.485 mg/L) and D3rd (0.531 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.
- The concentration of nitrate-N at TD1 in August 2024 (2.3 mg/L) exceeded the ANZECC Aquatic Ecosystems (AE) (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- The concentration of ammoniacal-N at TD1 in October 2024 (6.45 mg/L) exceeded the ANZECC AE (95%ile) DGV of 2.1 mg/L.
- The level of detection applied to $scBOD_5$ for TD1 in August and October 2024 was such that, even at half the detection level (i.e., 3 mg/L), the concentration exceeded the ANZECC AE (95%ile) DGV of 2 mg/L.
- Nitrate-N exceeded both the ANZECC AE (95%ile) DGV and consent trigger value of 0.16 mg/L at all Hōkio Stream sites (i.e., HS1, HS1A, HS2 and HS3) in all three months, with values ranging between 0.61 mg/L and 3.06 mg/L.
- The concentration of dissolved aluminium at HS1A in September 2024 (0.057 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.055 mg/L.
- The concentrations of dissolved copper at all Hōkio Stream sites in September 2024 (ranging between 0.0017 and 0.0018 mg/L), and at HS1A in October 2024 (0.0023 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.0014 mg/L.

[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.

The re-test sample for bore Xd1 in November 2024 yielded two further exceedances of resource consent trigger values, as follows:

- The November 2024 re-test results for bore Xd1 gave an *E.coli* result of 3 CFU/100mL, which is greater than the DWSNZ MAV of NIL. This has occurred before for this bore.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bore Xd1 (0.474 mg/L). As noted above, this is not unusual for bore Xd1.

Of the thirty-three exceedances, thirty-two are considered to be unrelated to the landfill activities as follows:

- One exceedance in the shallow aquifer is for elevated *E.coli*, considered to be on account of animal activities around the bore.
- Eight exceedances in the deep aquifer are not unusual and are related to the existing water quality.
- One exceedance in the deep aquifer is a very low pH value, considered to be an anomaly, and proven through a re-test sample.
- One exceedance in the deep aquifer is on account of an incorrect level of detection being applied for *E.coli* testing but is considered to be a non-compliance.
- One exceedance in the Northern Farm Drain is for elevated nitrate-N, most likely related to farming activities in the adjoining paddock.
- Two exceedances in the Northern Farm Drain are on account of an incorrect level of detection being applied for $scBOD_5$ testing but are considered to be non-compliances.
- Twelve exceedances in the Hōkio Stream are for elevated nitrate-N levels, which are elevated upstream. Whilst there is an increase in nitrate-N levels proceeding downstream, there is doubt that it is from landfill activities because the bores close to the “source” of the shallow groundwater contamination do not have elevated nitrate-N levels.
- Five exceedances in the Hōkio Stream are for elevated concentrations of dissolved copper. The highest levels occur upstream of the landfill property, so the upstream activities are considered to be the source.
- One exceedance in the Hōkio Stream is for elevated concentrations of dissolved aluminium. This occurs upstream of the landfill property, so the upstream activities are considered to be the source.

One exceedance for the Northern Farm Drain was on account of elevated ammoniacal-N concentrations. This could well be associated with leachate from the old landfill contaminating the shallow groundwater, and then daylighting into the Northern Farm Drain. Modelling of the plume has shown that there could also be unacceptable future impacts on the Hōkio Stream. This matter is being further assessed through the Leachate Best Practicable Option (BPO) project to which Council has committed some $1.8 million. Progress with this project has been communicated to Horizons Regional Council (HRC), the Project Management Group (PMG) and the Neighbourhood Liaison Group (NLG).

The August 2024 to October 2024 ‘background’ monitoring results were also considered in the context of relevant guidelines, both within the groundwater aquifers (shallow and deep bores) and the surface water receiving environment. Low pH and elevated iron concentrations were observed in background bore G1s, indicating that groundwater could be being impacted by up-gradient activities unrelated to the landfill operations. Because of this, bores D5, F2 and F3 have been used to represent background water quality, because of their location upstream of the new and old landfills.

Whilst the shallow groundwater downstream of the old landfill meets the resource consent trigger values for all parameters except *E.coli* at one bore, it is well documented that leachate from the old landfill is extending in a plume northward and is impacting the quality of the shallow aquifer. As noted above modelling of the plume has shown that there could be unacceptable future impacts on the Hōkio Stream and is being dealt with through the Leachate BPO project.

Methane was detected in twenty bores in October 2024, with readings varying between 0.01% and 0.11%. The large increase in the number of bores in which methane was detected may be a result of a change being made in the gas detection equipment being used. The maximum concentration methane reported is well below the explosive limit of 5%, and therefore represents 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 0.35% at bore G2S. Hydrogen sulphide was not detected at any of the bores.

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.

There were ten 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. Eight 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.

The following recommendations are made, based on the results of this reporting period:

- Sampling times for some surface water and groundwater samples are recorded in the laboratory sheets as being late at night, and at midnight, which is assumed to be incorrect and calls into question the accuracy of the information on the custody sheets. This is a matter that needs to be discussed with the parties undertaking sampling.
- HDC should discuss with HRC the need for a further two rounds of comprehensive testing of bores D3rs and D3rd, given that out of the 14 sampling events conducted since they were installed in October 2021, comprehensive testing has been done on 12 occasions.
- Nitrate-N levels at D6 were less than the maximum value recorded last monitoring round, and the value recorded for conductivity also reduced somewhat. Nevertheless, whilst all levels are below the ANZECC LDW trigger values, it is a matter to keep a check on and may merit an assessment in the future to try and identify the cause.
- The detection limits for the deep aquifer bores for *E.coli* must be set at the most accurate level available, which is understood to be 1 CFU/100ml. This is a matter that needs to be discussed with the parties involved in requesting sampling and undertaking the laboratory testing.
- Similarly, the ANZECC AE DGV (95%ile species protection) for scBOD5 is 2 mg/L. So, the level of detection to be applied to the surface water samples must be set at a level where half the detection limit is less than the DGV of 2 mg/L. As for the above, this is a matter that needs to be discussed with the parties involved in requesting sampling and undertaking the laboratory testing.
- Consecutive monthly sampling has occurred at all Hōkio Stream sites since October 2021. HDC has had these results assessed, as required by the conditions of the consent, to determine their significance. HDC should discuss the results of this assessment with HRC to ascertain if a reduction in sampling frequency of the surface water monitoring locations can be made.
- Gas sampling of the bores has been recorded on days different from when the groundwater sampling was undertaken. In future, the gas sampling needs to be done when groundwater samples are taken, as required by the resource consent conditions.

Acronyms / Abbreviations

Acronym / Abbreviation	Full Name
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZECC AE	ANZECC Guidelines for Fresh and Marine Water Quality - Aquatic Ecosystems
ANZECC LDW	ANZECC 2000 Livestock Drinking Water
BPO	Best Practicable Option
CFU	Colony-forming unit
COD	Chemical Oxygen Demand
DGV	Default guideline value
DWSNZ	Drinking Water Standards for New Zealand
DWSNZ GV	Drinking Water Standards for New Zealand - Guideline Values for aesthetic determinants
DWSNZ MAV	Drinking Water Standards for New Zealand – Maximum Acceptable Values
HDC	Horowhenua District Council
HRC	Horizons Regional Council
mbgl	Metres below ground level
NLG	Neighbourhood Liaison Group
PMG	Project Management Group
$scBOD_5$	Soluble carbonaceous Biochemical Oxygen Demand (5-day)
WWTP	Wastewater Treatment Plant

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 Hōkio 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. The new landfill footprint was developed in stages. The current landfill has reached capacity and has been capped with a permanent clay capping (0.7 m thick) on all sides.

The Levin Landfill site is located above two identified aquifers, a shallow sand aquifer and a deeper gravel aquifer, which are separated by an aquiclude. 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. There is also an upward flow gradient from the deep aquifer to the shallow aquifer. Horizons Regional Council (HRC) hydrology staff advises that "*the general confined groundwater flow direction is towards the west*" (i.e., from the ranges to the coast). 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 current consent conditions.

This report presents the results for the August 2024 - October 2024 quarterly monitoring period.

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

2 Groundwater and Surface Water Monitoring

2.1 Sample Analyses

Surface water samples were collected by Downer (a contractor to HDC) on 6 August 2024, 12 September 2024, and 09 October 2024, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. The recorded timeframe between sample collection and laboratory reception varied between 9 and 41 hours, with all the samples in August 2024 being delivered later than 24 hours after sampling. Additionally, the laboratory sheets showed all the October 2024 samples being taken at midnight, which is clearly incorrect, and being delivered to the laboratory by 13h35 the following day. In August 2024, two of the samples are recorded as being taken at 22h10 and 22h30, which is assumed to be incorrect, and no sample time is stated on the August 2024 sampling from the leachate pond outlet.

Groundwater samples were collected by Downer on 9 and 10 October 2024, with the samples being received by the Eurofins ELS Ltd laboratory in Lower Hutt, Wellington. All the laboratory sheets, except for three (viz., C2, C2ds and Xs2), recorded a time of less than 24 hours between the sample being taken and it being accepted at the laboratory. However, eight of the laboratory sheets recorded the sampling time at midnight, which is clearly incorrect, and bore Xs2 is recorded as being sampled at 22h17, which is also assumed to be incorrect.

These assumed errors call into question the accuracy of the recording of the sampling time on the custody sheets and is a matter that needs to be discussed with the parties undertaking sampling.

The monitoring schedule for July 2023 - April 2026 is summarised in Appendix C. From July 2019, *E. coli* counts analyses have been included within the indicator and comprehensive analytical suites, as agreed by HDC with 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 were analysed for the indicator list of parameters which is outlined in Table 2-1. Surface water samples from Hōkio Stream, the Northern Farm Drain and the manhole next to the leachate pond, were analysed for the comprehensive list 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 ($scBOD_5$) and soluble mercury have each been added to the indicator and comprehensive suites of parameters, and *E. coli* added to the comprehensive suite of parameters. The $scBOD_5$ and *E. coli* parameters replace BOD_5 and faecal coliforms, respectively. Monitoring of these additional parameters began with the April 2020 sampling round.

Table 2-1: Test Parameters

Type	Indicator Parameters	Comprehensive Parameters
Physico-chemical characteristics	pH, Electrical Conductivity	pH, Electrical Conductivity, Alkalinity, Total Hardness, Suspended Solids
Oxygen demand	Chemical Oxygen Demand (COD), $scBOD_5$**	COD, $scBOD_5$**
Nutrients*	Nitrate nitrogen, Ammoniacal-nitrogen	Nitrate nitrogen, Ammoniacal-nitrogen, Dissolved Reactive Phosphorus, Sulphate
Metals*	Aluminium, Manganese, Nickel, Lead, Mercury**	Aluminium, Arsenic, Cadmium, Chromium, Copper, Iron***, Magnesium, Manganese, Nickel, Lead, Zinc, Mercury**
Other elements	Boron, Chloride	Boron, Calcium, Chloride, Potassium, Sodium***
Biological+	*E. coli*	*E. coli*
Organics	Not required	Total organic carbon, total phenols, volatile acids

** $scBOD_5$ and soluble mercury added as per revised consent conditions for Discharge Permit ATH-2002003983.02, December 2019.

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

+ *E.coli* added from December 2019 onwards, with first sampling in April 2020 (see Appendix C).

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 up-gradient from the landfill site is not subject to any consent conditions. However, for comparison purposes, both the Australian and New Zealand Environment and Conservation Council 2000 Livestock Drinking Water (ANZECC LDW) trigger values and the Drinking Water Standards for New Zealand (DWSNZ) guidelines are regularly used to benchmark the quality of water up-gradient from the landfill site.

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

The results for the October 2024 monitoring round are presented in Table 2-2.

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

- pH (6.7) was below the lower DWSNZ limit of 7.0.
- Dissolved iron (1.68 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 is different between sites – 1 CFU/100mL at G1d and 100 CFU/100mL at the other bores, because different guidelines apply to the shallow and deep aquifer bores. While the DWSNZ Maximum Acceptable Value (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 appropriate for the other bores, 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 was reviewed as part of the Annual Report, with the recommendation that bores F2, F3 and D5 be used as the primary background reference bores for shallow groundwater.

Table 2-2: Background Monitoring Results for October 2024

Determinant	Units	DWSNZ MAV	ANZECC LDW	G1s	G1d	D5	F2	F3
Sampling date				09/10/24	09/10/24	09/10/24	09/10/24	09/10/24
Water Level	mbgl	-	-	14.24	14.71	10.08	3.00	5.38
pH	pH units	7 to 8.5*	6 to 9	**6.7**	7.2	7.2	7.2	7.3
Conductivity	mS/m	-	-	29.6	25.2	30.4	22.6	16.4
COD	mg/L	-	-	58	*7.5*	*7.5*	*7.5*	*7.5*
$scBOD_5$	mg/L	-	-	*1.5*	*1.5*	*0.5*	1	*0.5*
E. coli	CFU/100ml	NIL	100	*50*	*0.5*	*50*	*50*	*50*
Chloride	mg/L	250*	-	44.2	27.4	29.8	22.9	12.7
Nitrate-N	mg/L	11.3	90.3	*0.005*	*0.005*	1.03	0.69	2.31
Ammoniacal-N	mg/L	1.17	-	*0.005*	0.08	0.02	*0.005*	*0.005*
Sodium	mg/L	200*	-	37	n/r	n/r	n/r	21
Dissolved Aluminium	mg/L	0.1*	5	0.059	*0.001*	*0.001*	*0.001*	*0.001*
Dissolved Boron	mg/L	1.4	5	0.03	0.042	0.046	0.039	0.028
Dissolved Iron	mg/L	0.2*	-	**1.68**	n/r	n/r	n/r	*0.0025*
Dissolved Lead	mg/L	0.01	0.1	0.0005	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	0.4	-	0.0373	0.0608	0.0055	0.0026	*0.00025*
Dissolved Mercury	mg/L	-	0.002	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.08	1	0.001	*0.00025*	*0.00025*	*0.00025*	*0.00025*

Notes: *denotes guideline values for aesthetic determinants (GV)
All `<' values have been reported as half the detection limit for statistical purposes and are *expressed in italics*
Values which exceeded the DWSNZ MAV are shown in **bold**
ND – not detected n/r – not required

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. Since October 2021, bores D3rd and D3rs have been sampled 14 times, and on 12 of those occasions the testing has been for the comprehensive suite of parameters. Because testing has been done twice for the indicator suite (i.e., in July 2022 and April 2023), two continuous years of comprehensive testing has yet to be done. It is recommended that HDC discusses this matter with HRC to determine if the sampling regime can revert to the “normal” regime, without having to continue with the comprehensive sampling for another two rounds.

The results from the October 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 B and the historical graphs are presented in Appendix D.

There were **no exceedances of the resource consent conditions** during the quarterly (October 2024) monitoring round in samples from the shallow aquifer down-gradient of the new landfill.

However, it is noted that the nitrate-N levels at D6 remain elevated at 41.4 mg/L, which is less than last round’s maximum level of 54.1 mg/L but is still elevated. Likewise, conductivity was at 60.3 mS/m, down from the maximum value of 75.3 mS/m. Whilst all levels are below the ANZECC LDW trigger values, it is a matter to keep a check on and may merit an assessment in the future to try and identify the cause. In the past this was explained because of the presence of nitrogen fixing gorse plants. To reiterate what was reported previously, a website search indicated that it has been recorded that pine trees can also accumulate nitrogen in the soil, so it is possible that the groundwater around bore D6 has been affected by the nearby pine trees.

Table 2-3: D-Series and E1s Monitoring Bore Results for October 2024

Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1s
Sampling date			09/10/24	09/10/24	09/10/24	09/10/24	09/10/24	09/10/24	09/10/24
Water Level	mbgl	-	16.77	21.43	6.09	8.16	10.08	16.35	11.37
pH	pH units	6 to 9	6.5	6.3	6.3	7.0	7.2	6.7	7.0
Suspended Solids	mg/l	-	n/r	n/r	*3*	n/r	n/r	n/r	n/r
Phenol	mg/l	-	n/r	n/r	*0.005*	n/r	n/r	n/r	n/r
VFA	mg/l	-	n/r	n/r	*2.5*	n/r	n/r	n/r	n/r
TOC	mg/L	-	n/r	n/r	18.2	n/r	n/r	n/r	n/r
Alkalinity	mg $CaCO_3$/L	-	n/r	n/r	88	n/r	n/r	n/r	n/r
Conductivity	mS/m	-	51.9	79.6	23.5	28.8	30.4	60.3	24.3
COD	mg/L	-	*7.5*	47	52	*7.5*	*7.5*	*7.5*	*7.5*
$scBOD_5$	mg/L	-	*0.5*	3	*1.5*	*1.5*	*0.5*	*0.5*	*1.5*
E. coli	CFU/100ml	100	*50*	*50*	*50*	*50*	*50*	*50*	*50*
Chloride	mg/L	-	29.3	109	17.4	31.1	29.8	45.5	27.2
Nitrate-N	mg/L	90.3	5.96	*0.005*	*0.005*	*0.005*	1.03	41.4	*0.005*
Sulphate	mg/L	1000	n/r	n/r	2.23	n/r	n/r	n/r	n/r
Ammoniacal-N	mg/L	-	0.03	0.76	0.65	0.23	0.02	*0.005*	0.16
Hardness	mg $CaCO_3$/L	-	n/r	n/r	51	n/r	n/r	n/r	n/r
Calcium	mg/L	1000	n/r	n/r	11.5	n/r	n/r	n/r	n/r
Magnesium	mg/L	-	n/r	n/r	5.37	n/r	n/r	n/r	n/r
Potassium	mg/L	-	n/r	n/r	3.97	n/r	n/r	n/r	n/r
Sodium	mg/L	-	n/r	63.5	22.5	27.4	n/r	n/r	26.3
D.R. Phosphorus	mg/L	-	n/r	n/r	0.183	n/r	n/r	n/r	n/r

Determinant	Units	ANZECC LDW	D1	D2	D3rs	D4	D5	D6	E1s
Dissolved Aluminium	mg/L	5	*0.001*	0.003	0.044	0.004	*0.001*	*0.001*	0.005
Dissolved Arsenic	mg/L	0.5	n/r	n/r	*0.0005*	n/r	n/r	n/r	n/r
Dissolved Boron	mg/L	5	0.058	0.051	0.041	0.034	0.046	0.075	0.03
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	0.002	n/r	n/r	n/r	n/r
Dissolved Copper	mg/L	0.4	n/r	n/r	*0.00025*	n/r	n/r	n/r	n/r
Dissolved Iron	mg/L	-	n/r	24.1	11.8	4.46	n/r	n/r	4.04
Dissolved Lead	mg/L	0.1	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	*0.00025*	0.84	0.385	0.228	0.0055	*0.00025*	0.186
Dissolved Mercury	mg/L	0.002	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	1	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Zinc	mg/L	20	n/r	n/r	*0.001*	n/r	n/r	n/r	n/r

Notes:

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

n/r – not require

2.3.2 Deep Gravel Aquifer

Bores E1d, C2dd, E2dE2d, Xd1, and the new replacement bore D3rd all penetrate the deeper gravel aquifer. Deep groundwater flow at the site is assumed to be towards the northwest (as opposed to the regional flow which is towards the west – see section 1).

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 down-gradient of the old landfill.

Results for the quarterly (October 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 B 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 October 2024 monitoring round, and **two exceedances of the DWSNZ limits** for the November re-test sample of bore Xd1, as follows:

- pH at Xd1 was recorded as 5.1 which is an extremely low value and is well below the next lowest pH on record for all the deep aquifer wells (pH of 6.5 at C2dd). As such, its accuracy was questioned, and a re-test was requested for this parameter for bore Xd1. The re-test yielded a pH result of 8.4, which is the maximum recorded for this bore, but is still within the DWSNZ MAVs.
- As occurred last quarter, *E. coli* at D3rd was tested with an incorrect detection limit of 100 CFU/100mL. Since *E.coli* was not detected, it is recorded as being *50* CFU/100mL. As such is it considered to be non-compliant.
- The November 2024 re-test results for bore Xd1 gave an *E.coli* result of 3 CFU/100mL, which is greater than the DWSNZ MAV of NIL. This has occurred before for this bore.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.021 mg/L). This is characteristic of D3rd with the levels varying between 0.017 and 0.022 mg/L on all sampling occasions.
- Hardness at bore D3rd (212 mg $CaCO_3$/L) exceeded the DWSNZ MAV of 200 mg $CaCO_3$/L. This is characteristic of D3rd with the levels varying between 186 and 223 mg $CaCO_3$/L on all sampling occasions.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2dd (0.559 mg/L), E2d (0.431 mg/L), Xd1 (0.485 mg/L and 0.474 mg/L for the re-test sample) and D3rd (0.531 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.

The very low pH value at bore Xd1 is considered an anomaly, since it is well below the lowest pH value recorded at any of the deep aquifer bores, ever since monitoring started in September 1997. It is also most unlikely to be on account of landfill activities, since even the lowest pH value recorded for the landfill leachate is 6.8. The re-test sample gave a pH value of 8.4.

The deep aquifer bores occasionally have *E.coli* results that exceed the DWSNZ MAV of NIL CFU/100ml. Testing for *E.coli* for the deep aquifer bores requires that the lowest level of detection be applied in the laboratory testing, which is 1 CFU/100ml. However, the wrong test is occasionally applied

which has a detection limit applicable to the shallow aquifer (viz., 100 CFU/100ml). This is what has been done for bore D3rd and since *E.coli* was not detected, it has to be recorded as being half the detection limit, which is 50 CFU/100ml. This represents a non-compliance and is an issue that must be taken up with the laboratory.

E.coli levels in bore Xd1 have been elevated previously, so this is not an unusual occurrence. It was acceptable in October 2024, but the November 2024 re-test sample yielded a value of 3 CFU/100mL.

The quality of the groundwater is such that concentrations of some parameters for certain groundwater bores, regularly exceed the trigger values. This is true for elevated manganese values in four of the deep aquifer bores (C2dd, E2d, Xd1 and D3rd).

It is also true for arsenic concentration measured in bore D3rd, which has always been elevated. This is not related to poor shallow water quality because bore D3rd is nested with bore D3rs, and that bore has consistent levels of arsenic below the trigger value.

Similarly, hardness levels in bore D3rd have often been elevated, whereas they are not elevated in bore D3rs, nor are they elevated in the other deep aquifer bores. It appears to be a characteristic of the water quality at D3rd.

The deep aquifer is separated from the shallow aquifer by an aquiclude, which is a layer of low permeability material that acts as a barrier between the two aquifers. Additionally, there is an up-gradient flow from the deep aquifer to the shallow aquifer, which will prevent contamination of the deep aquifer from overlying groundwater.

So, six of the exceedances for the deep aquifer bores (i.e., last three bullet points) are not unusual and are extremely unlikely to be related to landfill activities, particularly because of the environmental setting.

One exceedance is on account of incorrect level of detection being applied for *E.coli* and is considered a non-compliance.

The exceedance for low pH at bore Xd1 is considered to be an anomaly unrelated to landfill activities.

Table 2-4: Results for Monitoring Bores within the Deep Aquifer for October 2024 and November 2024 (for bore Xd1)

Determinant	Units	DWSNZ MAV	E1d	C2dd	E2d	Xd1	Xd1 Duplicate	D3rd
Sampling date			09/10/24	10/10/24	09/10/24	10/10/24	01/11/24	09/10/24
Water Level	mbgl	-	11.24	2.675	4.69	2.84	n/r	6.42
pH	pH units	7 to 8.5*	7.5	7.7	7.3	**5.1**	8.4	7.6
Suspended Solids	mg/l	-	n/r	n/r	n/r	n/r	n/r	37
Phenol	mg/l	-	n/r	n/r	n/r	n/r	n/r	*0.005*
VFA	mg/l	-	n/r	n/r	n/r	n/r	n/r	*2.5*
TOC	mg/L	-	n/r	n/r	n/r	n/r	n/r	5.9
Alkalinity	mg $CaCO_3$/L	-	n/r	228	n/r	n/r	n/r	224
Conductivity	mS/m	-	43.3	56.2	44.1	53.5	53.3	53.2

Determinant	Units	DWSNZ MAV	E1d	C2dd	E2d	Xd1	Xd1 Duplicate	D3rd
COD	mg/L	-	*7.5*	24	*7.5*	21	*7.5*	*7.5*
scBOD$_5$	mg/L	-	*0.5*	*1.5*	*0.5*	*1.5*	*0.5*	*0.5*
E. coli	CFU/100ml	NIL	*0.5*	*0.5*	*0.5*	*0.5*	**3**	***50***
Chloride	mg/L	250*	40.2	40.6	41.4	59.6	58.5	38.3
Nitrate-N	mg/L	11.3	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
Sulphate	mg/L	250*	n/r	*0.01*	n/r	n/r	n/r	*0.01*
Ammoniacal-N	mg/L	1.17	0.2	0.36	0.25	0.37	0.38	0.37
Hardness	mg $CaCO_3$/L	200*	n/r	n/r	n/r	n/r	n/r	**212**
Calcium	mg/L	-	n/r	n/r	n/r	n/r	n/r	62.3
Magnesium	mg/L	-	n/r	n/r	n/r	n/r	n/r	13.8
Potassium	mg/L	-	n/r	n/r	n/r	n/r	n/r	7.58
Sodium	mg/L	200*	29.2	n/r	n/r	n/r	n/r	27.3
D.R. Phosphorus	mg/L	-	n/r	n/r	n/r	n/r	n/r	1.24
Dissolved Aluminium	mg/L	0.1*	*0.001*	*0.001*	*0.001*	*0.001*	0.002	*0.001*
Dissolved Arsenic	mg/L	0.01	n/r	n/r	n/r	n/r	n/r	**0.021**
Dissolved Boron	mg/L	1.4	0.063	0.075	0.064	0.049	0.069	0.055
Dissolved Cadmium	mg/L	0.004	n/r	n/r	n/r	n/r	n/r	*0.0001*
Dissolved Chromium (VI)	mg/L	0.05	n/r	n/r	n/r	n/r	n/r	*0.0005*
Dissolved Copper	mg/L	2	n/r	n/r	n/r	n/r	n/r	*0.00025*
Dissolved Iron	mg/L	0.2*	0.055	n/r	n/r	n/r	n/r	0.014
Dissolved Lead	mg/L	0.01	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	0.4	0.211	**0.559**	**0.431**	**0.485**	**0.474**	**0.531**
Dissolved Mercury	mg/L	-	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.08	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Zinc	mg/L	1.5*	n/r	n/r	n/r	n/r	n/r	0.001

Notes:

*Denotes DWSNZ GV

Bold – denotes an exceedance of the DWSNZ MAV

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

n/r – not required

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 Hōkio 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 Hōkio Road and the entrance road to the landfill.

Bores Xs1 and Xs2 are located along Hōkio 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 (October 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 B and the historical graphs are presented in Appendix D.

There was **one exceedance** of the ANZECC LDW trigger values for the shallow boreholes down-gradient of the old landfill during the October 2024 monitoring round. This was for *E.coli* in bore C2 (2,000 CFU/100ml) which exceeded the ANZECC LDW trigger value of 100 CFU/100ml.

E.coli has not been detected at Bore C2 at a level greater than 100 CFU/100ml for the past six monitoring rounds. Additionally, shallow aquifer bores close to bore C2 (e.g., bores C2ds and B3) did not detect *E.coli* this monitoring round. So, it is suspected that animal activities close to bore C2 have caused the elevated levels of *E.coli* this monitoring round, and it is not related to landfill activities.

Whilst the shallow groundwater downstream of the old landfill meets the resource consent trigger values for all parameters except *E.coli* at one bore, it is well documented that leachate from the old landfill is extending in a plume northward and is impacting the quality of the shallow aquifer. Modelling of the plume has shown that there could be unacceptable future impacts on the Hōkio Stream. This matter is being addressed through the Leachate Best Practicable Option (BPO) project to which HDC has committed some $1.8 million. Progress with that project is being communicated to relevant parties, such as the HRC, Project Management Group (PMG) and Neighborhood Liaison Group (NLG).

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

Determinant	Units	ANZECC LDW	E2s	B1	B2	B3s	C1	C2	C2ds	G2S	Xs1	Xs2
Sampling date			09/10/24	10/10/24	10/10/24	10/10/24	09/10/24	09/10/24	09/10/24	09/10/24	10/10/24	09/10/24
Water level	mbgl	-		0.935	1.26	0.15	0.85	0.375	2.65	2.05	0.2	2.03
pH	pH units	6 to 9	7.5	7.4	6.9	7.3	6.9	7.0	6.9	7.2	7.0	6.7
Alkalinity	mg $CaCO_3$/L	-	n/r	n/r	1,240	1,210	n/r	1,620	736	n/r	n/r	n/r
Conductivity	mS/m	-	33.4	191	249	264	115	361	159	104	105	29.5
COD	mg/L	-	*7.5*	231	128	438	131	463	87	35	130	*7.5*
scBOD5	mg/L	-	*0.5*	*3*	*3*	*3*	*1.5*	*3*	*3*	*1.5*	*3*	*0.5*
E. coli	CFU/100ml	100	*50*	*50*	*50*	*50*	*50*	**2,000**	*50*	*50*	*50*	*50*
Chloride	mg/L	-	38.5	255	158	144	111	320	113	148	70.9	50.8
Nitrate-N	mg/L	90.3	*0.005*	1.48	4.03	*0.05*	0.02	*0.005*	*0.005*	*0.005*	*0.05*	1.81
Sulphate	mg/L	1,000	n/r	n/r	18.5	2.11	n/r	0.66	*0.01*	n/r	n/r	n/r
Ammoniacal-N	mg/L	-	0.3	16.8	92.8	131	15.3	118	1.55	*0.005*	10.7	0.05
Sodium	mg/L	-	26.5	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Dissolved Aluminium	mg/L	5	*0.001*	0.055	0.019	0.024	0.24	0.034	0.004	0.003	0.006	0.024
Dissolved Boron	mg/L	5	0.031	1.9	2.03	2.11	0.896	1.94	0.779	0.777	0.29	0.056
Dissolved Iron	mg/L	-	0.017	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
Dissolved Lead	mg/L	0.1	*0.00025*	*0.00025*	*0.00025*	*0.00025*	0.0008	*0.00025*	0.00025	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	0.251	4.33	4.7	4.4	0.239	0.339	2.6	0.111	1.33	0.0357
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*	0.0048	0.0037	0.0111	0.0011	0.0076	0.0023	0.002	0.0012	*0.00025*

Notes:

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

Bold – denotes an exceedance of the ANZECC LDW

n/r – not required

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 (WWTP). 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 B and the historical graphs are presented in Appendix D.

There were **no exceedances** of the resource consent conditions in samples from these bores during the October 2024 (quarterly) monitoring round.

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

Determinant	Units	ANZECC LDW	F1	F2	F3
Sampling Date			09/10/24	09/10/24	09/10/24
Water level	mbgl	-	8.1	3.0	5.38
pH	pH units	6 to 9	6.9	7.2	7.3
Conductivity	mS/m	-	51.7	22.6	16.4
COD	mg/L	-	16	*7.5*	*7.5*
scBOD5	mg/L	-	2	1	*0.5*
E. coli	CFU/100ml	100	*50*	*50*	*50*
Chloride	mg/L	-	78.5	22.9	12.7
Nitrate-N	mg/L	90.3	3.21	0.69	2.31
Ammoniacal-N	mg/L	-	*0.005*	*0.005*	*0.005*
Sodium	mg/L	-	n/r	n/r	21
Dissolved Aluminium	mg/L	5	*0.001*	*0.001*	*0.001*
Dissolved Boron	mg/L	5	0.034	0.039	0.028
Dissolved Iron	mg/L	-	n/r	n/r	*0.0025*
Dissolved Lead	mg/L	0.1	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	-	0.006	0.0026	*0.00025*
Dissolved Mercury	mg/L	0.002	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	1	*0.00025*	*0.00025*	*0.00025*

Notes:
All `<' values have been reported as half the detection limit for statistical purposes and are *expressed in italics*
n/r – not required

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 WWTP for treatment. However, for comparison purposes, typical leachate characteristics for landfills, as published by the Waste Management Institute New Zealand (WasteMINZ) *Technical Guidelines for Disposal to Land* (September 2023), have been compared against the leachate quality monitoring results (Table 2-7). The full laboratory report is included in Appendix B and the historical graphs are presented in Appendix D.

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

Table 2-7 presents the concentrations of monitored parameters for leachate effluent samples collected in August 2024, September 2024, and October 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 Hōkio Stream was required.

There were **ten outliers** from the typical leachate characteristics in the August 2024, September 2024, and October 2024 results. Eight of these were for parameters having **less** concentration than the typical minimal concentrations**.**

- Alkalinity exceeded the maximum typical concentration in August 2024.
- COD exceeded the maximum typical concentration in October 2024, being the maximum recorded concentration to date.
- nitrate-N was less than the minimum typical concentration in August and October 2024.
- Ammonia-N was less than the minimum typical concentration in October 2024, being the lowest recorded concentration to date.
- Dissolved cadmium was not detected in all three months and was therefore less than the minimum typical concentrations.
- Dissolved copper was less than the minimum typical concentration in September 2024.
- Dissolved lead was less than the minimum typical concentration in September 2024.

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 August 2024, September 2024, and October 2024

Determinant	Units	Typical Leachate Characteristics* (range)	August 2024	September 2024	October 2024
Sampling Date			06/08/24	12/09/24	09/10/24
pH		5.9 - 8.5	7.7	7.9	7.8
Suspended Solids	mg/l	-	50	40	24
Phenol	mg/L	-	n/p	n/p	n/p
VFA	mg/L	-	*2.5*	*2.5*	*2.5*
TOC	mg/L	17.2 - 822	795	635	625
Alkalinity	mg $CaCO_3$/L	264 – 6,820	**7,520**	6,620	6,760
Conductivity	mS/m	308 – 27,900	1,810	1,560	1,450
COD	mg/L	84 – 5,090	2,900	2,820	**8,230**
$scBOD_5$	mg/L	12 – 3,867	113	88	108
E-Coli	CFU/100mL	-	*50*	100	*50*
Chloride	mg/L	45 – 2,584	1,380	1,050	1,070
Nitrate-N	mg/L	0.1 – 50**	***0.005***	0.33	***0.05***
Sulphate	mg/L	1 - 780	54.3	46	52.7
Ammonia-N	mg/L	3.4 – 1,440	1,370	1,280	**0.16**
Hardness	mg $CaCO_3$/L	300 – 11,500**	385	351	384
Calcium	mg/L	20 – 600***	73.2	68.2	81.3
Magnesium	mg/L	40 – 350***	49.2	43.9	44
Potassium	mg/L	10 – 2,500**	659	563	601
Sodium	mg/L	50 – 4,000**	980	854	959
D.R. Phosphorus	mg/L	-	15.8	14.3	9.96
Dissolved Aluminium	mg/L	-	0.706	0.779	0.727
Dissolved Arsenic	mg/L	0.006 – 0.191	0.263	0.276	0.208
Dissolved Boron	mg/L	0.54 – 20	5.53	5.14	6.3
Dissolved Cadmium	mg/L	0.0005 – 0.140**	***0.0001***	***0.0001***	***0.0001***
Dissolved Chromium	mg/L	0.005 – 50.4	0.752	0.691	0.651
Dissolved Copper	mg/L	0.004 – 1.4**	0.0044	**0.003**	0.0048
Dissolved Iron	mg/L	1.6 – 220	6.08	6.49	6.45
Dissolved Lead	mg/L	0.001 - 0.42	0.001	***0.00025***	0.0015
Dissolved Manganese	mg/L	0.03 - 45***	1.19	1.23	1.17
Dissolved Mercury	mg/L	0.0002 – 0.05**	*0.00025*	*0.00025*	0.0007
Dissolved Nickel	mg/L	0.02 – 2.05**	0.112	0.0963	0.097
Dissolved Zinc	mg/L	0.015 – 24.2	0.038	0.03	0.037

Notes:

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

**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 conducting monthly sampling at TD1, in line with the surface water sampling of the Hōkio Stream.

Results from the August 2024, September 2024 and October 2024 sampling rounds are presented in Table 2-8 and have been compared with the ANZECC AE[2] (95%ile) DGVs, as per the revised resource consent conditions.

There have been **four exceedances** of the resource consent conditions for three monitored parameters in samples from the Northern Farm property at the TD1 location during the August 2024, September 2024 and October 2024 sampling rounds.

- The concentration of nitrate-N in August 2024 (2.3 mg/L) exceeded the ANZECC AE (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- The concentration of ammoniacal-N in October 2024 (6.45 mg/L) exceeded the ANZECC AE (95%ile) DGV of 2.1 mg/L.
- The level of detection applied to $scBOD_5$ in August and October 2024 was such that, even at half the detection level (i.e., 3 mg/L), the concentration exceeded the ANZECC AE (95%ile) DGV of 2 mg/L.

High nitrate-N and ammoniacal-N levels are not uncharacteristic of results for the Northern Farm Drain over the last two years or so. It is well-documented that a plume of leachate originating from the old landfill is affecting the water quality of the shallow groundwater. However, bores close to the Northern Farm Drain and the area considered the source of contamination for the drain (i.e., bores C1, C2 and B3) show low nitrate-N levels, but elevated ammoniacal-N levels. So, the shallow groundwater is quite possibly the cause for the elevated ammoniacal-N concentrations in the Northern Farm Drain, but it is not the cause of the elevated nitrate-N levels. 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 the elevated nitrate-N levels. The issue of leachate affecting the groundwater that daylights into the Northern Farm Drain is being addressed through the Leachate BPO project, which has been discussed with HRC, the PMG and the NLG.

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

Table 2-8: Northern Farm Drain Monitoring Results for August, September and October 2024

Determinant	Units	ANZECC AE DGV (95%ile species protection)	TD1 (formerly SW3)		
			August 2024	September 2024	October 2024
Sampling date			06/08/24	12/09/24	09/10/24
pH	pH units	-	7.4	8	7.3
Suspended Solids	mg/L	-	67	45	39
Phenol	mg/L	-	*0.005*	*0.005*	*0.005*
VFA	mg/L	-	*2.5*	*2.5*	*2.5*
TOC	mg/L	-	20.2	30	40.9
Alkalinity	mg $CaCO_3$/L	-	157	164	292
Conductivity	mS/m	-	58.3	49.9	80.7
COD	mg/L	-	90	115	143
scBOD5	mg/L	2	***3***	*1.5*	***3***
E-Coli	CFU/100ml	-	*50*	*50*	200
Chloride	mg/L	-	73.5	54.5	77.6
Nitrate-N	mg/L	0.16	**2.3**	*0.005*	*0.005*
Sulphate	mg/L	-	5.59	1.96	0.57
Ammoniacal-N	mg/L	2.1	0.03	0.71	**6.45**
Hardness	mg $CaCO_3$/L	-	113	126	215
Calcium	mg/L	-	18.9	24.8	43.6
Magnesium	mg/L	-	16	15.5	25.8
Potassium	mg/L	-	17.1	19	23.4
Sodium	mg/L	-	50.4	44.4	66.5
D.R. Phosphorus	mg/L	-	0.019	0.017	0.019
Dissolved Aluminium	mg/L	0.055	0.014	0.025	0.016
Dissolved Arsenic	mg/L	0.024	*0.0005*	0.002	0.003
Dissolved Boron	mg/L	-	0.21	0.19	0.315
Dissolved Cadmium	mg/L	0.0002	*0.0001*	*0.0001*	*0.0001*
Dissolved Chromium	mg/L	-	*0.0005*	*0.0005*	*0.0005*
Dissolved Copper	mg/L	0.0014	*0.00025*	0.0006	0.0006
Dissolved Iron	mg/L	-	0.44	1.65	2.6
Dissolved Lead	mg/L	0.0034	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	1.9	0.0174	0.213	0.659
Dissolved Mercury	mg/L	0.0006	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.011	0.0011	0.0013	0.002
Dissolved Zinc	mg/L	0.008	*0.001*	0.005	0.004

Notes:
Bold – denotes an exceedance of the ANZECC AE 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 Hōkio Stream

Surface water grab samples are obtained monthly from Hōkio 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 50 m down-stream of the landfill site property boundary and the Northern Farm Drain discharge. Samples from these monitoring locations on Hōkio Stream are analysed for a comprehensive suite of parameters every month (as shown in Appendix C).

Results from the August 2024, September 2024, and October 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 **eighteen exceedances** of the resource consent conditions in samples from the Hōkio Stream during the August 2024, September 2024, and October 2024 sampling rounds.

- nitrate-N exceeded both the ANZECC AE (95%ile) DGV and consent trigger value of 0.16 mg/L at all sites in all three months, with values ranging between 0.61 mg/L and 3.06 mg/L.
- The concentration of dissolved aluminium at HS1A in September 2024 (0.057 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.055 mg/L.
- The concentrations of dissolved copper at all sites in September 2024 (ranging between 0.0017 and 0.0018 mg/L), and at HS1A in October 2024 (0.0023 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.0014 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 Hōkio 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.

nitrate-N concentrations upstream of the landfill property (i.e., at HS1 and HS1A) are already elevated, and whilst there is a minor increase in concentrations downstream, it cannot be definitively attributed to landfill activities. The bores closest to the considered source of contamination of the shallow groundwater (i.e., bores C1, C2 and B3) have low nitrate-N levels, so there are likely other activities that are causing an increase in nitrate-N levels between the upstream and downstream monitoring locations.

Dissolved aluminium was most elevated at HS1A in September 2024, which is upstream of the landfill and so cannot be attributed to the landfill activities.

Similarly, concentrations of dissolved copper were most elevated at HS1A in September and October 2024, and so upstream activities are considered to be the cause.

Consecutive monthly sampling and testing for the comprehensive suite of parameters has occurred at all Hōkio Stream sites since October 2021. HDC has had the results of monthly sampling events assessed, as required by the conditions of the consent, to determine the significance of the results, and will discuss the results with HRC to determine if a reduction in sampling frequency can be made.

Table 2-9: Hōkio Stream Monitoring Results for August 2024, September 2024, and October 2024

Determinant	Units	ANZECC AE DGV (95%ile species protection)	Consent Trigger Values (Table C1)	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3
				August 2024				September 2024				October 2024			
Sampling date				06/08/24	06/08/24	06/08/24	06/08/24	12/09/24	12/09/24	12/09/24	12/09/24	09/10/24	09/10/24	09/10/24	09/10/24
pH	pH units	-	-	7.5	7.6	7.6	7.5	7.7	7.7	7.6	7.9	7.3	7.7	7.7	7.6
Suspended Solids	mg/l	-	-	*3*	6	*3*	79	20	*3*	*3*	*3*	16	*3*	*3*	*3*
Phenol	mg/l			*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*	*0.005*
VFA	mg/l			*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*	*2.5*
TOC	mg/L	-	-	3.7	3.4	3.4	3.8	6.6	6.5	8.1	6.9	6.6	6.2	5.9	6.4
Alkalinity	mg $CaCO_3$/L	-	-	50	50	53	55	40	38	41	41	42	39	40	42
Conductivity	mS/m	-	-	23.2	23.2	23.9	24.6	21.9	21.9	23.8	22.8	23.5	23.2	23.5	23.8
COD	mg/L	-	-	64	*7.5*	*7.5*	*7.5*	*7.5*	32	27	18	17	25	22	22
$scBOD_5$	mg/L	2	Monthly Avg. 2	2	1	2	2	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*	*1.5*	*0.5*	*1.5*
E. coli	CFU/ 100ml	-	-	100	*50*	*50*	*50*	*50*	200	*50*	*50*	*50*	400	300	100
Chloride	mg/L	-	-	25	24.8	24	26.4	21.4	22.5	22.4	21.9	21.3	21.9	22.3	23.2
Nitrate-N	mg/L	0.16	0.16	**0.61**	**0.61**	**0.66**	**0.75**	**1.35**	**1.41**	**1.28**	**1.35**	**2.84**	**2.99**	**3.00**	**3.06**
Sulphate	mg/L	-	-	22.2	22.1	20.1	21.3	25.5	26.8	26.9	25	23.9	24.8	24.9	25.4
Ammoniacal-N	mg/L	2.1	Max. 2.1 Avg. 0.400	*0.005*	*0.005*	*0.005*	0.1	0.02	0.02	0.01	0.03	0.05	0.07	0.1	0.08
Hardness	mg $CaCO_3$/L	-	-	50	52	56	55	56	57	62	58	63	66	64	65
Calcium	mg/L	-	-	9.2	9.5	10.3	10	11.6	11.8	13	12.1	12.8	13.4	12.9	13

Determinant	Units	ANZECC AE DGV (95%ile species protection)	Consent Trigger Values (Table C1)	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3
				August 2024				September 2024				October 2024			
Magnesium	mg/L	-	-	6.59	6.75	7.39	7.31	6.51	6.59	7.13	6.74	7.49	7.82	7.6	7.78
Potassium	mg/L	-	-	2.29	2.15	2.47	2.62	2.65	2.73	2.88	2.83	2.29	1.99	1.92	2.02
Sodium	mg/L	-	-	18.4	18.9	20.5	20.4	16.9	17.1	17.8	17.3	18.3	19.4	18.6	19.4
D.R. Phosphorus	mg/L	-	-	0.015	0.015	0.005	0.014	0.017	0.008	0.033	0.023	0.06	0.049	0.059	0.054
Dissolved Aluminium	mg/L	0.055	Med. 0.055	0.009	0.009	0.006	0.004	**0.057**	0.045	0.029	0.032	0.006	0.007	0.008	0.007
Dissolved Arsenic	mg/L	0.024	Med. 0.024	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*
Dissolved Boron	mg/L	0.370	-	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.056	0.057	0.058	0.058
Dissolved Cadmium	mg/L	0.0002	Med. 0.0002	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*	*0.0001*
Dissolved Chromium (VI)	mg/L	0.001	-	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*	*0.0005*
Dissolved Copper	mg/L	0.0014	Med. 0.0014	0.0008	0.0007	0.0006	0.0006	**0.0018**	**0.0017**	**0.0017**	**0.0017**	**0.0023**	0.0011	0.0013	0.001
Dissolved Iron	mg/L	-	-	0.07	0.07	0.07	0.06	0.1	0.09	0.11	0.1	0.104	0.113	0.135	0.208
Dissolved Lead	mg/L	0.0034	Med. 0.0034	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Manganese	mg/L	1.9	-	0.0117	0.0212	0.0269	0.0108	0.0047	0.0078	0.0029	0.009	0.0143	0.0156	0.0172	0.0242
Dissolved Mercury	mg/L	0.0006	Med. 0.0006	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*
Dissolved Nickel	mg/L	0.011	Med. 0.011	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	*0.00025*	0.0005	*0.00025*	0.0008	*0.00025*	*0.00025*	*0.00025*

Determinant	Units	ANZECC AE DGV (95%ile species protection)	Consent Trigger Values (Table C1)	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3	HS1A	HS1	HS2	HS3
				August 2024				September 2024				October 2024			
Dissolved Zinc	mg/L	0.008	Med. 0.008	0.003	0.003	0.003	*0.001*	*0.001*	0.002	0.005	0.003	0.011	*0.001*	0.004	*0.001*

Notes:

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

Underlined – denotes exceedance of the Consent Trigger Value.

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

3 Landfill Gas Detection in Monitoring Wells

Condition 4 of Discharge Permit ATH-2002003984.02 (DP 6011) requires that: "…*groundwater monitoring wells shall be sampled for landfill gas when groundwater samples are taken from the wells. As a minimum, sampling shall be undertaken for methane, carbon dioxide and oxygen*…"

Appendix E summarises the results of landfill gas monitoring undertaken on 4 and 21 October 2024. As noted in previous reports, this is not the date of sampling of the groundwater bores, which somewhat nullifies part of the reason for doing the gas monitoring when the groundwater sampling is done, as is required by the resource consent condition.

Note that landfill gas monitoring results for bore D2 have been assumed since one set of results did not have a bore label.

Of the 27 groundwater monitoring bores:

- Methane was recorded at twenty bores in concentrations varying between 0.01% and 0.11%. In the previous monitoring round methane was reported as being detected only at one bore. Possibly this is results of a change being made in the gas detection equipment being used. Nevertheless, the maximum concentration reported is well below the explosive limit of 5%, and therefore represents 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 0.35% at bore G2S. Historically, fluctuations have been seen across the bores, and October concentrations are within historical ranges.
- Hydrogen sulphide was not detected at any of the bores.
- The landfill gas levels in October 2024 appear to reinforce the previous sampling rounds' 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 samples were all collected on the same day in each month, and groundwater samples were collected within a 2-day period in October, which also included the dates when the surface water sampling was done. Given the number of samples that needed to be taken, this is a significant effort.

The August 2024 surface water samples were received by the laboratory outside the normally accepted 24-hour timeframe between sampling and reception. This could affect the reliability of the results, which reduces the confidence in comparing the results with historical data. Three groundwater samples are recorded as taking longer than 24 hours between sampling and delivery to the laboratory.

The laboratory reports for all the October 2024 surface water samples and eight of the groundwater bores showed the recorded “Sampled Time” as being at midnight, which is assumed to be incorrect. Additionally, two surface water samples in August 2024 and one of the groundwater bores were recorded as being sampled after 22h00, which is also assumed to be incorrect. The sample time for the leachate pond outlet was not stated for the August 2024 sampling round.

These assumed errors call into question the accuracy of the recording of the sampling time on the custody sheets.

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.

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 has been reviewed as part of the Annual Report, with the recommendation that bores F2, F3 and D5 be used as the primary background reference bores for shallow groundwater, which has been done in this report.

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 (October 2024) monitoring period.

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

There was **one exceedance** of consent conditions hydraulically down-gradient of the old landfill during this quarterly (October 2024) monitoring period. This was for *E.coli* in bore C2 (2,000 CFU/100ml) which exceeded the ANZECC LDW trigger value of 100 CFU/100ml.

E.coli has not been detected at Bore C2 at a level greater than 100 CFU/100ml for the past six monitoring rounds. Additionally, *E.coli* was not detected in other shallow aquifer bores close to bore C2. So, it is suspected that the elevated levels of *E.coli* were caused by animal activities in the vicinity of bore C2, and it is unlikely to be related to landfill activities.

Deeper Gravel Aquifer

There were **eight exceedances** of the DWSNZ limits in samples from the deep gravel aquifer during the October 2024 monitoring round, and **two exceedances** of the DWSNZ limits for the November re-test sample of bore Xd1as follows:

- pH at Xd1 was recorded as 5.1 which is an extremely low value and is well below the next lowest pH on record for all the deep aquifer wells (pH of 6.5 at C2dd). As such, its accuracy was questioned, and a re-test was requested for this parameter for bore Xd1. The re-test yielded a pH result of 8.4, which is the maximum recorded for this bore, but is still within the DWSNZ MAVs.

- As occurred last quarter, *E. coli* at D3rd was tested with an incorrect detection limit of 100 CFU/100mL. Since *E.coli* was not detected, it is recorded as being *50* CFU/100mL. As such is it considered to be non-compliant.
- The November 2024 re-test results for bore Xd1 gave an *E.coli* result of 3 CFU/100mL, which is greater than the DWSNZ MAV of NIL. This has occurred before for this bore.
- Dissolved arsenic exceeded the DWSNZ MAV of 0.01 mg/L at bore D3rd (0.021 mg/L). This is characteristic of D3rd with the levels varying between 0.017 and 0.022 mg/L on all sampling occasions.
- Hardness at bore D3rd (212 mg $CaCO_3$/L) exceeded the DWSNZ MAV of 200 mg $CaCO_3$/L. This is characteristic of D3rd with the levels varying between 186 and 223 mg $CaCO_3$/L on all sampling occasions.
- Dissolved manganese concentrations exceeded the DWSNZ MAV of 0.4 mg/L in bores C2dd (0.559 mg/L), E2d (0.431 mg/L), Xd1 (0.485 mg/L and 0.474 mg/L for the re-test sample) and D3rd (0.531 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.

The very low pH value at bore Xd1 is considered an anomaly, since it is well below the lowest pH value recorded at any of the deep aquifer bores, ever since monitoring started in September 1997. It is also most unlikely to be on account of landfill activities, since even the lowest pH value recorded for the landfill leachate is 6.8. The re-test sample gave a pH value of 8.4.

The incorrect level of detection for *E.coli* was applied to the sample taken from bore D3rd and since E.coli was not detected, it has to be recorded as being half the detection limit, which is 50 CFU/100ml. This represents a **non-compliance** and is an issue that must be taken up with the laboratory.

E.coli levels in bore Xd1 have been elevated previously, so this is not an unusual occurrence. It was acceptable in October 2024, but the November 2024 re-test sample yielded a value of 3 CFU/100mL.

As noted in section 2.3.2, the remaining seven exceedances are not unusual and are related to the quality of the groundwater regularly observed with respect to manganese concentrations (boresC2dd, E2d, Xd1(in October and November) and D3rd), arsenic concentration and level of hardness (bore D3rd).

These seven exceedances are not unusual and do not appear to be attributable to the landfill activities, particularly because there is an aquiclude between the shallow aquifer and the deep aquifer, with a flow gradient from the deep aquifer upwards (i.e., sub-artesian conditions exist).

Leachate Effluent

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

There were **ten outliers** from the typical leachate characteristics in the August 2024, September 2024, and October 2024 results. Eight of these were for parameters having **less** concentration than the typical minimal concentrations**.**

Northern Farm Drain

There have been **four exceedances** of the resource consent conditions for three monitored parameters in samples from the Northern Farm property at the TD1 location during the August 2024, September 2024 and October 2024 sampling rounds.

- The concentration of nitrate-N in August 2024 (2.3 mg/L) exceeded the ANZECC AE (95%ile) DGV of 0.16 mg/L. This site has commonly presented elevated levels.
- The concentration of ammoniacal-N in October 2024 (6.45 mg/L) exceeded the ANZECC AE (95%ile) DGV of 2.1 mg/L.
- The level of detection applied to $scBOD_5$ in August and October 2024 was such that, even at half the detection level (i.e., 3 mg/L), the concentration exceeded the ANZECC AE (95%ile) DGV of 2 mg/L.

One exceedance for the Northern Farm Drain was on account of elevated nitrate-N and one exceedance was because of elevated ammoniacal-N concentrations. Both nitrate-N and ammoniacal-N levels have frequently exceeded trigger levels. The elevated ammoniacal-N level could well be associated with leachate from the Old Landfill contaminating the groundwater. This is well recognised and is being further assessed through the Leachate BPO project, which has been communicated to HRC, the PMG and the NLG.

However, this is not the case for the elevated nitrate-N levels since the contaminated groundwater, as measured in the shallow groundwater bores (i.e., at C1, C2 and B3), has low levels of nitrate-N. It is most likely that farming activities in the paddock through which the Northern Farm Drain runs is causing the elevated nitrate-N levels.

The ANZECC AE DGV (95%ile species protection) for $scBOD_5$ is 2 mg/L. In both August and October 2024, the laboratory test applied had a level of detection of 6 mg/L. Since no $scBOD_5$ was detected, the results must be recorded as half the detection limit (i.e., at 3 mg/L), which still exceeds the DGV, and so represents non-compliance.

Hōkio Stream

There were **eighteen exceedances** of the resource consent conditions in samples from the Hōkio Stream during the August 2024, September 2024, and October 2024 sampling rounds.

- Nitrate-N exceeded both the ANZECC AE (95%ile) DGV and consent trigger value of 0.16 mg/L at all sites in all three months, with values ranging between 0.61 mg/L and 3.06 mg/L.
- The concentration of dissolved aluminium at HS1A in September 2024 (0.057 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.055 mg/L.
- The concentrations of dissolved copper at all sites in September 2024 (ranging between 0.0017 and 0.0018 mg/L), and at HS1A in October 2024 (0.0023 mg/L) exceeded the ANZECC AE (95%ile) DGV and consent trigger value of 0.0014 mg/L.

Twelve of the exceedances are for elevated nitrate-N concentrations. However, nitrate-N concentrations upstream of the landfill property (i.e., at HS1 and HS1A) are already elevated, and whilst there is a minor increase in concentrations downstream, it cannot be definitively attributed to landfill activities. The bores closest to the considered source of contamination of the shallow groundwater (i.e., bores C1, C2 and B3) have low nitrate-N levels, so there are likely other activities that are causing an increase in nitrate-N levels between the upstream and downstream monitoring locations.

Five of the exceedances were for elevated concentrations of dissolved copper which occurred at all sites in September 2024, and at HS1A in October 2024. In both months, the most elevated levels were measured at HS1A (i.e., upstream of the landfill), and so upstream activities are considered to be the cause.

Similarly, one exceedance was for dissolved aluminium which was elevated at HS1A in September 2024. Being upstream of the landfill, this cannot be attributed to the landfill activities.

6 Conclusions

During the August 2024 to October 2024 monitoring period, there were thirty-one exceedances of the trigger values set out in the resource consent conditions: one from the shallow aquifer down-gradient of the Old Landfill, eight from the deep gravel aquifer, four in the samples from the Northern Farm Drain (formerly known as Tatana Property Drain), and the remaining eighteen from surface water monitoring locations along the Hōkio Stream.

There were also two exceedances of the trigger values in a re-test sample conducted in November 2024 for bore Xd1.

Of the thirty-three exceedances, thirty-two are considered to be unrelated to the landfill activities as follows:

- Eight exceedances in the deep aquifer are not unusual and are related to the existing water quality.
- One exceedance in the deep aquifer is a very low pH value, considered to be an anomaly, since a re-test gave a pH value that, although much higher, is still within the DWSNZ standards.
- One exceedance in the deep aquifer is on account of an incorrect level of detection being applied for *E.coli* testing but is considered to be a non-compliance.
- One exceedance in the shallow aquifer is for elevated *E.coli*, considered to be on account of animal activities around the bore.
- One exceedance in the Northern Farm Drain is for elevated nitrate-N, most likely related to farming activities in the adjoining paddock.
- Two exceedances in the Northern Farm Drain are on account of an incorrect level of detection being applied for $scBOD_5$ testing but are considered to be non-compliances.
- Twelve exceedances in the Hōkio Stream are for elevated nitrate-N levels, which are elevated upstream. Whilst there is an increase in nitrate-N levels proceeding downstream, there is doubt that it is from landfill activities because the bores close to the “source” of the shallow groundwater contamination do not have elevated nitrate-N levels.
- Five exceedances in the Hōkio Stream are for elevated concentrations of dissolved copper. The highest levels occur upstream of the landfill property, so the upstream activities are considered to be the source.
- One exceedance in the Hōkio Stream is for elevated concentrations of dissolved aluminium. This occurs upstream of the landfill property, so the upstream activities are considered to be the source.

One exceedance for the Northern Farm Drain was on account of elevated ammoniacal-N concentrations. This could well be associated with leachate from the old landfill contaminating the shallow groundwater, and then daylighting into the Northern Farm Drain. Modelling of the plume has shown that there could also be unacceptable future impacts on the Hōkio Stream. This matter is being further assessed through the Leachate BPO project to which Council has committed some $1.8 million. Progress with this project has been communicated to HRC, the PMG and the NLG.

Whilst the shallow groundwater downstream of the old landfill meets the resource consent trigger values for all parameters except *E.coli* at one bore, it is well documented that leachate from the old landfill is extending in a plume northward and is impacting the quality of the shallow aquifer. As noted above, modelling of the plume has shown that there could be unacceptable future impacts on the Hōkio Stream and is being dealt with through the Leachate BPO project.

Methane was detected in twenty bores in October 2024, with readings varying between 0.01% and 0.11%. The large increase in the number of bores in which methane was detected may be a result of a change being made in the gas detection equipment being used. The maximum concentration methane

reported is well below the explosive limit of 5%, and therefore represents 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 0.35% at bore G2S. Hydrogen sulphide was not detected at any of the bores.

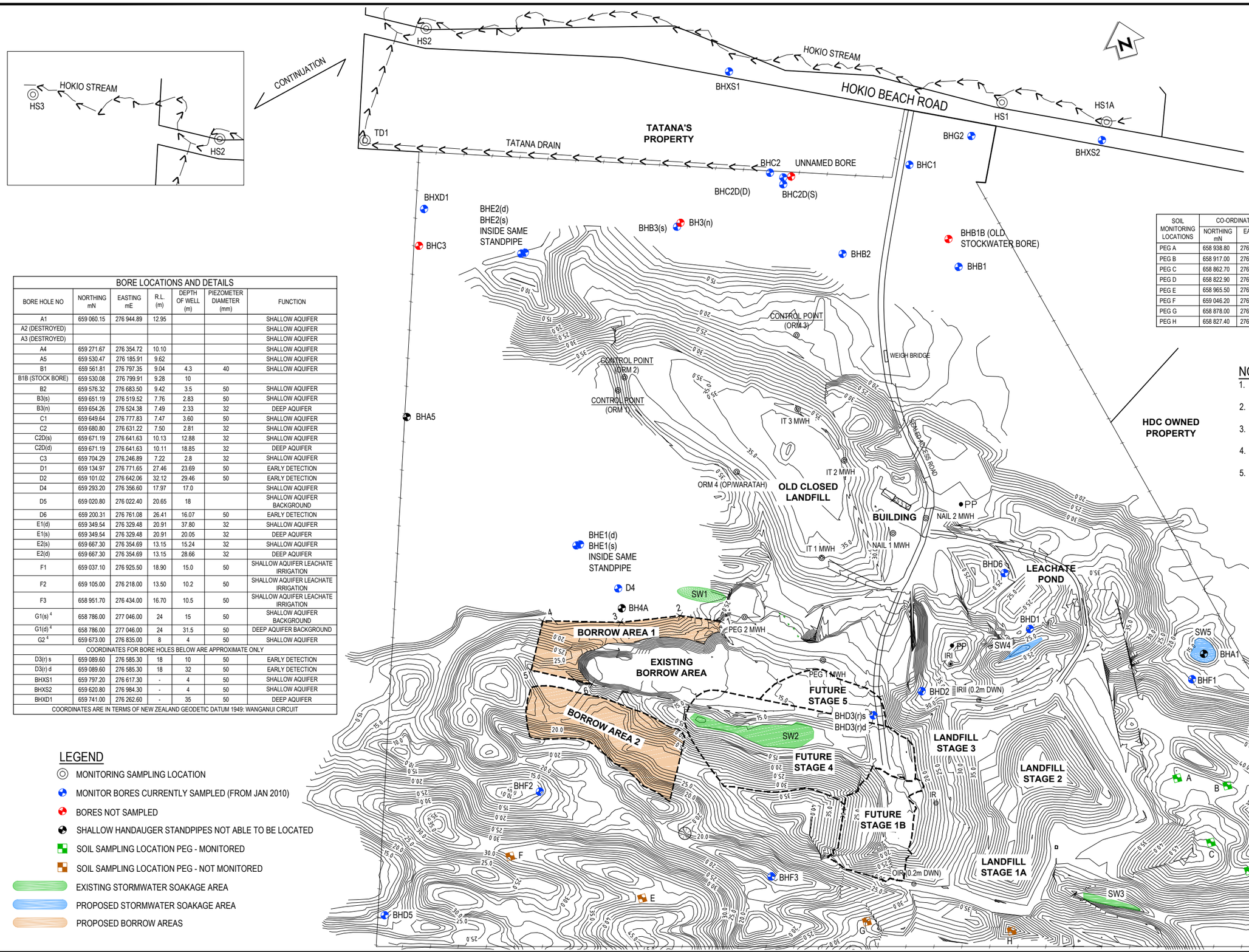
The possibility of encountering methane (and hydrogen sulphide) in groundwater bores endorses the need for appropriate health and safety measures to be adopted during monitoring.

The following recommendations are made, based on the results of this reporting period:

- Sampling times for some surface water and groundwater samples are recorded in the laboratory sheets as being late at night, and at midnight, which is assumed to be incorrect and calls into question the accuracy of the information on the custody sheets. This is a matter that needs to be discussed with the parties undertaking sampling.
- HDC should discuss with HRC the need for a further two rounds of comprehensive testing of bores D3rs and D3rd, given that out of the 14 sampling events conducted since they were installed in October 2021, comprehensive testing has been done on 12 occasions.
- Nitrate-N levels at D6 were less than the maximum value recorded last monitoring round, and the value recorded for conductivity also reduced somewhat. Nevertheless, whilst all levels are below the ANZECC LDW trigger values, it is a matter to keep a check on and may merit an assessment in the future to try and identify the cause.
- The detection limits for the deep aquifer bores for *E.coli* must be set at the most accurate level available, which is understood to be 1 CFU/100ml. This is a matter that needs to be discussed with the parties involved in requesting sampling and undertaking the laboratory testing.
- Similarly, the ANZECC AE DGV (95%ile species protection) for $scBOD_5$ is 2 mg/L. So, the level of detection to be applied to the surface water samples must be set at a level where half the detection limit is less than the DGV of 2 mg/L. As for the above, this is a matter that needs to be discussed with the parties involved in requesting sampling and undertaking the laboratory testing.
- Consecutive monthly sampling has occurred at all Hōkio Stream sites since October 2021. HDC has had these results assessed, as required by the conditions of the consent, to determine their significance. HDC should discuss the results of this assessment with HRC to ascertain if a reduction in sampling frequency of the surface water monitoring locations can be made.
- Gas sampling of the bores has been recorded on days different from when the groundwater sampling was undertaken. In future, the gas sampling needs to be done when groundwater samples are taken, as required by the resource consent conditions.

Appendices

Appendix A Site Plan



COORDINATES OF SURVEY CONTROL MARKS			
PT	NORTHING mN	EASTING mE	RL
ORM 1	659 498.38	276 412.21	38.94
ORM 2	659 510.09	276 422.72	34.98
ORM 3	659 505.14	276 612.86	21.10
ORM 4(OP/W)	659 380.16	276 511.94	30.92
MWH NAIL 1	659 272.67	276 656.87	27.61
MWH NAIL 2	659 278.98	276 695.22	28.40
MWH IT 1	659 267.33	276 576.02	30.03
MWH IT 2	659 361.94	276 627.00	33.70
MWH IT 3	659 428.24	276 593.00	32.74
MWH PEG 1	659 160.94	276 548.30	32.99
MWH PEG 2	659 227.86	276 479.35	30.49
IRII	659 075.85	276 698.70	30.04
OIR	658 903.62	276 579.37	30.35
IRI	659 121.09	276 679.47	40.00
IR	276 625.10	658 981.29	21.30
COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC DATUM 1949: WANGANUI CIRCUIT			

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

BORROW AREA 1 SET-OUT COORDINATES		
POINT NO.	NORTHINGS mN	EASTINGS mE
1	659 230.38	276 453.28
2	659 247.32	276 413.49
3	659 257.33	276 349.62
4	659 280.93	276 269.42
5	659 233.27	276 243.39
6	659 201.34	276 302.68

BORE LOCATIONS AND DETAILS						
BORE HOLE NO	NORTHING mN	EASTING mE	R.L. (m)	DEPTH OF WELL (m)	PIEZOMETER DIAMETER (mm)	FUNCTION
A1	659 060.15	276 944.89	12.95			SHALLOW AQUIFER
A2 (DESTROYED)						SHALLOW AQUIFER
A3 (DESTROYED)						SHALLOW AQUIFER
A4	659 271.67	276 354.72	10.10			SHALLOW AQUIFER
A5	659 530.47	276 185.91	9.62			SHALLOW AQUIFER
B1	659 561.81	276 797.35	9.04	4.3	40	SHALLOW AQUIFER
B1B (STOCK BORE)	659 530.08	276 799.91	9.28	10		
B2	659 576.32	276 683.50	9.42	3.5	50	SHALLOW AQUIFER
B3(s)	659 651.19	276 519.52	7.76	2.83	50	SHALLOW AQUIFER
B3(n)	659 654.26	276 524.38	7.49	2.33	32	DEEP AQUIFER
C1	659 649.64	276 777.83	7.47	3.60	50	SHALLOW AQUIFER
C2	659 680.80	276 631.22	7.50	2.81	32	SHALLOW AQUIFER
C2D(s)	659 671.19	276 641.63	10.13	12.88	32	SHALLOW AQUIFER
C2D(d)	659 671.19	276 641.63	10.11	18.85	32	DEEP AQUIFER
C3	659 704.29	276.246.89	7.22	2.8	32	SHALLOW AQUIFER
D1	659 134.97	276 771.65	27.46	23.69	50	EARLY DETECTION
D2	659 101.02	276 642.06	32.12	29.46	50	EARLY DETECTION
D4	659 293.20	276 356.60	17.97	17.0		SHALLOW AQUIFER
D5	659 020.80	276 022.40	20.65	18		SHALLOW AQUIFER BACKGROUND
D6	659 200.31	276 761.08	26.41	16.07	50	EARLY DETECTION
E1(d)	659 349.54	276 329.48	20.91	37.80	32	SHALLOW AQUIFER
E1(s)	659 349.54	276 329.48	20.91	20.05	32	DEEP AQUIFER
E2(s)	659 667.30	276 354.69	13.15	15.24	32	SHALLOW AQUIFER
E2(d)	659 667.30	276 354.69	13.15	28.66	32	DEEP AQUIFER
F1	659 037.10	276 925.50	18.90	15.0	50	SHALLOW AQUIFER LEACHATE IRRIGATION
F2	659 105.00	276 218.00	13.50	10.2	50	SHALLOW AQUIFER LEACHATE IRRIGATION
F3	658 951.70	276 434.00	16.70	10.5	50	SHALLOW AQUIFER LEACHATE IRRIGATION
G1(s) [4]	658 786.00	277 046.00	24	15	50	SHALLOW AQUIFER BACKGROUND
G1(d) [4]	658 786.00	277 046.00	24	31.5	50	DEEP AQUIFER BACKGROUND
G2 [4]	659 673.00	276 835.00	8	4	50	SHALLOW AQUIFER
COORDINATES FOR BORE HOLES BELOW ARE APPROXIMATE ONLY						
D3(r) s	659 089.60	276 585.30	18	10	50	EARLY DETECTION
D3(r) d	659 089.60	276 585.30	18	32	50	EARLY DETECTION
BHXS1	659 797.20	276 617.30	-	4	50	SHALLOW AQUIFER
BHXS2	659 620.80	276 984.30	-	4	50	SHALLOW AQUIFER
BHXD1	659 741.00	276 262.60	-	35	50	DEEP AQUIFER
COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC DATUM 1949: WANGANUI CIRCUIT						

NOTES:

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

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

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

REV	REVISIONS	DRN	CHK	APP	DATE
E	FOR INFORMATION - BHD3(r)s AND BHD3(r)d ADDED, AND CONTOURS UPDATED FROM JULY 2021 SURVEY	BCJ	PSL	PSL	24.09.21
D	FOR INFORMATION - BORROW AREA 2 RELOCATED, DEFINED AREAS OF FUTURE STAGES 1B, 4 AND 5	BCJ	PSL	PSL	01.06.21
C	FOR INFORMATION - BORROW AREA AND LANDFILL AREA UPDATES AND BORE HOLES AND SAMPLING LOCATIONS ADDED FOR HOKIO STREAM AND TATANA DRAIN	BCJ	PSL	PSL	24.03.21
B	FOR INFORMATION - BORROW AREA AND LANDFILL AREA UPDATES	BCJ	PSL	PSL	22.09.20
A	FOR INFORMATION	BCJ	PSL	PSL	26.08.19

SURVEYED	MWH	
DESIGNED	N/A	-
DRAWN	Brent James	08.2019
CAD REVIEW	Brent James	23.09.21
APPROVED	Phil Landmark	23.09.21
PROF REGISTRATION:		

Stantec

Client:

HOROWHENUA DISTRICT COUNCIL
LEVIN LANDFILL

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

Status Stamp: FOR INFORMATION ONLY
Date Stamp: 24.09.21
Scales: 1:2000 (A1) 1:4000 (A3)
Drawing No.: 310101088-19-001-G001
Rev.: E

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

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

Appendix B Analytical Results

eurofins

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064514-01** REPORT DATE **22/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150602**

Sample Name 372568-0
Product: Ground water
Sampling Point code: WIL-B1
Sampling Point name: Levin B1
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 07:57
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	16.8	(± 1.68) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	231	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	255	(± 25.5) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	191	(± 3.8) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.055	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	1.90	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	4.33	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0048	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.48	(± 0.15) mg/l	0.01

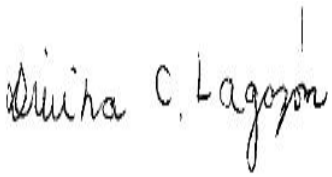
	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.4 (± 0.2)	0.1

LIST OF METHODS

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

Signature

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor Microbiology

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

The Customer acknowledges and accepts that: (a) where Eurofins is not responsible for sampling, the test result(s) in this report apply only to the sample as received. Customer is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the product.
This document can only be reproduced in full.
The tests are identified by a five-digit code, their description is available on request.
Accreditation does not apply to comments or graphical representations.
Unless otherwise stated, all tests in this analytical report (except for subcontracted tests) are performed at 85 Port Road, Seaview, Lower Hutt, Wellington, NEW ZEALAND.
The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.
Eurofins may subcontract the performance of part or all of the Services to a third party and the Customer authorises the release of all information necessary to the third party for the provision of the Services.
All samples become the property of Eurofins to the extent necessary for the performance of the Services.
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-064511-01	REPORT DATE	22/10/2024

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE	812-2024-00150597		
Sample Name	372697-0		
Product:	Ground water		
Sampling Point code:	WIL-B2	**Sampling Point name:**	Levin B2
Reception Date & Time:	11/10/2024 7:00		
Analysis Started on:	11/10/2024	**Analysis Ending Date:**	22/10/2024
Product Type	Ground water	**Sampled Date & Time**	10/10/2024 08:25
Sampler(s)	Client nominated external sampler	**Sampled by Eurofins**	No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	92.8	(± 9.28) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	128	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	158	(± 15.8) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	249	(± 5.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.019	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	2.03	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	4.70	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0037	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	4.03	(± 0.40) mg/l	0.01

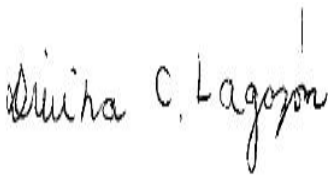
	RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	6.9	(± 0.2)	0.1
NW011	**Sulphate**		
Sulphate	18.5	(± 1.85) mg/l	0.02
NW003	**Total Alkalinity**		
Alkalinity total	1240	mg CaCO3/l	1

LIST OF METHODS

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

Signature

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor Microbiology

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✓ (Satisfactory) means meets the specification
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-064512-01	REPORT DATE	22/10/2024

Attention Downer NZ Ltd (EDI Levin)
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Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE 812-2024-00150598

Sample Name 372698-0
Product: Ground water
Sampling Point code: WIL-B3
Sampling Point name: Levin B3s
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 08:54
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	131	(± 13.1) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	438	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	144	(± 14.4) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	264	(± 5.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.024	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	2.11	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	4.40	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0111	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

		RESULTS (UNCERTAINTY)		LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	2.11	(± 0.21) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	1210	mg CaCO3/l	1

LIST OF METHODS

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

Signature

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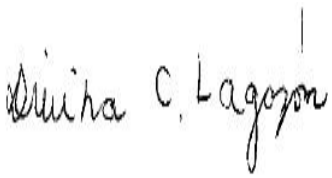

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063729-01** REPORT DATE **19/10/2024**

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4741 Levin
NEW ZEALAND

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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149328**

Sample Name 372566-0
Product: Ground water
Sampling Point code: WIL-C1
Sampling Point name: Levin C1
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 12:45
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	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	131	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	111	(± 11.1) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	115	(± 2.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.240	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.896	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0008	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.239	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
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.02	(± 0.00) mg/l	0.01

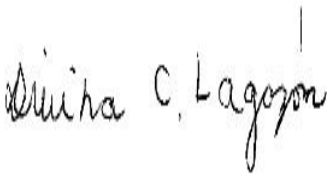
	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	6.9 (± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	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 Eurofins ELS Limited



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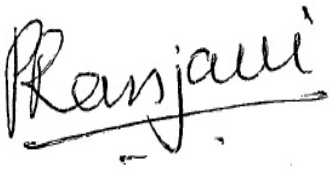

Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064508-01** REPORT DATE **22/10/2024**

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150594**

Sample Name 372695-0
Product: Ground water
Sampling Point code: WIL-C2
Sampling Point name: Levin C2
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 06:42
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	118	(± 11.8) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	463	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	320	(± 32.0) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	361	(± 7.2) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.034	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	1.94	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.339	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0076	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	2000	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	mg/l	0.01

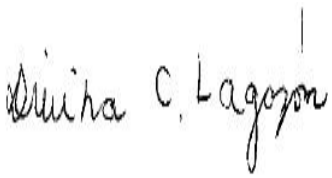
		RESULTS	(UNCERTAINTY)	LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.0	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	0.66	(± 0.07) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	1620	mg CaCO3/l	1

LIST OF METHODS

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

Signature

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Hannah Smith Laboratory Supervisor Microbiology

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✓ (Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062552-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062552-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149157

Sample Name 372564-0
Product: Ground water
Sampling Point code: WIL-C2dd
Sampling Point name: Levin C2dd
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.36	(± 0.04) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	24	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	40.6	(± 4.06) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	56.2	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.075	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.559	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

		RESULTS (UNCERTAINTY)		LOQ
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
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	228	mg CaCO3/l	1

LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager
Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst
Eurofins ELS Limited

Robyn Madge Laboratory Technician
Laboratory technician

Gabriela Carvalhaes Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064513-01** REPORT DATE **22/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
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NEW ZEALAND
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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150600**

Sample Name 372696-0
Product: Ground water
Sampling Point code: WIL-C2ds
Sampling Point name: Levin C2ds
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 06:59
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1.55	(± 0.15) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	87	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	113	(± 11.3) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	159	(± 3.2) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.004	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.779	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	2.60	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
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

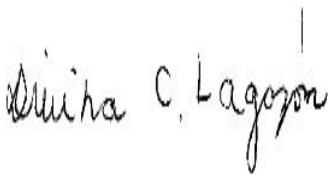
		RESULTS	(UNCERTAINTY)	LOQ
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	6.9	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	(± 0.01) mg/l	0.02
NW003	**Total Alkalinity**			
	Alkalinity total	736	mg CaCO3/l	1

LIST OF METHODS

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

Signature

Jennifer Mont Supervisor Eurofins ELS Limited



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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062561-01** REPORT DATE **15/10/2024**

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

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149327**

Sample Name 372699-0
Product: Ground water
Sampling Point code: WIL-D1
Sampling Point name: Levin D1
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 08:12
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.03	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	29.3	(± 2.93) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	51.9	(± 1.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.058	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	<0.0005	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	5.96	(± 0.60) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	6.5 (± 0.2)	0.1

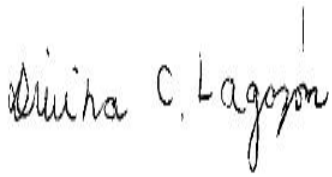
LIST OF METHODS

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

Signature

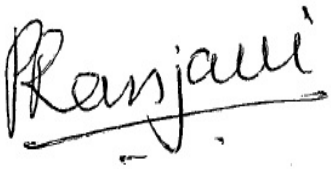
Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063728-01** REPORT DATE **19/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149326**

Sample Name 372700-0
Product: Ground water
Sampling Point code: WIL-D2
Sampling Point name: Levin D2
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 09:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.76	(± 0.08) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	47	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	109	(± 10.9) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	79.6	(± 1.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.051	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	24.1	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.840	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)	63.5	mg/l	0.01

		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	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

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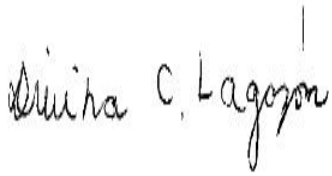

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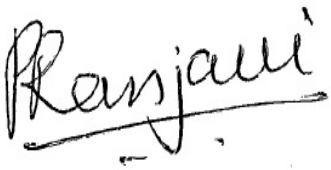

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063681-01** REPORT DATE **19/10/2024**

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149329**

Sample Name 372647-0
Product: Ground water
Sampling Point code: WIL-D3rd
Sampling Point name: Levin D3rd
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 09:45
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.37	(± 0.04) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS (UNCERTAINTY)		LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	38.3	(± 3.83) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	53.2	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.021	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.055	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	62.3	mg/l	0.05
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)	0.014	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	13.8	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.531	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)	7.58	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	1.24	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	27.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	(± 0.00) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	<0.02	mg/l	0.02

		RESULTS (UNCERTAINTY)		LOQ
NW206	**Suspended Solids**			
	Suspended Solids	37	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	224	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	212	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.9	mg/l	0.1

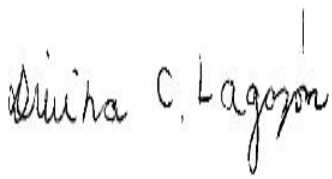
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS	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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



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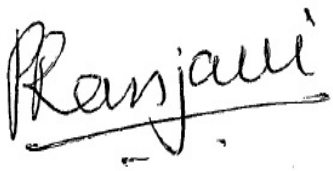

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Cody Forbes Laboratory Analyst
Laboratory Analyst

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Food & Water Testing

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REPORT CODE **AR-24-NW-063730-01** REPORT DATE **19/10/2024**

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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149333**

Sample Name 372648-0
Product: Ground water
Sampling Point code: WIL-D3rs
Sampling Point name: Levin D3rs
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 10:10
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.65	(± 0.07) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<3	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	52	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	17.4	(± 1.74) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.5	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.044	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.041	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	11.5	mg/l	0.05
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.002	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	<0.0005	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	11.8	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	5.37	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.385	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	3.97	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.183	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	22.5	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	6.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	2.23	(± 0.22) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	<6	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	88	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	51	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	18.2	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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✓ (Satisfactory) means meets the specification
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063727-01** REPORT DATE **19/10/2024**

Attention Downer NZ Ltd (EDI Levin)
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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149325**

Sample Name 372567-0
Product: Ground water
Sampling Point code: WIL-D4
Sampling Point name: Levin D4
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 12:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.23	(± 0.02) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	31.1	(± 3.11) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	28.8	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.004	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.034	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	4.46	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.228	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)	27.4	mg/l	0.01

		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

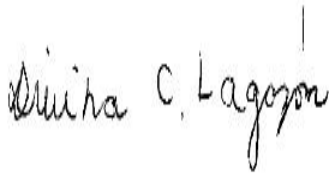
LIST OF METHODS

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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

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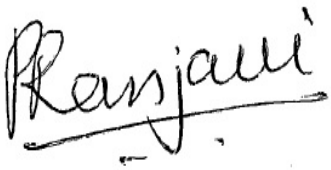

Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062549-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062549-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149149

Sample Name 372572-0
Product: Ground water
Sampling Point code: WIL-D5
Sampling Point name: Levin D5
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.02	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	29.8	(± 2.98) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	30.4	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.046	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0055	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

		RESULTS (UNCERTAINTY)		LOQ
NW010	**Nitrate-N**			
	Nitrate-N	1.03	(± 0.10) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.2	(± 0.2)	0.1

LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Robyn Madge Laboratory Technician Laboratory technician

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062564-01** REPORT DATE **15/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149332**

Sample Name 372571-0
Product: Ground water
Sampling Point code: WIL-D6
Sampling Point name: Levin D6
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 10:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	45.5	(± 4.55) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	60.3	(± 1.2) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.075	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	<0.0005	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	41.4	(± 4.14) mg/l	0.01

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	6.7 (± 0.2)	0.1

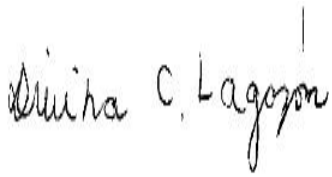
LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



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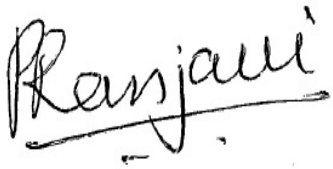

Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062562-01** REPORT DATE **15/10/2024**

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Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149330**

Sample Name 372692-0
Product: Ground water
Sampling Point code: WIL-E1d
Sampling Point name: Levin E1d
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 07:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.20	(± 0.02) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	40.2	(± 4.02) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	43.3	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.063	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.055	mg/l	0.005
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)	29.2	mg/l	0.01

	RESULTS (UNCERTAINTY)		LOQ
ZMF1E	**Enumeration of Escherichia coli by Membrane Filtration**		
Escherichia coli	<1	cfu/100 ml	1
NW010	**Nitrate-N**		
Nitrate-N	<0.01	mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**		
pH	7.5	(± 0.2)	0.1

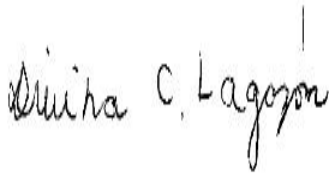
LIST OF METHODS

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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



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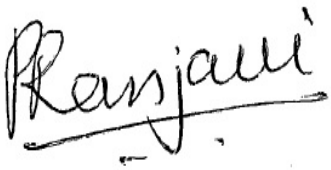

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062560-01** REPORT DATE **15/10/2024**

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Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149324**

Sample Name 372569-0
Product: Ground water
Sampling Point code: WIL-E1s
Sampling Point name: Levin E1s
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 11:26
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.16	(± 0.02) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	27.2	(± 2.72) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	24.3	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.005	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.030	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	4.04	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.186	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)	26.3	mg/l	0.01

		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

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NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.	NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

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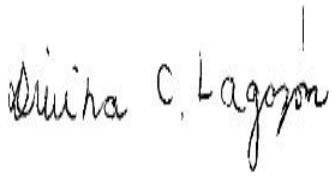

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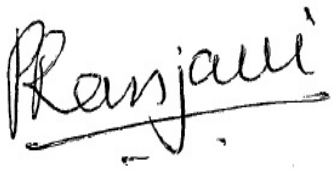

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062563-01** REPORT DATE **15/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
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4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149331**

Sample Name 372693-0
Product: Ground water
Sampling Point code: WIL-E2d
Sampling Point name: Levin E2d
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 07:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.25	(± 0.03) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	41.4	(± 4.14) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	44.1	(± 0.9) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.064	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.431	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	mg/l	0.01

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

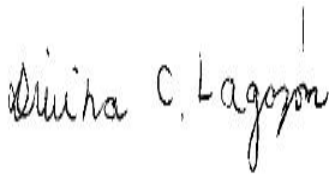
LIST OF METHODS

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

Signature

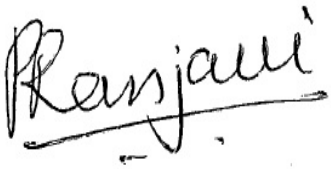
Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

EXPLANATORY NOTE

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⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-062559-01	REPORT DATE	15/10/2024

Attention Downer NZ Ltd (EDI Levin)
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Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210072
Purchase Order Number: Landfill

SAMPLE CODE 812-2024-00149322

Sample Name 372570-0
Product: Ground water
Sampling Point code: WIL-E2s
Sampling Point name: Levin E2s
Reception Date & Time: 09/10/2024 17:10
Analysis Started on: 10/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 12:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.30	(± 0.03) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	38.5	(± 3.85) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	33.4	(± 0.7) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.031	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.017	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.251	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)	26.5	mg/l	0.01

		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	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	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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
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✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062548-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062548-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
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NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149147

Sample Name 372573-0
Product: Ground water
Sampling Point code: WIL-F1
Sampling Point name: Levin F1
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	2	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	16	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	78.5	(± 7.85) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	51.7	(± 1.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.034	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0060	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	<0.0005	mg/l	0.0005
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100

		RESULTS (UNCERTAINTY)		LOQ
NW010	**Nitrate-N**			
	Nitrate-N	3.21	(± 0.32) mg/l	0.01
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	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D	NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.	NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.	NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.	NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H	NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B	ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral	Laboratory Manager Eurofins ELS Limited	**Jennifer Mont**	Supervisor Eurofins ELS Limited	**Divina Cunanan Lagazon**	Supervisor Eurofins ELS Limited
Gordon McArthur	Senior Laboratory Analyst Eurofins ELS Limited	**Robyn Madge**	Laboratory Technician Laboratory technician	**Gabriela Carvalhaes**	Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062553-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062553-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
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NEW ZEALAND

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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149169

Sample Name 372703-0
Product: Ground water
Sampling Point code: WIL-F2
Sampling Point name: Levin F2
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	22.9	(± 2.29) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	22.6	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.039	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0026	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

		RESULTS (UNCERTAINTY)		LOQ
NW010	**Nitrate-N**			
	Nitrate-N	0.69	(± 0.07) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.2	(± 0.2)	0.1

LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Robyn Madge Laboratory Technician Laboratory technician

Gabriela Carvalhaes Business Unit Manager - Wellington

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062547-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062547-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149146

Sample Name 372704-0
Product: Ground water
Sampling Point code: WIL-F3
Sampling Point name: Levin F3
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	12.7	(± 1.27) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	16.4	(± 0.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.028	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	<0.005	mg/l	0.005
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

		RESULTS (UNCERTAINTY)		LOQ
NW120	**Dissolved Sodium**			
	Sodium (Na)	21.0	mg/l	0.01
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	2.31	(± 0.23) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.3	(± 0.2)	0.1

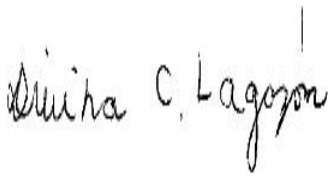
LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

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Gabriela Carvalhaes Business Unit Manager - Wellington

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062550-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062550-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149154

Sample Name 372694-0
Product: Ground water
Sampling Point code: WIL-G1D
Sampling Point name: Levin G1D
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.08	(± 0.01) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	27.4	(± 2.74) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	25.2	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.042	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0608	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

	RESULTS (UNCERTAINTY)		LOQ
NW010 Nitrate-N			
Nitrate-N	<0.01	(± 0.00) mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.2	(± 0.2)	0.1

LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062551-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062551-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149155

Sample Name 372701-0
Product: Ground water
Sampling Point code: WIL-G1S
Sampling Point name: Levin G1S
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	58	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	44.2	(± 4.42) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	29.6	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.059	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.030	mg/l	0.005
NW109	**Dissolved Iron**			
	Iron (Fe)	1.68	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0373	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0010	mg/l	0.0005

		RESULTS (UNCERTAINTY)		LOQ
NW120	**Dissolved Sodium**			
	Sodium (Na)	37.0	mg/l	0.01
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	<0.01	mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	6.7	(± 0.2)	0.1

LIST OF METHODS

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

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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063256-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-063256-01, dated 17/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE 812-2024-00149148

Sample Name 372702-0
Product: Ground water
Sampling Point code: WIL-G2
Sampling Point name: Levin G2s
Reception Date & Time: 09/10/2024 7:00
Analysis Started on: 09/10/2024
Analysis Ending Date: 17/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	35	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	148	(± 14.8) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	104	(± 2.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.003	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.777	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.111	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

	RESULTS (UNCERTAINTY)		LOQ
NW010 Nitrate-N			
Nitrate-N	<0.01	mg/l	0.01
NW195 pH (Tested beyond 15 minute APHA holding time)			
pH	7.2	(± 0.2)	0.1

LIST OF METHODS

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

Signature

Marylou Cabral	Laboratory Manager Eurofins ELS Limited	**Jennifer Mont**	Supervisor Eurofins ELS Limited	**Divina Cunanan Lagazon**	Supervisor Eurofins ELS Limited
Gordon McArthur	Senior Laboratory Analyst Eurofins ELS Limited	**Robyn Madge**	Laboratory Technician Laboratory technician	**Gabriela Carvalhaes**	Business Unit Manager - Wellington

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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
MAV means Maximum Allowable Value

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064386-01** REPORT DATE **22/10/2024**

Attention Downer NZ Ltd (EDI Levin)
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NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150576**

Sample Name 372565-0
Product: Ground water
Sampling Point code: WIL-Xd1
Sampling Point name: Levin Xd1
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 11:12
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.37	(± 0.04) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	21	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	59.6	(± 5.96) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	53.5	(± 1.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	<0.002	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.049	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.485	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

	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	5.1 (± 0.2)	0.1

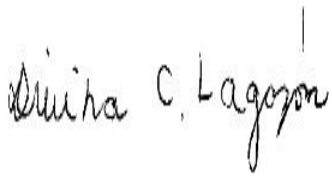
LIST OF METHODS

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

Signature

Marylou Cabral Laboratory Manager
Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst
Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor Microbiology

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064510-01** REPORT DATE **22/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150596**

Sample Name 372574-0
Product: Ground water
Sampling Point code: WIL-Xs1
Sampling Point name: Levin Xs1
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 10/10/2024 09:57
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	10.7	(± 1.07) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<6	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	130	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	70.9	(± 7.09) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	105	(± 2.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.006	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.290	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.33	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

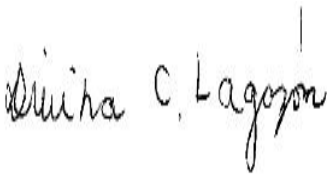
	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	7.0 (± 0.2)	0.1

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 Eurofins ELS Limited



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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-064509-01** REPORT DATE **22/10/2024**

Attention Downer NZ Ltd (EDI Levin)
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4741 Levin
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Phone +64272491292
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Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Admin

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00210451
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00150595**

Sample Name 372575-0
Product: Ground water
Sampling Point code: WIL-Xs2
Sampling Point name: Levin Xs2
Reception Date & Time: 11/10/2024 7:00
Analysis Started on: 11/10/2024
Analysis Ending Date: 22/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 22:17
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.05	(± 0.01) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	50.8	(± 5.08) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	29.5	(± 0.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.024	mg/l	0.002
NW103	**Dissolved Boron**			
	Boron (B)	0.056	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0357	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	1.81	(± 0.18) mg/l	0.01

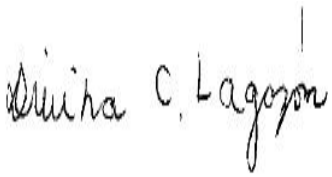
	RESULTS (UNCERTAINTY)	LOQ
NW195 pH (Tested beyond 15 minute APHA holding time)		
pH	6.7 (± 0.2)	0.1

LIST OF METHODS

NW007	**Chloride:** APHA Online Edition 4110 B	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 Eurofins ELS Limited



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Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor Microbiology

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⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-048950-01** REPORT DATE **17/08/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
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4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114389**

Sample Name 358698-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 07/08/2024 15:36
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled Date & Time 06/08/2024 09:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS		RESULTS	(UNCERTAINTY)	LOQ
NW00U	**Chlorophenols**			
	2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
	2,4-Dichlorophenol	<0.01	mg/l	0.01
	2,6-Dichlorophenol	<0.2	mg/l	0.2
	2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
	3,4,5-Trichlorophenol	<0.01	mg/l	0.01
	4-Chloro-3-cresol	<0.01	mg/l	0.01
	Pentachlorophenol	<0.005	mg/l	0.005
	Phenol	<0.01	mg/l	0.01
	Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
	Isocaproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	1	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	24.8	(± 2.48) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.2	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.009	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	9.5	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0007	mg/l	0.0005
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)	0.0212	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)	2.15	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.015	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	18.9	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	0.61	(± 0.06) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	22.1	(± 2.21) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	6	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	50	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	52	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	3.4	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Chemistry

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-056236-01** REPORT DATE **20/09/2024**

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00133405**

Sample Name 368253-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 12/09/2024 16:13
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 06:45
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.02	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	32	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	22.5	(± 2.25) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.9	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.045	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)	11.8	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0017	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.09	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.59	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0078	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)	2.73	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.008	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	17.1	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	200	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.41	(± 0.14) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	26.8	(± 2.68) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	<6	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	38	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	57	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	6.5	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Ganesh Ilancko Supervisor Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor
Microbiology

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063726-01** REPORT DATE **19/10/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
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NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149043**

Sample Name 372576-0
Product: Ground water
Sampling Point code: WIL-HS1
Sampling Point name: Levin HS1
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.07	(± 0.01) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<3	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	25	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	21.9	(± 2.19) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.2	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.007	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.057	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.4	mg/l	0.05
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)	0.113	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.82	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0156	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)	1.99	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.049	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	19.4	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	400	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	2.99	(± 0.30) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	24.8	(± 2.48) mg/l	0.02

		RESULTS (UNCERTAINTY)		LOQ
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	39	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	66	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	6.2	mg/l	0.1

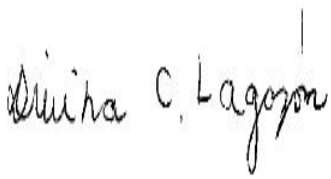
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NWWG6	**Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.
NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

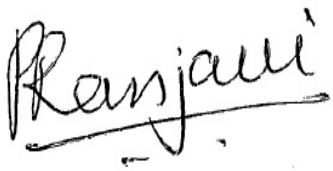
Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

EXPLANATORY NOTE

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MAV means Maximum Allowable Value

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-048952-01** REPORT DATE **17/08/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114394**

Sample Name 358699-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 07/08/2024 15:42
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled Date & Time 06/08/2024 09:10
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	2	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	64	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	25.0	(± 2.50) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.2	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.009	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	9.2	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**			
	Iron (Fe)	0.07	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.59	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0117	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)	2.29	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.015	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	18.4	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	0.61	(± 0.06) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	22.2	(± 2.22) mg/l	0.02

		RESULTS (UNCERTAINTY)		LOQ
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	50	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	50	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	3.7	mg/l	0.1

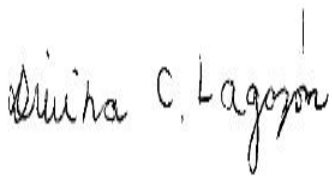
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS	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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gabriela Carvalhaes Manager Chemistry

Vineel Chandra Laboratory Supervisor Microbiology

EXPLANATORY NOTE

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✓ (Satisfactory) means meets the specification

All test method Quality Controls including method blanks, reference samples, spikes, surrogates, and duplicate sample testing, have passed and are within the control limits.

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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.
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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE	AR-24-NW-056237-01	REPORT DATE	20/09/2024

Attention Downer NZ Ltd (EDI Levin)
David McMillan
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NEW ZEALAND

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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE 812-2024-00133414

Sample Name 368254-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 12/09/2024 16:18
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 07:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.02	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	21.4	(± 2.14) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	21.9	(± 0.4) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.057	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)	11.6	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0018	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.10	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	6.51	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0047	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)	2.65	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.017	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	16.9	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	<0.002	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.35	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	25.5	(± 2.55) mg/l	0.02

		RESULTS (UNCERTAINTY)		LOQ
NW206	**Suspended Solids**			
	Suspended Solids	20	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	40	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	56	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	6.6	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Ganesh Ilancko Supervisor Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor
Microbiology

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063723-01** REPORT DATE **19/10/2024**

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149018**

Sample Name 372577-0
Product: Ground water
Sampling Point code: WIL-HS1A
Sampling Point name: Levin HS1A
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.05	(± 0.01) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS (UNCERTAINTY)		LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	17	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	21.3	(± 2.13) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.5	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.006	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.056	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	12.8	mg/l	0.05
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0023	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.104	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.49	mg/l	0.01
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)	0.0008	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	2.29	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.060	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	18.3	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.011	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	2.84	(± 0.28) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	23.9	(± 2.39) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	16	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	42	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	63	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	6.6	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

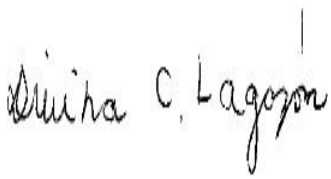
NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

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

Signature

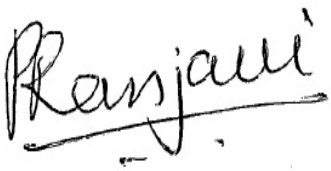
Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification
MAV means Maximum Allowable Value

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If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The 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.
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END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-048953-01** REPORT DATE **17/08/2024**

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4741 Levin
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Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114402**

Sample Name 358700-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 07/08/2024 15:44
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled Date & Time 06/08/2024 09:50
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS		RESULTS (UNCERTAINTY)		LOQ
NW00U	**Chlorophenols**			
	2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
	2,4-Dichlorophenol	<0.01	mg/l	0.01
	2,6-Dichlorophenol	<0.2	mg/l	0.2
	2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
	3,4,5-Trichlorophenol	<0.01	mg/l	0.01
	4-Chloro-3-cresol	<0.01	mg/l	0.01
	Pentachlorophenol	<0.005	mg/l	0.005
	Phenol	<0.01	mg/l	0.01
	Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
	Isocaproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	<0.01	(± 0.00) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	2	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	24.0	(± 2.40) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.9	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.006	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)	10.3	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**			
	Iron (Fe)	0.07	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.39	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0269	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)	2.47	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.005	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	20.5	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.003	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.66	(± 0.07) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	20.1	(± 2.01) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	<6	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	53	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	56	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	3.4	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Chemistry

EXPLANATORY NOTE

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

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-056238-01** REPORT DATE **20/09/2024**

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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00133415**

Sample Name 368267-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 12/09/2024 16:20
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 07:00
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.01	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	27	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	22.4	(± 2.24) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.8	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.029	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)	13.0	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0017	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.11	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.13	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0029	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)	2.88	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.033	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	17.8	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	1.28	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	26.9	(± 2.69) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	<6	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	41	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	62	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	8.1	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

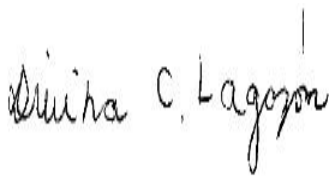
NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



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EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062545-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062545-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
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NEW ZEALAND

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Amend sample date as per customer update

SAMPLE CODE **812-2024-00149030**

Sample Name 372707-0
Product: Ground water
Sampling Point code: WIL-HS2
Sampling Point name: Levin HS2
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.10	(± 0.01) mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<1	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	22	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	22.3	(± 2.23) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.5	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.008	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.058	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	12.9	mg/l	0.05
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**			
	Iron (Fe)	0.135	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.60	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0172	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)	1.92	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.059	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	18.6	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.004	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	300	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	3.00	(± 0.30) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1

		RESULTS (UNCERTAINTY)		LOQ
NW011	**Sulphate**			
	Sulphate	24.9	(± 2.49) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	40	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	64	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	5.9	mg/l	0.1

LIST OF METHODS

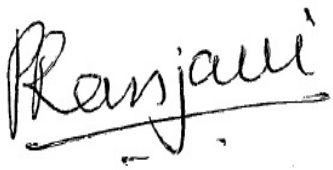
NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B	NW020	**Chemical Oxygen Demand:** APHA Online Edition 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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

EXPLANATORY NOTE

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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

END OF REPORT

eurofins

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-048954-01** REPORT DATE **17/08/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114414**

Sample Name 358701-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 07/08/2024 15:56
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled Date & Time 05/08/2024 22:10
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.10	(± 0.01) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	2	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	<15	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	26.4	(± 2.64) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	24.6	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.004	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.04	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	10.0	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)	0.06	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.31	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0108	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)	2.62	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.014	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	0.75	(± 0.08) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.5	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	21.3	(± 2.13) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	79	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	55	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	55	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	3.8	mg/l	0.1

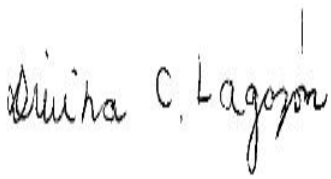
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NWWG6	**Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.
NW007	**Chloride:** APHA Online Edition 4110 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Chemistry

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

All test method Quality Controls including method blanks, reference samples, spikes, surrogates, and duplicate sample testing, have passed and are within the control limits.

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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.
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All samples become the property of Eurofins to the extent necessary for the performance of the Services.
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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-056283-01** REPORT DATE **20/09/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00133413**

Sample Name 368268-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 12/09/2024 16:16
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 07:15
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.03	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<1	mg/l	1

		RESULTS	(UNCERTAINTY)	LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	18	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	21.9	(± 2.19) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	22.8	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.032	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)	12.1	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	<0.001	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0017	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	0.10	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)	0.0090	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)	2.83	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.023	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	17.3	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	<100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	1.35	(± 0.13) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.9	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	25.0	(± 2.50) mg/l	0.02

		RESULTS (UNCERTAINTY)		LOQ
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	41	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	58	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	6.9	mg/l	0.1

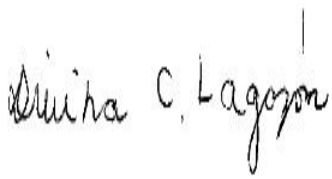
LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS	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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Ganesh Ilancko Supervisor Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor
Microbiology

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

END OF REPORT

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-062546-02 #** REPORT DATE **19/10/2024**

This amended report supersedes Analytical Report number AR-24-NW-062546-01, dated 15/10/2024.

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00209998
Purchase Order Number: Landfill
Comments: Sample date amended as per customer update

SAMPLE CODE **812-2024-00149032**

Sample Name 372708-0
Product: Ground water
Sampling Point code: WIL-HS3
Sampling Point name: Levin HS3
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 15/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)		LOQ
NW00U Chlorophenols				
2,3,4,6-Tetrachlorophenol	<0.01		mg/l	0.01
2,4-Dichlorophenol	<0.01		mg/l	0.01
2,6-Dichlorophenol	<0.2		mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01		mg/l	0.01
3,4,5-Trichlorophenol	<0.01		mg/l	0.01
4-Chloro-3-cresol	<0.01		mg/l	0.01
Pentachlorophenol	<0.005		mg/l	0.005
Phenol	<0.01		mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02		mg/l	0.02
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
Isocaproic acid	<5		mg/l	5
Isobutyric acid	<5		mg/l	5
Isovaleric acid	<5		mg/l	5
Propionic acid	<5		mg/l	5
Valeric acid	<5		mg/l	5
Volatile fatty acids as acetic acid	<5		mg/l	5

	RESULTS	(UNCERTAINTY)		LOQ
NW179 Ammonia Nitrogen				
Ammoniacal nitrogen (N)	0.08	(± 0.01)	mg/l	0.01

		RESULTS (UNCERTAINTY)		LOQ
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	<3	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	22	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	23.2	(± 2.32) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	23.8	(± 0.5) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.007	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	<0.001	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.058	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	13.0	mg/l	0.05
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)	0.208	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	7.78	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0242	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)	2.02	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.054	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	19.4	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	3.06	(± 0.31) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.6	(± 0.2)	0.1

		RESULTS (UNCERTAINTY)		LOQ
NW011	**Sulphate**			
	Sulphate	25.4	(± 2.54) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	<6	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	42	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	65	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	6.4	mg/l	0.1

LIST OF METHODS

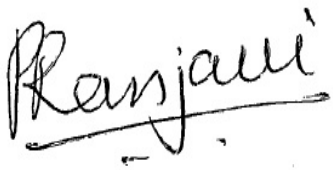
NW003	**Total Alkalinity:** APHA Online Edition 2320 B	NW007	**Chloride:** APHA Online Edition 4110 B
NW00U	**Chlorophenols:** Internal Method, LC-MS/MS	NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B	NW020	**Chemical Oxygen Demand:** APHA Online Edition 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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓(Satisfactory) means meets the specification
MAV means Maximum Allowable Value

END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-049575-01** REPORT DATE **20/08/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
4741 Levin
NEW ZEALAND

Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114376**

Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 07/08/2024 15:33
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1370	(± 137) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	113	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	2900	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	1380	(± 138) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1810	(± 36.1) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.706	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.263	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	5.53	mg/l	0.03

		RESULTS	(UNCERTAINTY)	LOQ
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	73.2	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.752	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0044	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	6.08	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0010	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	49.2	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.19	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.112	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	659	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	15.8	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	980	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.038	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	mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.7	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	54.3	(± 5.43) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	50	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	7520	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	385	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	795	mg/l	0.1

LIST OF METHODS

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

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

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Wellington 5010
NEW ZEALAND

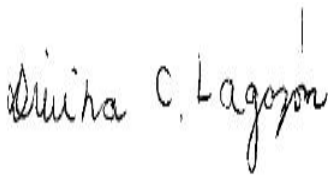
Phone +64 4 576 5016
www.eurofins.co.nz

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

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Chemistry

EXPLANATORY NOTE

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Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

All test method Quality Controls including method blanks, reference samples, spikes, surrogates, and duplicate sample testing, have passed and are within the control limits.

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-057548-01** REPORT DATE **26/09/2024**

Attention Downer NZ Ltd (EDI Levin)
David McMillan
122 Hokio Beach Road
PO Box 642
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NEW ZEALAND
Phone +64272491292
Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00133404**

Sample Name 368266-0
Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 12/09/2024 16:11
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 07:40
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS (UNCERTAINTY)		LOQ
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

		RESULTS (UNCERTAINTY)		LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	1280	(± 128) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	88	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	2820	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	1050	(± 105) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1560	(± 31.3) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.779	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.276	mg/l	0.001

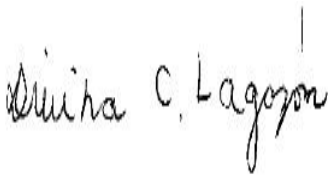
		RESULTS (UNCERTAINTY)		LOQ
NW103	**Dissolved Boron**			
	Boron (B)	5.14	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	68.2	mg/l	0.1
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.691	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0030	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	6.49	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	43.9	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.23	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0963	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	563	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	14.3	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	854	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.030	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	100	cfu/100 ml	100
NW010	**Nitrate-N**			
	Nitrate-N	0.33	(± 0.03) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.9	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	46.0	(± 4.60) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	40	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	6620	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	351	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	635	mg/l	0.1

LIST OF METHODS

NW003	**Total Alkalinity:** APHA Online Edition 2320 B
NW010	**Nitrate-N:** APHA Online Edition 4110 B
NW020	**Chemical Oxygen Demand:** APHA Online Edition 5220 D
NW030	**Total Hardness:** APHA Online Edition 2340 B
NW103	**Dissolved Boron:** APHA Online Edition 3125 B mod.
NW105	**Dissolved Calcium:** APHA Online Edition 3125 B mod.
NW108	**Dissolved Copper:** APHA Online Edition 3125 B mod.
NW110	**Dissolved Lead:** APHA Online Edition 3125 B mod.
NW113	**Dissolved Manganese:** APHA Online Edition 3125 B mod.
NW116	**Dissolved Nickel:** APHA Online Edition 3125 B mod.
NW120	**Dissolved Sodium:** APHA Online Edition 3125 B mod.
NW179	**Ammonia Nitrogen:** APHA Online Edition 4500-NH3 H
NW195	**pH (Tested beyond 15 minute APHA holding time):** APHA 24th Edition 4500-H B
NW210	**Total Non-Purgeable Organic Carbon:** APHA Online Edition 5310 B
NW583	**Dissolved Arsenic:** APHA Online Edition 3125 B mod.
ZM2GA	**Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition
NW007	**Chloride:** APHA Online Edition 4110 B
NW011	**Sulphate:** APHA Online Edition 4110 B
NW023	**Conductivity:** APHA 24th Edition 2510 B
NW098	**Dissolved Aluminium:** APHA Online Edition 3125 B mod.
NW104	**Dissolved Cadmium:** APHA Online Edition 3125 B mod.
NW106	**Dissolved Chromium:** APHA Online Edition 3125 B mod.
NW109	**Dissolved Iron:** APHA Online Edition 3125 B mod.
NW112	**Dissolved Magnesium:** APHA Online Edition 3125 B mod.
NW114	**Dissolved Mercury:** APHA Online Edition 3125 B mod.
NW117	**Dissolved Potassium:** APHA Online Edition 3125 B mod.
NW125	**Dissolved Zinc:** APHA Online Edition 3125 B mod.
NW193	**Dissolved Reactive Phosphorus:** APHA Online Edition 4500-P G
NW206	**Suspended Solids:** APHA Online Edition 2540 D
NW341	**BOD5 - Soluble Carbonaceous:** APHA Online Edition 5210 B
NWWG6	**Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

Signature

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited

Gabriela Carvalhaes Business Unit Manager - Wellington

Vineel Chandra Laboratory Supervisor Microbiology

EXPLANATORY NOTE

①Test is not accredited
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③Test is subcontracted within Eurofins group and is not accredited
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⑤Test is subcontracted outside Eurofins group and is not accredited
⑥Test result is provided by the customer and is not accredited
⑦Tested at the sampling point by Eurofins and is not accredited
⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
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N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063725-01** REPORT DATE **19/10/2024**

Attention Downer NZ Ltd (EDI Levin)
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NEW ZEALAND
Phone +64272491292
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Copy to: Water and Waste Team (waterandwasteteam@horowhenua.govt.nz), Admin

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00209998
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149031**

Sample Name 372706-0
Product: Ground water
Sampling Point code: WIL-LP
Sampling Point name: Levin Leachate Pond
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS (UNCERTAINTY)		LOQ
NW229 VOC (GC-MS)			
1,1,1,2-Tetrachloroethane	<0.0005	mg/l	0.0005
1,1,1-Trichloroethane	<0.0005	mg/l	0.0005
1,1,2,2-tetrachloroethane	<0.0005	mg/l	0.0005
1,1,2-Trichloroethane	<0.0005	mg/l	0.0005
1,1-Dichloroethane	<0.0005	mg/l	0.0005
1,1-Dichloroethene	<0.0005	mg/l	0.0005
1,1-Dichloropropene	<0.0005	mg/l	0.0005
1,2,3-Trichlorobenzene	<0.0005	mg/l	0.0005
1,2,3-Trichloropropane	<0.0005	mg/l	0.0005
1,2,4 trimethylbenzen	<0.0005	mg/l	0.0005
1,2,4-Trichlorobenzene	<0.0005	mg/l	0.0005
1,2-Dibromo-3-chloropropane	<0.001	mg/l	0.001
1,2-Dibromoethane	<0.0002	mg/l	0.0002
1,2-Dichlorobenzene (2)	<0.0005	mg/l	0.0005
1,2-Dichloroethane	<0.0005	mg/l	0.0005
1,2-Dichloropropane	<0.0005	mg/l	0.0005
1,3,5-Trichlorobenzene	<0.0005	mg/l	0.0005
1,3,5-Trimethylbenzene	<0.0005	mg/l	0.0005
1,3-Dichlorobenzene	<0.0005	mg/l	0.0005
1,3-Dichloropropane	<0.0005	mg/l	0.0005
1,4-dichlorobenzene	<0.0005	mg/l	0.0005
2,2-Dichloropropane	<0.0005	mg/l	0.0005
2-Chlorotoluene	<0.0005	mg/l	0.0005
3-chloropropene	<0.0005	mg/l	0.0005
4-Chlorotoluene	<0.0005	mg/l	0.0005

ORGANICS	RESULTS (UNCERTAINTY)		LOQ
NW229 VOC (GC-MS)			
4-methyl-2-pentanone	Not Recovered	mg/l	0.0005
Benzene	0.0022	mg/l	0.0005
Bromobenzene	<0.0005	mg/l	0.0005
Bromochloromethane	<0.0012	mg/l	0.0012
Bromodichloromethane	<0.0005	mg/l	0.0005
Bromoform	<0.0005	mg/l	0.0005
Bromomethane (zone 2)	<0.001	mg/l	0.001
Carbon tetrachloride	<0.0005	mg/l	0.0005
Carbondisulphide (CS2)	<0.0005	mg/l	0.0005
Chlorobenzene	0.0008	mg/l	0.0005
Chloroethane	<0.001	mg/l	0.001
Chloroform	<0.0005	mg/l	0.0005
Chloromethane	<0.006	mg/l	0.006
cis-1,2-Dichloroethene	<0.001	mg/l	0.0005
cis-1,3-Dichloropropene	<0.0005	mg/l	0.0005
Dibromochloromethane	<0.0005	mg/l	0.0005
Dibromomethane	<0.0005	mg/l	0.0005
Dichloromethane	<0.005	mg/l	0.005
Ethylbenzene	0.0063	mg/l	0.0005
Hexachlorobutadiene	<0.0002	mg/l	0.0002
Isopropylbenzene (Cumene)	<0.0005	mg/l	0.0005
m,p-Xylene, Ethylbenzene	0.02	mg/l	0.0015
m-Xylene	0.0063	mg/l	0.0005
Naphthalene	0.0010	mg/l	0.0005
n-Butylbenzene	Not Recovered	mg/l	0.0005
n-Propylbenzene	<0.0005	mg/l	0.0005
p-Isopropyltoluene	<0.0005	mg/l	0.0005
p-Xylene	0.0063	mg/l	0.0005
sec-Butylbenzene	<0.0005	mg/l	0.0005
Styrene	0.0059	mg/l	0.0005
tert-Butylbenzene	<0.0005	mg/l	0.0005
Tetrachloroethene	<0.0005	mg/l	0.0005
Toluene	0.0031	mg/l	0.0005
trans-1,2-Dichloroethene	<0.001	mg/l	0.0005
trans-1,3-Dichloropropene	<0.0005	mg/l	0.0005
Trichloroethene	<0.0005	mg/l	0.0005
Trichlorofluoromethane	<0.0005	mg/l	0.0005
Vinyl chloride	<0.0003	mg/l	0.0003
Xylene (ortho-)	0.0113	mg/l	0.0005
NW228 SVOC (GC-MSMS)			
Acenaphthene	<0.0001	mg/l	0.0001
Acenaphthylene	<0.001	mg/l	0.001
Adipatic acid, bis-2-ethylhexyl ester (DEHA)	<0.0001	mg/l	0.0001
Alachlor	<0.0001	mg/l	0.0001
Aldicarb	<0.1	mg/l	0.1
Aldrin	<0.001	mg/l	0.001
Anthracene	<0.001	mg/l	0.001

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW228 SVOC (GC-MSMS)			
Atrazine	<0.0001	mg/l	0.0001
Benz(a)anthracene	<0.0001	mg/l	0.0001
Benzo(a)pyrene	<0.0001	mg/l	0.0001
Benzo(g,h,i)perylene	<0.001	mg/l	0.001
Bromacil	<0.005	mg/l	0.005
Carbofuran	<0.001	mg/l	0.001
Chlordane	<0.0001	mg/l	0.0001
Chlordane, gamma	<0.001	mg/l	0.001
Chlorpyrifos (-ethyl)	<0.0001	mg/l	0.0001
Chrysene	<0.0001	mg/l	0.0001
Cyanazine	<0.005	mg/l	0.005
d-BHC	<0.0001	mg/l	0.0001
DDD, p,p'-	<0.0001	mg/l	0.0001
DDE, p,p-	<0.0001	mg/l	0.0001
DDT, p,p'-	<0.001	mg/l	0.001
Diazinon	<0.0001	mg/l	0.0001
Dibenz(a,h)anthracene	<0.0001	mg/l	0.0001
Dieldrin	<0.0001	mg/l	0.0001
Dimethoate	<0.001	mg/l	0.001
Diuron	<0.001	mg/l	0.001
Endosulfan, alpha-	<0.001	mg/l	0.001
Endosulfan, beta-	<0.005	mg/l	0.005
Endosulfan-sulfate	<0.0001	mg/l	0.0001
Endrin	<0.0001	mg/l	0.0001
Endrin	<0.0001	mg/l	0.0001
Endrin ketone	<0.0001	mg/l	0.0001
Endrin-aldehyde	<0.01	mg/l	0.01
Fluoranthene	<0.0001	mg/l	0.0001
Fluorene	<0.0001	mg/l	0.0001
HCH, alpha-	<0.0001	mg/l	0.0001
HCH, beta-	<0.0001	mg/l	0.0001
Heptachlor	<0.0001	mg/l	0.0001
Heptachlor epoxide, cis-	<0.0001	mg/l	0.0001
Hexachlorobenzene (HCB)	<0.0001	mg/l	0.0001
Hexazinone	<0.001	mg/l	0.001
Indeno(1,2,3-cd)pyrene	<0.0001	mg/l	0.0001
Lindane (gamma-HCH)	<0.0001	mg/l	0.0001
Metalaxyl and metalaxyl-M (metalaxyl including other mixtures of constituent isomers including metalaxyl-M (sum of isomers))	<0.001	mg/l	0.001
Methoxychlor	<0.0001	mg/l	0.0001
Metolachlor	<0.0001	mg/l	0.0001
Metribuzin	<0.0001	mg/l	0.0001
Molinate	<0.0001	mg/l	0.0001
Naphthalene	0.0008	mg/l	0.0001
Oxadiazon	<0.0001	mg/l	0.0001
PCB 101	<0.0001	mg/l	0.0001
PCB 138	<0.001	mg/l	0.001

ORGANICS		RESULTS	(UNCERTAINTY)	LOQ
NW228	**SVOC (GC-MSMS)**			
	PCB 183	<0.0001	mg/l	0.0001
	PCB 28	<0.0001	mg/l	0.0001
	PCB 7	<0.0001	mg/l	0.0001
	Pendimethalin	<0.002	mg/l	0.002
	Permethrin (sum of isomers)	<0.0001	mg/l	0.0001
	Phenanthrene	<0.0001	mg/l	0.0001
	Pirimiphos-methyl	<0.0001	mg/l	0.0001
	Procymidone	<0.0001	mg/l	0.0001
	Propanil	<0.001	mg/l	0.001
	Propazine	<0.0001	mg/l	0.0001
	Pyrene	<0.0001	mg/l	0.0001
	Pyriproxyfen	<0.0001	mg/l	0.0001
	Simazine	<0.0001	mg/l	0.0001
	Sum of DDT and isomers	<0.001	mg/l	0.001
	Terbuthylazine	<0.0001	mg/l	0.0001
	Total Benzo(b) and Benzo(k) fluoranthene	<0.001	mg/l	0.001
	Trifluralin	<0.0001	mg/l	0.0001
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
	Isocaproic acid	<5	mg/l	5
	Isobutyric acid	<5	mg/l	5
	Isovaleric acid	<5	mg/l	5
	Propionic acid	<5	mg/l	5
	Valeric acid	<5	mg/l	5
	Volatile fatty acids as acetic acid	<5	mg/l	5

		RESULTS	(UNCERTAINTY)	LOQ
NW179	**Ammonia Nitrogen**			
	Ammoniacal nitrogen (N)	0.16	(± 0.02) mg/l	0.01
NW341	**BOD5 - Soluble Carbonaceous**			
	BOD5	108	mg/l	1
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	8230	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	1070	(± 107) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	1450	(± 29.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.727	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.208	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	6.30	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002

		RESULTS (UNCERTAINTY)		LOQ
NW105	**Dissolved Calcium**			
	Calcium (Ca)	81.3	mg/l	0.05
NW106	**Dissolved Chromium**			
	Chromium (Cr)	0.651	mg/l	0.001
NW108	**Dissolved Copper**			
	Copper (Cu)	0.0048	mg/l	0.0005
NW109	**Dissolved Iron**			
	Iron (Fe)	6.45	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	0.0015	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	44.0	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	1.17	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	0.0007	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0970	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	601	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	9.96	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	959	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.037	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	7.8	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	52.7	(± 5.27) mg/l	0.02
NW206	**Suspended Solids**			
	Suspended Solids	24	mg/l	3
NW003	**Total Alkalinity**			
	Alkalinity total	6760	mg CaCO3/l	1
NW030	**Total Hardness**			
	Hardness	384	mg CaCO3/l	1
NW210	**Total Non-Purgeable Organic Carbon**			
	Total Organic Carbon	625	mg/l	0.1

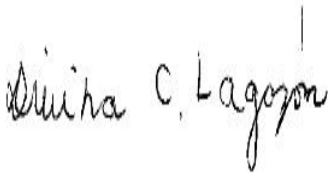
LIST OF METHODS

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.
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
NW228	**SVOC (GC-MSMS):** Internal Method, GC-MS/MS
NW229	**VOC (GC-MS):** Internal Method, HS-GC-MS
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

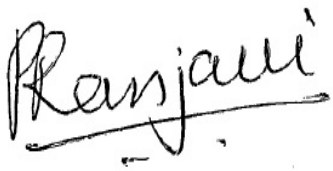
Signature

Jennifer Mont Supervisor Eurofins ELS Limited



Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



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Cody Forbes Laboratory Analyst Laboratory Analyst

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MAV means Maximum Allowable Value

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-048951-01** REPORT DATE **17/08/2024**

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Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00198592
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00114393**

Sample Name 358696-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 07/08/2024 15:39
Analysis Started on: 07/08/2024
Analysis Ending Date: 17/08/2024
Product Type Ground water
Sampled Date & Time 05/08/2024 22:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.03	(± 0.00) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<6	mg/l	1

		RESULTS (UNCERTAINTY)		LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	90	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	73.5	(± 7.35) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	58.3	(± 1.2) 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)	0.21	mg/l	0.03
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	18.9	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)	0.44	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	16.0	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.0174	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)	17.1	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.019	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	50.4	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	2.30	(± 0.23) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	7.4	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	5.59	(± 0.56) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	67	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	157	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	113	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	20.2	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Divina Cunanan Lagazon Supervisor Eurofins ELS Limited

Arvinder Singh Laboratory Supervisor Microbiology

Gabriela Carvalhaes Manager Chemistry

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

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END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-056235-01** REPORT DATE **20/09/2024**

Attention Downer NZ Ltd (EDI Levin)
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Email Davidm@horowhenua.govt.nz

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill
Order code: EUNZWE-00205057
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00133403**

Sample Name 368265-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 12/09/2024 16:07
Analysis Started on: 12/09/2024
Analysis Ending Date: 20/09/2024
Product Type Ground water
Sampled Date & Time 12/09/2024 06:30
Sampler(s) Client nominated external sampler
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	0.71	(± 0.07) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<3	mg/l	1

		RESULTS (UNCERTAINTY)		LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	115	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	54.5	(± 5.45) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	49.9	(± 1.0) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.025	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.002	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)	24.8	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)	1.65	mg/l	0.01
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	15.5	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.213	mg/l	0.0005
NW114	**Dissolved Mercury**			
	Mercury (Hg)	<0.0005	mg/l	0.0005
NW116	**Dissolved Nickel**			
	Nickel (Ni)	0.0013	mg/l	0.0005
NW117	**Dissolved Potassium**			
	Potassium (K)	19.0	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.017	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	44.4	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	<0.01	(± 0.00) mg/l	0.01
NW195	**pH (Tested beyond 15 minute APHA holding time)**			
	pH	8.0	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	1.96	(± 0.20) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	45	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	164	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	126	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	30.0	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

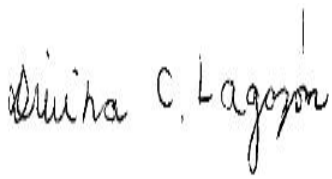
NW583 **Dissolved Arsenic:** APHA Online Edition 3125 B mod.

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 Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited



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Vineel Chandra Laboratory Supervisor
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EXPLANATORY NOTE

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④Test is subcontracted outside Eurofins group and is accredited
⑤Test is subcontracted outside Eurofins group and is not accredited
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⑧Tested at the sampling point by Eurofins and is accredited
⑨Test is RLP accredited
⑩Test is subcontracted within Eurofins group and is RLP accredited

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification

END OF REPORT

Food & Water Testing

ANALYTICAL REPORT

REPORT CODE **AR-24-NW-063724-01** REPORT DATE **19/10/2024**

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

Contact for your orders: Gabriela Carvalhaes
Contract: Landfill

Order code: EUNZWE-00209998
Purchase Order Number: Landfill

SAMPLE CODE **812-2024-00149019**

Sample Name 372705-0
Product: Ground water
Sampling Point code: WIL-TD1
Sampling Point name: Levin TD1
Reception Date & Time: 09/10/2024 13:35
Analysis Started on: 09/10/2024
Analysis Ending Date: 19/10/2024
Product Type Ground water
Sampled Date & Time 09/10/2024 00:00
Sampler(s) customer
Sampled by Eurofins No

ORGANICS	RESULTS	(UNCERTAINTY)	LOQ
NW00U Chlorophenols			
2,3,4,6-Tetrachlorophenol	<0.01	mg/l	0.01
2,4-Dichlorophenol	<0.01	mg/l	0.01
2,6-Dichlorophenol	<0.2	mg/l	0.2
2-Chlorophenol (o-chlorophenol)	<0.01	mg/l	0.01
3,4,5-Trichlorophenol	<0.01	mg/l	0.01
4-Chloro-3-cresol	<0.01	mg/l	0.01
Pentachlorophenol	<0.005	mg/l	0.005
Phenol	<0.01	mg/l	0.01
Total of 2,4,5 & 2,4,6 -Trichlorophenol	<0.02	mg/l	0.02
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
Isocaproic acid	<5	mg/l	5
Isobutyric acid	<5	mg/l	5
Isovaleric acid	<5	mg/l	5
Propionic acid	<5	mg/l	5
Valeric acid	<5	mg/l	5
Volatile fatty acids as acetic acid	<5	mg/l	5

	RESULTS	(UNCERTAINTY)	LOQ
NW179 Ammonia Nitrogen			
Ammoniacal nitrogen (N)	6.45	(± 0.65) mg/l	0.01
NW341 BOD5 - Soluble Carbonaceous			
BOD5	<6	mg/l	1

		RESULTS (UNCERTAINTY)		LOQ
NW020	**Chemical Oxygen Demand**			
	Chemical oxygen demand (COD)	143	mg/l	15
NW007	**Chloride**			
	Chloride (Cl)	77.6	(± 7.76) mg/l	0.02
NW023	**Conductivity**			
	Conductivity	80.7	(± 1.6) mS/m	0.1
NW098	**Dissolved Aluminium**			
	Aluminium	0.016	mg/l	0.002
NW583	**Dissolved Arsenic**			
	Arsenic (As)	0.003	mg/l	0.001
NW103	**Dissolved Boron**			
	Boron (B)	0.315	mg/l	0.005
NW104	**Dissolved Cadmium**			
	Cadmium (Cd)	<0.0002	mg/l	0.0002
NW105	**Dissolved Calcium**			
	Calcium (Ca)	43.6	mg/l	0.05
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)	2.60	mg/l	0.005
NW110	**Dissolved Lead**			
	Lead (Pb)	<0.0005	mg/l	0.0005
NW112	**Dissolved Magnesium**			
	Magnesium (Mg)	25.8	mg/l	0.01
NW113	**Dissolved Manganese**			
	Manganese (Mn)	0.659	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
NW117	**Dissolved Potassium**			
	Potassium (K)	23.4	mg/l	0.01
NW193	**Dissolved Reactive Phosphorus**			
	Phosphorus (soluble reactive)	0.019	mg/l	0.005
NW120	**Dissolved Sodium**			
	Sodium (Na)	66.5	mg/l	0.01
NW125	**Dissolved Zinc**			
	Zinc (Zn)	0.004	mg/l	0.002
ZM2GA	**Enumeration of Escherichia coli by Membrane Filtration**			
	Escherichia coli	200	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	7.3	(± 0.2)	0.1
NW011	**Sulphate**			
	Sulphate	0.57	(± 0.06) mg/l	0.02

	RESULTS (UNCERTAINTY)		LOQ
NW206 Suspended Solids			
Suspended Solids	39	mg/l	3
NW003 Total Alkalinity			
Alkalinity total	292	mg CaCO3/l	1
NW030 Total Hardness			
Hardness	215	mg CaCO3/l	1
NW210 Total Non-Purgeable Organic Carbon			
Total Organic Carbon	40.9	mg/l	0.1

LIST OF METHODS

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

NW00U **Chlorophenols:** Internal Method, LC-MS/MS

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

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

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

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

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

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

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

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

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

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

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

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

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

NWWG6 **Volatile Fatty Acids (VFA):** APHA 24th Edition 5560 D mod.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

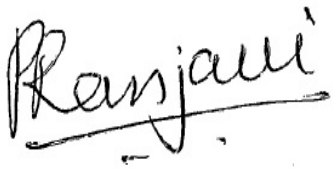
ZM2GA **Escherichia coli E (Water) [NZ] <100 >6 000 000 /100 ml (0-3) m-FC Agar-F:** SMEWW 9222I; APHA 24th Edition

Signature

Marylou Cabral Laboratory Manager Eurofins ELS Limited

Jennifer Mont Supervisor Eurofins ELS Limited

Gordon McArthur Senior Laboratory Analyst Eurofins ELS Limited



Pathma Ranjanie Senior Analyst Senior Analyst

Gabriela Carvalhaes Business Unit Manager - Wellington

Cody Forbes Laboratory Analyst Laboratory Analyst

EXPLANATORY NOTE

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

N/A means Not Applicable
Not Detected means not detected at or above the Limit of Quantification (LOQ)
LOQ means Limit of Quantification and the unit of LOQ is the same as the result unit
✗ (Unsatisfactory) means does not meet the specification
✓ (Satisfactory) means meets the specification
MAV means Maximum Allowable Value

The Customer acknowledges and accepts that: (a) where Eurofins is not responsible for sampling, the test result(s) in this report apply only to the sample as received. Customer is solely responsible for the sampling process and warrants that the sample provided to Eurofins is representative of the lot / batch from which the samples were drawn; and (b) Eurofins expresses no opinion and accepts no liability in respect of the Customer's production process or homogeneity of the product.
This document can only be reproduced in full.
The tests are identified by a five-digit code, their description is available on request.
Accreditation does not apply to comments or graphical representations.
Unless otherwise stated, all tests in this analytical report (except for subcontracted tests) are performed at 85 Port Road, Seaview, Lower Hutt, Wellington, NEW ZEALAND.
The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.
Eurofins may subcontract the performance of part or all of the Services to a third party and the Customer authorises the release of all information necessary to the third party for the provision of the Services.
All samples become the property of Eurofins to the extent necessary for the performance of the Services.
Eurofins will not be required to store samples and may destroy or otherwise dispose of the samples or return the samples to the Customer (at the Customer's cost in all respects) immediately following analysis of the samples.
If the Customer pays for storage of the samples Eurofins will take commercially reasonable steps to store the samples for the agreed period in terms of industry practice.
The Eurofins water sampling 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.
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END OF REPORT

Appendix C Sampling Schedule

LEVIN LANDFILL - SUMMARY OF SURFACE AND GROUNDWATER MONITORING REQUIREMENTS (July 2023 - April 2026).

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

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

Sampling at HS1 to be discontinued when HRC advises.

Measure groundwater level and sample all bores for CH_4, CO_2 and O_2 each time that groundwater is sampled (Condition 4a of DP 6011)

Notes:

(1) Replacement bore D3r consists of two nested piezometers that have been called D3rs and D3rd. Testing for comprehensive to continue to provide 2 year's of comprehensive monitoring.
(2) See table below
(3) If irrigation re-commences then the annual sampling is to change from comprehensive + 3 times indicator to bi-annual comprehensive + indicator (Clause D of Condition 3, DP 6010) .
(4) See table below
(5) See table below
(6) Measure water level at C2, C2ds, Xs1 and Xs2 when taking monthly samples at TD1 and within the Hokio Stream. Testing of X-series bores to continue at comprehensive to provide 2 year's of comprehensive data.
(7) Start taking comprehensive samples at TD1 every month when sampling the Hokio Stream sites. Also note the depth of water in the drain invert at TD1. Continue monthly comprehensive sampling to October 2023 to give 24 month's continuous data.
(8) Start measuring approximately the depth of flow in the Hokio Stream at each sampling site when sampling monthly. Monthly sampling at comprehensive level to continue to, and including, October 2023, to give a full continuous 24 months of data.
(9) Northern Farm Drain is a name change from the former 'Tatana Drain'
C Comprehensive list (see below)
I Indicator list (see below)
A Pesticide and SVOC analysis
SW Add sodium and iron analysis (for stormwater consent 102559)

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

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

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

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

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

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

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

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

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

Characterising parameters	pH
	electrical conductivity (EC)
	alkalinity
	total hardness
	suspended solids
Oxygen demand	COD and $scBOD_5$
Nutrients*	NO3-N, NH4-N, DRP and SO_4
Metals*	Al, As, Cd, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Zn and Hg
Other elements	B, Ca, Cl, K and Na
Organics	Total organic carbon, total phenols, volatile acids
Biological	E. coli

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

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

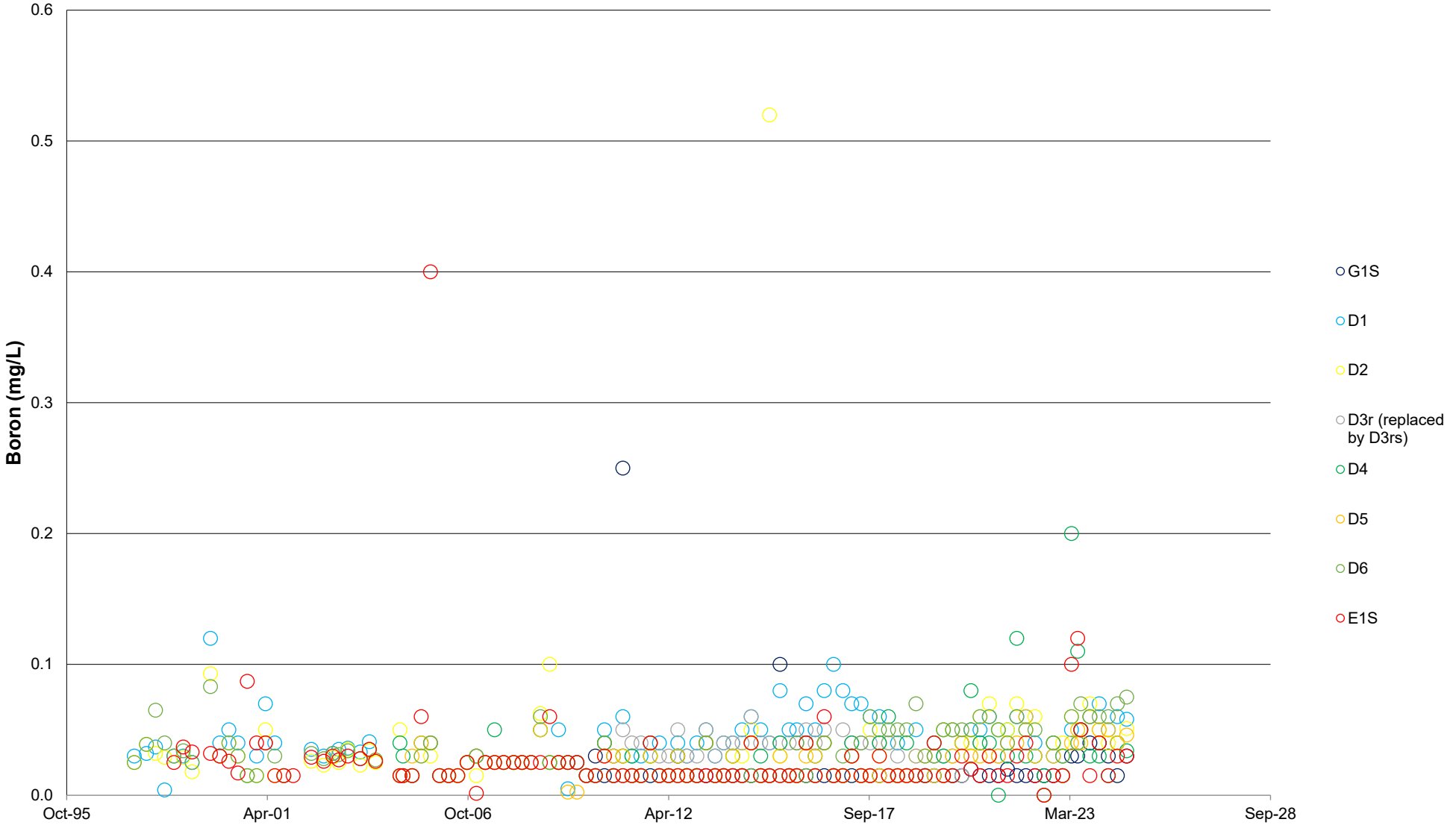
Characterising parameters	pH
	electrical conductivity (EC)
Oxygen demand	COD and $scBOD_5$
Nutrients*	NO3-N and NH4-N
Metals*	AL, Mn, Ni, Pb and Hg
Other elements	B and Cl
Biological+	E. coli

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

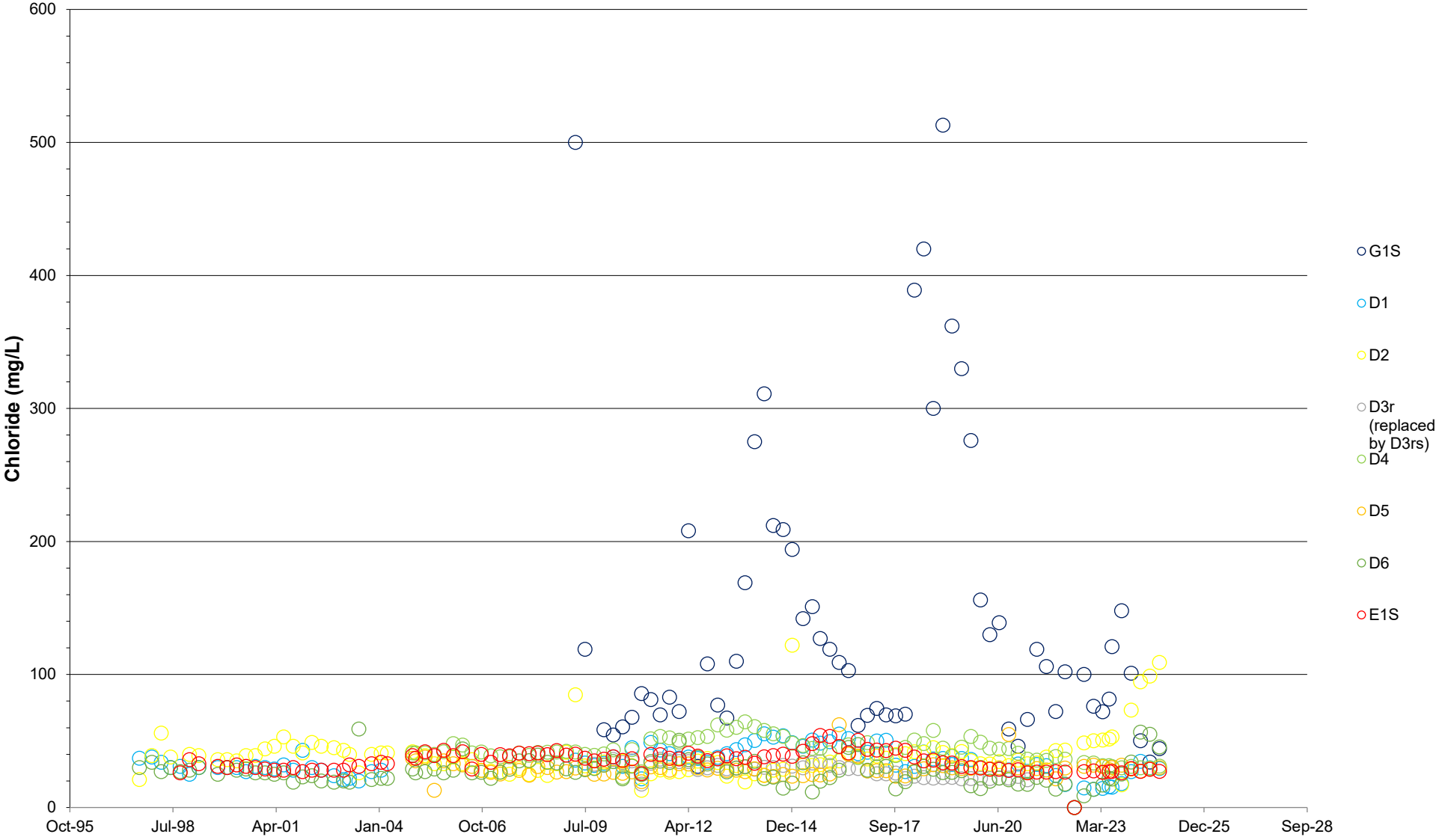
+ E. coli added from December 2019, with first sampling from April 2020 onwards

Appendix D Historical Results Graphs

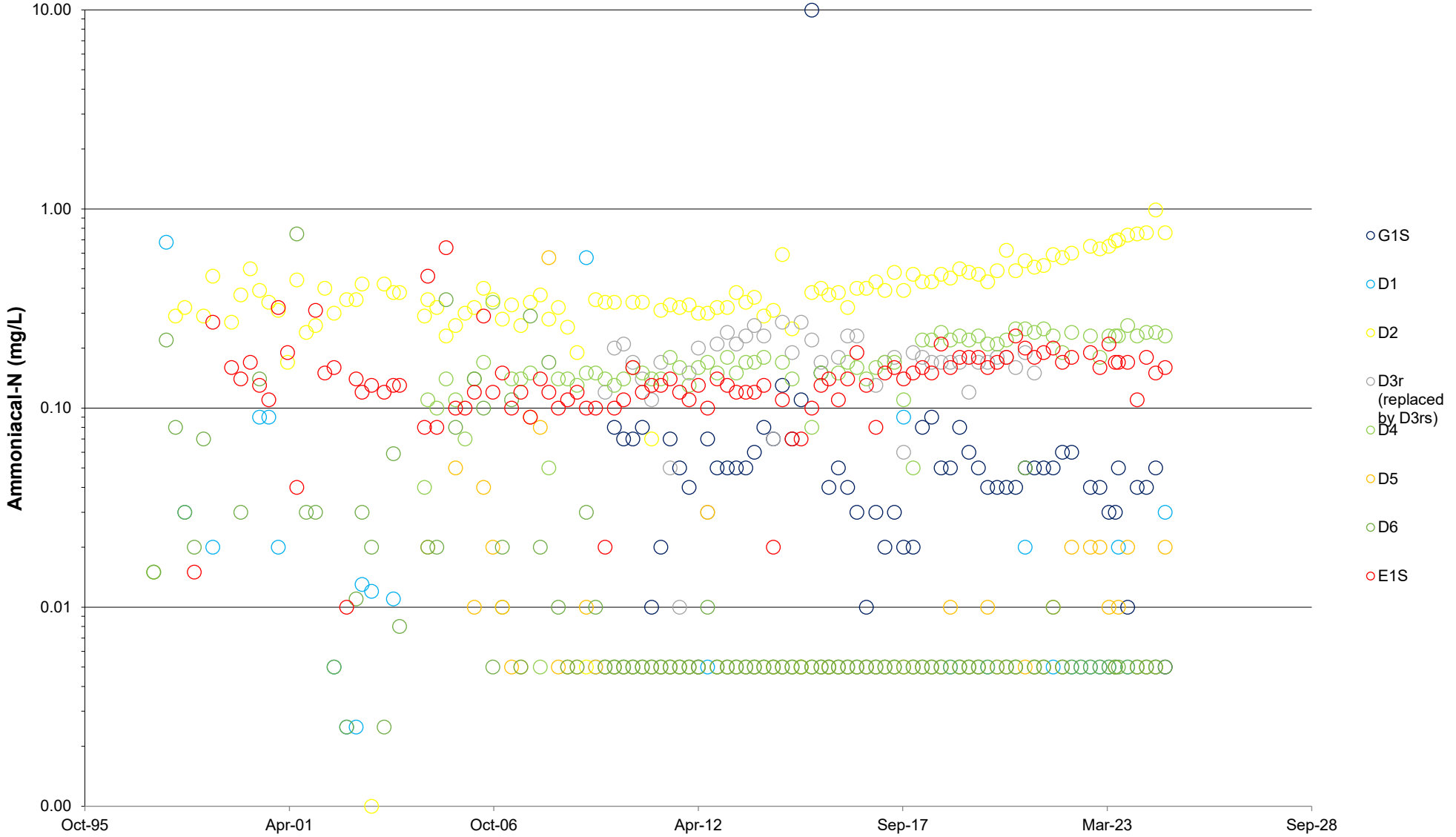
Sand Aquifer Downgradient of New Landfill - Boron Concentrations



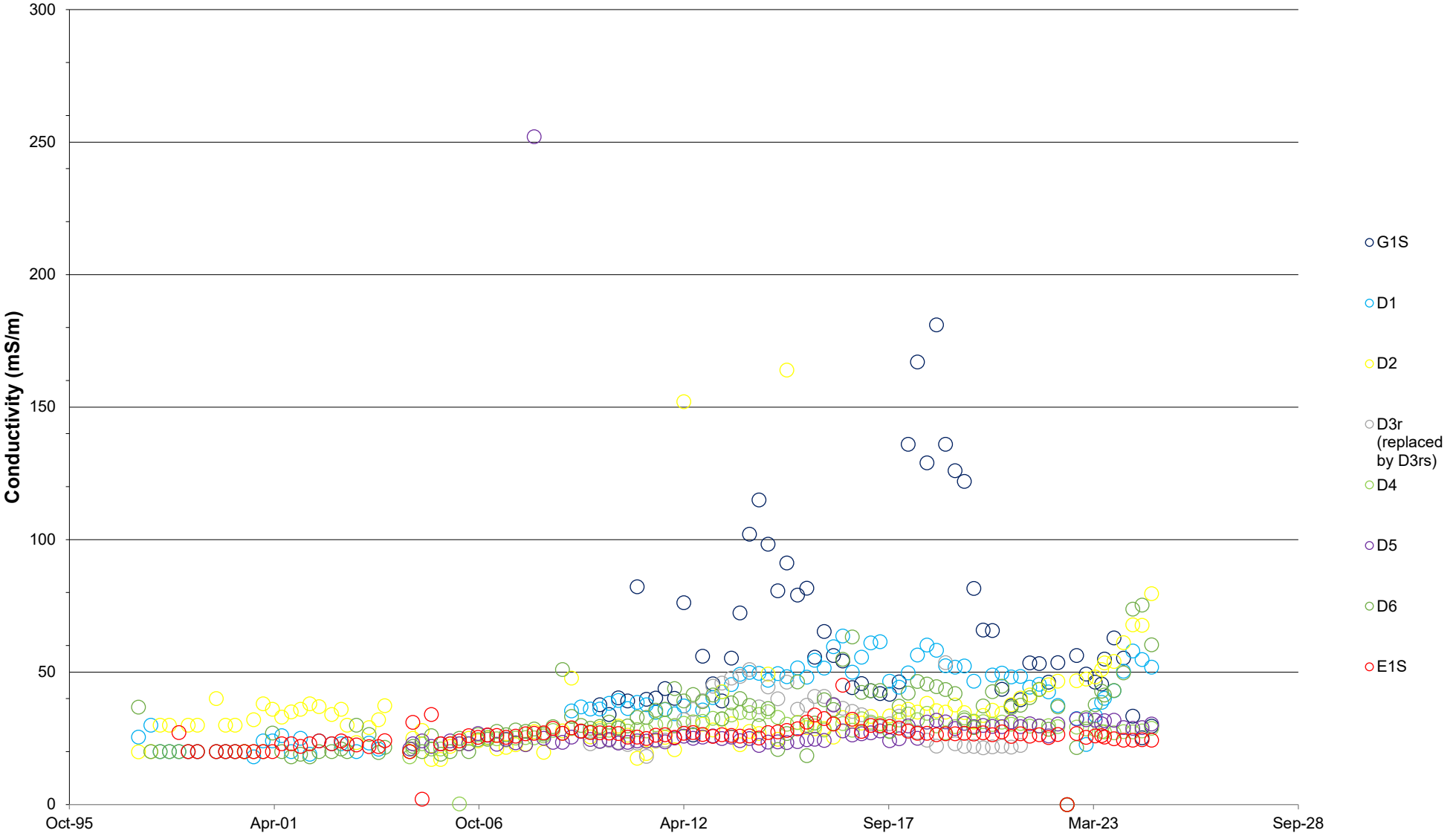
Sand Aquifer Downgradient of New Landfill - Chloride Concentrations



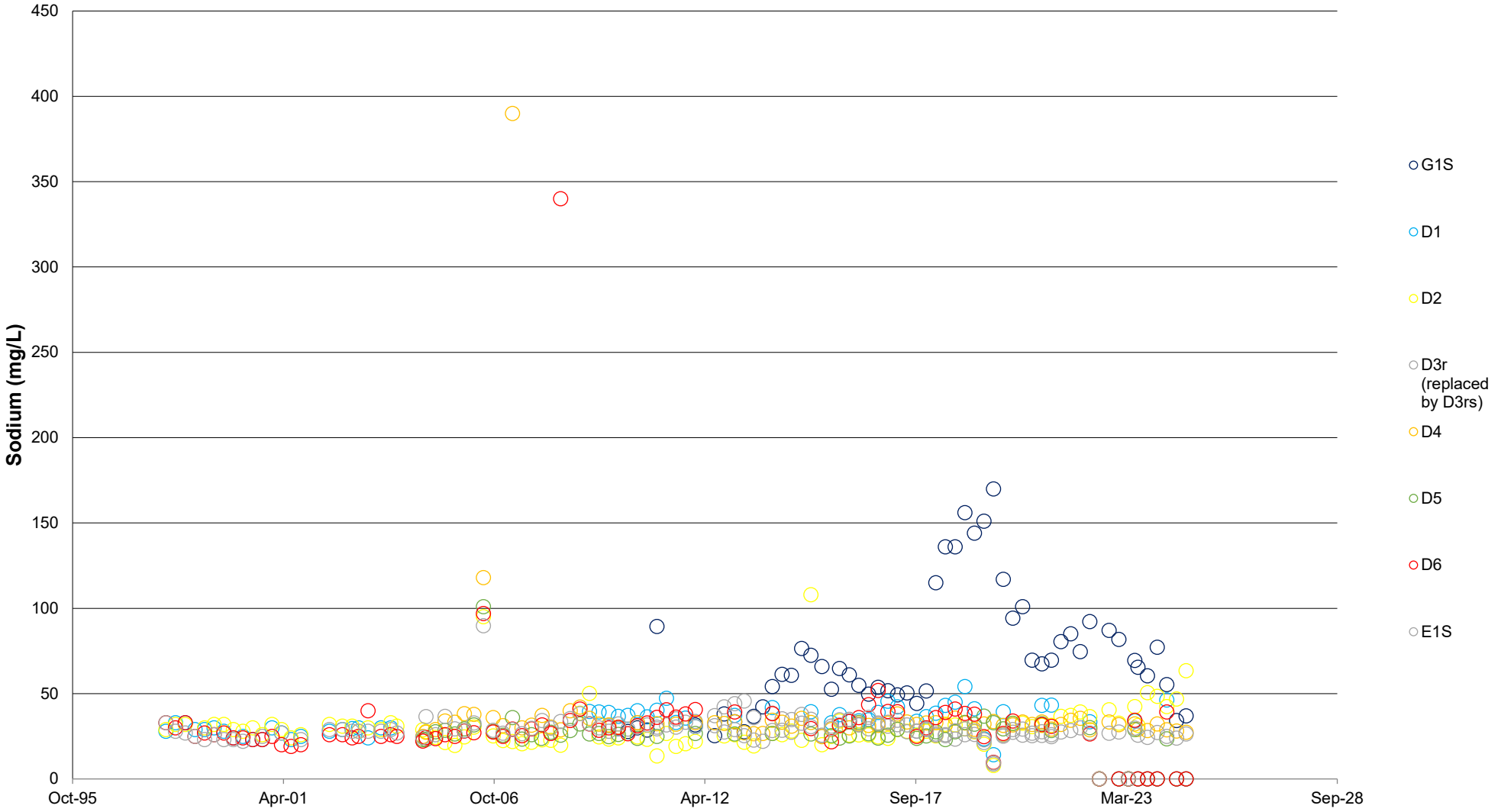
Sand Aquifer Downgradient of New Landfill - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic



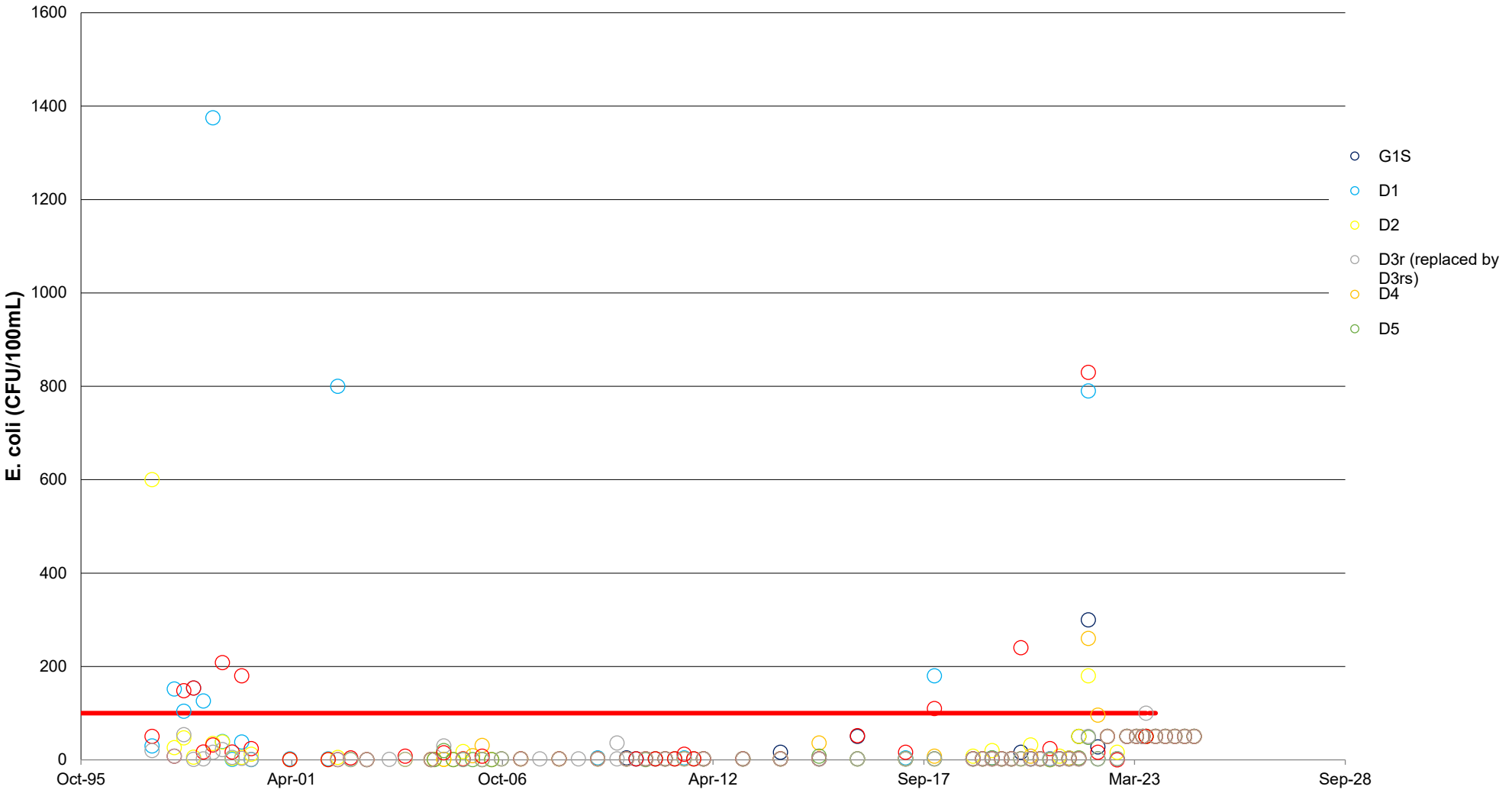
Sand Aquifer Downgradient of New Landfill - Conductivity Levels

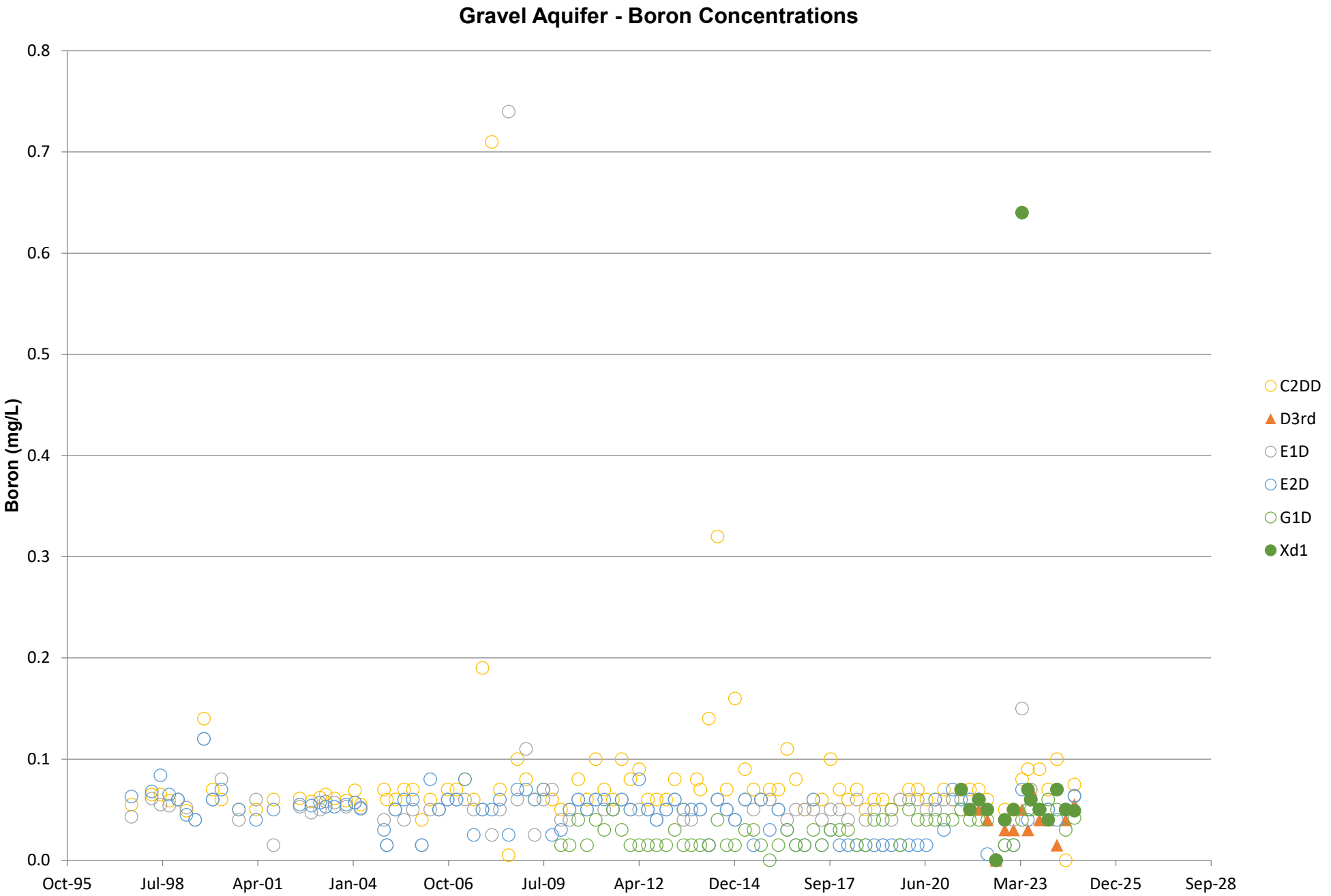


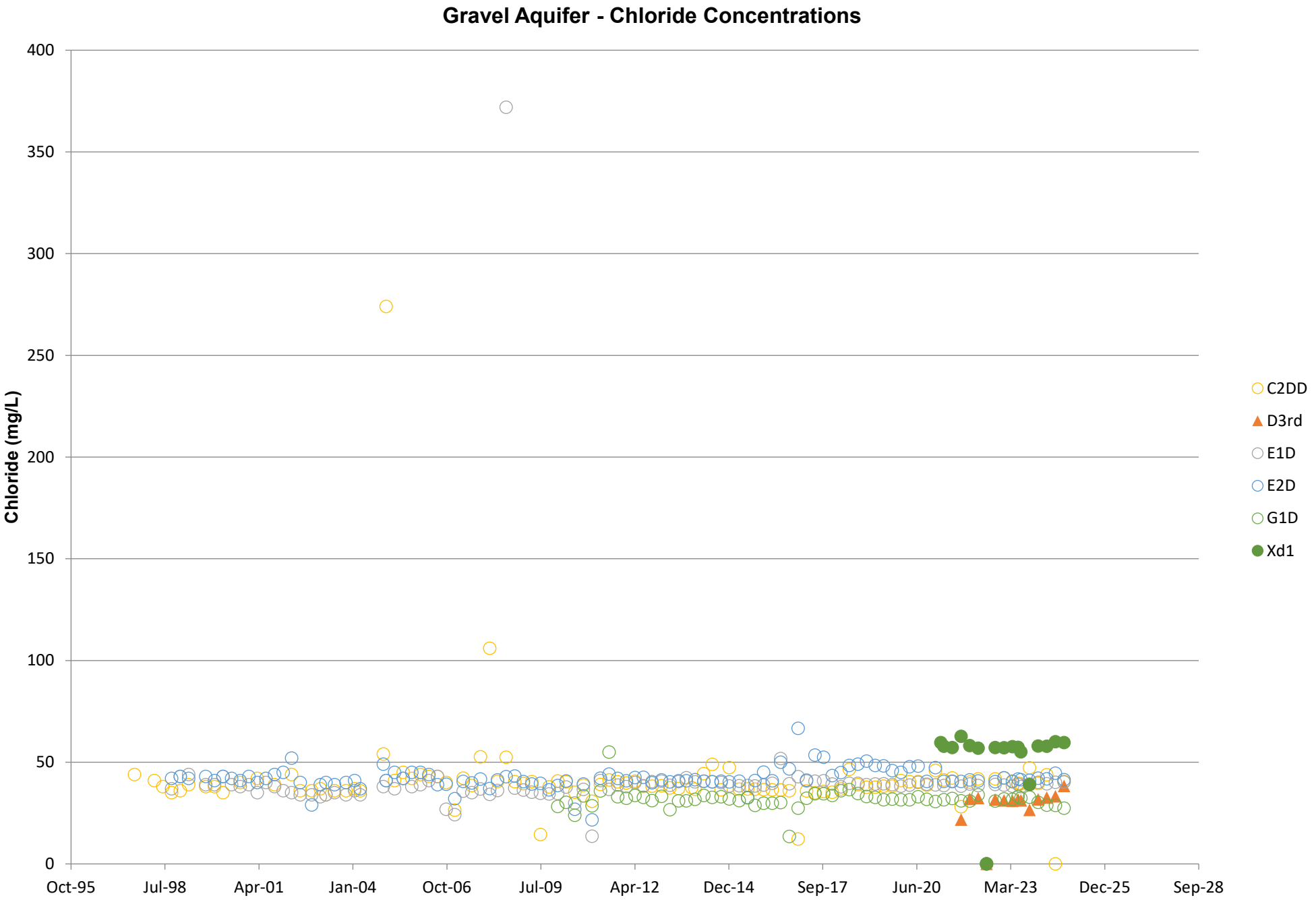
Sand Aquifer Downgradient of New Landfill - Sodium Concentrations

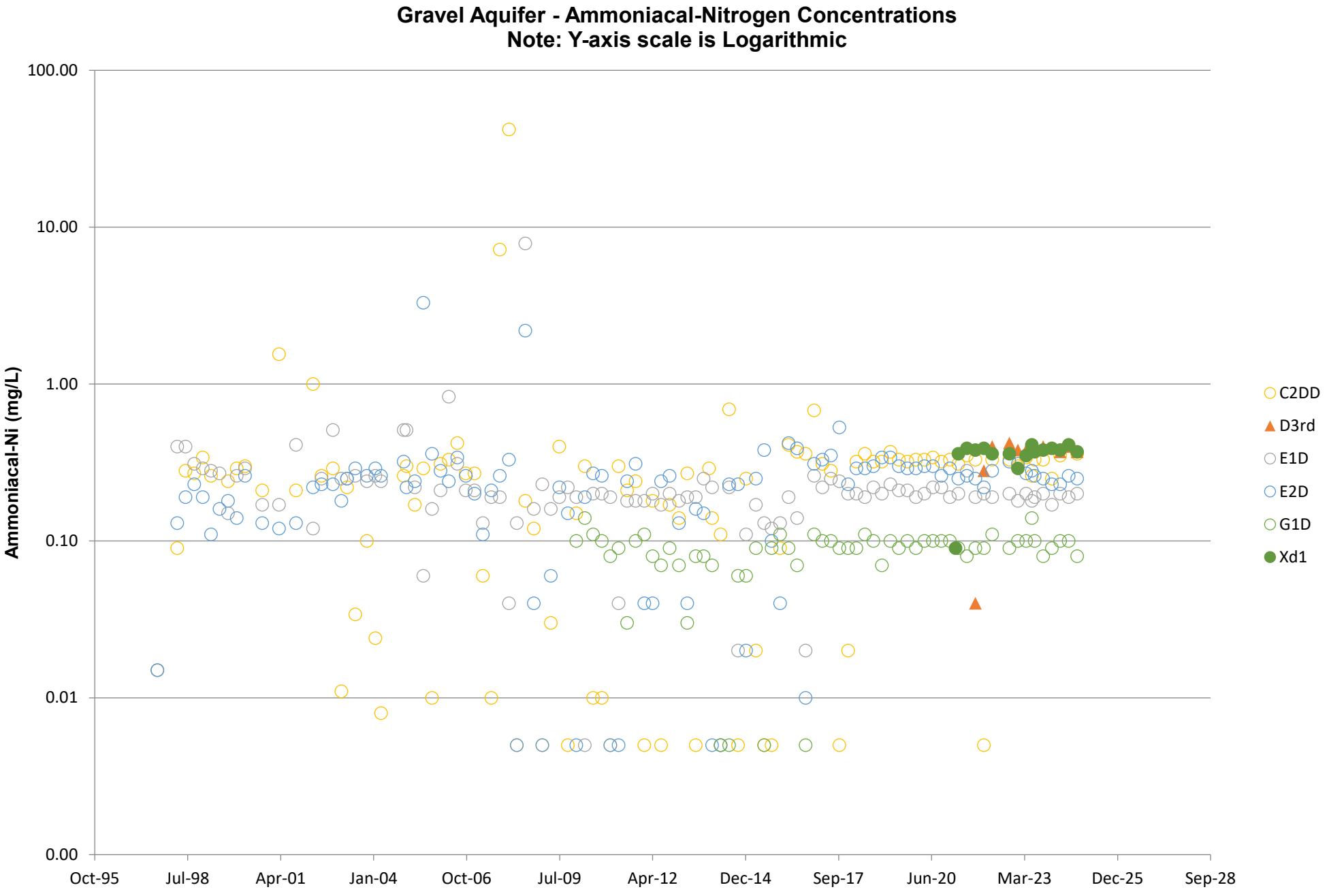


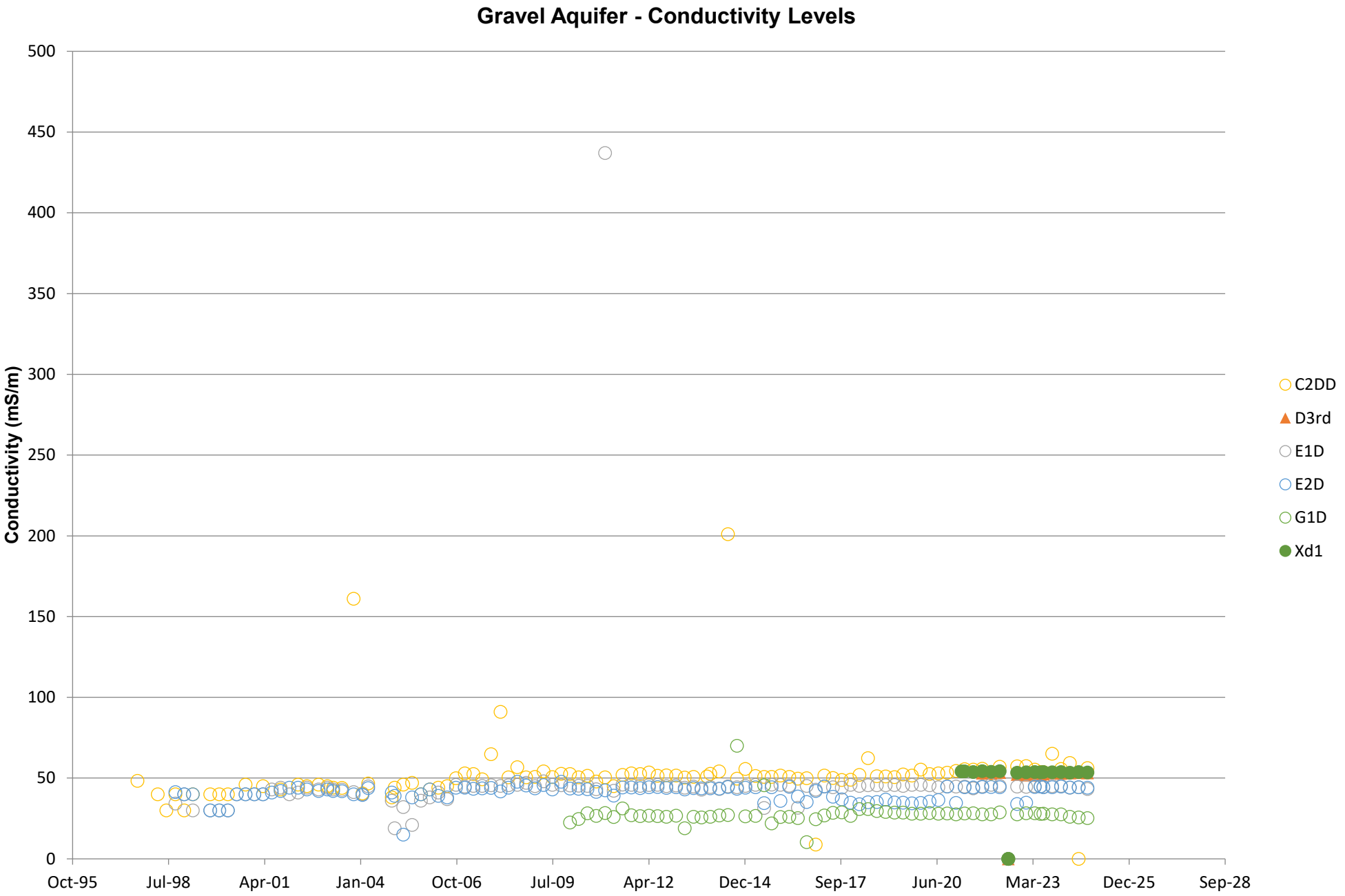
Sand Aquifer Downgradient of New Landfill - E. coli




Gravel Aquifer - Boron Concentrations
Boron (mg/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1


Gravel Aquifer - Chloride Concentrations
Chloride (mg/L)
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1


Gravel Aquifer - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic
Ammoniacal-Ni (mg/L)
100.00
10.00
1.00
0.10
0.01
0.00
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1


Gravel Aquifer - Conductivity Levels
Conductivity (mS/m)
500
450
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
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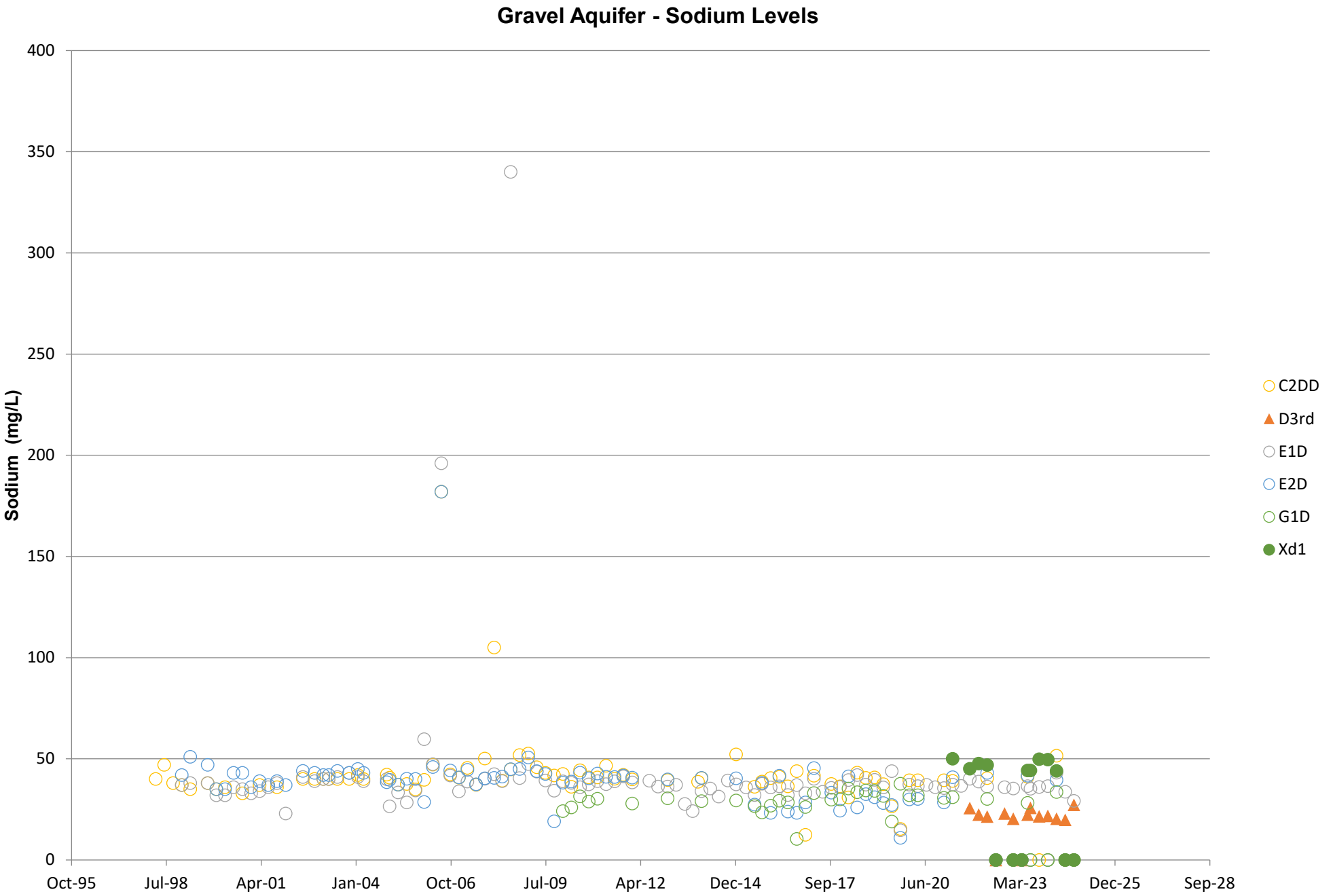
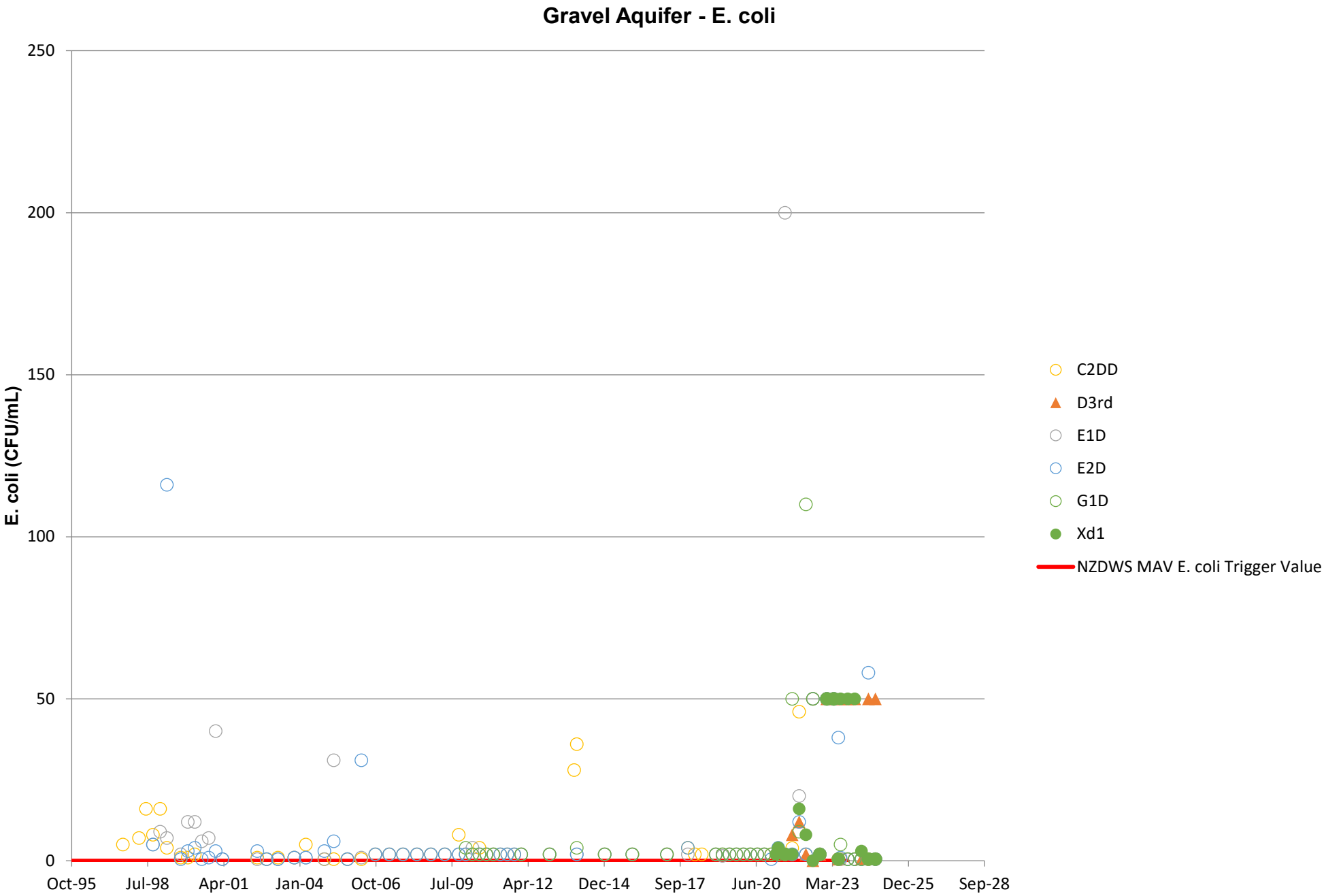
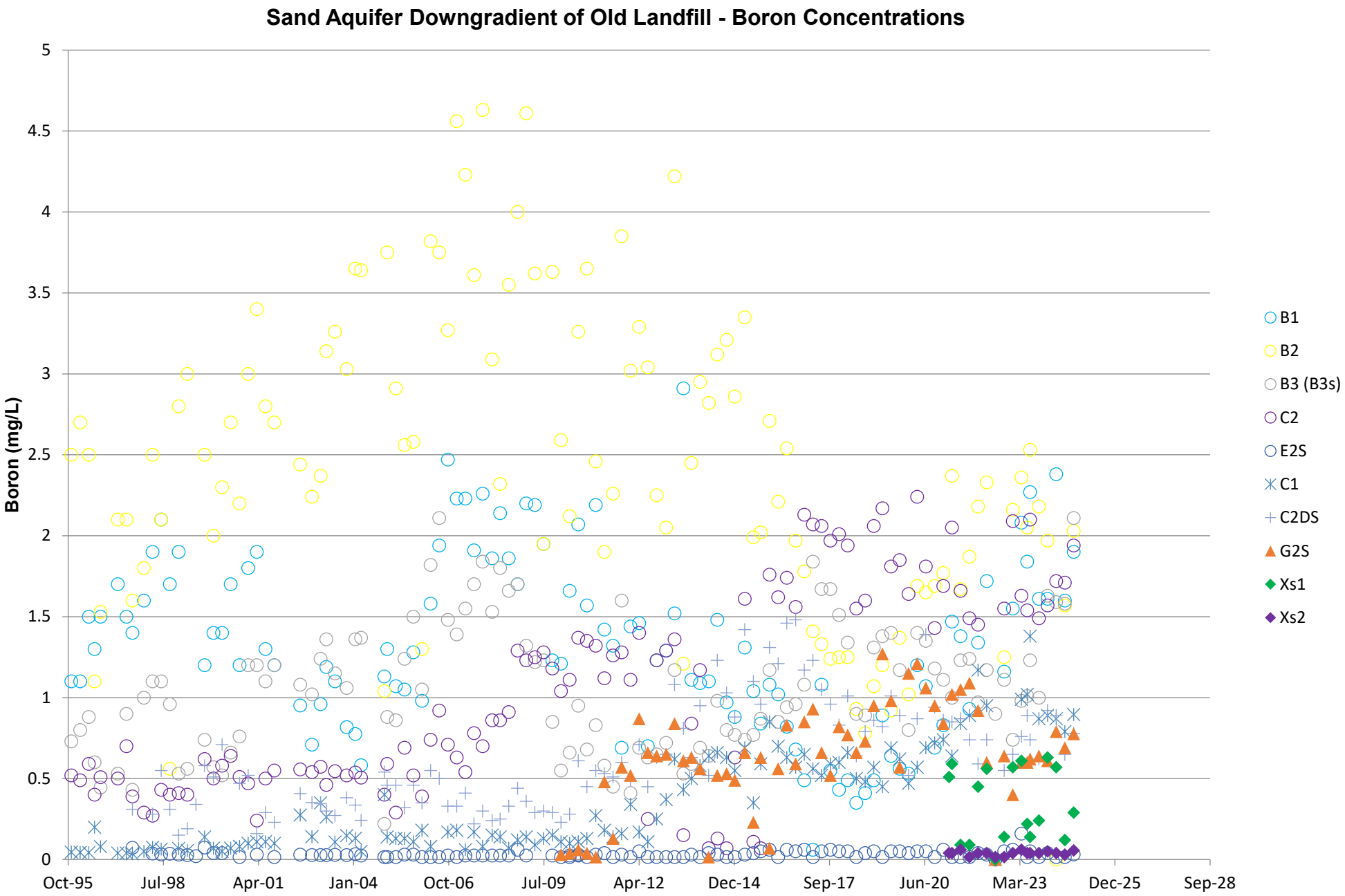
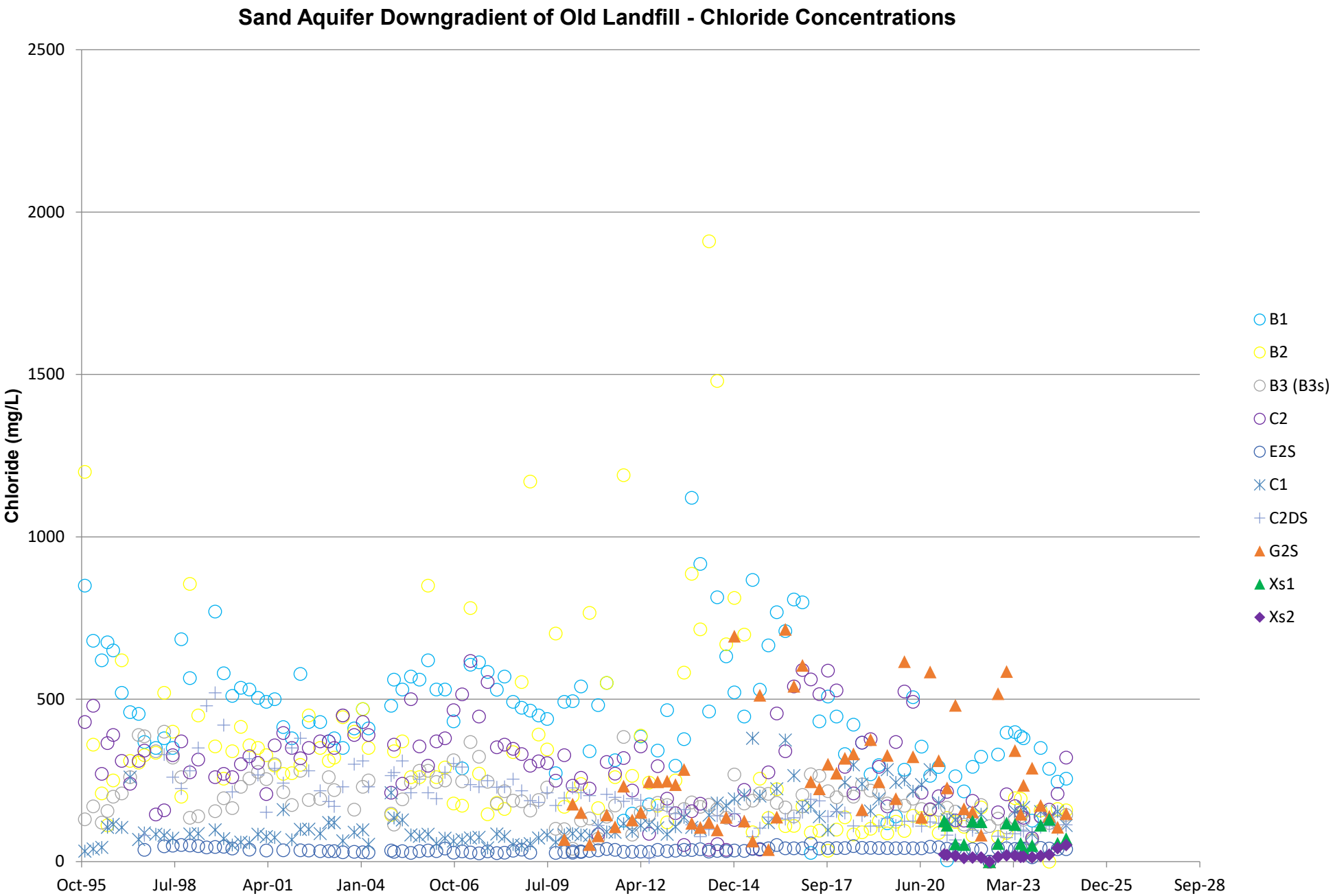
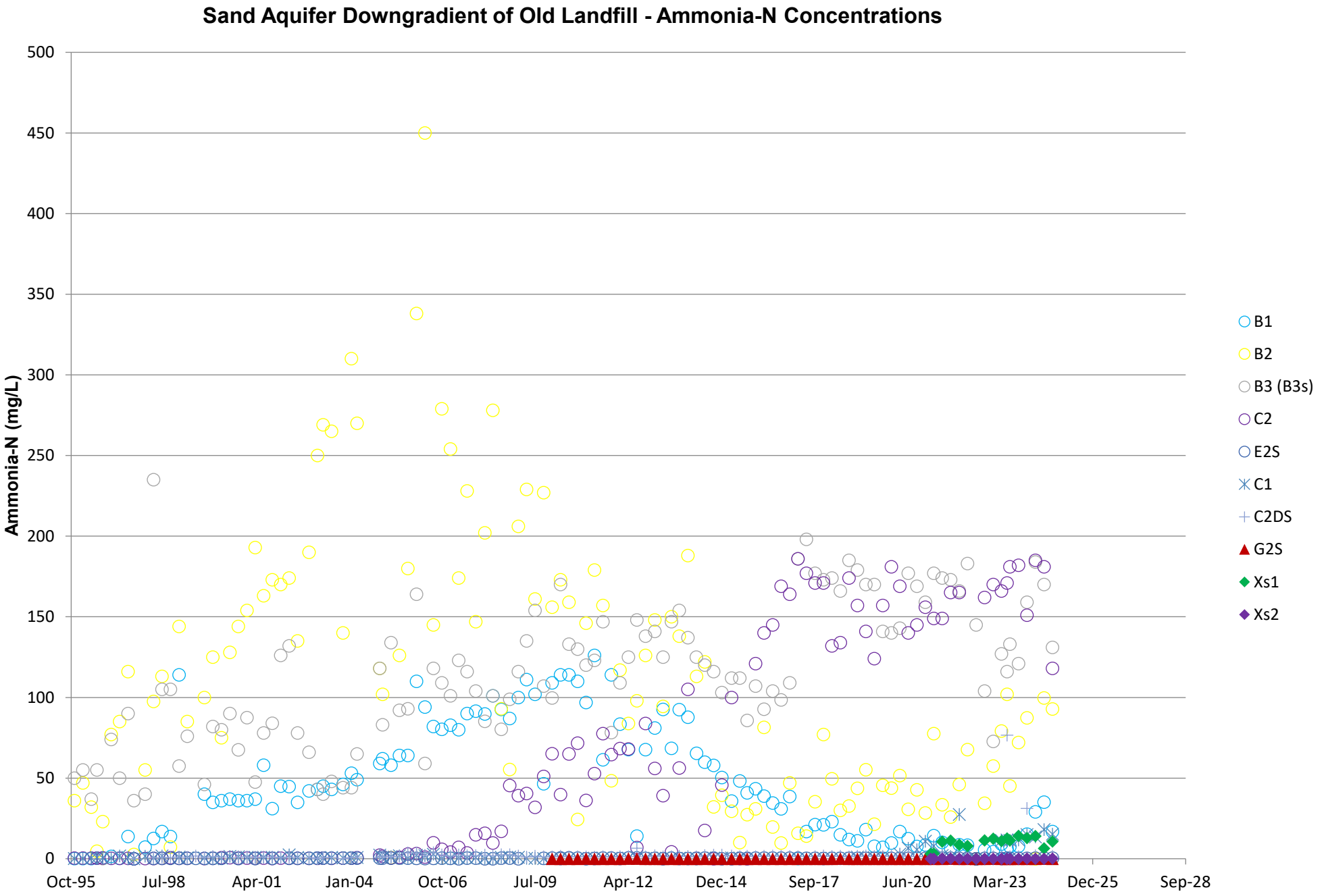
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1

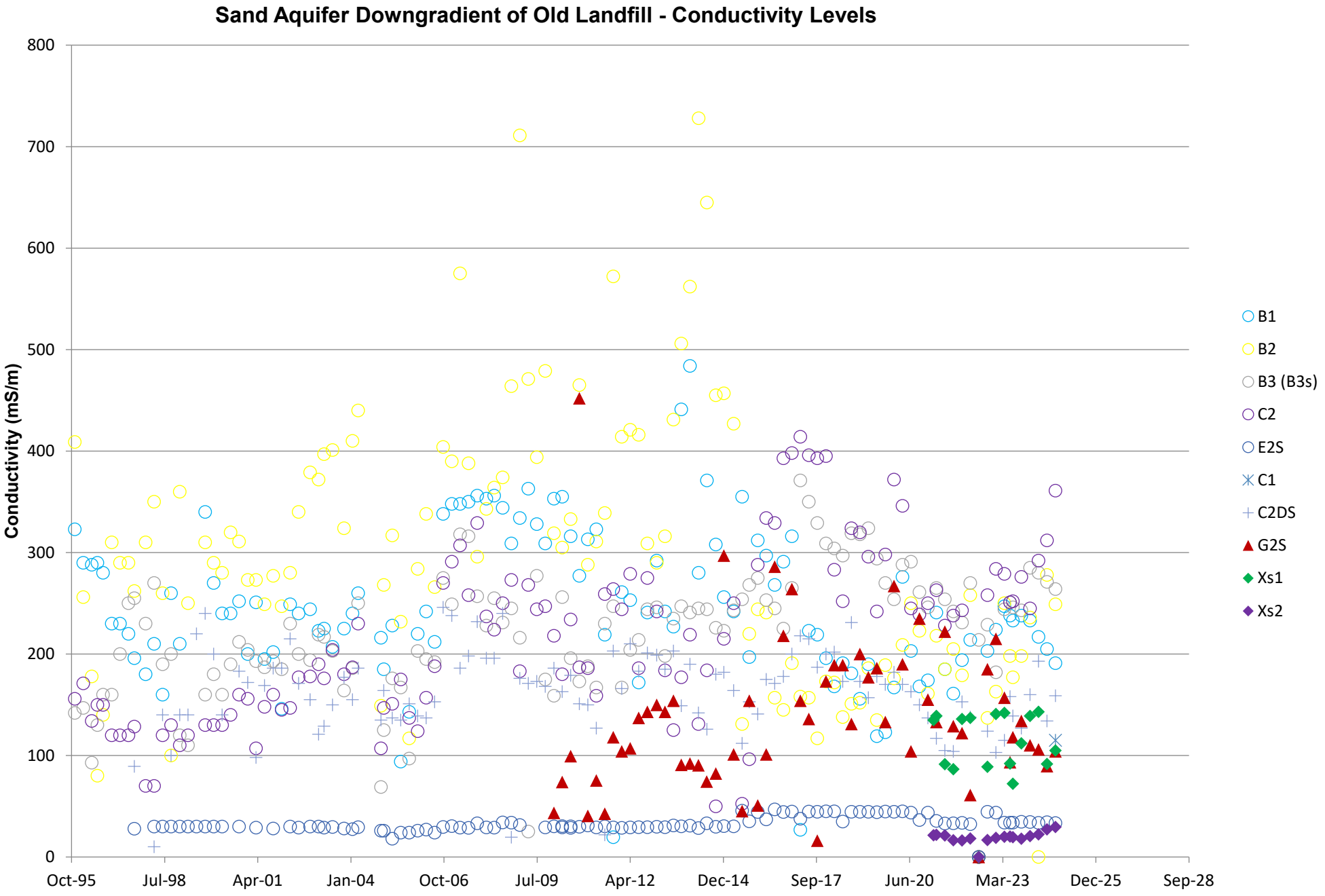

Gravel Aquifer - Sodium Levels
Sodium (mg/L)
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1

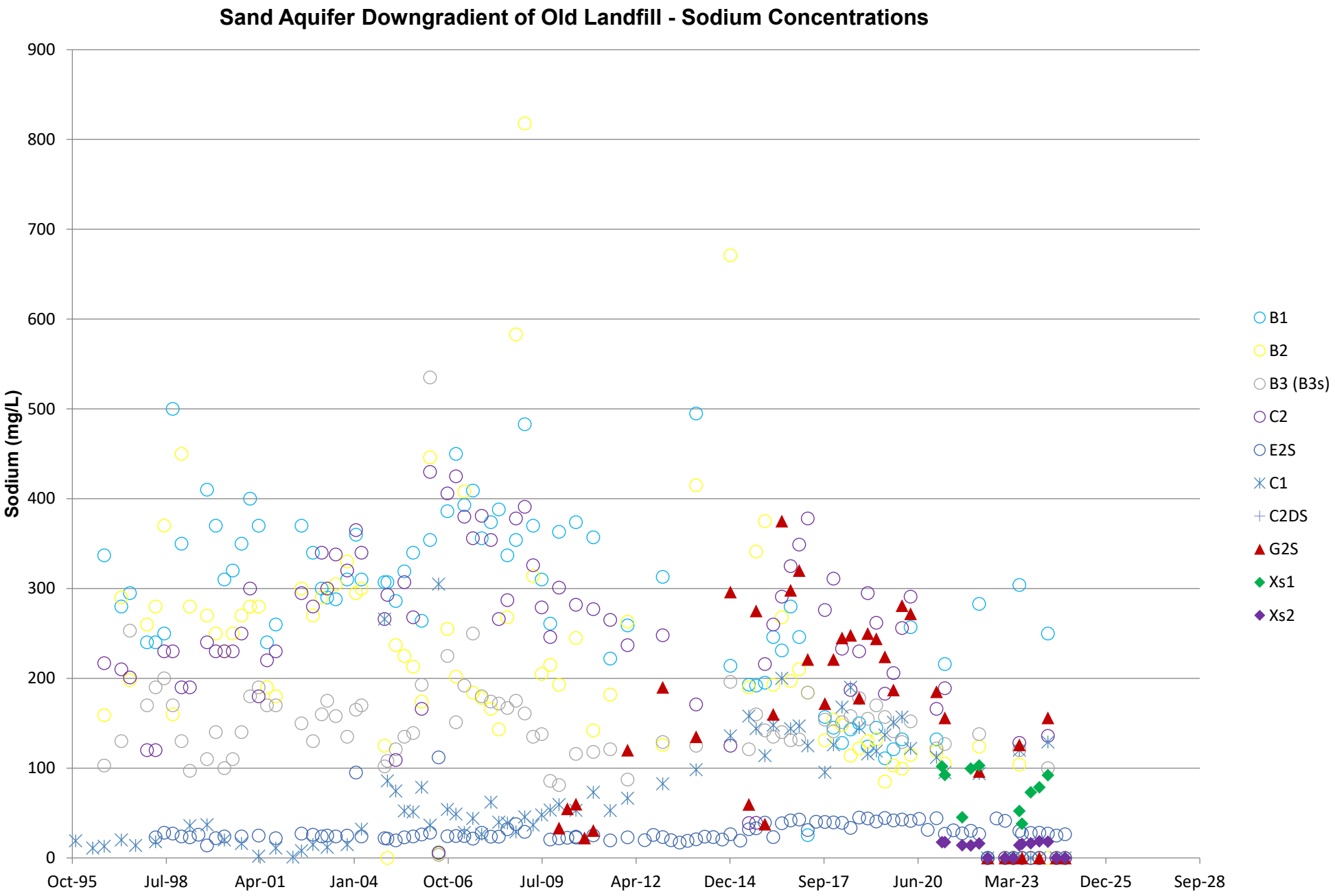

Gravel Aquifer - E. coli
E. coli (CFU/mL)
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
C2DD
D3rd
E1D
E2D
G1D
Xd1
NZDWS MAV E. coli Trigger Value

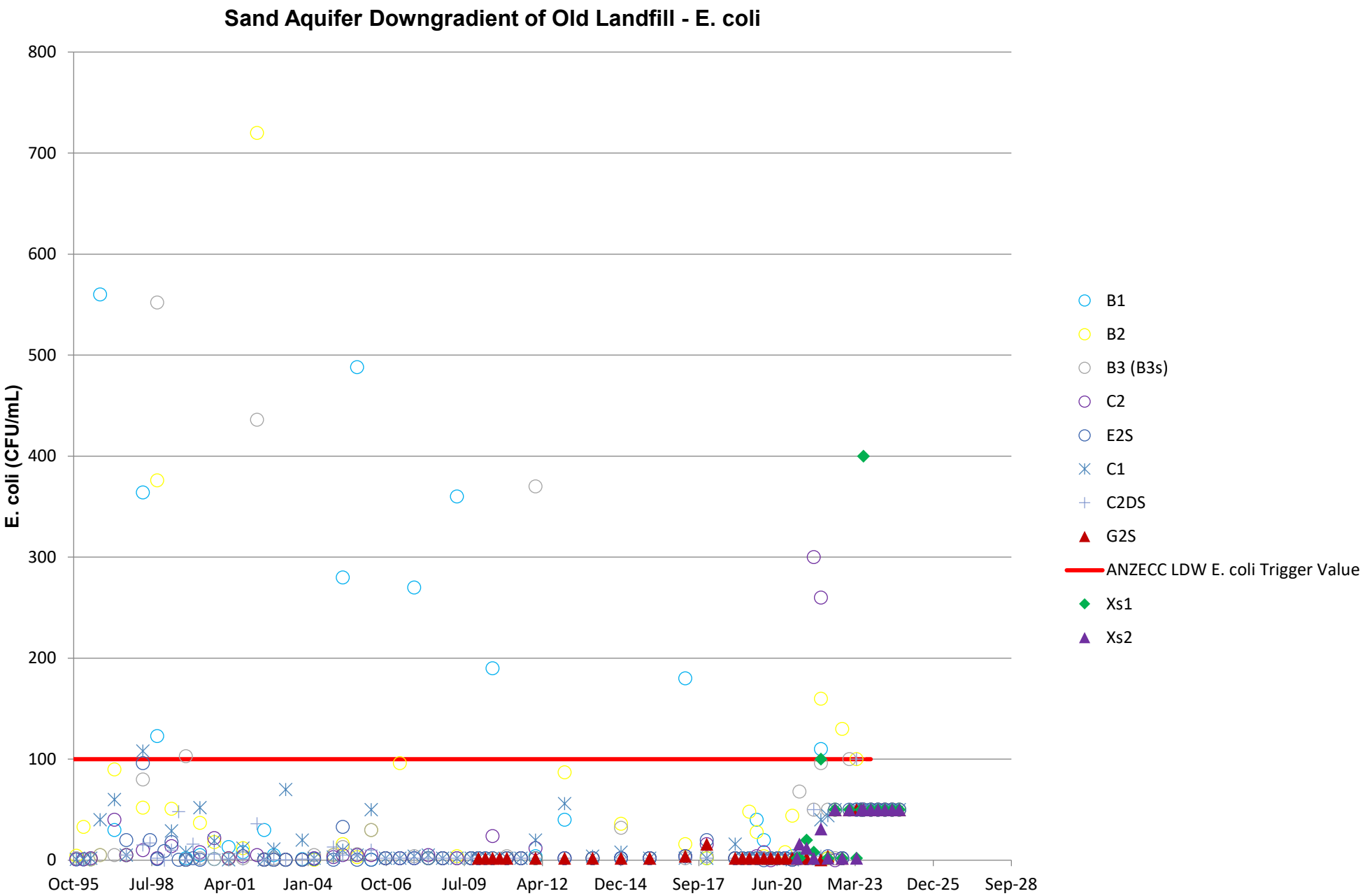

Sand Aquifer Downgradient of Old Landfill - Boron Concentrations
Boron (mg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
Xs1
Xs2


Sand Aquifer Downgradient of Old Landfill - Chloride Concentrations
Chloride (mg/L)
2500
2000
1500
1000
500
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
Xs1
Xs2

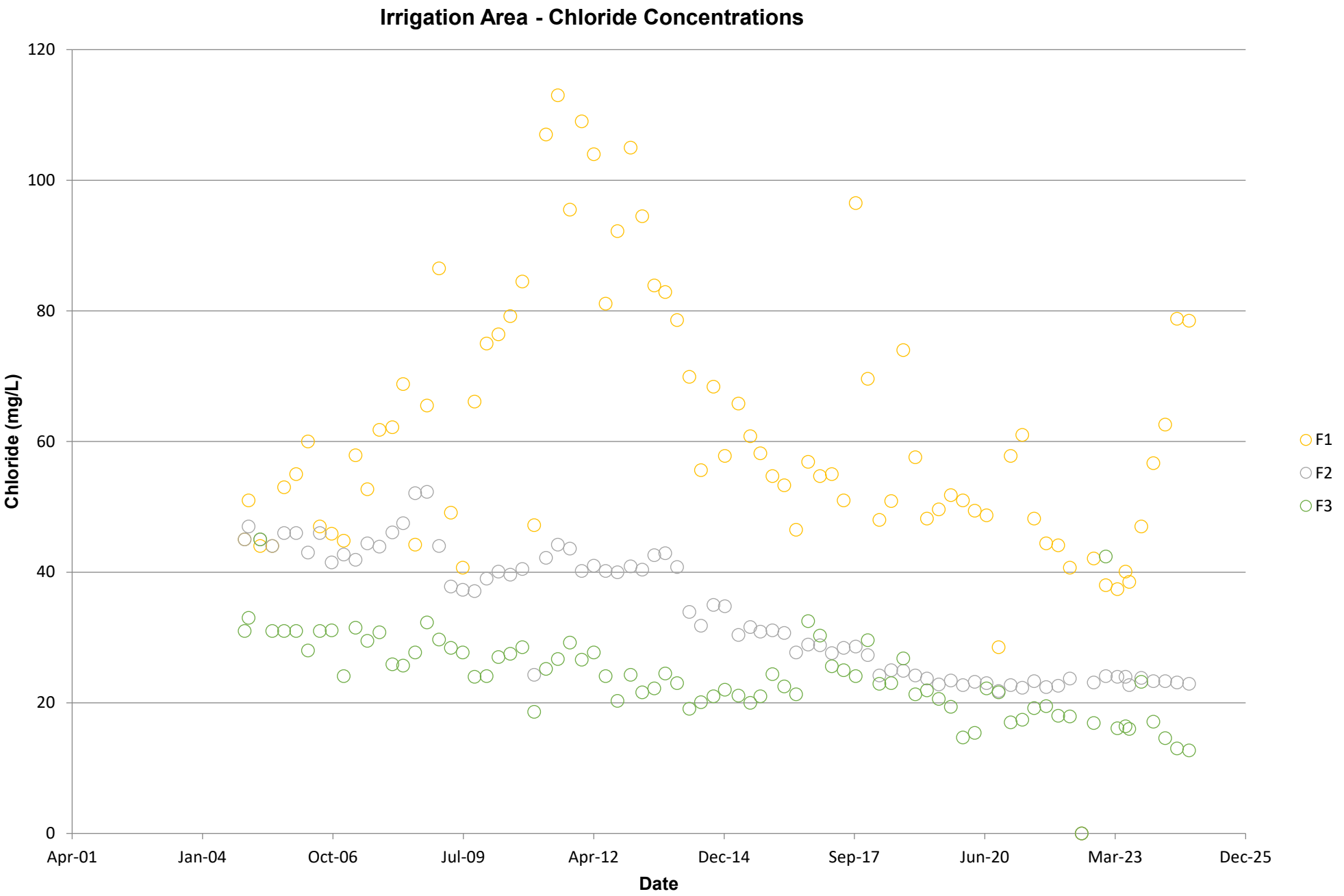

Sand Aquifer Downgradient of Old Landfill - Ammonia-N Concentrations
Ammonia-N (mg/L)
500
450
400
350
300
250
200
150
100
50
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
Xs1
Xs2

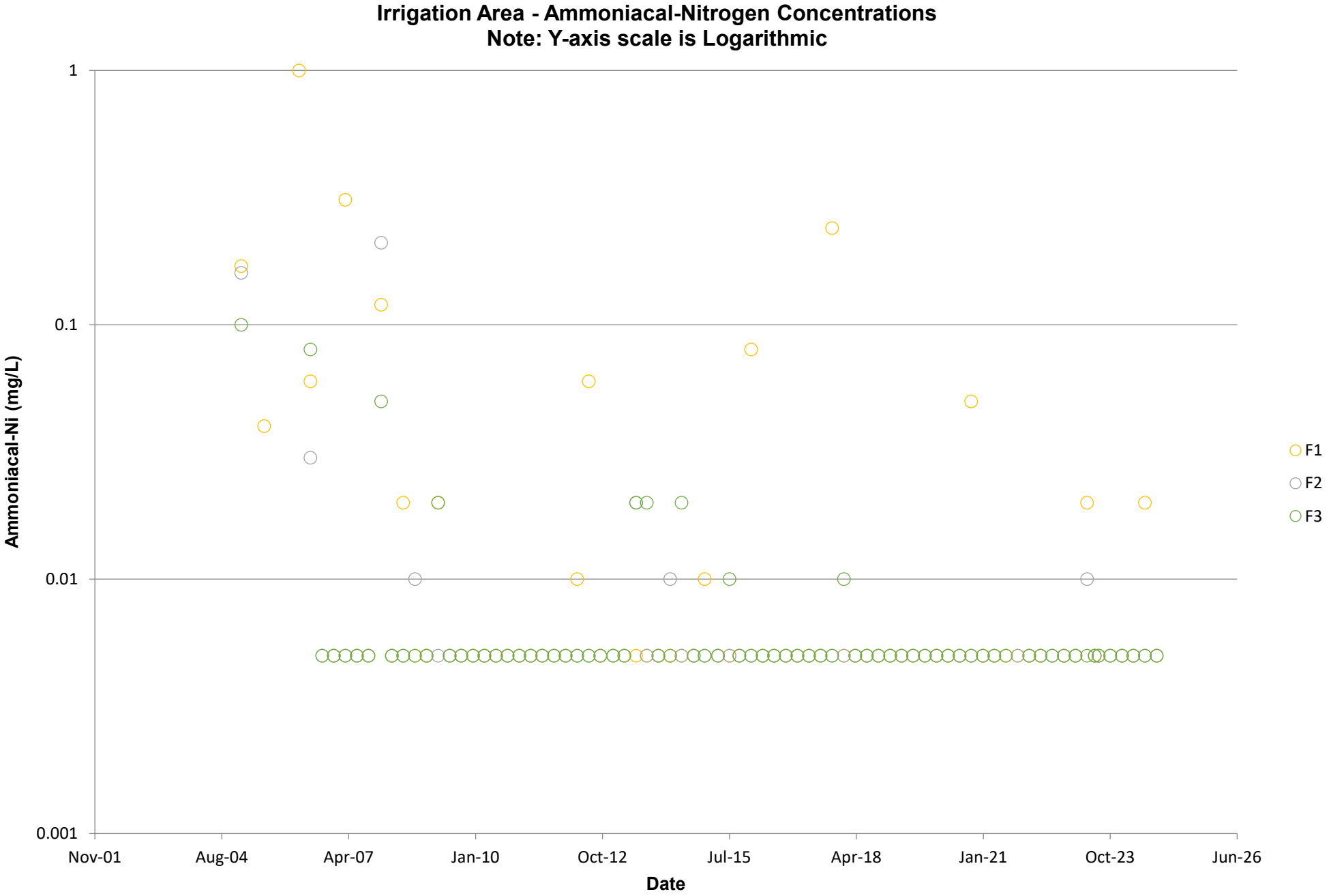

Sand Aquifer Downgradient of Old Landfill - Conductivity Levels
Conductivity (mS/m)
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
Xs1
Xs2

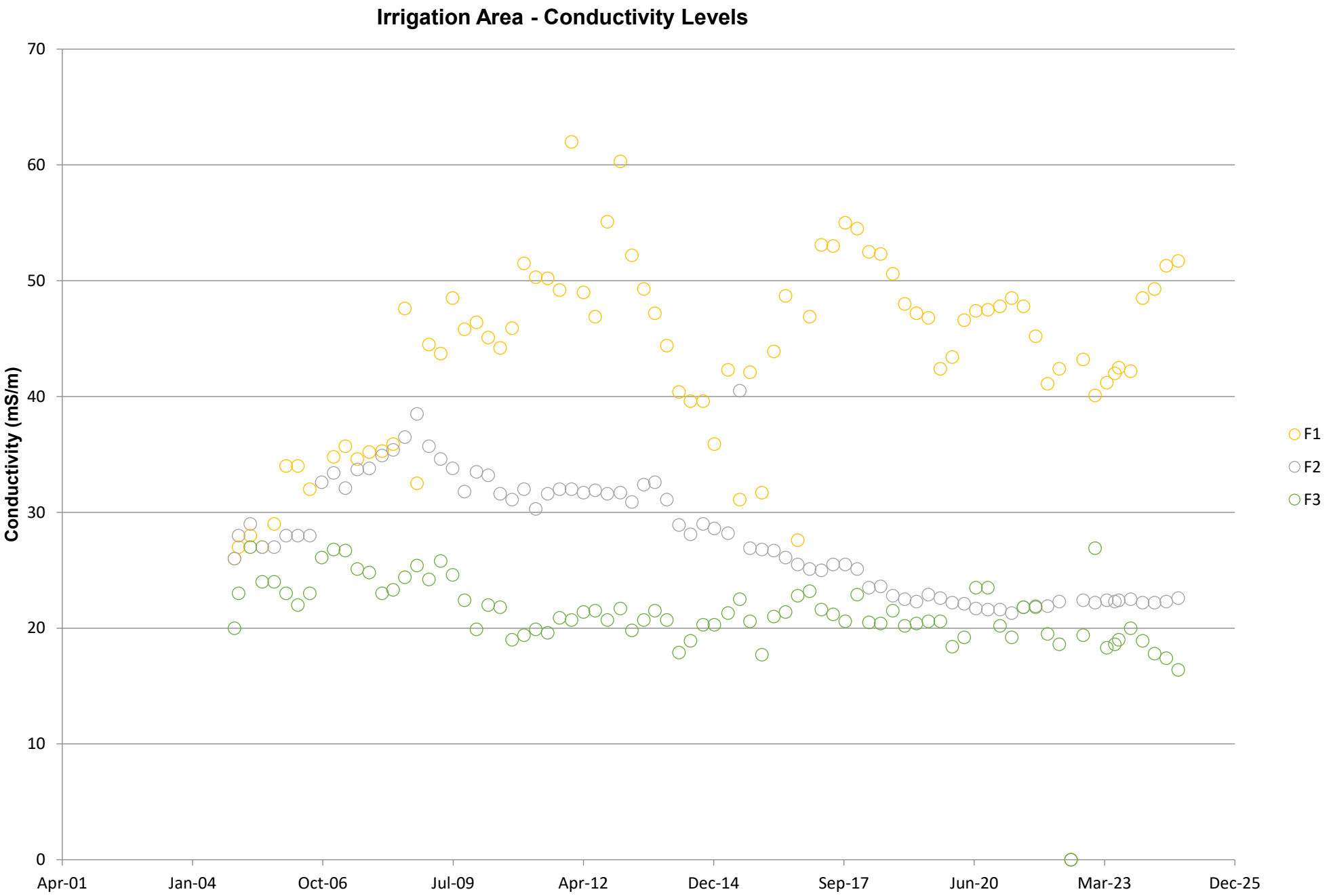

Sand Aquifer Downgradient of Old Landfill - Sodium Concentrations
Sodium (mg/L)
900
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
Xs1
Xs2

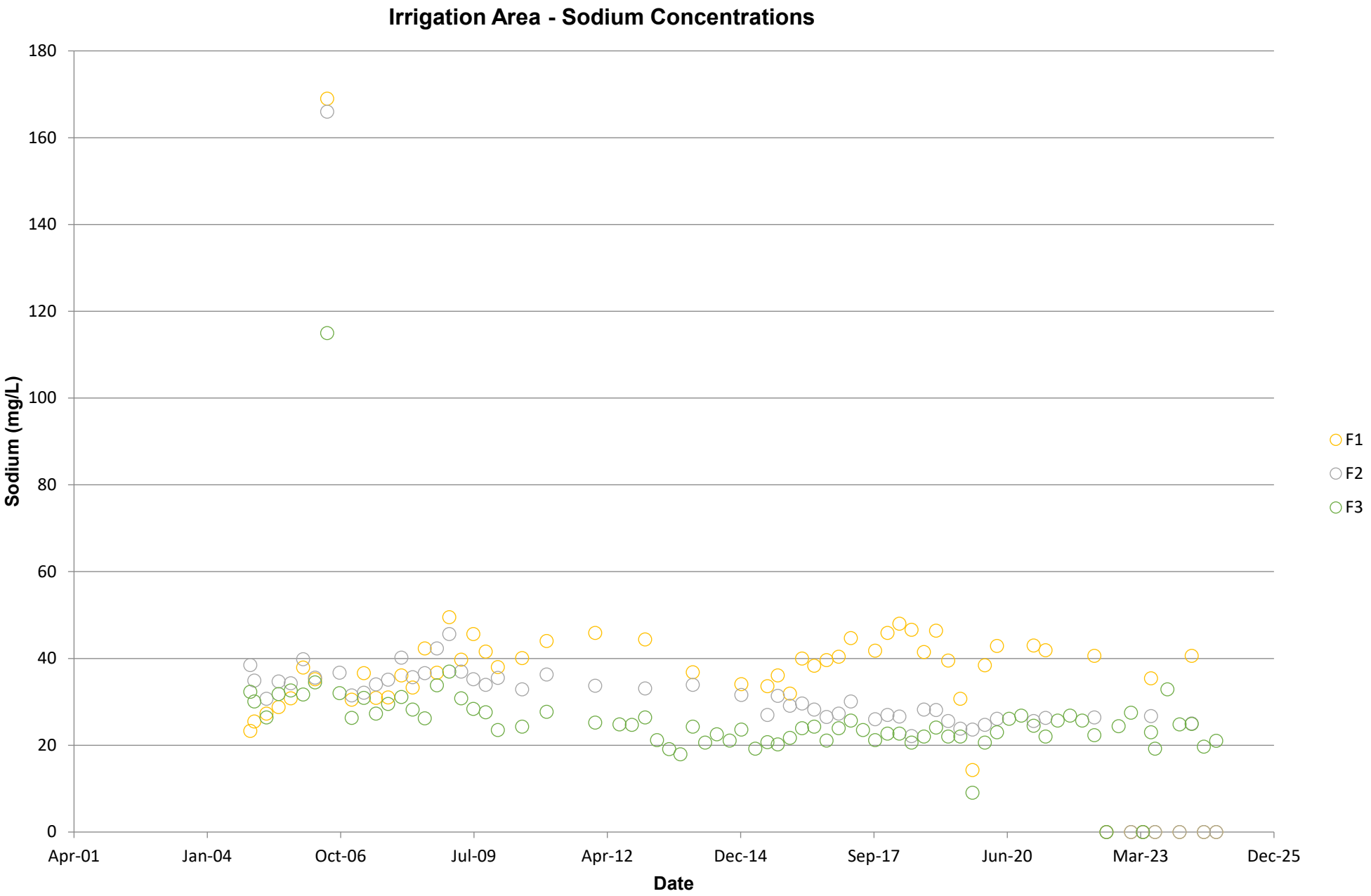

Sand Aquifer Downgradient of Old Landfill - E. coli
E. coli (CFU/mL)
800
700
600
500
400
300
200
100
0
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
B1
B2
B3 (B3s)
C2
E2S
C1
C2DS
G2S
ANZECC LDW E. coli Trigger Value
Xs1
Xs2

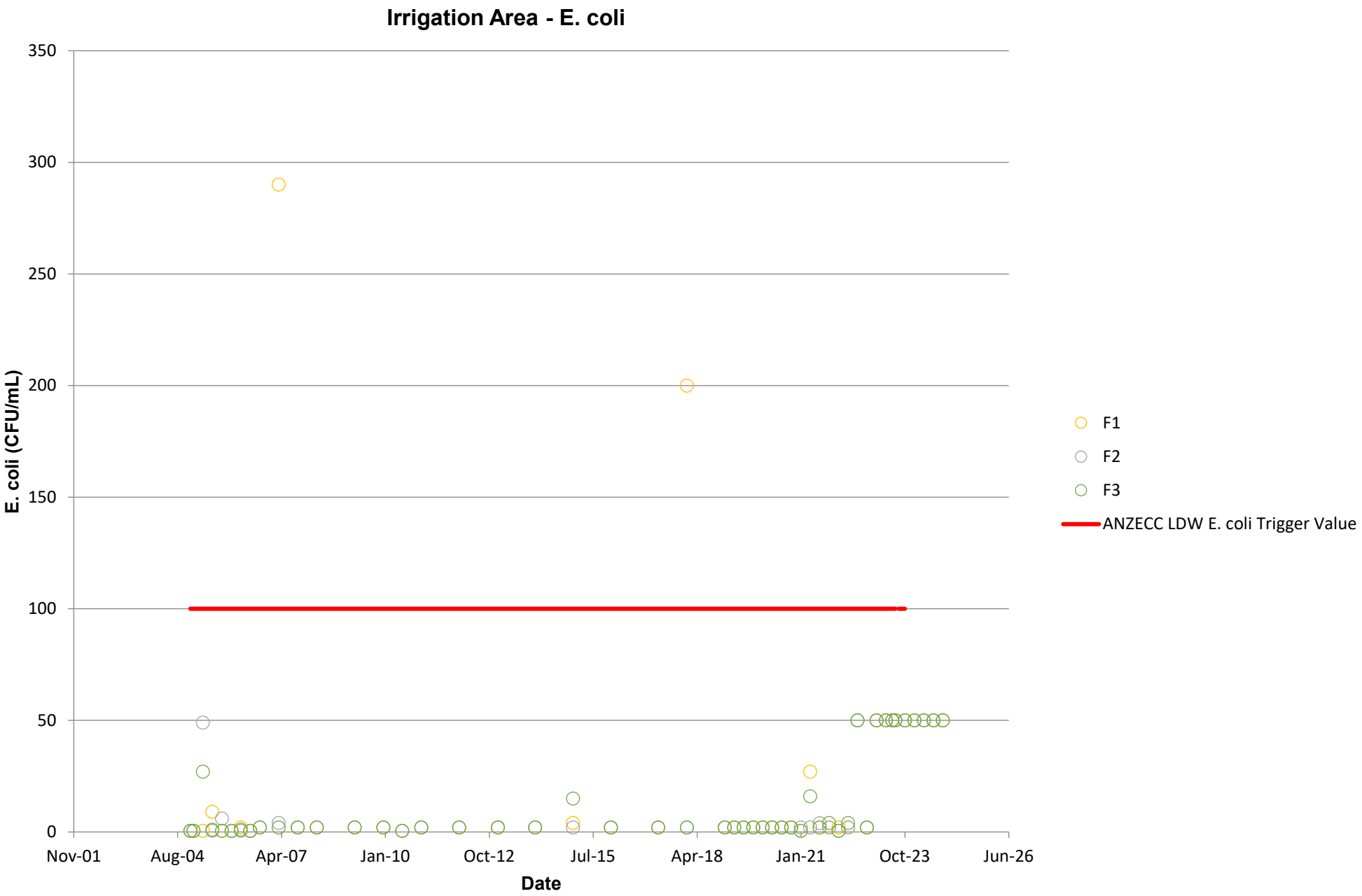

Irrigation Area - Boron Concentrations
Boron (mg/L)
400
350
300
250
200
150
100
50
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
F1
F2
F3

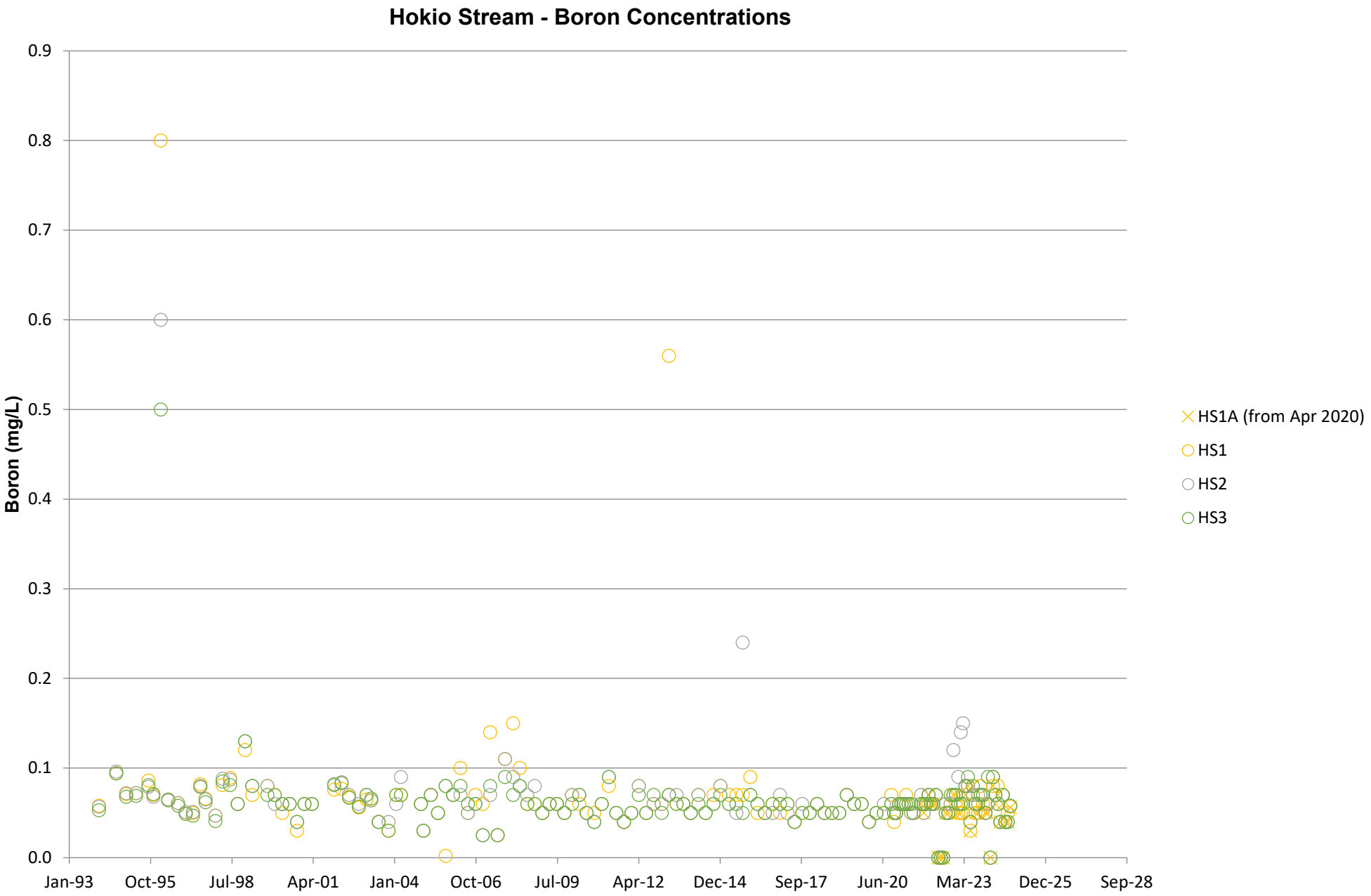

Irrigation Area - Chloride Concentrations
Chloride (mg/L)
120
100
80
60
40
20
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Date
F1
F2
F3

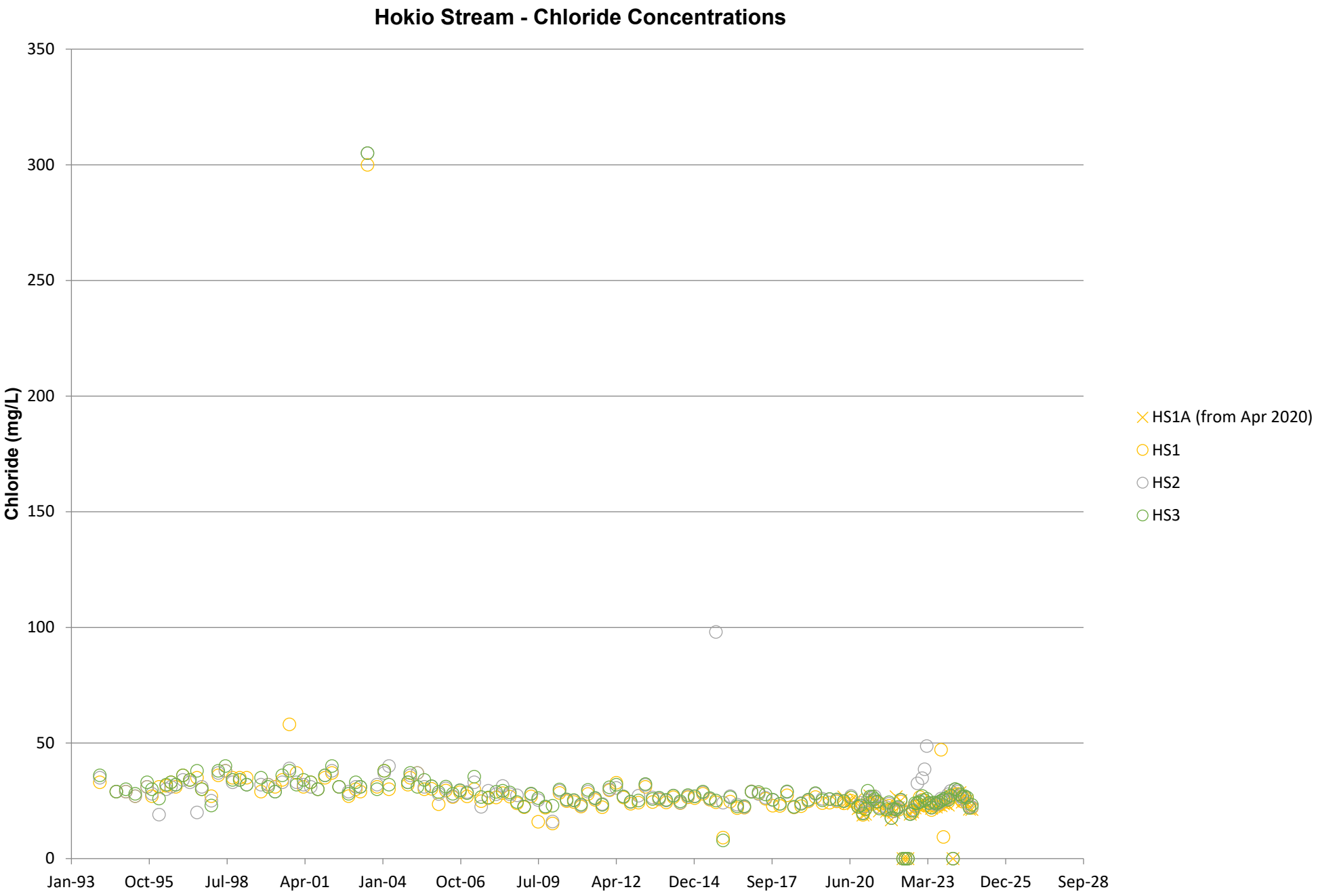

Irrigation Area - Ammoniacal-Nitrogen Concentrations
Note: Y-axis scale is Logarithmic
Ammoniacal-Ni (mg/L)
1
0.1
0.01
0.001
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Jun-26
Date
F1
F2
F3

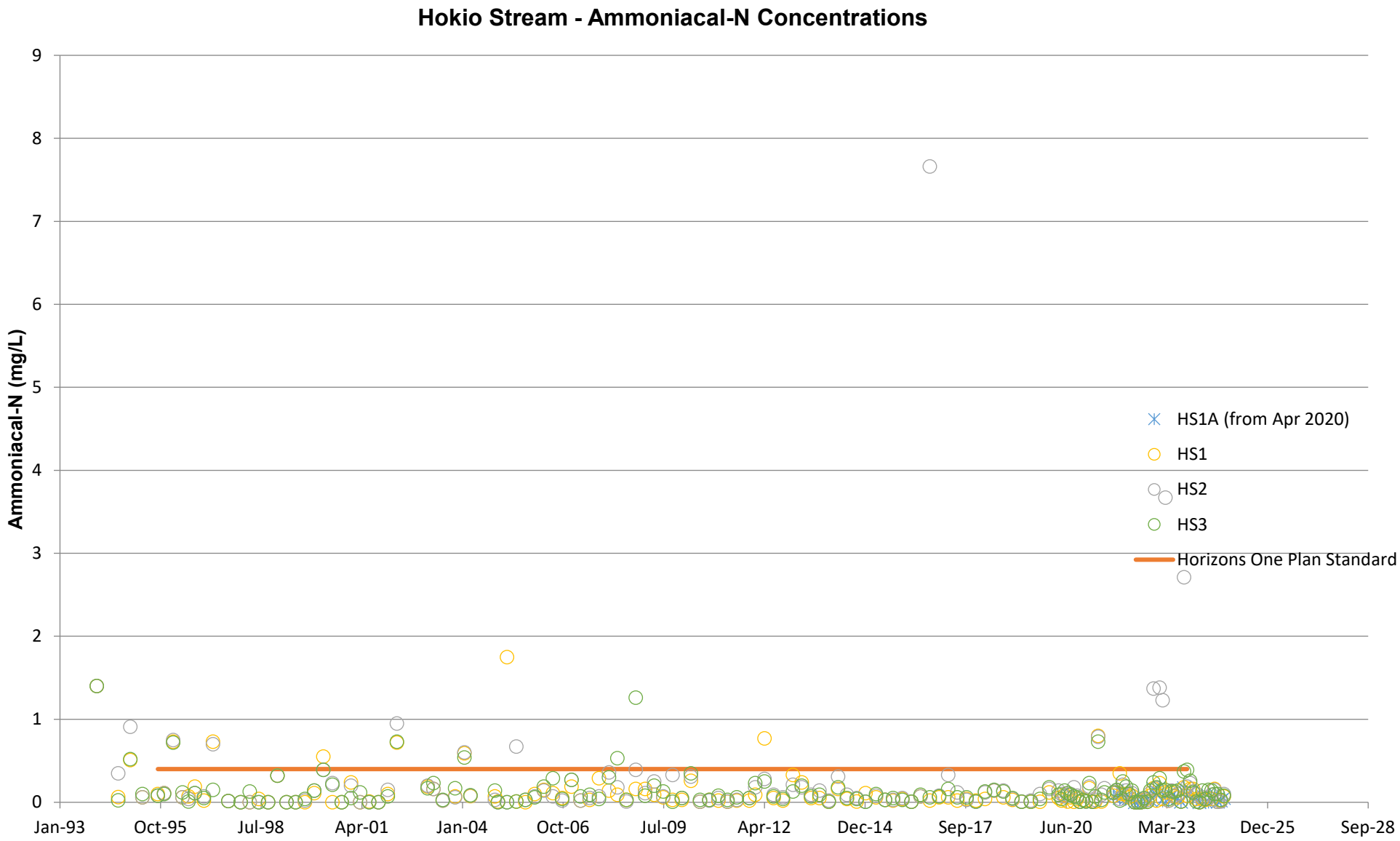

Irrigation Area - Conductivity Levels
Conductivity (mS/m)
70
60
50
40
30
20
10
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
F1
F2
F3

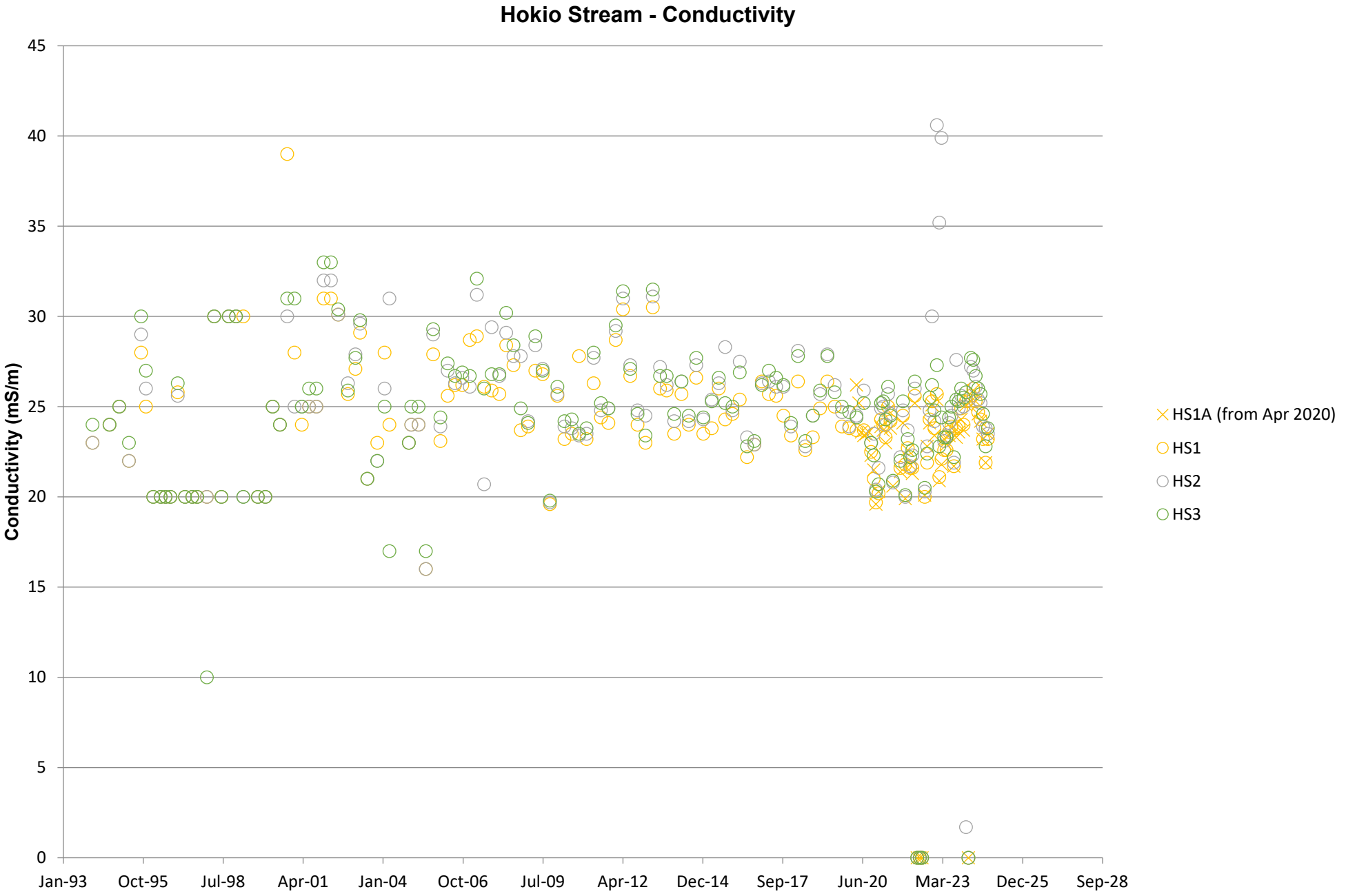

Irrigation Area - Sodium Concentrations
Sodium (mg/L)
180
160
140
120
100
80
60
40
20
0
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Date
F1
F2
F3

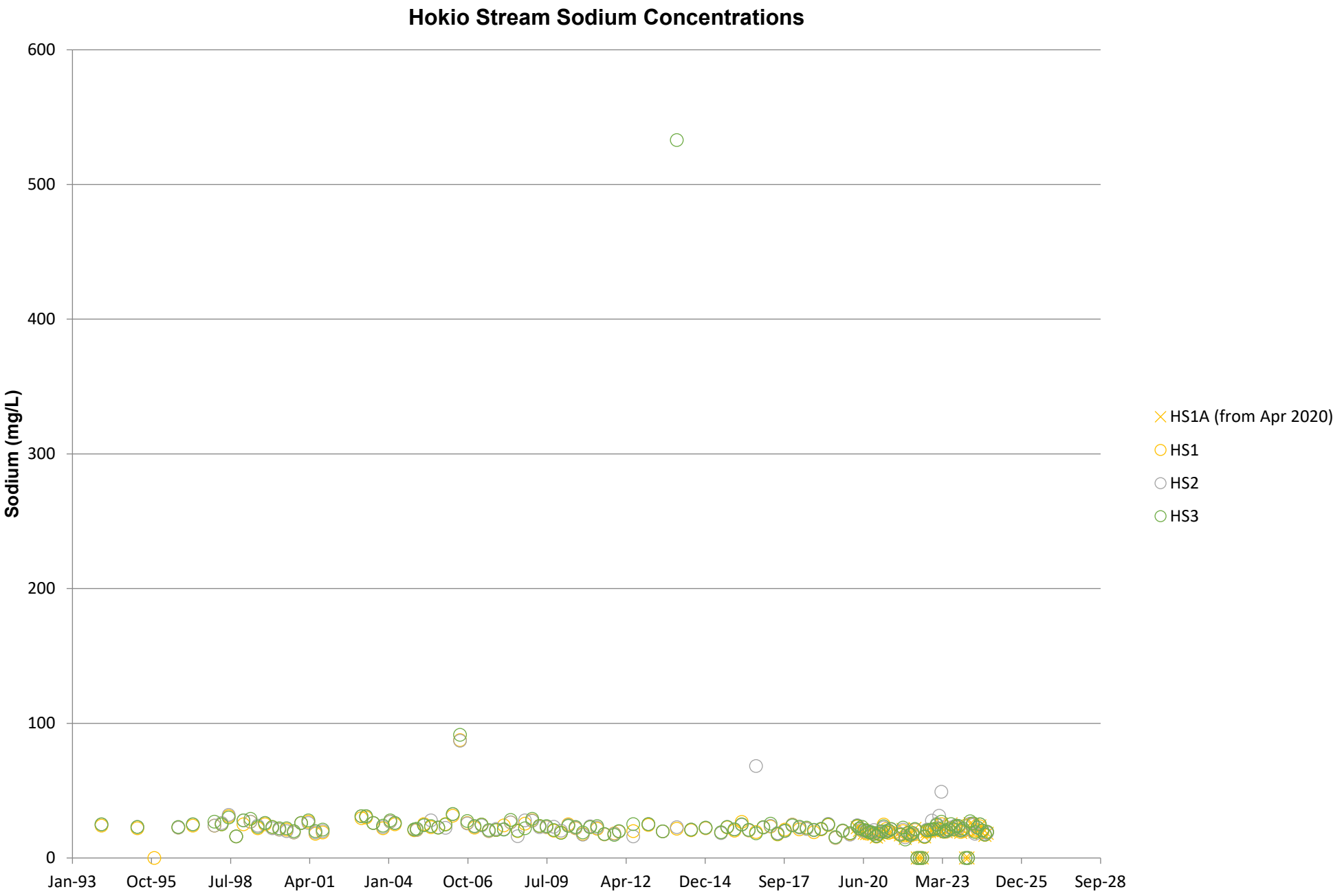

Irrigation Area - E. coli
E. coli (CFU/mL)
350
300
250
200
150
100
50
0
Nov-01
Aug-04
Apr-07
Jan-10
Oct-12
Jul-15
Apr-18
Jan-21
Oct-23
Jun-26
Date
F1
F2
F3
ANZECC LDW E. coli Trigger Value

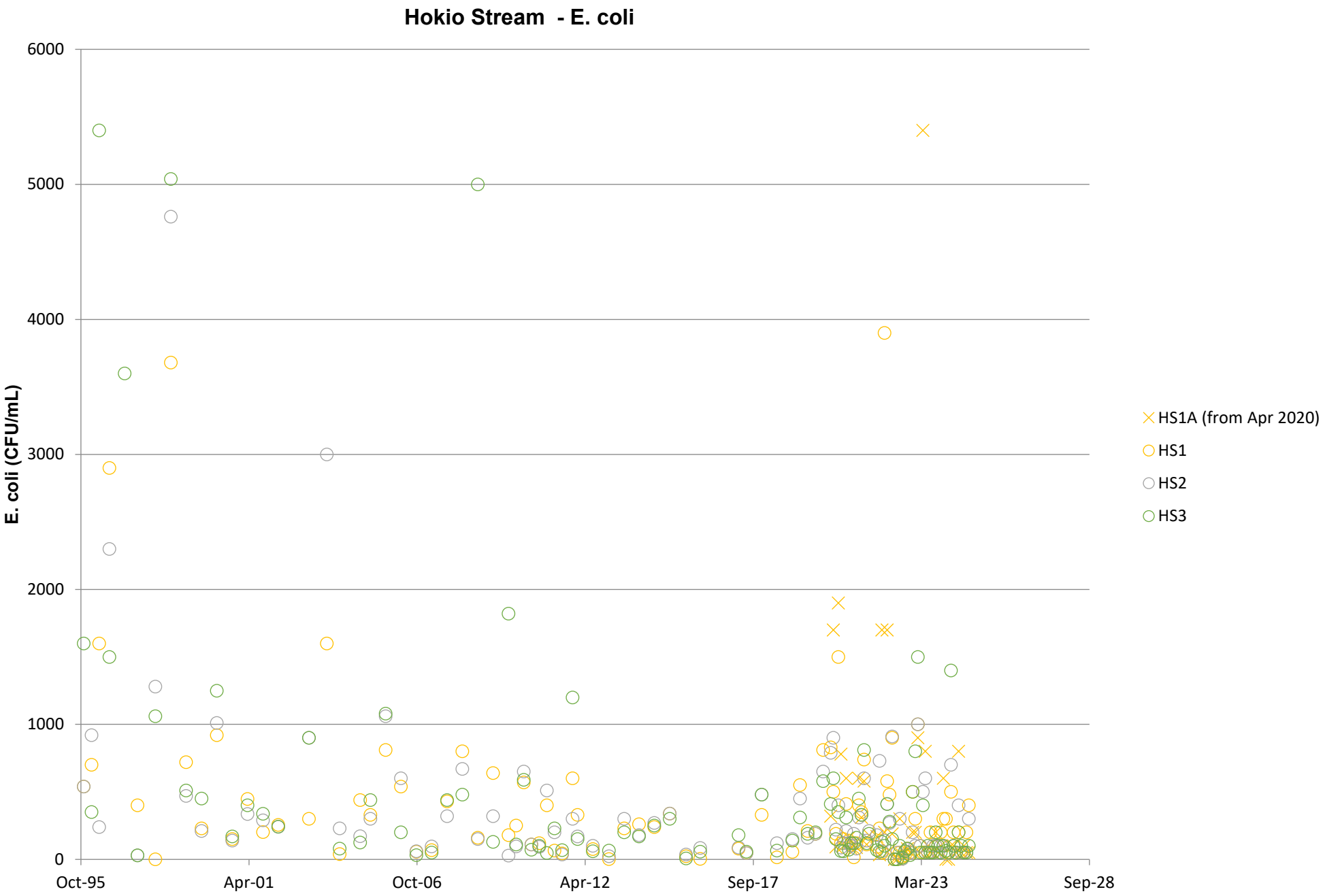

Hokio Stream - Boron Concentrations
Boron (mg/L)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - Chloride Concentrations
Chloride (mg/L)
350
300
250
200
150
100
50
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - Ammoniacal-N Concentrations
Ammoniacal-N (mg/L)
0
1
2
3
4
5
6
7
8
9
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3
Horizons One Plan Standard


Hokio Stream - Conductivity
Conductivity (mS/m)
45
40
35
30
25
20
15
10
5
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream Sodium Concentrations
Sodium (mg/L)
600
500
400
300
200
100
0
Jan-93
Oct-95
Jul-98
Apr-01
Jan-04
Oct-06
Jul-09
Apr-12
Dec-14
Sep-17
Jun-20
Mar-23
Dec-25
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3


Hokio Stream - E. coli
E. coli (CFU/mL)
6000
5000
4000
3000
2000
1000
0
Oct-95
Apr-01
Oct-06
Apr-12
Sep-17
Mar-23
Sep-28
HS1A (from Apr 2020)
HS1
HS2
HS3

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

Entry Date	Borehole	Methane (CH_4) %	Carbon Dioxide (CO_2) %	Hydrogen Sulphide (H_2S) ppm	Oxygen (O_2) %	Air Temperature °C
4/10/2024	Levin Landfill: Levin B1	0.04	0.04	0	20.7	14
4/10/2024	Levin Landfill: Levin B2	0.02	0.31	0	20.9	20.9
4/10/2024	Levin Landfill: Levin B3s	0.05	0.04	0	21.4	14
21/10/2024	Levin Landfill: Levin C1	0.03	0.06	0	21	14
4/10/2024	Levin Landfill: Levin C2	0.11	0.2	0	21.1	14
4/10/2024	Levin Landfill: Levin C2dd	0.03	0.04	0	21.2	14
4/10/2024	Levin Landfill: Levin C2ds	0.04	0.09	0	21.1	14
4/10/2024	Levin Landfill: Levin D1	0	0.05	0	21	14
4/10/2024	Levin Landfill: Levin D2 (assumed)	0.01	0.13	0	20.2	15
4/10/2024	Levin Landfill: Levin D3rs	0.03	0.07	0	20.1	15
4/10/2024	Levin Landfill: Levin D3rd	0.04	0.02	0	20.2	15
4/10/2024	Levin Landfill: Levin D4	0.02	0.07	0	21.5	15
4/10/2024	Levin Landfill: Levin D5	0.01	0.09	0	22.4	16
4/10/2024	Levin Landfill: Levin D6	0.1	0.04	0	20.5	15
4/10/2024	Levin Landfill: Levin E1d	0.05	0.07	0	21.6	15
4/10/2024	Levin Landfill: Levin E1s	0.05	0.05	0	21.2	15
4/10/2024	Levin Landfill: Levin E2s	0.01	0.06	0	21.1	14
4/10/2024	Levin Landfill: Levin E2d	0.03	0.06	0	21.1	14
4/10/2024	Levin Landfill: Levin F1	0.03	0.01	0	21	14
4/10/2024	Levin Landfill: Levin F2	0	0.1	0	22.5	15
4/10/2024	Levin Landfill: Levin F3	0	0.09	0	22.7	15
4/10/2024	Levin Landfill: Levin G1d	0.02	0.03	0	21	18
4/10/2024	Levin Landfill: Levin G1s	0	0.04	0	21	18
4/10/2024	Levin Landfill: Levin G2s	0.05	0.35	0	20.5	14
4/10/2024	Levin Landfill: Levin Xd1	0.04	0.05	0	21.5	14
4/10/2024	Levin Landfill: Levin Xs1	0.07	0.05	0	20.2	11
4/10/2024	Levin Landfill: Levin Xs2	0.04	0.05	0	20.8	12

Stantec

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.