Annual Compliance Audit Report

Levin Landfill

8 June 2021

Resource Consents:
ATH-2002003982.03 (6009),
ATH-2002003983.02 (6010),
ATH-2002003984.02 (6011),
ATH-2002003985.01 (6012),
ATH-2002003680.02 (7289),
ATH-2002009801.02 (102259), and
ATH-2014015044.01 (106798)

Reporting Period
19 December 2019 – 31 December 2020

horizons
REGIONAL COUNCIL

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Front Cover Photo
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EXECUTIVE SUMMARY

This report assesses compliance against the resource consents held by Horowhenua District Council (HDC) for the operation of the Levin Landfill, situated on Hōkio Beach Road. In preparation of this report Horizons Regional Council (Horizons) has undertaken a review of HDC's Annual Report for the Levin Landfill covering the period 19 December 2019 to 31 December 2020. In addition to this,

- The most recent Annual Monitoring Report and Quarterly Monitoring reports;
- Site Management Plans;
- Two site visits undertaken on 17 March 2020 and 22 September 2020, respectively; and,
- An independent review of the groundwater and surface water monitoring data undertaken by Pattle Delamore Partners Ltd (PDP).

The beginning of this reporting period 19 December 2019 coincides with the date of the Environment Court Order which resulted in a number of amendments to some of the resource consents.

As a result of the inspections and assessments outlined above the following compliance grading's have been allocated to each consent:

Resource consent	Activity	Compliance Rating
6009	Discharge solid waste to land	Comply – Full
6010	Discharge landfill leachate onto and into land	Low Risk Non-Compliance
6011	Discharge landfill gas, odour and dust to air	Significant Non-Compliance
6012	Divert stormwater from around the landfill	Comply – Full
7289	Discharge liquid waste onto and into land	Comply – Full
102259	Discharge stormwater to land and potentially to groundwater via ground soakage	Comply – Full
106798	Discharge to air (flared landfill gas)	Low Risk Non-Compliance

Reasons for the non-compliances with the above resource consents are provided as follows:

Resource Consent 6010: Low risk non-compliances were given as a result of failure to remediate the capping on the old unlined landfill, immediately implement the updated monitoring program and, appropriately report on the significance of all exceedances in the monitoring program.

Resource Consent 6011: A number of non-compliances were assessed against the sub-conditions of Condition 5 and typically relate to failure to undertake certain monitoring requirements or provide data. Failure to undertake any methane surface monitoring resulted in a significant non-compliance. Further low risk non-compliances were given for providing insufficient information as required by Conditions 8, and 8F.

Resource Consent 106798: A number of low risk non-compliances were assessed based on failure to meet certain timeframes, the Operations and Management Plan not including all required information and not meeting all sampling requirements.

A summary of identified non-compliances, recommendations and actions is provided at the end of this report. The actions in particular will need to be addressed no later than 16 July 2021 to prevent any potential non-compliance with the consent conditions.

1. BACKGROUND

1.1. Site

The Levin Landfill is located on Hōkio Beach Road in the Horowhenua District, 4 kilometres west of Levin. The landfill site is located in undulating sand country surrounded by pastoral farming land, 3 kilometres from the coast and 6 kilometres from State Highway 1. The site is approximately 72 hectares in area.

The Hōkio Stream (the single outlet for Lake Horowhenua) runs in close proximity to the northern boundary of the landfill site as it flows west to the sea over a distance of approximately 2.5 kilometres. There are a number of rural residences located to the north-east of the landfill site and the small coastal settlement of Hōkio Beach is located approximately 1.5 kilometres to the north-west. The Ngatokowaru marae (Ngāti Pareraukawa, Ngāti Raukawa) is located approximately 500 metres north-east of the landfill property, while the Kawiu marae (Muaūpoko) is on the northern shore of Lake Horowhenua.

The landfill is owned by Horowhenua District Council (HDC) and is operated by EnviroWaste Services Ltd under subcontract to Midwest Disposals Ltd.

1.2. History of Resource Consents

The original resource consents were granted to HDC in 1998. These covered the old closed (unlined) landfill and the new lined landfill.

In 2004 the Parliamentary Commissioner for the Environment (the commissioner), received complaints from several members of the local community expressing concern about the management and associated environmental effects of the Levin Landfill. The commissioner suggested a review was in order. Subsequently, a formal review was initiated and this completed by 2010. This resulted in the following consents being varied:

Resource consent number	Nature of resource consent
6009	Discharge of solid waste to land
6010	Discharge of landfill leachate onto and into land
6011	Discharge of landfill gas, odour and dust to air
7289	Discharge of liquid waste onto and into land
102259	Discharge of stormwater to land and potentially to groundwater via ground soakage

In October 2015 Horizons initiated a publicly notified review of the above resource consents. This went to a hearing and the Commissioners' decision was issued on 18 November 2016. This decision was then appealed to the Environment Court and subsequently, a Consent Order was issued on 19 December 2019, which resulted in a number of amendments to the resource consent conditions. The changes to the consent conditions following the Commissioners' decision and the Environment Court Order, represent the current set of consent conditions for the operation of the Levin Landfill, which came into effect as of 19 December 2019.

In addition to those resource consents referenced above, HDC also hold the following consents relating to the Levin Landfill:

- 6012 – divert stormwater from around the landfill
- 106798 – discharge landfill gas and odour from a gas flare

2. SCOPE OF THE REPORT

This compliance report assesses compliance of the Levin Landfill against resource consents 6009/1, 6010/1, 6011/1, 7289/1 & 102259/1 held by HDC. The focus of this compliance report is a data assessment of the Annual and Quarterly Monitoring Reports, which are required by certain conditions of the resource consents. This report also summarises observations made during two site visits (undertaken on 17 March 2020 and 22 September 2020, respectively) and odour complaints received and the outcomes of any odour assessments undertaken. The period covered by this report is 19 December 2019 – 31 December 2020.

The following reports have been utilised to assess the Levin Landfill's compliance:

- Levin Landfill Annual Compliance Report July 2019 – June 2020
- Levin Landfill January 2020 Quarterly Monitoring Report
- Levin Landfill April 2020 Quarterly Monitoring Report
- Levin Landfill July 2020 Quarterly Monitoring Report
- Levin Landfill October 2020 Quarterly Monitoring Report
- Levin Landfill Gas Flare Annual Report 2019/2020

This report also makes use of the following documents and other information related to the above consents:

- Levin Landfill Management Plan
- Levin Landfill Odour Management Plan
- Levin Landfill Stormwater Management Plan
- Levin Landfill – Environmental Monitoring & Reporting Requirements
- Hazardous and Special Waste Logs 2019-2020
- Sludge records 2019-2020
- Weekly Site Walkover Sheets 2019-2020
- Weather Station Data 2019-2020

In addition to this, Horizons engaged an independent expert namely Pattle Delamore Partners Ltd (PDP) to undertake a review of the Levin Landfill Annual Monitoring Report, with a specific focus on the following areas:

- Assessing whether the discharge of leachate from the landfill has an adverse impact on groundwater quality;
- Confirm the contaminant mass load projections; and
- Assessing whether the discharge of leachate from the landfill has an adverse impact on surface water quality.

PDP provided a response by way of a Memorandum dated 30 April 2021. This Memo is appended to this report and excerpts have been inserted to help the assessment of compliance with particular consent conditions.

2.1 Odour Complaints

All complaints received for the Levin Landfill by Horizons during this reporting period have been in relation to odour.

The assessment period covered by the previous compliance report, in relation to odour complaints, was between 30 July 2018 and 18 December 2019. This assessment provides a summary of the odour complaints received and outcomes of assessments between 19 December 2019 and 31 December 2020.

Horizons compliance assessment in relation to these odour complaints is discussed further under Condition 3 of Resource Consent 6011.

2.2 Review of Levin Landfill Annual Monitoring Report

In preparation of this report Horizons engaged Pattle Delamore Partners Ltd (PDP) to assess the recent surface water and groundwater monitoring data. PDP responded via a Memorandum entitled "Review of Levin Landfill Annual Monitoring Report" dated 30 April 2021 (Memo), which is appended to this report.

The Memo states the Levin Landfill is effecting local groundwater quality and surface water quality within the Tatana Drain that could be described as adverse. In addition, the recent data indicates there are effects from the landfill on water quality in the Hōkio Stream but noting that relevant guideline thresholds have not yet been exceeded.

The review also noted a pattern of rising concentrations and potential for effects in Hōkio Stream which should be considered as early warning signs and preparations to manage those effects should be put in place.

The findings of this review have been used to aid the assessment of compliance for the relevant conditions of Resource Consent 6011.

3. GENERAL ASSESSMENT OF CONDITIONS APPLICABLE TO 6009

Consent is granted to the Horowhenua District Council to **discharge solid waste to land** *at the Levin landfill, Hōkio Road, Levin, legally described as Lot 3 DP 40743 Blk II Waitohu* Survey District, for a term expiring 35 years from the commencement of the consent subject to the following conditions:

1. This permit does not authorise the disposal of liquid waste to land at the Levin Landfill.

   Liquid waste is defined as:

   Septic tank waste, grease trap waste, sewage and any material that contains free liquids.

   The presence of free liquids may be determined by either of the following methods, whichever is most practicable at the time:

   i. *The "Paint Filter Test"; or*
   ii. Material which may be loaded, transported and deposited at the landfill without the risk of free liquid seeping from the material, and without the risk of having the deposited material flow under gravity down any slope on the landfill shall be deemed to not contain free liquids.

Condition 26 of this consent and various conditions of Resource Consent 7289 provide exceptions to this condition under certain situations. Despite this the Levin Landfill Management Plan (LMP) requires that any liquid waste disposed of at the Levin Landfill must be accompanied by a Special Waste Application Form.

Copies of the Hazardous Waste and Special Waste logs for the 2019-20 and 2020-21 monitoring periods were provided upon request. These indicate that no liquid waste was disposed at the landfill over these periods.

It is important to note that site-generated sludges that contain free liquids, such as those from cess pits, leachate ponds and other site activities to facilitate site operations, are permitted to be disposed of in the landfill, as an exception to the conditions of consent.
Compliance Rating: Comply – Full

General Conditions – Discharge Solid Waste to Land

2. The Permit Holder shall take all practicable measures to avoid the discharge of waste from within the landfill to surrounding land. To this end, the Permit Holder shall ensure:

    a. The amount of refuse exposed at any one time is confined in dimension to 800 square metres of tipping face; and

    b. Exposed refuse is covered at the end of each day that refuse is received at the landfill.

The tip head itself was not inspected during the 17 March 2020 or 22 September 2020 site visits due to heavy machinery movements. The LMP states primary cover of waste shall be provided daily over the entire operational fill area to a depth of at least 150mm by the end of each operating day. It is recommended that observations of the above are added to the weekly site walkovers to demonstrate compliance.
Compliance Rating: Not Assessed

3. If refuse is discharged from within the active landfill areas to land outside the legal boundary of the landfill property, the Permit Holder shall ensure that such waste is cleared and removed to the landfill as soon as practicable.

During the visits on 17 March 2020 and 22 September 2020, no refuse was observed to have been discharged beyond the boundary of the landfill property. No complaints have been made regarding litter escaping the property boundary during the reporting period.
Compliance Rating: Comply – Full

4. The Permit Holder will monitor the landfill at least once every two weeks for the build-up of litter, paper and other deposits outside the active landfilling areas, and remove such material as required.

Site walkovers are undertaken weekly and include observations for litter outside of the active landfill cell area. During the site visit on 22 September 2020, small amounts of refuse were observed to have collected on the litter nets. HDC advised that litter is removed periodically.
Compliance Rating: Comply – Full

5. The Permit Holder shall regularly inspect for the presence of vermin, birds and other pests take appropriate measures to control them.

Site walkovers are undertaken weekly and include observations for evidence of vermin, pests and gulls. Periodic shooting, bait stations and a gas gun are used onsite to manage pests.
Compliance Rating: Comply – Full

6. The Permit Holder shall regularly inspect the landfill for noxious weeds, and take appropriate measures to control those noxious weeds.

At the time of the site visits there were no obvious problems with noxious weeds on site. During the 17 March 2021 site visit HDC advised that gorse was sprayed late 2019. The LMP states that the landfill shall be inspected regularly for noxious weeds and spraying is usually undertaken twice a year.
Compliance Rating: Comply – Full

Hazardous Material

7. The Permit Holder shall not allow the disposal of waste of an explosive, flammable, reactive, toxic, corrosive or infectious nature, to an extent that the waste poses a present or future threat to the environment or the health and the safety of people.

Any potentially hazardous material must follow an approval process with the requisite application form filled out and approved. This process is covered in the LMP. The Hazardous Waste log for the 2019-20 and 2020-21 periods indicate that no loads of hazardous waste were received nor were any applications made over the reporting period.
Compliance Rating: Comply – Full

8. The Permit Holder shall develop and implement a procedure for the landfill operator, such that potentially hazardous material, as listed in Annex 1 attached to and forming part of this permit, will not be accepted for disposal at the Levin landfill without specific authorization. The Operations Manager of the Horowhenua District Council, or some other designated person, is able at their discretion to accept quantities of such wastes. The waste shall be accompanied by a Hazardous Waste Manifest, as listed in Annex 1, which will form part of the permanent record and shall be reported by the Regional Council by 30 September each year for the term of this Permit.

The Annual Report summarises the types of waste that is deemed hazardous as specified in Annex 1 while the LMP provides a more comprehensive list. EnviroWaste maintain a hazardous waste log to record pre-arranged disposals of hazardous waste. The Hazardous Waste log for the reporting period indicate no loads of hazardous waste were received nor were any applications made over the reporting period.
Compliance Rating: Comply – Full

9. The Permit Holder shall maintain a secure facility for any small quantities of hazardous waste, pending a decision on treatment, disposal or transfer to another facility.

This facility was not observed during the Horizons site visits. Section 5.5.8 of the LMP states this facility makes use of a shipping container that has been specifically designed for this purpose which is located near the site office.
Compliance Rating: Not Assessed

10. Hazardous waste stored at the facility described in Condition 9 shall be stored in a sealed and bunded area to avoid adverse effects from spills.

The LMP states this shipping container is appropriately bunded and sealed to avoid adverse effects from spills.
Compliance Rating: Not Assessed

11. Any hazardous waste accepted for disposal shall be disposed within an adequate *volume of mature refuse, in accordance with Centre for Advanced Engineering's* Landfill Guidelines (2000).

The hazardous waste log indicates that no hazardous waste was disposed of at the landfill during the reporting period.
Compliance Rating: Not Applicable

Monitoring and Reporting

Specific Conditions – Discharge Solid Waste to Land at Existing Landfill

12. No solid waste shall be disposed to the existing landfill, after two years from the commencement of this consent.

The existing landfill as described in this consent is described as the old closed (unlined) landfill or Stage 1 by the operators and HDC. This stage of the landfill has final capping in place. Solid waste is currently being discharged into Stage 3 of the newer lined landfill.
Compliance Rating: Comply – Full

13. All new fill should be placed on top of at least 2 metres of existing material in the existing landfill.

As detailed in Condition 12, final capping is in place and this condition was verified as being compliant in Horizons Compliance Report 42517 dated 19 May 2011.
Compliance Rating: Comply – Full

14. The Permit Holder shall update the Landfill Management Plan in respect of the operations on the lined landfill to the satisfaction of the Regulatory Manager at the Regional Council before November 2019. The Landfill Management Plan shall include, but not be limited to:
    a. The specific conditions contained herein, related to the operation, management and monitoring of the landfill.
    b. A description of the development and maintenance of the landfill.
    c. A description of how the consent will be exercised in a manner to ensure compliance with the consent and the conditions thereof and the Resource Management Act 1991.
    d. A description of how the consent will be exercised to minimise adverse effects on the environment.

e. A description of the hazardous waste acceptance criteria, including the criteria set out.
f. The emergency procedures to be followed in the event of natural emergencies and hazardous waste spills.
g. The methods of controlling dust and odour emissions including the criteria for assessing when, and how regularly, roadways and the landfill are dampened by water or otherwise.
h. Details of measures to avoid nuisance effects on adjacent properties i.e. birds and vermin, as a result of landfill activities.
i. Operational, intermediate and final capping requirements.
j. Closure and aftercare.
k. Procedure to update the management plan, in light of changing circumstances, to continue compliance with Conditions of this Permit.
l. A screen planting implementation description.
m. **[deleted]**

The Permit Holder shall prepare a Closed Landfill Aftercare Management Plan in respect of the closed unlined landfill (Area "A") to the satisfaction of the Environmental Protection Manager at the Regional Council within six months of the completion of the review of the consent conditions. The Closed Landfill Aftercare Management Plan shall include, but not be limited to those aspects that are detailed in Appendix E of the MfE publication entitled 'A guide for the Management of Closing and Closed Landfills in New Zealand (May 2001)'. The Closed Landfill Aftercare Management Plan shall require at the least:

n. Grading to a final slope on the landfill faces and caps of between 1V:3H (1 in 3) and 1V:40H (1 in 40);
o. Ensuring the final landfill surface is sloped to promote run-off toward the outside of the landfill footprint and prevent surface water ponding on the landfill cap;
p. Ensuring the landfill cap incorporates a layer at least 700 mm thick. All material added to the existing cap to bring the thickness up to 700 mm, or for future cap maintenance purposes, is to have a permeability of not greater than 1 x 10(-7) m/s.
q. Establishing and maintaining a grass or tussock vegetation cover on the capped landfill consistent with an ongoing ability to monitor and maintain the integrity of the landfill cap as per Condition 15 (d) of Consent 6010.
r. Monitoring the landfill cover on an annual basis to identify areas of differential settlement slope stability issues, erosion and changing vegetation patterns, including a topographic survey to ensure Conditions 14(n) to (q) continue to be met;

The Permit Holder shall submit an annual report to the Regional Council by 30 September each year for the duration of this Permit documenting the condition of the unlined landfill and any maintenance carried out during the previous year. The annual report shall address but not be limited to those aspects listed in Conditions 14(n) to 14(r) above. The annual report shall include a plan of the unlined landfill specifically documenting the shape of the closed landfill and any changes during the previous year related to Condition 14(q) [The annual report can be written in conjunction with the annual report required as part of Condition 15 (f) for Consent Number 6010]

Horizons note that this condition, and specifically the date by which time the LMP shall have been updated by, was subject to an amendment as a result of the Environment Court Order on 19 December 2019. The updated LMP was provided to Horizons on 3 February 2020. This condition would normally be assessed as a low risk non-compliance; however, this part of the condition cannot be assessed given the date by which time the plan needed to be submitted was before the date of the Environment Court Order. The updated LMP has been reviewed by an expert on behalf of Horizons and is currently being finalised by HDC.

The Closed Landfill Aftercare Management Plan was submitted in 2011. It is understood that no changes have been made since then and is considered current.

The Annual Report was provided to Horizons on 30 September 2020. Section 12 of the Annual Report provides detail on the old landfill remediation, as required by this condition. Therefore, this condition is assessed as fully compliant.
Compliance Rating: Comply – Full

Specific Conditions – Discharge of Offal and Dead Animals to Land

15. Offal waste shall be immediately buried in depth of 0.6 metres upon delivery.

The procedure for disposing of offal is outlined in Section 5.5.5 of the LMP, which includes the requirement for immediate burial to a depth of 0.6m and only after a special waste permit has been issued to the waste generator. The special waste log indicates that three loads of dead frozen chickens from Tegel Foods Ltd were received during the reporting period, totalling 12.4 m^3.
Compliance Rating: Not Assessed

16. All animals disposed of as diseased animals under the Animal Act 1967 shall be immediately buried to a depth of at least 1 metre.

Procedures for disposal of diseased animals are detailed in Section 5.5.5 of the LMP which specifies that they must be immediately buried to a depth of at least 1.0m. No diseased animals (under the Animal Act 1967) were received during the reporting period.
Compliance Rating: Not Assessed

17. Pits for the burial of offal and animals shall be excavated in mature refuse and shall be away from the public tipping area.

There is no public tipping at the Levin Landfill; however, Section 5.5.5 of the LMP states that *"If the contractor excavates and prepares holes for the disposal of offal and dead animals,* they will be in a closed previous tipping area and shall be at least 10 metres from any landfill *batter slope."*
Compliance Rating: Not Assessed

18. Pits for the burial of offal and animals shall be at least 10 metres from any landfill batter slope.

As detailed under Condition 17 the LMP requires that all offal and dead animals are to be buried at least 10m from any batter slope.
Compliance Rating: Not Assessed

19. Pits for the burial of offal and animals shall not exceed a maximum size of two metres by 15 metres.

Section 5.5.5 of the LMP states: *"If used, the offal holes shall be ex*cavated to a depth of at *least 2.5 metres and to a maximum size of 2m by 15m."*
Compliance Rating: Not Assessed

20. The immediate cover material of all offal and animals shall be a minimum depth of at least 100 millimetres unless these conditions specify otherwise. Pits shall be filled to within one metre of the prior refuse surface level and reinstated with appropriate compaction with previously removed refuse or other suitable material.

Section 5.5.5 of the LMP states: *"All materials placed in the offal ho*le shall be covered within one hour of being deposited. The intermediate cover material shall be to a minimum depth of at least 100mm, with a final cover of greater than 300mm provided when closing that hole. The contractor shall maintain the surface over *a closed offal hole as a level surface."*
Compliance Rating: Not Assessed

21. Pits for the burial of offal and animals shall be demarcated as such and shall be fenced off.

Section 5.5.5 of the LMP states: *"Offal holes shall be fenced off and the location rec*orded and sign-*posted accordingly."*
Compliance Rating: Not Assessed

Note for Conditions 15 – 22: The aforementioned conditions require specific practices for the disposal of dead animals and offal which is provided for in the LMP. This report strongly recommends any future annual reports provide volumes/quantity of offal and/or dead animals disposed of and photographic examples that these practices are being strictly followed.

22. Any other malodorous wastes not already covered specifically by these conditions shall be covered immediately upon disposal.

Section 5.5.5 of the LMP states: *"All other materials requiring specific burial shall be immediately buried to the specified depth in the presence of the relevant observers."*
Compliance Rating: Not Assessed

Specific Conditions – Discharge of Biosolids and Sludges to Land

23. Biosolids, sludges and similar materials which do not contain free liquids may be accepted at the landfill as solid waste. This shall include dewatered municipal wastewater treatment plant solids, dewatered processing plant solids and dewatered agricultural wastes.

    The presence of free liquids may be determined by either of the following methods, whichever is most practicable at the time:
    i. *The "Paint Filter Test"; or*
    ii. Material which may be loaded, transported and deposited at the landfill without the risk of free liquids seeping from the material, and without the risk of having the deposited material flow under gravity down any slope on the landfill shall be deemed to not contain free liquids.

The LMP states that only biosolids and sludges that do not contain free liquids may be accepted at the landfill. HDC maintains a special waste log which records, among other things, when sludges and biosolids are disposed of at the landfill. A copy of the special waste log was provided to Horizons upon request by HDC. The special waste log indicates biosolids or sludges were received during the monitoring period and these comprised water treatment plant sludge and wastewater treatment plant sludge. Each consignment was accompanied by a special waste permit as required.
Compliance Rating: Comply – Full

24. If not co-disposed of within the landfill, the biosolids, sludges and similar materials shall be applied to the landfill surface in accordance with the 1992 Ministry of Health *Guidelines for the "safe use of sewage effluent and sewage sludge on land".*

The special waste log indicates all biosolids and sludges received at the landfill were co-disposed with general waste. Section 5.5.6 of the LMP details the procedure for disposal if bioslids or sludges are not co-disposed.
Compliance Rating: Comply – Full

25. The Permit Holder shall maintain records of:
    a. The type of waste received;
    b. The volume of waste received;
    c. Source of waste; and
    d. The location in which the material was placed.

All waste including special wastes are categorised, weighed and recorded across the RTS weigh bridge prior to disposal at the Levin Landfill. HDC maintains a special waste log in accordance with the above.
Compliance Rating: Comply – Full

26. Disposal of site-generated sludge from cess-pits, leachate ponds or other site activities that contain free liquids is acceptable to facilitate site operation, provided this does not adversely affect landfill stability or face operations.

Since January 2012 all leachate generated from the newer lined landfill has been piped directly to the Levin Waste Water Treatment Plant.
Compliance Rating: Not Applicable

Note for Conditions 23 – 26: The aforementioned conditions require specific practices for the disposal of biosolids and sludges which are provided for in the LMP. This report strongly recommends any future annual reports provide volumes/quantity of biosolids and sludges disposed of and the location of where they were placed.

Specific Conditions – Discharge Solid Waste to Land at Lined Landfill

27. Design specifications and a set of construction drawings for the lined landfill shall be forwarded to the Regional Council (Environmental Protection Manager) for certification, to ensure compliance with the conditions of this consent and all related consents, at least three months prior to the intended construction of the lined landfill begins.

The latest cell constructed on site was for Stage 3. At the time the HDC engaged Tonkin & Taylor to undertake a peer review of MWH's design specifications for the liner system. Subsequent to this review, Horizons certified the liner design by way of letter dated 1 July 2013 in accordance with this condition. A full list of documentation provided to Horizons in relation to this has been provided in previous reports.
Compliance Rating: Comply – Full

28. The Permit Holder shall construct the liner system for all new cells to include the following elements:
    a. A smooth base constructed from insitu materials the level of which is above the winter groundwater level.

b. A geosynthetic clay liner (GCL) a minimum of 5mm thick, with a coefficient of permeability not exceeding 3 x 10(-11)m/s. The Permit Holder shall supply documentation from the manufacturer demonstrating quality control procedures ensuring that 95 % of the GCL meets the coefficient of permeability standard required.
c. A synthetic flexible membrane (high density polyethylene, HDPE with a minimum thickness of 1.5 mm, or polypropylene, PP with a minimum thickness of 1.0 mm).
d. A protective layer of sand 100 mm thick on the base overlain by a 300 mm thick gravel drainage layer, and on the side slopes a confining layer of gravel 300 mm thick, lain on top of a protective geo fabric and geo-grid, appropriately designed for the site conditions.
e. Provision for the collection of leachate from the liner and reticulating to a treatment system outside the landfill area.
f. An alternative to any of the above as agreed from time to time, in writing, between the Permit Holder and the consent authority.

The design specifications for liner system as certified under Condition 27 included the requirements listed above.
Compliance Rating: Comply – Full

29. **[deleted]**

30. If any ancient human remains or artefacts are discovered during any earthworks activity associated with the construction and maintenance of the landfill, then works shall cease, and the Consent Holder shall immediately inform the Environmental Protection Manager of the Regional Council and relevant tangata whenua. Further work in the vicinity of the find shall be suspended while relevant tangata whenua carry out their procedures for the removal of taonga. The Environmental Protection Manager of the Regional Council will inform the Consent Holder when work can recommence in the vicinity of the find.

There have been no discoveries of human remains or artefacts made during the course of earthworks during this reporting period.
Compliance Rating: Not Applicable

31. The Regional Council may initiate a review of Conditions 2, 8, 14(a) to (m), 28, 32, 33, and 34 of this permit during the month of October in 2024, 2029 and 2034. The reviews shall be for the purpose of:
    a. Assessing the adequacy of the management plan outlined in Conditions 14 and 29 of this consent; and/or
    b. Assessing the effectiveness of Conditions 2, 8 and 28 of this consent.
    c. Assessing the effectiveness of the NLG outlined in Conditions 32, 33 and 34.

In avoiding, remedying or mitigating adverse effects on the environment surrounding the Levin Landfill, the review of conditions shall allow for:

d. Modification of the management plan outlined in Conditions 14 and 29 of this consent;
e. Deletion or changes to Conditions 2, 8 and 28 of this consent;
f. Deletion or changes to Conditions 32, 33, and 34; and
g. Addition of new conditions as necessary.
h. An alternative to any of the above as agreed from time to time, in writing, between the Permit Holder and the consent authority.

To avoid, remedy or mitigate adverse effects on the environment surrounding the Levin Landfill.

The amended version of this condition states Horizons may initiate a review, with the next date being October 2024.
Compliance Rating: Not Applicable

Specific Conditions – *Neighbourhood Liaison Group (hereinafter "NLG")*

32. The Permit Holder shall establish an NLG. Members of the NLG will suggest available and suitably qualified nominees for an independent facilitator in advance of or at the first meeting. The list of nominees must be limited to six nominees. The Permit Holder will confirm that the list of nominees contains suitably qualified people for the facilitator role. The NLG will appoint an independent facilitator from the list of nominees confirmed by the Permit Holder at that same meeting. In the event consensus cannot be reached an independent facilitator will be appointed from the list of nominees by a majority vote of community NLG representatives as identified in (a) to (d) and (g).

    The following parties shall be eligible to be members of the NLG with one representative each at NLG meetings:

    a. the Lake Horowhenua Trustees;
    b. Mr Charles Rudd;
    c. Ngati Pareraukawa;
    d. Each of the owners and occupiers of those properties adjoining the Levin Landfill property described as A through to N on Drawing 2181 attached;
    e. Horowhenua District Council
    f. the Manawatu-Wanganui Regional Council; and
    g. Two representatives of the owners and occupiers of the properties affected by the landfill.

Advice Note:

Technical advisors as appointed by any member(s) of the NLG may be invited to NLG meetings if the NLG member(s) consider it reasonable to assist the discussions with the NLG (at the members own cost).

The Permit Holder's staff and contractor shall be able to attend and participate in the NLG meetings and assist on the invitation of the Permit Holder's representative.

At the invitation of the Permit Holder and/or NLG, other parties may attend NLG meetings as jointly agreed by both the Permit Holder and NLG.

The representatives on the NLG are responsible for reporting back to their members and interested parties. The Permit Holder will make (unless confidential) the reports and information provided to the NLG and the minutes of the NLG available on its website.

The Permit Holder is responsible solely for the reasonable costs of administering the NLG, such as providing a venue, the facilitator's costs and drafting up of minutes.

The facilitator will be paid in accordance with level 2 of the fees range for members under Cabinet Office circular (12) 6: "Fees framework for members appointed to bodies in which the Crown has an interest".

HDC has established an NLG which is open to the members as outlined above. An independent facilitator was appointed in accordance with the process outlined above at the first meeting held following the Environment Court Order (dated 19 December 2019) which took place on 30 July 2020.
Compliance Rating: Comply – Full

33. The Permit Holder shall:
    a. Convene one meeting by the end of June 2019 to appoint an independent facilitator in accordance with clause 32:

Horizons note that this condition, and specifically the date by which a meeting shall have been convened to appoint an independent facilitator, was subject to an amendment as a result of the Environment Court Order dated 19 December 2019. This condition would normally be assessed as a low risk non-compliance; however, this part of the condition cannot be assessed given the date by which time the meeting was to have been convened was prior to the Environment Court Order date. Nevertheless, an NLG meeting was held on 30 July 2020 at which Ms Jenny Rowan was appointed as the independent facilitator.
Compliance Rating: Comply – Full

b. Convene a further meeting within two months of the appointment of the independent facilitator;

A further NLG meeting was held on 29 September 2020.
Compliance Rating: Comply – Full

c. Thereafter convene a meeting at intervals of six months for the following 18 months; and

NLG meetings will need to be held in March 2021, September 2021 and March 2022 in order to ensure compliance with this condition. At the time of writing this report, Horizons note the NLG meeting required for March 2021 was held in April 2021. This is outside the scope of this report and will assessed in the next annual compliance review.
Compliance Rating: Not Applicable

d. Thereafter convene a meeting at intervals of no more than twelve months unless all NLG representatives agree that changes are acceptable.

Meetings thereafter will need to be convened accordingly to ensure compliance with this condition.
Compliance Rating: Not Applicable

34. The purpose of the NLG is to create a forum in which the Permit Holder, Horizons Regional Council and community can engage for the purpose of reviewing and sharing perspectives on monitoring results, and where appropriate, discuss strategies for maintaining or improving the landfill operation, consistent with the consent conditions.

NLG meeting minutes to date show there has been robust discussion regarding monitoring results and, strategies for maintaining or improving the landfill operation.
Compliance Rating: Comply – Full

35. The Permit Holder Shall:
    a. Supply notes of each meeting to the Group Members;

Minutes of the meetings are made available via the HDC website and the Solid Waste Newsletter which is emailed to all group members.
Compliance Rating: Comply – Full

b. Forward an annual report to members and to the Regional Council and the District Council;

HDC has provided copies of the Annual Report to Horizons and the other NLG members via their Solid Waste Newsletter.
Compliance Rating: Comply – Full

c. Forward any other information to the Group Members, in accordance with the conditions of the consents; and

The information assessed as part of this report indicates relevant reports and other information required by these consents was forwarded to the NLG group members.
Compliance Rating: Comply – Full

d. The Permit Holder shall ensure the NLG members are:
   i. Able to advise the Permit Holder of potential members of the NLG, such new members to be at the agreement of the Permit Holder.

This has been a frequently debated point during the meetings.
Compliance Rating: Comply – Full

   ii. Given the opportunity to inspect the operations on site on the occasion of NLG meetings, and/or on such other occasions as are agreed by the Permit Holder and Landfill Operator. The Permit Holder and the Landfill Operator shall not unreasonably withhold such agreement. The Permit Holder shall grant the NLG members access to the landfill property, during working hours, subject to relevant regulations, including health and safety regulations and the Management Plan.

NLG members were invited by HDC to attend a site visit to the landfill on 1 December 2020.
Compliance Rating: Comply – Full

   iii. Consulted by the Permit Holder as a group prior to any change of conditions pursuant to section 127 of the Resource Management Act 1991 (and/or any consequential amendments).

At an NLG meeting on 17 November 2020, HDC expressed their interest at de-commissioning the biofilter and treating the gas from the leachate collection by potentially re-piping it through the gas collection system to the gas flare. The NLG agreed to proceed with this change in principal but suggested HDC provide feedback at future meetings.
Compliance Rating: Comply – Full

iv. Provided by the Permit Holder with a copy of all monitoring reports and other documentation relating to the non-commercially sensitive, environmental operation of the landfill, at the same time as such reports are provided to the Regional Council in accordance with the resource consents.

The Annual and Quarterly Monitoring Reports relevant to the reporting period are as follows:

- Levin Landfill Annual Compliance Report July 2019 – June 2020
- Levin Landfill January 2020 Quarterly Monitoring Report
- Levin Landfill April 2020 Quarterly Monitoring Report
- Levin Landfill July 2020 Quarterly Monitoring Report
- Levin Landfill October 2020 Quarterly Monitoring Report

These were distributed to Horizons and the NLG members via the Solid Waste Newsletters.
Compliance Rating: Comply – Full

v. Able to raise with the Permit Holder, as necessary, any matter which the NLG member believes the Permit Holder should address in order to meet the conditions of the consent(s).

The minutes of the meetings show there has been ample discussion regarding compliance with the consent conditions.
Compliance Rating: Comply – Full

vi. Able to provide written suggestions to the Permit Holder on possible improvements to, or concerns about, the landfilling operations that are formally acknowledged and considered by the Permit Holder at or before the next NLG meeting.

Formal minutes have been kept as above with suggested actions where appropriate.
Compliance Rating: Comply – Full

vii. Given reasons from the Permit Holder for any comments from the NLG representatives at the annual meeting on environmental and monitoring results in relation to environmental mitigations at the Levin landfill being rejected.

The NLG continues to provide a forum for raising and responding to concerns and these are responded to as required.
Compliance Rating: Comply – Full

viii. Formally invited to participate in the Permit Holder's Waste Management and Minimisation Plan review process.

Email evidence from 29 March 2018 indicate that NLG members and HEKA were invited to consult with HDC on the draft Waste Minimisation and Management Plan.
Compliance Rating: Comply – Full

ix. Provided with a copy of any complaints within 10 workings days of a request by the NLG.

The NLG meetings minutes do not refer to any such requests, nor is Horizons aware of any other requests being made.
Compliance Rating: Not Assessed

Charges

36. Charges, set in accordance with section 36(1)c of the Resource Management Act 1991, and section 690 A of the Local Government Act 1974, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

[**Note**: Section 36(1)c of the Act provides that Council may from time to time fix charges payable by holders of resource consents. The procedure for setting administrative charges is governed by section 36(2) of the Act and is currently *carried out as part of the formulation of the Council's Annual Plan.]*

HDC has paid all fees to-date in accordance with this condition.
Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 6009: Comply – Full

4. GENERAL CONDITIONS APPLICABLE TO 6010

Consent is granted to the Horowhenua District Council to **discharge landfill leachate onto and into land** *at the Levin landfill, Hōkio Beach Road, Levin, legally described as Lot 3 DP* 40743 Blk II Waitohu Survey District, for a term expiring 35 years from the commencement of the consent subject to the following conditions:

1. Charges, set in accordance with section 36(1)c of the Resource Management Act 1991, and section 690 A of the Local Government Act 1974, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

   *[***Note:** Section 36(1)c of the Act provides that Council may from time to time fix charges payable by holders of resource consents. The procedure for setting administrative charges is governed by section 36(2) of the Act and is currently *carried out as part of the formulation of the Council's Annual Plan.]*

HDC has paid all fees to-date in accordance with this condition.
Compliance Rating: Not Applicable

General Conditions – Discharge leachate to ground

2. There shall be no overland flow discharge of leachate beyond the site boundary.

No signs of leachate breakouts were observed during the site visits and the Annual Report states no leachate breakouts were recorded during the 2019/2020 monitoring period.
Compliance Rating: Comply – Full

2A By the end of April 2021 the Permit Holder must complete an assessment of leachate remediation options (and a BPO) to:
   a. cease, or if cessation is not feasible, materially reduce the discharge of *leachate to the Tatana Drain and Hōkio Stream; or*
   b. if neither of the options in (a) are feasible then options to offset effects within *the Hōkio catchment and if that is not feasible* or possible options to *compensate effects within the Hōkio catchment or outside of it (either option* through an ecological package).

The Permit Holder must provide a draft of the assessment to the NLG representatives and Horizons Regional Council for comments. The Permit Holder shall decide on an option that is feasible to implement, applying the hierarchy above from the assessment. The Permit Holder must notify the Regulatory Manager of Horizons Regional Council which option it selects, and provide a copy of the final assessment. The selected leachate remediation option must be fully implemented by June 2023.

Please ensure an assessment of leachate remediation options is completed before the end of April 2021 and, a draft provided to Horizons and the NLG for comment. At the time of writing this report, Horizons note this assessment was provided on 29 April 2021. This is outside the scope of this report and will be assessed in the next annual compliance review.
Compliance Rating: Not Assessed

3. The Permit Holder shall commence the following monitoring programme:

Table A: Landfill Groundwater Monitoring Locations, Parameters, and Frequency – Deep Aquifer Wells

Location	Parameters and frequency
C2dd, E1d, E2d and any other future deep monitoring well unless installed for background monitoring purposes.	Quarterly comprehensive for 2 years. Subsequently, conditional Annual comprehensive Quarterly indicator.
G1d, Xd1 and any other future deep monitoring well installed for background monitoring purposes.	Quarterly comprehensive for 1 year Subsequently Annual comprehensive Quarterly indicator
All monitoring wells.	Annual pesticide / semi VOC

During this reporting period deep monitoring wells C2dd, E1d, E2d and G1d were sampled on: 8 and 9 January 2020; 2 and 6 April 2020; 1, 6 and 13 July 2020; and, 6 and 10 October 2020. Horizons note the consent is silent on timeframes within which new bores shall be installed however, Xd1 was installed in November 2020.

Indicator analysis list parameters were monitored in January (with the exception of Mercury and scBOD$_5$), July and October while comprehensive analysis parameters including pesticides / semi volatile organic compounds (sVOC) were monitored in April.

The new X series bore (Xd1) was not sampled during the monitoring period. Horizons note the consent is silent on timeframes within which new bores shall be installed however, Xd1 was installed in November 2020.

Previous compliance reports have confirmed the completion of the initial monitoring program therefore, this condition is fully compliant.
Compliance Rating: Comply – Full

Table B: Summary of Landfill Groundwater Monitoring Locations, Parameters, and Frequency – Shallow Aquifer Wells

Location	Parameters and frequency
C1, C2, C2ds, D4 B1, B2, B3s, E1s, E2s and any other shallow **Compliance** monitoring well installed in the future.	Six monthly comprehensive for 2 years Quarterly indicator Subsequently, conditional Annual comprehensive Quarterly indicator
D5, F1, F2, F3 and any other shallow monitoring well installed to monitor **leachate irrigation areas** in the future.	Six monthly comprehensive for 2 years Quarterly indicator Conditional Annual comprehensive Quarterly indicator
G1s and any other shallow **Background** monitoring well installed in the future.	Quarterly comprehensive for 1 year Subsequently, conditional Quarterly indicator
D1, D2, D3r, D6, Xs1, Xs2 and any other **Early Detection** wells installed in the future.	Quarterly comprehensive for 2 years Subsequently, conditional Annual comprehensive Quarterly indicator
All monitoring wells.	Annual pesticide/ semi VOC

During this reporting period shallow monitoring wells (compliance) C1, C2, C2ds, D4, B1, B2, B3s, E1s, E2s and G2s were sampled on: 8, 10, 13 and 14 January 2020; 2, 7 and 8 April 2020; 1, 13 and 14 July 2020; and, 1, 7 and 8 October 2020. Shallow monitoring wells (leachate irrigation areas) D5, F1, F2 and F3 were sampled on: 8 January 2020; 2 and 3 April 2020; 9 July 2020; and, 5 October 2020. Indicator analysis list parameters for C1, C2, C2ds, D4, B1, B2, B3s, E1s, E2s, G2s, D5, F1, F2 and F3 were monitored in January (with the exception of Mercury and scBOD$_5$), July and October while comprehensive analysis parameters including pesticides / semi volatile organic compounds (sVOC) were monitored in April.

Shallow monitoring well (background) G1s was sampled on: 8 January 2020; 2 April 2020; 1 July 2020; and, 1 October 2020. Indicator analysis list parameters for G1S was monitored in the January, July and October sampling rounds while comprehensive analysis list parameters were monitored in April.

Early detection wells D1, D2, D3r and D6 were sampled on: 9 January 2020; 1 and 7 April 2020 (with the exception of D1 due to insufficient water); 9 July 2020; and, 5 October 2020. Indicator analysis list parameters for D1, D2, D3r and D6 were monitored in January (with the exception of Mercury and scBOD$_5$), July and October while comprehensive analysis parameters including pesticides / semi volatile organic compounds (sVOC) were monitored in April.

The new X series bores (Xs1 and Xs2) were not sampled during the monitoring period. Horizons note the consent is silent on timeframes within which new bores shall be installed however, Xs1 and Xs2 were installed in November 2020.

Indicator parameters (as referred to in Table F) were monitored on every monitoring occasion (with the exception of Mercury and scBOD$_5$ during the January sampling round) and the comprehensive parameters (as referred to in Table E) were monitored in April. Pesticides / semi VOC's were also monitored during the April sampling round.

Previous compliance reports have confirmed the completion of the initial monitoring program (i.e. two years of quarterly comprehensive analysis) therefore, this condition is fully compliant.
Compliance Rating: Comply – Full

Groundwater levels are to be measured and recorded during each sampling procedure.

Ground water level data taken during sampling has been included in each quarterly report.
Compliance Rating: Comply – Full

Conditions: A reduction in sampling frequency at any groundwater monitoring point is conditional on:

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.

   Sampling frequency for the shallow monitoring wells installed to monitor proposed leachate irrigation areas as defined in Table B may begin on the conditional basis, however the frequency is to revert to the unconditional frequency if leachate irrigation begins and continues from that date as if the monitoring well had been newly installed.

Previous compliance reports have confirmed the completion of the initial monitoring program. HDC has not requested a reduction in the monitoring frequency.
Compliance Rating: Not Applicable

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:

E. This must be communicated to the regional council as soon as practicable;

F. A replacement well is to be constructed in a position agreed upon with the Environmental Protection Manager at Horizons Regional Council;

G. The replacement well should be installed in a position suitable to act as an early detection well and be classed as an early detection well; and

H. The replacement well should be constructed as a nested well (or two separate wells) with screens positioned in both shallow and deep aquifers.

Onsite operations have not eliminated any monitoring wells onsite during this compliance assessment period. The last well to be replaced was well D3r in 2009.
Compliance Rating: Not Applicable

Table C: Other Water Monitoring Locations, Frequencies and Parameters

Location	Parameters and frequency
HS1,	Monthly comprehensive for comparison purposes with HS1A. Monitoring to be discontinued after 2 years
HS1A, HS2, HS3	Monthly comprehensive for 2 years Subsequently, conditional Six monthly comprehensive Quarterly Indicator
TD1	Six monthly comprehensive Quarterly Indicator
Leachate Pond Outlet	Monthly comprehensive for 2 years Six monthly pesticide / semi VOC Subsequently, conditional Six monthly comprehensive Quarterly indicator Annual pesticide / semi VOC

During this reporting period Hōkio Stream monitoring locations HS1, HS2 and HS3 were sampled in January, April, May, June, July, August, September and, October 2020. HS1A is a new monitoring location and was not sampled in January but was sampled in April 2020 and thereafter monthly with HS1, HS2 and HS3. No sampling was undertaken in February and March as the revisions to the monitoring program following the Environment Court Order dated 19 December 2019 were still in the process of being implemented. Indicator analysis list (Table F) parameters for HS1, HS2 and HS3 were monitored during the January sampling round while comprehensive analysis list (Table E) parameters were sampled in all other sampling rounds.

The Leachate Pond Outlet was sampled in January, April, May, June, July, August, September and, October 2020. No sampling was undertaken in February and March as the revisions to the monitoring program following the Environment Court Order dated 19 December 2019 were still in the process of being implemented. Indicator analysis list parameters for the leachate pond outlet was monitored during the January sampling round while comprehensive analysis list parameters were sampled in all other sampling rounds. The results also indicate that monthly sampling of comprehensive analysis list parameters for the leachate pond outlet commenced from July 2020. Pesticides / semi volatile organic compounds (sVOC) were monitored during the April and October sampling rounds.

Tatana Property drain monitoring location TD1 (formerly SW3) was sampled on: 14 January 2020; 3 April 2020; 7 July 2020; and, 1 October 2020. Indicator analysis list parameters for TD1 were sampled in January (with the exception of Mercury and $scBOD_5$) and July while the comprehensive analysis list parameters were sampled in April and October.

As the consent requires monthly comprehensive analysis (for a given frequency) to be undertaken this is assessed as a low risk non-compliance given monthly comprehensive analysis did not commence immediately following the revisions to the monitoring program, per the Environment Court Order dated 19 December 2019. Please undertake comprehensive analysis for the required frequencies in order to ensure compliance with this condition.
Compliance Rating: Low Risk Non-Compliance

Conditions: *A reduction in sampling frequency for the Hōkio Stream monitoring locations* (HS1A, HS2 and HS3) after April 2021 is conditional on:

I. No significant increases in the concentrations between monitoring sites HS1A and HS3, for parameters exceeding the Trigger values contained in Table C1 at Site HS3;

J. To determine whether there is a significant increase in contaminant levels the consent holder shall engage a suitably qualified freshwater scientist to assess the 24 month water quality monitoring results obtained *for the Hōkio Stream against the* trigger values specified in Table C1, after 24 months of monthly data collection. Should any of the trigger values be exceeded at the downstream monitoring site (HS3 as per Fig. X) the consent holder shall propose a statistical analysis approach to the Regional Council for certification. The analysis shall be run, for the parameter(s) exceeding the relevant trigger value, on the last 24 consecutive samples to determine if there are any significant increases in concentrations between upstream and downstream. This analysis shall be provided to the Regional Council within 3 months following the completion of the 24 month monitoring period;

Table C1: Trigger Values

Parameter	Measure	Value
Total ammoniacal nitrogen	Maximum (g/m^3)	2.1
Total ammoniacal nitrogen	Average (g/m^3)	0.400
$ScBOD_5$	Monthly average (g/m^3)	2
Aluminium	Dissolved, median concentration (g/m^3)	0.055
Arsenic	Dissolved, median concentration (g/m^3)	0.024
Cadmium	Dissolved, median concentration (g/m^3)	0.0002
Chromium (Total)	Dissolved, median concentration (g/m^3)	
Copper	Dissolved, median concentration (g/m^3)	0.0014
Lead	Dissolved, median concentration (g/m^3)	0.0034
Nickel	Dissolved, median concentration (g/m^3)	0.011
Zinc	Dissolved, median concentration (g/m^3)	0.008
Mercury	Dissolved, median concentration (g/m^3)	0.0006

K. Following the initial 24 month monitoring period, there shall be no significant increases in concentrations between monitoring sites HS1A and HS3 for parameters exceeding the Trigger values contained in Table C1 at Site HS3. The consent holder shall use a statistical approach certified by the Regional Council to determine whether there has been a significant increase in concentrations, based on samples collected over the previous 36 month period.

L. *If the Hōkio 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.

HDC has not requested a reduction in the monitoring frequency.
Compliance Rating: Not Applicable

Conditions: A reduction in sampling frequency at the leachate pond outlet is conditional on:

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.

If existing analysis records indicate that the water quality at a monitoring location complies with the requirements permitting a shift to a conditional sampling schedule, this may be done immediately. If the site complies, sampling for these parameters can be instigated following the base schedule while sampling for the other parameters can be continued based on the conditional schedule.

HDC has not requested a reduction in the monitoring frequency.
Compliance Rating: Not Applicable

Locations: (Unless otherwise stated, locations are described on Figure 4, attached to and forming part of this consent, with some of the additional monitoring sites added in the 2015 review shown in Figure X attached to this consent).

Table D: Monitoring Point Locations

Monitoring group	Monitoring point	Location
Shallow groundwater	B1	
	B2	
	B3s	
	C1	
	C2	
	C2ds	
	D1	
	D2	
	D3r	
	D4	
	D5	Lined landfill area groundwater bore
	D6	Lined landfill area groundwater bore
	E1s	
	E2s	
	F1	Groundwater bore downflow from irrigation area
	F2	Groundwater bore downflow from irrigation area
	F3	Groundwater bore downflow from irrigation area
	G1s	South Eastern boundary of the site (proposed location)
	Xs1	*Adjacent to Hōkio Stream, opposite* the landfill access road
	Xs2	*Adjacent to Hōkio Stream, near the* HS2 monitoring site
Deep groundwater	C2dd	

	E1d E2d G1d Xd1	South Eastern boundary of the site (proposed location)
Stream	HS1A HS1 HS2 HS3	*Hōkio Stream* – upstream site up-gradient of landfill groundwater plume (Refer Fig X) *Hōkio Stream* – opposite landfill access road (refer Fig. X) *Hōkio Stream* – alongside landfill (Refer Fig. X) *Hōkio Stream at or about 50 metres* downstream of landfill property boundary(Refer Fig. X)
Tatana Drain	TD1	South-western corner of Tatana Drain
Soils	Refer Condition 5	In land disposal area
Leachate		Pond outlet

In addition to those monitoring points listed above, well G2s is also part of the monitoring program. The well is a shallow groundwater bore down flow of the old landfill and located adjacent to Hōkio Beach Road near the entrance to the landfill.

The consent is silent on timeframes within which new bores shall be installed however, HDC advised the new monitoring point locations Xs1, Xs2 and Xd1 were installed in November 2020. At the time of writing this report, Horizons note these monitoring points have been added to the monitoring schedule and were first sampled in March 2021.

Horizons also acknowledge that new groundwater bores take some time to install and that this was delayed by the Covid19 lockdown.
Compliance Rating: Comply – Full

Alternative Sampling Sites: Some of the sampling sites are located on land that is not owned by the consent holder. Sampling at these sites is subject to the land owner approval. If that approval is not given, then samples must be collected from the nearest suitable and accessible site, as agreed to with the Regulatory Manager at the Regional Council.

Parameters: The comprehensive and indicator parameter lists referenced in Tables A, B and C are presented in Tables E and F.

Table E: Comprehensive Analysis List

Type	Parameters
Characterising	pH, electrical conductivity (EC), alkalinity, total hardness, suspended solids
Oxygen demand	COD, $scBOD_5$
Nutrients*	NO_3-N, NH_4-N, DRP, SO_4
Metals*	Al, As, Cd, Cr, Cu, Fe, Mg, Mn, Ni, Pb, Zn, Hg
Other elements	B, Ca, Cl, K, 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.

Table F: Indicator Analysis List

Type	Parameters
Characterising	pH, EC
Oxygen demand	COD, $scBOD_5$
*Nutrients	NO_3-N, NH_4-N
*Metals	Al, Mn, Ni, Pb, Hg
Other elements	B, Cl

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

Schedule: The sampling regime defined in Tables A to C shall be undertaken based on the following schedule:

Q. The first samples for all parameters shall be taken in July 2010.

This condition has already been complied with.
Compliance Rating: Not Applicable

R. Quarterly monitoring referred to in Tables A and B shall be carried out in January, April, July and October.

The quarterly monitoring referred to in Tables A and B has been undertaken in the months as prescribed.
Compliance Rating: Comply – Full

S. Six monthly monitoring referred to in Tables A and B shall be carried out in April and October.

Six monthly monitoring referred to in Tables A and B has been undertaken in April and October as required.
Compliance Rating: Comply – Full

T. Annual monitoring referred to in Table A shall be carried out in April.

Annual monitoring in accordance with the comprehensive analysis list was undertaken in April as required.
Compliance Rating: Comply – Full

U. The Permit Holder shall invite NLG to nominate a representative who shall, at the *person's own cost, be permitted to observe the quarterly and six monthly* monitoring referred to in Table C.

HDC advised this was discussed at an NLG meeting on 1 December 2020 however, a nominee was not put forward at that stage.
Compliance Rating: Comply – Full

4. The Permit Holder shall monitor soils in the irrigated areas. The first soil samples from an irrigation area shall be taken in the first year that leachate is irrigated to land in that area and shall be taken prior to irrigation. Thereafter, samples shall be taken on the schedule provided in Table H.

Table H: Soil Monitoring Locations, Parameters, and Frequencies

Location	Parameters and frequency
All soil sampling locations.	Background prior to irrigation Six monthly metals and other elements for 2 years Annual pesticide / semi VOC Subsequently, conditional Annual metals and other elements

Parameters: The analysis parameters applied for soil monitoring are presented in Table I:

Table I: Irrigated Soil Analysis List

Type	Parameters
Metals	Al, As, Cd, Cr, Co, Hg, Ni, Pb, Zn
Other elements	Cl, B
Organics	Pesticides to screen concentrations Semi-volatile organic compounds

Schedule: The sampling regime defined in Table H shall be undertaken based on the following schedule:

A. Six monthly monitoring referred to in Table H shall be carried out in April and October.

B. Annual monitoring referred to in Table I shall be carried out in April.

The first samples required by the schedule in Table H shall be taken during April or October immediately following the start of irrigation, whichever comes first.

Soil sample sites shall be chosen in consultation with the Regional Council. Soil samples shall be obtained from two locations within each leachate irrigation area, with the sampling locations separated by at least 50 m. In addition, a soil sample shall be obtained from one location down gradient from each leachate irrigation area, with the sampling point selected at a low point between dunes. Each soil sample shall consist of a continuous soil core obtained from the surface to a depth of 0.2 m.

Leachate from the newer lined landfill was irrigated during the period 2004 to October 2008. From June 2009 leachate from the newer lined landfill was pumped off site to the Levin Wastewater Treatment Plant (WWTP) with some recirculation through Stage 1a. Since January 2012 all leachate from the newer lined landfill stages has been pumped off site to the Levin WWTP. This condition came into effect on 31 May 2010 following a review pursuant to Section 128 of the Resource Management Act 1991; this is subsequent to the last occasion leachate was irrigated to the irrigation area. On this basis soil sampling is not required.
Compliance Rating: Not Applicable

Conditions: A reduction in soil sampling frequency for the sites located within a leachate irrigation area, based on the mean of the analysis results for the two sites, is conditional on:

C. Completion of the initial two year monitoring program.

D. Good consistency of soil sample analysis results.

E. No continuous increase in contaminant concentrations in soils as determined from parameter trends for the majority of the metals tested over four consecutive sampling rounds.

F. If a leachate area being monitored on a conditional frequency becomes non-compliant with condition E, the monitoring frequency for that area should return to the base case intensive monitoring until conditions D and E are again being fulfilled.

G. Pesticides or semi-volatile organic compounds being below the screen detection limits in the leachate collected from the lined landfill during the previous two sampling rounds.

Leachate from the newer lined landfill areas has been piped off-site to the Levin WWTP since 2012.
Compliance Rating: Not Applicable

5. The results of monitoring under Conditions 3 and 4 of this Permit shall be reported to the Regional Council by 30 September each year for the duration of this Permit.

Monitoring results are reported on a quarterly basis. Leachate has not been irrigated since 2012 when it began to be piped offsite and as such monitoring in accordance with Condition 4 is not applicable.
Compliance Rating: Comply – Full

6. The Permit Holder shall ensure the above monitoring programme is undertaken by either the Regional Council, or, an independent organisation approved by the Environmental Protection Manager of the Regional Council.

The above monitoring programme is undertaken by Stantec, which is an environmental engineering consultancy, on behalf of HDC. MWH Global previously undertook this work and were approved by Horizons. In 2016 MWH Global was acquired by Stantec; accordingly Horizons approval still stands for Stantec to undertake the monitoring programme.
Compliance Rating: Comply – Full

7. The Permit Holder shall inform the Neighbourhood Liaison Group of the identity of the organisation carrying out the monitoring.

As demonstrated under Condition 35(d)(iv) of Resource Consent 6009 quarterly monitoring reports are sent out to members of the NLG. Section 1 of each report clearly states that HDC has commissioned Stantec to carry out the monitoring programme. Furthermore, Phil Landmark of Stantec is often present at NLG group meetings.
Compliance Rating: Comply – Full

8. The Permit Holder shall meet the costs of the monitoring.

All costs for monitoring are paid by HDC.
Compliance Rating: Comply – Full

9. The Permit Holder shall report the results of the monitoring to the Neighbourhood Liaison Group by 30 September each year for the duration of the Permit.

As discussed under Condition 7 of this consent, quarterly monitoring reports and the annual report are forwarded to members of the NLG via the Solid Waste Newsletter as shown under Condition 35(d)(iv) of Resource Consent 6009.
Compliance Rating: Comply – Full

10. All analyses on water quality samples shall be carried out by an IANZ accredited laboratory.

All water quality analysis is undertaken by Eurofins ELS Ltd which is accredited by International Accreditation New Zealand (IANZ).
Compliance Rating: Comply – Full

11. (a) Should any shallow aquifer groundwater parameters tested for under Condition 3 of this consent exceed the Australian and New Zealand Environment and Conservation Council Water Quality Guidelines (2000) for Livestock Watering, the Permit Holder shall report to the Regional Council as soon as practicable on the significance of the result and, where the change can be attributed to landfill leachate then Condition 11(c) applies.

Horizons engaged Pattle Delamore Partners Ltd (PDP) to assess the recent surface water and groundwater monitoring data. PDP responded via a Memorandum entitled "Review of Levin Landfill Annual Monitoring Report" dated 30 April 2021 (Memo), which is appended to this report.

The PDP Memo states *"concentrations of most water quality parameters are significantly* elevated in shallow bores located downgradient of the old, unlined landfill compared to upgradient concentrations. Specifically, ammonia concentrations are elevated up to 175 *mg/L. Furthermore, plots provided in the applicant's report indicate a long*-term rising trend (since 2006) in ammonia concentrations in bores C2 and B3 (not shown in the plots). Although there is no specified ANZECC Livestock Drinking Limit (LDW) for ammonia, these very high ammonia concentrations will have an effect on surface water downgradient. In addition, concentrations of nitrate nitrogen are significantly elevated in bore B2 and the most recent quarterly monitoring report indicates concentrations in bore B2 reached 133 mg/L in July 2020, which exceeded the ANZECC LDW limit of 90 mg/L and corresponds *to a requirement to trigger the actions specified in consent conditions 11(a) and 11(c)."*

Based on these findings, Horizons consider the significance of the exceedances described above have not been adequately reported by HDC which, subsequently results in a low risk non-compliance. The PDP Memo further indicates that the effects from the landfill on groundwater quality could be described as adverse and therefore, Horizons consider that Condition 11(c) also applies.
Compliance Rating: Low Risk Non-Compliance

(aa) Should any surface water parameters tested for under Condition 3 of this consent, including the Tatana Drain location, exceed the Australian and New Zealand Environment and Conservation Council Water Quality Guidelines (2000) for 95 per cent protection levels for Aquatic Ecosystems the Permit Holder shall report to the Regional Council as soon as practicable on the significance of the result. Where the change can be attributed to landfill leachate the Consent Holder shall consult with the Regional Council to determine if further investigation or remedial measures are required.

The Annual Monitoring Reports and the Quarterly Monitoring Reports do not specifically account for exceedances and the significance of some parameters, as referred to in the PDP Memo. These include recent exceedances in July and October 2020 of nitrate-nitrogen, ammoniacal-nitrogen and dissolved boron at TD1. With regard to the ammoniacal-nitrogen exceedances at TD1, the PDP Memo states that the concentrations of 43.2 mg/L and 57.8 mg/L, recorded in July and October 2020 respectively, are toxic for instream life.

As a result, Horizons assesses this as a low risk non-compliance for the failure to report on the significance of the results. Furthermore, Horizons note that the PDP Memo recommends that further investigation is undertaken as it concluded *"effects on the Tatana* Drain can be described as adverse. The data indicates that there are effects from the landfill *on water quality in Hōkio Stream, but these effects do not exceed the relevant ANZECC or* ANZG [Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZG 2018] *guideline thresholds."* On this basis, Horizons considers that further investigation is appropriate and shall include the following (as detailed in the PDP Memo):

- Wet weather monitoring, to determine if cumulative inputs change during wet weather events;
- Assessment of high groundwater level events against surface water quality data in Tatana Drain and Hōkio Stream to determine if inputs change at times of differing groundwater levels;
- Temporal analysis of data, as ammoniacal-nitrogen at this site appears to be increasing;
- Surface water mixing models to determine concentrations after mixing with Hōkio Stream over both short and longer term timeframes, as it is not considered that effects of ammonia toxicity have been accurately calculated; and,
- Monitoring site SW1 is reinstated to further understand the effects of leachate migration into this waterway under a range of groundwater level conditions.

To this end, Horizons recommend that HDC prepare a plan to undertake and/or implement the above recommendations. A draft of this plan shall be provided to Horizons for discussion **prior to 16 July 2021**.
Compliance Rating: Low Risk Non-Compliance

(b) In the event that the statistical analysis completed under Condition 3J shows a significant increase between upstream and downstream results in the *Hōkio Stream for any parameter exceeding the trigger exceeding the Trigger* values contained in Table C1 at Site HS3 (except for $scBOD_5$), an investigation into the risk of significant effects due to the parameter(s) exceeding the water quality targets or trigger values at the HS3 monitoring site shall be undertaken, This investigation shall be consistent with the ANZECC guidelines framework and should consider, but not be limited to, water chemistry aspects (such as pH, water hardness, dissolved versus total concentrations etc.), and biological aspects. The Permit Holder shall report to the Regional Council, within 3 months of the date the report under condition 3J was submitted to the Regional Council, on the significance of the result and, where the change can be attributed to landfill leachate then Condition 11(c) applies.

This condition requires 24 months of data in order to undertake the statistical analysis referred to under Condition 3J. The monitoring results indicate that monthly comprehensive sampling commenced in April 2020 therefore, Horizons recommend the statistical analysis is undertaken following completion of the April 2022 sampling round.
Compliance Rating: Not Assessed

(c) In the event that a significant effect associated with the landfill leachate is reported pursuant to Conditions 11(a), 11(b) or 11(e) then:
  (i) The Permit Holder must appoint an independent expert to promptly review the works implemented under condition 2A in light of the findings of the monitoring and identify whether they are working as designed. If they are not working as designed the report shall specify corrective works required and a timeframe to implement them.
  (ii) The Permit Holder shall promptly complete all recommended corrective works in accordance with the timeframes set out in the review.
  (iii) The Permit Holder shall provide a copy of the review to the Regional Council and NLG within 5 working days of receipt.

The PDP Memo recommends further investigations be undertaken as effects from the landfill on shallow groundwater quality could be described as adverse, in accordance with Conditions 11(a) and 11(e). This condition is intended to enable a review of the leachate remediation option as implemented under Condition 2A. However, the preferred leachate remediation option does not require full implementation until June 2023, as specified under Condition 2A. Therefore, this condition is currently not applicable.
Compliance Rating: Not Applicable

(d) The Permit Holder shall annually review the data derived from the groundwater monitoring program and evaluate contaminant mass load *projections for discharges from the landfill to the Hōkio Stream. The* contaminant mass load projections shall be based primarily, but not exclusively, on the monitoring da*ta obtained for the "B", "C" and "X" series* bores indicated in Table D of this discharge permit. The annual report required under Condition 5 shall include the following information:

(i) A summary of the methodology used to calculate the mass load projections.

(ii) The calculated mass loads transported in the groundwater and *comparable mass loads in the Hōkio Stream.*

(iii) An analysis of the implications of the mass load calculations with respect to ensuring discharges from the landfill would not result in a dec*line in the water quality in the Hōkio Stream under Condition 3.*

The PDP memo states "In general terms, the mass balance calculation methodology appears to be reasonable. However, there are a number of issues regarding the input data as well as the output *of the calculations".* The memo recommends some corrections are made to the calculations which include:

- "In Table 7-1 of the annual monitoring report, the effect of background groundwater concentrations is removed from the observed maximum and median concentrations of various parameters in the bores representing the leachate plume. However, it is unclear how this is applied. Furthermore, in some cases the resulting concentrations are negative (for example for nitrate and DRP). The negative concentrations are reportedly due to the landfill having no effect on the downgradient concentrations which seems implausible. Concentrations of nitrate in bore B2 are currently around 20 mg/L (although concentrations of up to 133 mg/L have occurred), but bore B2 is not included in the list of bores representing the leachate plume. This should be addressed in the report.
- Table 7-2 of the annual monitoring report indicates concentrations of nitrate in *Hōkio Stream of more than 21 mg/L, which again seems implausible and indicates* an error in the reporting."

In addition to this The PDP Memo suggests "the contaminant mass balance calculations indicate that effects from the landfill could cause effects on Hokio Stream that exceed the *guideline values."* Based on the findings of the PDP Memo, Horizons assess this as comply – at risk and recommend the corrections suggested above are applied to the next Annual Monitoring Report which is due by 30 September 2021.

Compliance Rating: Comply – At Risk

(e) Should the groundwater parameters tested for under Condition 3 of this consent, and subsequent evaluation and indicative assessment of contaminant mass loads under Condition 11(d) of this consent indicate that contaminants sourced from either the closed or active areas of the Levin Landfill are likely to result in a significant effect associated with the landfill leachate as identified through an investigation under Condition 3, then Condition 11(c) applies.

The PDP Memo indicates that shallow groundwater is influenced by the landfill (see the commentary to Condition 11(a) above) and to such an extent that groundwater quality could be described as adverse. The PDP Memo also states "the contaminant mass balance *calculations indicate that effects from the landfill could cause effects on Hōkio Stream that exceed the guideline values"* and, further *"the pattern of rising concentrations an*d potential for effects in Hokio Stream should be considered as early warning signs and preparations to manage those effects should be put in place.*"* Subsequently, Horizons considers that Condition 11(c) should apply as a precaution.
Compliance Rating: Comply – At Risk

12. Should any parameters tested for under Condition 3 of this consent from the deeper gravel aquifer (bores identified as C2dd, E1, E2, the proposed G1d and any other monitoring bore intersecting the deep gravel aquifer), exceed the requirements of *the Ministry of Health's Drinking Water Standards for New Zealand 2000, 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 landfill leachate, consult with the Regional Council to determine if further investigation or remedial measures are required.

The PDP report states *"water quality in the deeper bores appears to be within the New* Zealand Drinking Water Standards guidelines and maximum acceptable values with the exception of some exceedances of the guideline values for iron, although elevated iron concentrations are common in groundwater in this area and may not represent an effect from the landfill. The data therefore suggest that the discharge from the landfill complies *with Condition 12 of the discharge consent"*.
Compliance Rating: Comply – Full

13. Sampling of the groundwater wells within a 1.5 km radius down-flow or across-flow from the landfill property boundary is to be carried out by the Permit Holders representative upon receiving a written invitation from the bore owners. The frequency of sampling is to be decided through discussion between the bore owner and the Permit Holder. Initial analyses from individual bores are to be tested for the parameters in the Comprehensive Analysis List in Condition 3. Subsequent testing may be performed based on the Indicator Analysis List in Condition 3. Should analysis of water obtained from any groundwater wells used for human drinking water show concentrations of parameters which exceed the requirements of the *Ministry of Health's Drinking Water Standards for New Zealand 2000, or repeated* sampling from a specific bore indicates a decrease in water quality, the Permit

Holder shall report to the Regional Council and the bore owner as soon as practicable on the significance of the results. Where the exceedance or decreasing water quality can be attributed to landfill leachate, the Permit Holder shall consult with the Regional Council and the bore owner to determine if further investigation or remedial measures are required.

The Annual Report states *"there are a number of private bores within a 1.5km radius of the* site. Sampling of groundwater on a private property was last undertaken in March 2014. The *results were made available to the property owner and Horizons Regional Council."* Please ensure Horizons are notified if any such requests from bore owners accordingly.
Compliance Rating: Not Applicable

14. Any currently active and future lined landfill area shall be closed and remediated by:

The lined portions of the Levin Landfill are yet to reach their final slope dimensions therefore, some of the following sub-conditions are not applicable. Where appropriate data is provided, a compliance rating has been given. In addition to this, comments have been made based on information contained in the Annual and Quarterly Monitoring Reports and the LMP.

a) Compacting refuse to such an extent and consistent with CAE guidelines of 600-800 kg/m^3, to ensure post closure settlement is minimised as far as practicable; and

Refuse density survey data presented in the Annual Report show the density achieved was 650 kg/m^3. Refuse of this density reduces the use of airspace and is higher than the minimum guideline standard to prevent settlement.
Compliance Rating: Comply – Full

b) Grading to a final slope of less or equal to 1V:3H (1 in 3) on any face; and

Although final slopes are not yet in place, the LMP requires all temporary fill batters to be a ratio 1V:3H.
Compliance Rating: Not Applicable

c) Ensuring the landfill cap incorporates a layer at least 700 mm thick with a permeability of no greater than 1 x 10^{-7} m/s, or has a material and layer structure that reduces rainwater infiltration to the waste to an equivalent extent; and

Although final capping is yet to be applied on the new landfill cells, the LMP requires capping material to meet the standard set by this condition.
Compliance Rating: Not Applicable

d) Establishing and maintaining a grass or tussock vegetation cover on the *capped landfill, unless it can be demonstrated to the Regional Council's* satisfaction that a different vegetation cover can produce clear benefits through reducing infiltration to the covered waste. Any vegetation cover should be consistent with an ongoing capacity to monitor and maintain the ongoing integrity of the landfill cap.

In-situ refuse density shall be determined through annual calculation based on information derived from topographic surveys of the landfill and borrow areas, and from weighbridge records. The survey shall be carried out within one month of the anniversary of the previous survey.

As discussed final capping of the existing lined landfill is yet to occur. A final determination of compliance with this condition cannot be assessed until final capping is in place.
Compliance Rating: Not Applicable

Specific Conditions – discharge leachate to ground from existing landfill

15. The Permit Holder shall close and remediate the existing unlined landfill by April 2011 by:

Final capping of the old existing landfill was detailed in the 2010-11 Annual Report and has been previously assessed and complied under Compliance Report 42517 dated 19 May 2011. There are annual reporting requirements as per the sub-conditions below. Where appropriate, information provided in the Levin Landfill reporting data has been used to provide a compliance rating.

a) Grading to a final slope on the landfill faces and caps of between 1V:3H (1 in 3) and 1V:40H (1 in 40);

This has previously been complied with.
Compliance Rating: Not Assessed

b) Ensuring the final landfill surface is sloped to promote run-off toward the outside of the landfill footprint and prevent surface water ponding on the landfill cap;

It is noted in the Annual Report that the maximum settlement that occurred in the past year is 48 mm and this area exhibits ponding. This could cause water to seep into the landfill, rather than being shed off it and so is of concern. The previous compliance report dated 27 July 2020 stated *"the consent holder will* need to take note of where ponding is occurring and apply capping material during dry weather to ensure run-off, as required. *HDC shall ensure this is reported to Horizons when the work is complete."* HDC advised this work was proposed to be completed in late January 2021.

At the time of writing this report, Horizons note this work was completed in late January as reported to Horizons via email on 1 February 2021. Given that the work was not completed during the reporting period, Horizons assess this as a low risk non-compliance.
Compliance Rating: Low Risk Non-Compliance

c) Ensuring the landfill cap incorporates a layer at least 700 mm thick. All material added to the existing cap to bring the thickness up to 700 mm, or for future cap maintenance purposes, is to have a permeability of no greater than 1×10^{-7} m/s;

This has previously been complied. Please also note comments under Condition 15(b).
Compliance Rating: Not Assessed

d) Establishing and maintaining a grass or tussock vegetation cover on the capped landfill consistent with an ongoing ability to monitor and maintain the integrity of the landfill cap. The vegetation is to be managed to exclude tree species that can potentially develop root systems capable of disrupting the landfill cap and thereby enhancing rainwater infiltration;

During the site visit on 22 September 2020 it was noted the cover on the capped landfill consisted of grass cover free of tree species. The Annual Report also notes *"the old landfill area has good grass cover."*
Compliance Rating: Comply – Full

e) Monitoring the landfill cover on an annual basis to identify areas of differential settlement slope stability issues, erosion and changing vegetation patterns, including a topographic survey to ensure Conditions 15(a) to (d) continue to be met; and

Ten monitoring points to monitor settlement were established on top of the old landfill as part of the survey which was carried out in June 2014. The locations of the monitoring points are shown in Appendix I of the Annual Report. Also shown is the extent of settlement estimated by comparing the current year's topographical survey information with that done last year. The maximum settlement for the 2019-20 reporting period is 48mm. The Annual Report also notes observations made pursuant to this condition.
Compliance Rating: Comply – Full

f) The Permit Holder shall submit an annual report to the Regional Council by 30 September each year for the duration of this Permit documenting the condition of the unlined landfill and any maintenance carried out during the previous year. The annual report shall address but not be limited to those aspects listed in Conditions 15(a) to (e) above. The annual report shall include a plan of the unlined landfill specifically documenting the shape of the closed landfill and any changes during the previous year. [The annual report can be written in conjunction with the annual report required as part of Condition 14 for Consent Number 6009].

The area of the existing landfill to be remediated is defined as Area A on Figure 1 attached.

The Annual Report was received by Horizons on 30 September 2020. The Annual Report includes all information as required by this condition.
Compliance Rating: Comply – Full

16. Within one month following the remediation of the Levin landfill, the Permit Holder *shall report in writing to the Regional Council of the Permit Holder's compliance* with Conditions 14 and 15 of this permit.

Final remediation has not yet occurred therefore this condition cannot currently be assessed.
Compliance Rating: Not Applicable

Specific Conditions – Discharge leachate to ground from lined landfill

Environmental Effects

17. There shall be no disposal of leachate sludge from the pond onto irrigation areas. Leachate sludge shall be disposed of in accordance with Condition 26 of consent number 6009 and Condition 18 of consent number 7289.

18. The rate of application of leachate irrigated to land shall not exceed 200 kg Nitrogen/hectare per year.

19. There shall be no ponding or runoff of leachate on or beyond the irrigation areas.

20. Subject to Condition 19 of this permit, application of leachate on to soil shall not exceed 50 millimetres per day. Notwithstanding, the maximum rate of application shall not exceed 5 millimetres per hour.

21. There shall be no discharge of offensive or objectionable odour at or beyond the legal boundary of the Levin Landfill property as shown on Figure 1 resulting from leachate irrigation.

22. Should the quality of leachate being irrigated exceed the STV parameters set out in the Australian and New Zealand Environment and Conservation Council Water Quality Guidelines (2000) for metals in Irrigation Water the Permit Holder shall report to the Regional Council as soon as practicable on the significance of the result and in consultation with the Regional Council determine if further investigation or remedial measures are required.

Process Management

23. The daily volume of leachate irrigated to land shall be metered and recorded.

24. The Permit Holder shall make regular and at least weekly, inspections of the irrigation system, including pumps, pipes, irrigators and vegetation to ensure that the system is operating efficiently and that vegetation is in good health.

Conditions 17 to 24 (inclusive): all leachate from the Levin Landfill is piped directly to the Levin WWTP. Further, there is no irrigation of leachate or leachate sludge to land at the Levin Landfill.
Compliance Rating: Not Applicable

25. The Permit Holder shall have carried out the works described in Condition 14(a) to (d) of this permit to rehabilitate:
    a. Any lined landfill area within four months following the closure of that lined landfill area, if the landfill area is closed before 35 years from the granting of this consent.
    b. Any lined landfill area before 35 years from the granting of this consent.

    [Note*: "lined landfill area" is defined as a distinct "cell" or stage of the landfill.]*

Stage 1a, although not closed, has interim capping in place and is in accordance with Conditions 14(a) to (d).
Compliance Rating: Comply – Full

Monitoring and Reporting

26. A plan of the leachate irrigation system shall be prepared to the satisfaction of the *Regional Council's Environmental Protection Manager nine months prior to* placement of refuse on the lined landfill. The plan shall include:
    a. A map showing areas to be irrigated;
    b. Design of the recirculation, treatment and irrigation systems;
    c. Contingency measures in case of failures in the irrigation system;
    d. Criteria for installing aerators in the leachate pond;
    e. Assessment of options for recirculating leachate over the lined landfill;
    f. Assessment of groundwater profile beneath the irrigation area and effects leachate irrigation will have on groundwater;

g. Groundwater and soil monitoring programme, including a map showing sampling locations; and
h. Any other relevant matter.

This plan was previously completed by MWH in 2010 and titled Levin Landfill Leachate Management Plan. As leachate is no longer irrigated over the landfill, this is now redundant.
Compliance Rating: Not Applicable

27. The Permit Holder shall keep a log of:
    a. The dates and times of leachate irrigation;
    b. The total volume of leachate irrigated daily;
    c. The volumes of leachate irrigated to specific areas;
    d. Weather and ground conditions during irrigation;
    e. Observations made during the weekly inspections of the pump, irrigation system and irrigation areas; and
    f. Repairs and maintenance carried out on the irrigation system.

    Copies of this log shall be forwarded to the Regional Council's Environmental Protection Manager on 28 February and 31 August of each year that the irrigation system is operated.

There is no irrigation on the Levin Landfill site. All Leachate is piped to the Levin WWTP.
Compliance Rating: Not Applicable

28. The Permit Holder shall inspect the landfill for leachate break out, settlement and other adverse environmental effects at least once per month until such time as discharge of refuse to the landfill ceases. Thereafter, the frequency of inspection shall be determined in consultation with the Regional Council.

The active landfill is inspected weekly and observations recorded on the Weekly Site Walkover Sheet. The 2019-20 Annual Report states that *"no leachate breakouts were* recorded during the 2019/2020 reporting period. There were no other signs of ground settlement and other adverse environmental effects detected during the 2019-2020 *reporting period."* No signs of leachate breakout settlement or other adverse effects were observed during the two site visits by Horizons on 17 March 2020 and 22 September 2020, respectively.
Compliance Rating: Comply – Full

29. The Permit Holder shall record the date, time, observations and any remedial action as a result of Condition 28. The record shall be made available to the Regional Council on request.

No leachate breakout, settlement or other adverse effects were observed during the reporting period.
Compliance Rating: Comply – Full

Review

30. The Regional Council may initiate a publicly notified review of Conditions 3, 4, 11 (a) (e), 12, 13, 14, 24, 27, 28 and 29 of this Permit during the month of October in 2024, 2029 and 2034. The reviews shall be for the purpose of:
    a. Assessing the adequacy of monitoring outlined in Conditions 3 and 4 of this consent; and/or
    b. Assessing the effectiveness of Conditions 11(a) – (e), 12, 13, 14, 24, 27, 28 and 29 of this consent,

    in avoiding, remedying or mitigating adverse effects on the environment surrounding the Levin Landfill.

    The review of conditions shall allow for the:
    c. Modification of monitoring outlined in Conditions 3 and 4 of this consent;
    d. Deletion or changes to Conditions 11(a) – (e), 12, 13, 14, 24, 27, 28 and 29 of this consent;
    e. Addition of new conditions as necessary ,

    to avoid, remedy or mitigate adverse effects on the environment surrounding the Levin Landfill.

This is discussed under Condition 31 of Resource Consent 6009.
Compliance Rating: Not Applicable

31. The Regional Council may initiate a publicly notified review of Conditions 11 (a) – (e) of this Permit at any time outside those reviews required by Condition 30. The review shall be carried out pursuant to section 128 (1)(a)(i) of the Resource Management Act 1991 and shall be for the specific purpose of:
    a. Assessing the need and appropriateness of implementing a mitigation or remediation plan as the best practicable option to remove or reduce any adverse effect on t*he water quality of the Hōkio Stream.*

    The review of conditions shall allow for the:
    b. Deletion or changes to Conditions 11(a) – (e) of this consent;
    c. Addition of new conditions as necessary,

    to avoid, remedy or mitigate adverse effects on the environment surrounding the Levin Landfill.

The review of conditions shall have regard to:

d. The nature of the discharge and the receiving environment; and
e. The financial implications for the applicant of including that condition; and
f. Other alternatives, including a new condition requiring the observance of minimum standards of quality of the receiving environment, having regard to the need to be satisfied that including that condition is the most efficient and effective means of removing or reducing that adverse effect.

Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 6010: Low Risk Non-Compliance

5. GENERAL CONDITIONS APPLICABLE TO 6011

Consent is granted to the Horowhenua District Council to **discharge landfill gas, odour and dust to air** *at the Levin landfill, Hōkio Road, Levin, legally described as Lot 3 DP 40743* Blk II Waitohu Survey District, for a term expiring 35 years from the commencement of the consent subject to the following conditions:

1. Charges, set in accordance with section 36(1)c of the Resource Management Act 1991, and section 690 A of the Local Government Act 1974, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

   [**Note**: Section 36(1)c of the Act provides that Council may from time to time fix charges payable by holders of resource consents. The procedures for setting administrative charges are governed by section 36(2) of the Act and is currently *carried out as part of the formulation of the Council's Annual Plan.]*

There are no outstanding charges related to this consent.
Compliance Rating: Not Applicable

Environmental Effects

2. The Permit Holder will ensure dust is controlled on access roads and on the landfill, if necessary, by watering or other methods.

There have been no complaints to Horizons related to dust from the site. The site visits have confirmed that access up to the Levin Landfill site office is sealed and the main haul roads are metaled.
Compliance Rating: Comply – Full

3. There shall be no objectionable or offensive odour or dust beyond the boundary of the site.

   Advice Note: Odour investigations for the purpose of determining compliance with this condition shall be carried out in accordance with good practice measures outlined in the Ministry for the Environment Good Practice Guideline for Assessment and Management of Odour (MfE, 2016)

The previous assessment period recorded all odour complaints received and actions undertaken up to 18 December 2019, which was the day prior to the new conditions being issued and taking effect.

This report assesses all odour complaints received from 19 December 2019 to 31 December 2020. During this reporting period Horizons received eleven complaints in relation to odour from the Levin Landfill. A breakdown of these incidents is summarised in Table 1 below.

Table 1: Complaints received – 19 December 2019 to 31 December 2020

Incident #	Date	Communication Method	Odour Assessment	Comments
25629	5/03/2020	Hotline	Yes	No odour detected.
25633	6/03/2020	Hotline	Yes	No odour detected.
25655	11/03/2020	Email	No	Emailed at 1130pm - called complainant following morning and odour gone.
25656	12/03/2020	Email	No	Emailed at 0100am - called complainant following morning and odour gone.
25668	15/03/2020	Hotline	No	Complainant advised the odour has since gone.
25679	16/03/2020	Hotline	No	Unable to attend - officer attending another incident at time. Called back later - no odour.
25683	17/03/2020	Hotline	Yes	Odour detected - difficult to determine source. However, odour determined not to be objectionable at the time of the assessment.
25736	31/03/2020	Hotline	No	Unable to attend – Covid19 lockdown restrictions.
25767	6/04/2020	Hotline	No	Unable to attend – Covid19 lockdown restrictions.
26172	3/08/2020	Hotline	Yes	No odour detected.
26673	18/12/2020	Hotline	No	Unable to attend - HDC informed.

Of the eleven complaints received:

- Four complaints were followed up with a site assessment. Odour was detected during one of these assessments and this was determined not objectionable at that time;
- Two complaints were received by email after the event occurred meaning they could not be followed up at the time of the incident;
- A further two were received during the Covid19 lockdown during which protocols restricted Council officers' ability to attend incidents;
- Two complaints were unable to be attended due to the availability of the on-call duty officer at the time; and,
- The remaining complaint was not attended as the complainant advised on the phone the odour had since gone.

One of the odour assessments undertaken during the reporting period resulted in an odour being detected. Notes from the inspecting officer indicate that the odour was reported after 2130 hrs and the odour assessment undertaken at 2230 hrs approx. This made it difficult to determine that actual source of the odour. Despite this, the odour itself was not determined to be objectionable at the time of the assessment.
Compliance Rating: Comply – Full

4. If an appropriately experienced officer of the Manawatu-Wanganui Regional Council or a suitably qualified independent expert considers that an objectionable odour beyond the boundary has occurred, having regard to:
   (i) a consideration of the FIDOL factors; and/or
   (ii) receipt of complaints from neighbours or the public having considered (i); and/or
   (iii) relevant written advice or a report from an Environmental Health Officer of a territorial authority, then

   And the permit holder receives a request from the Manawatu-Wanganui Regional Council to provide them with a written report, then the report shall specify;
   (a) the activities that were occurring on the site at the time;
   (b) the cause or likely cause of the event and any factors that influenced its severity;
   (c) the nature and timing of any measures implemented by the permit holder to avoid, remedy or mitigate any adverse effects; and
   (d) the steps to be taken in future to prevent re-occurrences of similar events should this be necessary.

   The permit holder shall provide its report for items (a), (b) and (c) within five days and for item (d) within 20 days of request. When notification of an alleged objectionable odour is delayed such that investigation by the permit holder is compromised, the report should as far as practicable include the information required by (a) – (d).

Further to Condition 3 above, none of the complaints received during the reporting period resulted in objectionable odour being verified. Furthermore, Horizons have not received a statement from a suitably qualified independent expert that they consider an objectionable odour beyond the boundary has occurred.
Compliance Rating: Not Assessed

5. The Permit Holder will also ensure that:
   a. 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 G of the Annual Report presents these results which show O_2 levels consistent with naturally occurring atmospheric concentrations whilst, CO_2 and CH_4 were detected at low levels and, H_2S was not detected.
Compliance Rating: Comply – Full

b. Any building constructed on the landfill site is adequately ventilated.

The only buildings on the Levin Landfill site are the main office and storage shed area. This building has roller doors and windows and doors throughout which can be opened to ventilate the building.
Compliance Rating: Comply – Full

c. The Permit Holder must place daily cover over the entire operational fill area to a depth of at least 150mm by the end of each operating day. Daily cover material may comprise a mixture of sand, soil or mulched woody material or alternative cover options specified in the WasteMINZ Technical guidelines for the Disposal to Land (WasteMINZ, August 2018).

The tip head itself was not inspected during the 17 March 2020 or 22 September 2020 site visits due to heavy machinery movements. The LMP states primary cover of waste shall be provided daily over the entire operational fill area to a depth of at least 150mm by the end of each operating day. Weekly walkover inspection records indicate that the daily cover typically comprises a mixture of sand, clay and mulch. It is recommended that observations of the above are undertaken regularly to demonstrate compliance.
Compliance Rating: Not Assessed

d. The Permit Holder must ensure that intermediate cover is placed as soon as practicable over daily cover for any area that will not receive additional waste or final cover for more than three months. The Permit Holder must apply intermediate cover no later than two weeks after the last application of daily cover. The Permit Holder will strive, at all times, to minimise the active areas of the landfill for the purpose of reducing odour generation.

The depth of intermediate cover, including daily cover, over the waste shall be a minimum of 300mm and must comprise of uncontaminated soil, and/or a mixture of sand and mulched woody material.

The Permit Holder shall apply a temporary cap on top of the intermediate cover within three months of an area last receiving fill. The temporary cap shall comprise of a layer of compacted cohesive soil with a thickness of at least 200 mm for a combined thickness of 500 mm including the daily and intermediate cover. Alternatively, the temporary cap could comprise of a compacted layer of clay with a thickness of at least 50 mm that achieves the methane surface concentration requirements of condition 4f.

Advice Note: This condition is additional to Condition 14c of Permit 6010, which addresses the final landfill cap (only). Some remediation of the temporary cap may be required to meet the requirements of Condition 14c.

The LMP states intermediate cover is to be placed in accordance with the above. It is recommended that observations of the above are undertaken regularly to demonstrate compliance.
Compliance Rating: Not Assessed

e. The Permit Holder must carry out monthly methane surface monitoring for all areas of the landfill with a temporary or permanent cap and the bio-filter bed. The monitoring of surface emissions for methane shall be undertaken utilizing emission testing methods that have been given prior written certification as to their appropriateness by the Manawatu-Wanganui Regional Council's Regulatory Manager. The monitoring of surface emissions shall not be undertaken during or immediately after heavy rainfall or during strong wind speed conditions, and the meteorological conditions at the time of the monitoring shall be provided in the monitoring report.

Advice Note: Favourable meteorological conditions for methane surface monitoring include those where weather and ground conditions are dry with less than 0.5 mm of rain having fallen for at least two days, and instantaneous wind speed should be less than 25 km per hour (ideally 5 to 10 km per hour)

This monitoring was not undertaken during the reporting period. HDC advised that this monitoring was held off until a remedial plan (as required by Condition 5 (f), below) was established. HDC advised that there were health and safety concerns to work through as well as problems resourcing the clay material used to remediate the cap. Notwithstanding the comments above, the failure to undertake monitoring has resulted in a significant non-compliance and this sampling must be implemented immediately.
Compliance Rating: Significant Non-Compliance

f. Surface concentrations of methane, as determined by monitoring carried out by condition 4(e) shall not exceed the following levels:
    i. 100 parts per million (ppm) for permanently capped areas:
    ii. 200 ppm for temporary capped areas: and
    iii. 5,000 ppm for onsite buildings and structures.

An exceedance of the above levels requires remedial action to be undertaken within 24 hours and retesting within 24 hours of remediation being completed. If the second round of testing results in a continued exceedance at the same location then an action plan shall be developed and implemented to reduce methane concentrations below the specified levels. The Permit Holder shall provide details of the action plan to the Manawatu-Wanganui Regional Council within 48 hours of the retest.

Further to Condition 5(e) above, this monitoring has not yet commenced therefore, compliance against this condition cannot be assessed. HDC are developing the remedial plan and have noted that there are health and safety concerns to work through as well as problems resourcing the clay material used to remediate the cap.
Compliance Rating: Not Assessed

g. The Permit Holder shall include records of surface emission monitoring for methane must be included in the Annual Report required by Condition 39 of Discharge Permit 6009 and must also be provided to Manawatu-Wanganui Regional Council on request.

Further to Condition 4(e), this monitoring has not yet commenced.
Compliance Rating: Significant Non-Compliance

h. Within six months of the commencement date of the decision of the 2015 review of conditions, the leachate collection chamber must be vented to a bio-filter. The bio-filter must be designed by a suitably qualified and experienced person.

The commencement date of the 2015 review is the date of the Environment Court Order, that being 19 December 2019. HDC have advised that the bio-filter was commissioned sometime between late 2016 and early 2017. Horizons note that HDC intend to connect the leachate collection chamber to the landfill gas network and decommission the biofilter as it would then be redundant.
Compliance Rating: Comply – Full

i. The Permit Holder must appoint an appropriately qualified person to undertake a comprehensive assessment of the bio-filter performance on an annual basis. The assessment shall include, but not be limited to, an evaluation of the media size distribution and composition and effectiveness in removing contaminants, and a review of any measurements or records relating to the parameters at (j) below.

Horizons have no records of this assessment having been completed for the reporting period nor knowledge that somebody has been appointed. HDC have advised they are proposing to vary this condition as they have plans to connect the leachate sump to the landfill gas extraction system.
Compliance Rating: Moderate Non-Compliance

j. The Permit Holder shall maintain the bio-filter, in good working order, and shall measure and record the following parameters:
   - Daily visual inspection of the state of the bio-filter bed, particularly for signs of any short-circuiting, clogging of the bed, compaction and weed growth.
   - Daily inspection of the inlet gas fan and ductwork and any maintenance;
   - Continuous display of differential pressure for the bio-filter fan discharge;
   - Weekly recording of pressure across the bio-filter bed;
   - Weekly monitoring and recording of the bio-filter media moisture content
   - Monthly monitoring and recording of the pH of the bio-filter media;
   - Quarterly raking and loosening of the bio-filter media, or as otherwise required, to reduce the potential for short-circuiting, clogging of the bed, compaction and weed growth.

The Annual Report states that continuous display of differential pressure, weekly recording of the moisture content and weekly recording of the pressure across the bed is done through HDC's SCADA system. However, the daily inspections, monthly monitoring of pH and the quarterly raking and loosening of the bio-filter media were not undertaken. Please provide evidence of the monthly monitoring and quarterly raking **by 16 July 2021** to demonstrate compliance with this condition.
Compliance Rating: Moderate Non-Compliance

k. The Permit Holder must ensure that the bio-filter and bed complies with the following limits at all times
   - Pressure drop across the bio-filter air distribution system shall be less than 150mm water gauge;
   - Bio-filter media moisture content shall be between 40-60% moisture content;
   - The air flow rate shall not exceed 35 m^3/hr @25°C, 1 per cubic metres of bio-filter media;
   - The pH of the filter material shall be maintained at or above pH 4 in the lower 1/3rd layer of the bed and at or above pH 5 in the upper 2/3rds layer of the bed.
   - An even distribution of gas flow through the filter bed; and
   - There shall be no short circuits of untreated air through and filter bed.

Please provide a summary of these sampling results **by 16 July 2021** to demonstrate compliance with this condition.
Compliance Rating: Not Assessed

l. As soon as practicable and no later than 12 months of the commencement date of the 2015 review of conditions, the Permit Holder shall install a landfill gas collection system and flare on the site. The gas collection and flare shall be maintained and used at all times.

Advice Note: HDC holds Discharge Permit 106798 for discharges from the flare.

A candlestick flare was installed and trialled in 2014. This was upgraded to a new GF500 landfill gas flare (manufactured and installed by Windsor Engineering) in 2017. The flare is maintained and used at all times with the exception of outages as recorded in the log provided with the Levin Landfill Gas Flare Annual Report.
Compliance Rating: Comply – Full

m. Within 2 months of the commencement date of the 2015 review of conditions, the Permit Holder shall prepare an Odour Management Plan (OMP) and provide it to the Regional Council's Regulatory Manager for technical certification. The OMP must include;
   i. Material specifications and procedures for the application of daily and intermediate cover and temporary and final capping;
   ii. Procedures for the documentation and handling of special and/or malodorous wastes (eg sewage sludge, animal carcasses);
   iii. Methodology for monthly field odour monitoring;
   iv. Methodology for monthly surface monitoring for methane;
   v. Methodology for biofilter monitoring;
   vi. Odour control practices relating to the leachate pond;
   vii. Odour control practices for the working face of the landfill;
   viii. Locations of odour control/treatment equipment (e.g. biofilter and flare);
   ix. The odour complaints investigation and recording procedure;
   x. The phasing of the Landfill construction and operation (filling), including the design and collection efficiency of the existing and proposed gas collection system (GCS). This shall also include a description of the thickness and type of cover and capping material used at different phases of the landfill development;
   xi. The operational procedures regarding the use of the bio-filter and the flare and GCS, including maintenance and breakdown procedures and methods to be followed to prevent a significant discharge of odour;
   xii. The resource consent conditions relevant to discharges to air at the landfill;
   xiii. Staff training requirements to ensure compliance with the resource consent conditions;
   xiv. Timing of audits and inspections and reporting to Council.

The commencement date of the 2015 review is the date of the Environment Court Order, that being 19 December 2019. The OMP was prepared by Stantec (on behalf of HDC) and submitted to Horizons on 3 February 2020; therefore, within the 2 month timeframe. This plan has been reviewed by independent experts, on behalf of Horizons, and the recommendations have been provided to HDC and Stantec for consideration and finalisation of the OMP.
Compliance Rating: Comply – Full

n. The Permit Holder must consult the NLG during the development of the Odour Management Plan and at any time the OMP is reviewed. The views of the NLG must be incorporated where appropriate and practicable. Where the NLG comments and views are not incorporated, the outstanding issues, and reasons why they have not been incorporated, must be provided to Manawatu-Wanganui Regional Council's Regulatory Manager at the same time the Odour Management Plan is provided.

A draft OMP was provided in February 2020 for certification and we understand that the NLG were not consulted during the preparation of this draft. Notwithstanding, HDC have stated that the OMP will be discussed at the next NLG meeting. Horizons have advised HDC the OMP will not be certified until the NLG have been consulted.
Compliance Rating: Moderate Non-Compliance

o. Subject to the conditions of consent, the Permit Holder shall carry out its operations in general accordance with the OMP;

Due to the failure to undertake monitoring in accordance with Conditions 4(e), (f), (g), (i), (j) and (k), HDC has not complied with this condition. However, HDC are operating the landfill in accordance with the draft OMP as submitted to Horizons on 3 February 2020.
Compliance Rating: Moderate Non-Compliance

p. The Permit Consent Holder shall collect meteorological data from an on-site weather station. The data recorded shall consist of wind direction, wind speed, air temperature, barometric pressure, relative humidity and rainfall. The meteorological monitoring shall be:
   i. Collected in general accordance with the Good Practice Guide for Air Quality Monitoring and Data Management, Ministry for the Environment, 2009, or subsequent updates;
   ii. Continuous for the duration of the consent comprising, 1 min data, collected and averaged to 10-min and 1-hour time periods;
   iii. At a point that is representative of local wind conditions across the site;
   iv. The wind speed and direction instrumentation shall be able to operate reliably down to a maximum wind speed threshold of 0.5 m/s.

The Annual Report indicates that the above meteorological data has been collected at 15 minute intervals and averaged to one-hour time periods. Please ensure the data is recorded in accordance with the requirements above.
Compliance Rating: Low Risk Non-Compliance

q. The Permit Holder shall provide the Manawatu-Wanganui Regional Council with information collected from the weather station referred to in condition 5p. The data shall be in a suitable data file format that allows the Manawatu-Wanganui Regional Council to upload it on a data management system. The data shall be provided on a monthly basis, and as soon as possible upon request.

The data referred to in Condition 5 (p) was provided following a request (during the preparation of this report) but there is no record that it was provided monthly. Please ensure the data is provided accordingly.
Compliance Rating: Low Risk Non-Compliance

6. There shall be no deliberate burning of waste or other material at the landfill. If fires occur at the landfill they shall be extinguished as quickly as possible.

There have been no verified reports or complaints made to Horizons relating to fires at the Levin Landfill. Section 4.8 of the LMP states the lighting of fires is not permitted on site.
Compliance Rating: Comply – Full

7. The Permit Holder shall take all practicable steps to avoid, remedy or mitigate significant adverse effects of the discharge of landfill gases to air.

The following improvements, as noted in the Annual Report, have been made in relation to the mitigation of landfill gas onsite:

- Further bunding and capping was provided at the back (eastern side) and the southern side of Stage 2.
- The borrow area was extended further in a westerly direction to provide additional sand for cover purposes.
- Additional vertical gas wells were installed on top of the landfill (Stages 2 and 3).

However, HDC has failed to undertake a number of monitoring requirements in accordance with the OMP, as noted under Condition 5 above. Therefore, we consider HDC has failed to appropriately avoid significant adverse effects.
Compliance Rating: Moderate Risk Non-Compliance

Monitoring and Reporting

8. The Permit Holder shall keep a record of any complaints received. The complaints record shall include the following, where possible:
    a. Names and addresses of complainant;
    b. Nature of complaint;
    c. Date and time of the complaint and alleged event;
    d. Weather conditions at the time of the event; and
    e. The activities that were occurring on the site at the time.

In response to a complaint and upon a request by the Regional Council, the Permit Holder shall keep a record of the following information in its complaint record:

f. The cause or likely cause of the event and any factors that influenced its severity;
g. Any action taken in response to the complaint including the nature and timing of any measures implemented by the Permit Holder to avoid, remedy or mitigate any adverse effects; and
h. The steps to be taken in future to prevent re-occurrences of similar events should this be necessary.

Complaint records shall be made available within 5 days of a request by the Regional Council.

The complaint register was provided following a request (during the preparation of this report). The register is relatively detailed however it does not appear to include the complainant details (a), the nature i.e. odour, dust or other (b), the date and time of the incident itself (c) nor what activities were occurring onsite at that time (e). HDC are to ensure that all information as specified is included in the register.
Compliance Rating: Low Risk Non-Compliance

8A The Permit Holder shall nominate a liaison person to manage any air quality complaint received. The name and contact details, which will include a landline telephone number, a cell phone number, and email address of the liaison person, shall be provided to the Manawatu-Wanganui Regional Councils Regulatory Manager. The Permit Holder shall ensure a liaison person is available to respond to odour or dust complaints in a reasonable manner as per condition 8B below.

The contact details of the liaison person has been provided in accordance with the above.
Compliance Rating: Comply – Full

8B The Permit Holder shall ensure any complaint received from a member of the general public regarding odour or dust originating from the landfill site is investigated as soon as practicable and within 24 hours of the complaint being received, or at a time mutually agreeable with the party making the complaint.

HDC aim to investigate all complaints received within the timeframes as specified above. Please provide evidence with the complaints log to show complaints are responded to within 24 hours of receipt.
Compliance Rating: Not Assessed

8C The Permit Holder shall notify a Manawatu-Wanganui Regional Council Consents Monitoring Officer and the Mid-Central District Health Board's Medical Officer of Health as soon as practicable after becoming aware of any offensive or objectionable odour emanating beyond the boundaries of the landfill site. An explanation as to the cause of the incident, details of any

remedial and follow-up actions taken and the wind speed and wind direction measured at the landfill at the time of the incident shall also be provided to the Regional Council Consents Monitoring Officer.

None of the complaints received by HDC during the reporting period resulted in an offensive or objectionable odour being verified beyond the boundary.
Compliance Rating: Not Assessed

8D The Permit Holder must undertake monthly field investigations of ambient odour at locations beyond the site boundary that are downwind of the landfill and located between the landfill and residential houses, until such time as discharges of refuse to the landfill ceases. Thereafter the frequency of investigations shall be determined in consultation with the Manawatu-Wanganui Regional Council. The monitoring shall be undertaken in accordance with good practice as specified in the Ministry for the Environment Good Practice Guide for Assessing and Managing Odour (MfE, 2016).

The Annual Report and the complaints register indicate that from March 2020 these assessments were undertaken monthly at the site boundary. Please ensure these are undertaken beyond the site boundary accordingly.
Compliance Rating: Low Risk Non-Compliance

8E The Permit Holder must carry out a weekly walkover site inspection of all the landfill surfaces, including the area around the bio-filter and leachate pond. The purpose of the walkover site inspection is to check for odour, cracks in the landfill surface and integrity of gas collection or leachate pipework.

Weekly walkover inspections are undertaken as required and includes those items listed above, with the exception of checking the integrity of the gas collection and leachate pipework. Please update the weekly walkover sheet to include these items.
Compliance Rating: Low Risk Non-Compliance

8F The Permit Holder shall maintain a log of all other inspections, investigations and actions taken in accordance with all monitoring and odour inspection conditions of this consent. The inspection and investigation log shall be made available to the Manawatu-Wanganui Regional Council on request and submitted in a summary form in the Annual Report.

The Annual Report includes a summary of some of the inspection, investigation and/or monitoring conditions however; a summary of complaints is not provided. Please ensure this is included in future reports.
Compliance Rating: Low Risk Non-Compliance

9. The Regional Council may initiate a publicly notified review of Conditions 4 and 7 of this permit during the month of October in 2024, 2029 and 2034. The reviews shall be for the purpose of:
    a. Assessing the effectiveness of Conditions 4 and 7 of this consent in avoiding, remedying or mitigating adverse effects of discharges to air from the Levin Landfill.
    b. The review of conditions shall allow for changes and amendments to Conditions 4 and 7 of this consent to avoid, remedy or mitigate adverse effects of discharges to air from the Levin Landfill.

This is discussed under Condition 31 of Resource Consent 6009.
Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 6011: Significant Non-Compliance

6. GENERAL CONDITIONS APPLICABLE TO 6012

Consent is granted to the Horowhenua District Council to divert stormwater from around *the Levin Landfill, Hōkio Road, Levin, Legally described as Lot 3 DP 40743 Blk II Waitohu* Survey District, for a term expiring 35 years from the commencement of the consent subject to the following conditions:

2. Charges, set in accordance with Section 36(1)c of the Resource Management Act 1991, and Section 690A of the Local Government Act 1974, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under Section 35 (duty to gather information, monitor, and keep records) of the Act.

   [Note: Section 36(1)c of the Act provides that Council may from time to time fix charges payable by holders of resource consents. The procedure for setting administrative charges is governed by Section 36(2) of the Act and is currently *carried out as part of the formulation of the Council's Annual P*lan.]

There are no outstanding charges related to this consent.
Compliance Rating: Not Applicable

3. Stormwater run-off contaminated by leachate to an extent that it may cause adverse environmental effects shall be regarded as leachate.

The operational fill area was not inspected during the Horizons site visits due to heavy machinery movements. The LMP states all stormwater runoff from the operational cells is retained within the lined landfill footprint and treated as leachate.
Compliance Rating: Not Assessed

4. Stormwater falling on the operational cells of any lined landfill area shall be regarded as leachate.

Further to the comments under condition 2 above, bunds and diversion drains have been constructed on the side slopes to retain stormwater that falls on the operational cells as required.
Compliance Rating: Not Assessed

5. The Permit Holder shall carry out such stormwater or sediment control measures as are necessary to ensure that sediment is not carried and deposited beyond the boundaries of the site.

A number of stormwater ponds have been sited in natural dune depressions which naturally soak into the ground and trap sediment preventing it from discharging beyond the site boundaries. These are inspected during the weekly site walkovers.
Compliance Rating: Comply – Full

6. The Permit Holder shall ensure that:

- stormwater drains within the site are maintained to ensure that the flow of stormwater around the landfill is unrestricted and the potential for stormwater contamination is reduced; and
- stormwater diversion systems, including all drains and ponds, are kept clear of refuse; and
- any sediment ponds are regularly cleaned to ensure effective settling out of suspended solids.

The LMP states stormwater drains shall be inspected monthly to ensure there is no refuse collecting in the drains. If so, they must be cleaned out immediately. These are inspected during the weekly site walkovers.
Compliance Rating: Comply Full

Further to Condition 4 above, there are no sediment ponds on-site.
Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 6012: Comply – Full

7. GENERAL CONDITIONS APPLICABLE TO 7289

Consent is granted to the Horowhenua District Council to **discharge liquid waste onto and into land** *at the Levin landfill, Hōkio Road, Levin, legally described as Lot 3 DP 40743* Blk ll Waitohu Survey District, for a term expiring 35 years from the commencement of the consent subject to the following conditions:

1. Charges, set in accordance with section 36(1)c of the Resource Management Act 1991, and section 690 A of the Local Government Act 1974, shall be paid to the Regional Council for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

   [**Note:** Section 36(1)c of the Act provides that Council may from time to time fix charges payable by holders of resource consents. The procedure for setting administrative charges is governed by section 36(2) of the Act and is currently *carried out as part of the formulation of the Council's Annual Plan.]*

HDC has no overdue charges in relation to this consent.
Compliance Rating: Not Applicable

2. Liquid wastes shall only be placed at the Levin Landfill as a contingency to normal disposal.

The LMP requires that any liquid waste, even that meeting the definition of Condition 3, must follow the application process for special waste. The special waste log indicates that no liquid waste was disposed of during the reporting period.
Compliance Rating: Comply – Full

3. For the purposes of this Permit, contingency conditions are circumstances where liquid waste is unable to be treated and disposed of at its regular location, for reasons of either, unforeseen events, breakdown or temporary closure for maintenance purposes.

There has been no disposal of liquid waste during this assessment period therefore this condition is not applicable.
Compliance Rating: Not Applicable

4. Liquid wastes are defined as the following:
   a. *Septic tank waste ("septage");*
   b. Grease trap waste;
   c. Sewage; and

d. Any material that contains free liquids.

The presence of free liquids may be determined by either of the following methods, whichever is most practicable at the time:

i. *The "Paint Filter Test"; or*

ii. Material which may be located, transported and deposited at the landfill without the risk of free liquid seeping from the material, and without the risk of having the deposited material flow under gravity down any slope on the landfill shall be deemed to not contain free liquids.

The LMP defines liquid waste as per this condition.
Compliance Rating: Not Applicable

5. *The Permit Holder shall notify the Regional Council's* Regulatory Manager and the Neighbourhood Liaison Group as soon as practicably possible after receiving notification of the intention to dispose of waste at the landfill under the terms of this consent, or as soon as practicable following urgent disposal in accordance with Condition 3.

   The Permit Holder shall detail the reason for the discharge, volume of discharge and timing of the discharge.

   Each nominated member of the Neighbourhood Liaison Group shall be notified in writing by post.

6. The maximum annual volume of liquid waste discharged shall not exceed 150 cubic metres (150 m^3) in any calendar year. (Calendar year is defined as being over any 12 month or 365 day period.)

7. Subject to Condition 6, the volume of liquid waste discharge shall not exceed 75 cubic metres (75 m^3) during any seven day period.

8. Subject to Condition 6 and 7 the maximum daily volume of liquid waste discharged shall not exceed 20 cubic metres (20 m^3).

9. The liquid material shall be placed in trenches which are no more than 2m wide, 1.5m deep and 5m long which are excavated in compacted refuse which is at least six months old and located within a lined landfill area.

10. Only one trench shall be open at any one time.

11. Trenches shall be at least 10 metres from any landfill batter slope.

12. The open trench shall be open for no longer than two weeks.

13. Trenches shall be filled with liquid wastes to a depth of not less than 1m below the prior refuse surface level and reinstated with appropriate compaction with previously removed refuse and cover.

14. The location of placement and cumulative volume will be identified on a site plan which shall be made available to the Regional Council upon request.

15. The location and placement shall be appropriately signed and fenced.

16. The Permit Holder will ensure odours, vermin and flies are not generated from or do not accumulate in open trenches.

Conditions 5 to 16: - There has been no disposal of liquid waste to the Levin Landfill during this assessment period.
Compliance Rating: Not Applicable

17. The Permit Holder shall maintain records of:
    a. The type of liquid waste received;
    b. The volume of liquid waste received;
    c. The source of liquid waste; and
    d. The location in the landfill in which the material was placed.

As stated above the LMP requires any liquid waste being disposed of at the Levin Landfill must go through the hazardous waste application process. HDC have advised there has been no disposal of liquid waste to the Levin Landfill during this assessment period. Nevertheless a copy of the hazardous waste logs and special waste sheets have been requested to verify compliance with this condition.
Compliance Rating: Not Applicable

18. In addition to the material that is accepted on the basis set out above, the consent holder may dispose of site-generated sludges that contain free liquids from cess-pits, leachate ponds or other site activities to facilitate site operation, provided this does not adversely affect landfill stability or face operations. The disposal of such materials is not to be included within the quantity restrictions as set out in Conditions 6, 7 and 8 of this permit.

This condition permits the disposal of site-generated sludges that contain free liquids from cess-pits, leachate ponds or other site activities. Horizons recommend that volumes/quantities of any of these liquid wastes are recorded on the special waste log.
Compliance Rating: Not Applicable

Note for Conditions 2 – 18: The aforementioned conditions require specific practices for the disposal of liquid wastes which are provided for in the LMP. This report strongly recommends any future annual reports provide volumes/quantity of liquid wastes disposed of and the location of where they were placed.

19. The Regional Council may initiate a publicly notified review of Conditions 5, 9, 12 and 17 of this permit during the month of October in 2024, 2029 and 2034. The reviews shall be for the purpose of:

    a. Assessing the adequacy of the monitoring conditions outlined in Conditions 5 and 17; and

    b. Assessing the effectiveness of Conditions 9 and 12 of this consent,

    in avoiding, remedying or mitigating adverse effects on the environment surrounding the Levin Landfill.

    The review of conditions shall allow for the:

    c. Modification of monitoring outlined in Conditions 5 and 17;

    d. Changes to Conditions 9 and 12 of this consent; and

    e. Addition of new conditions if necessary,

    to avoid, remedy or mitigate adverse effects on the environment surrounding the Levin Landfill.

This is discussed under Condition 31 of Resource Consent 6009.
Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 7289: Comply – Full

8. GENERAL CONDITIONS APPLICABLE TO 102259

The Team Leader Consents of the Manawatu-Wanganui Regional Council (trading as horizons.mw) has considered this non-notified application. On 15 May 2002 the Team Leader pursuant to delegated authority under section 34 of the Resource Management Act, grants Discharge Permit 102259 pursuant to section 105 of the Act, to Horowhenua District Council to **discharge stormwater to land and potentially to groundwater via ground soakage** *from the Levin landfill, Hōkio Beach Road, Levin, subject to the following* conditions.

1. This Permit shall be for a term of 35 years from the date of commencement of Levin Landfill Consents 6009 – 6011 and 7289.

This consent is currently active.
Compliance Rating: Comply – Full

2. Pursuant to section 125(1) of the Resource Management Act 1991, this Permit shall not lapse within its duration of 35 years.

Compliance Rating: Not Applicable

3. The activities authorised by this Permit shall be restricted to the discharge of stormwater to land via ground soakage originating from the existing fill site or any part of the new lined landfill that has had, or is intended to have, refuse placed beneath or upon it, as shown on Plan C102259 attached to and forming part of this Discharge Permit.

The Annual Report states stormwater is discharged to a central inter-dune depression located to the west of the access road leading to the lined landfill area. From here it soaks to groundwater. When groundwater levels are high in winter, water tends to pond in the inter-dune depression.
Compliance Rating: Comply – Full

4. All works and structures relating to this Discharge Permit shall be designed and constructed to conform to best engineering practices and shall at all times be maintained to a safe and serviceable standard.

It is noted the former stormwater management plan has been incorporated into the LMP. Previous inspections have shown that the stormwater drains on site have been maintained to a serviceable standard. Weekly walkover inspections make note of whether the structures are free of debris and the outlets clear. Please update the LMP to reflect the standard and/or guideline used to design and construct all stormwater structures.
Compliance Rating: Not Assessed

5. The Permit Holder shall inspect the stormwater system once a day when the site is in use to ensure the speedy recovery of any litter or refuse and shall remove any litter as soon as practicable.

The LMP states daily inspection of the site and removal of all litter which is liable to be a nuisance and all litter in drains on-site shall be removed immediately.
Compliance Rating: Comply – Full

6. The Permit Holder shall ensure the stormwater soakage ponds are inspected regularly and maintained to optimise their performance at all times. This shall include de-sludging or remediating the ponds as required.

Weekly walkover inspections include observations of the stormwater ponds.
Compliance Rating: Comply – Full

7. [Deleted]

8. There shall be no runoff or existing discharge of stormwater beyond the property boundary that has originated on any landfill area or new lined landfill area that has had, or is intended to have, refuse placed on it.

The LMP states it is expected that most rainfall on the site will soak into the ground. This shall not include stormwater falling on the operational area of the landfill which will be regarded as being leachate. In the early parts of a stage when there is a large lined area without any waste, runoff of clean stormwater from part of the lined area should be diverted off the lined area to ground soakage, as far as is practicable. The stormwater that falls on an operational phase/stage shall be contained within the phase/stage by the bunds and become leachate.
Compliance Rating: Comply – Full

Management – Existing Landfill

9. As far as practically possible, the Permit Holder shall ensure that all stormwater from the existing landfill area is directed to the centralised soakage area as shown on the latest version of the Stormwater Plan.

This was not inspected during the Horizons site visits. The Annual Report states stormwater is discharged to a central inter-dune depression located to the west of the access road leading to the lined landfill area. From here it soaks to groundwater. When groundwater levels are high in winter, water tends to pond in the inter-dune depression.
Compliance Rating: Not Assessed

Management – New Landfill

10. Where it is practical and economical to do so, the Permit Holder shall ensure that within the operational landfill cell the minimum amount of stormwater shall be allowed to come into contact with refuse. This shall be effected by constructing impermeable barriers, diversion drains or bunds on the side slopes and within the base of the landfill.

The operational area was not inspected during the Horizons site visits. All stormwater falling on the operational landfill is treated as leachate and is collected by the leachate collection system and subsequently piped to the Levin WWTP. Diversion drains and bunds are required to ensure stormwater falling on any operational cell stays within that operational cell and is collected by the leachate collection system.
Compliance Rating: Not Assessed

11. There shall be no contamination of stormwater with leachate. Leachate includes any stormwater within an operational cell that is not separated from refuse by a barrier as defined in Condition 10.

The LMP states stormwater falling on the operational area of the landfill will be regarded as being leachate. In the early parts of a stage when there is a large lined area without any waste, runoff of clean stormwater from part of the lined area should be diverted off the lined area to ground soakage, as far as is practicable.
Compliance Rating: Comply – Full

12. The Permit Holder shall ensure that a suitable stormwater soakage area is available for a given design storm and the area of the operational cell from which the stormwater is collected.

All stormwater landing on an operational cell is treated as leachate and sent to the Levin WWTP.
Compliance Rating: Comply- Full

13. Areas designated for stormwater discharge to land and their catchment and reticulation system shall be identified and located on site plans and their dimensions *submitted for approval by horizons.mw's Team Leader* Compliance prior to their use.

This condition has previously been complied with and is no longer applicable.
Compliance Rating: Not Applicable

Monitoring

14. The Permit Holder shall monitor groundwater quality in at least one upgradient and one downgradient bore of the existing landfill stormwater soakage area, and at least one upgradient and two downgradient bores of the new landfill area. The location *and number of bores is to be determined in consultation with horizons.mw's Team* Leader Compliance. Groundwater samples shall be taken quarterly in January, April, July and October for the term of this Discharge Permit, beginning in October 2002, and analysed for the following parameters:
    - PH
    - Conductivity
    - Ammonia-N
    - Nitrate-N
    - Sodium
    - Boron
    - Chloride
    - Iron

Water sampling is carried out from monitoring wells D3r and F3 (hydraulically upgradient of the stormwater soakage area); and, wells E1D, E1S, D4 and D2 (hydraulically down-gradient) on a quarterly basis. The required parameters are analysed and the results provided in the quarterly reports.
Compliance Rating: Comply – Full

15. Monitoring bores required in Condition 14 of this Discharge Permit can be incorporated into the monitoring programme of other Levin Landfill Consents (6009-6011 and 7289), providing the information sought is obtained at the frequency specified and reported as required for this Permit.

Sampling of the bores, mentioned under Condition 14 above, is undertaken quarterly concurrent with the monitoring program of other the other landfill consents. The results are reported with the quarterly reports prepared by Stantec.
Compliance Rating: Comply – Full

16. The results of monitoring under Condition 14 of this permit shall be reported to *Horizon Manawatu's Team Leader Compliance by 31 August each year fo*r the duration of this Permit beginning 31 August 2003. The annual report shall be supplemented by the raw water quality analysis data being forwarded to the Regional Council as soon as practically possible following the receipt of laboratory analysis certificates.

Results pursuant to condition 14 are forwarded on a quarterly basis with the quarterly reports. This includes the raw lab results.
Compliance Rating: Comply – Full

17. If a laboratory is used for water quality analyses which does not have independent accreditation for the parameters measured, then on each sampling occasion duplicate samples from at least one sampling location shall be analysed by a laboratory with independent accreditation for the parameters measured. Continued analysis by the unaccredited laboratory shall be at the discretion of horizons.mw.

All parameters monitored under condition 14 are analysed by Eurofins ELS Ltd laboratory which is holds an IANZ accreditation for the parameters required.
Compliance Rating: Comply – Full

18. Should any groundwater and surface water parameters tested for under Condition 14 of this consent exceed the Australian and New Zealand Environment and Conservation Council Water Quality Guidelines (2000) for Livestock Watering, the Permit Holder shall report to horizons.mw's Team Leader Compliance as soon as practicable on the significance of the result, and where the change can be attributed to the landfill operation, consult with horizons.mw's Team Leader Compliance to determine if further investigation or remedial measures are required.

The results indicate that groundwater quality in the bores D3r, F3, E1S, D4 and D2 is similar to that of the background bore (G1S). During the reporting period there were no exceedances of the ANZECC LDW trigger levels.
Compliance Rating: Comply – Full

19. The Regional Council may initiate a publicly notified review of all conditions of this Permit during the month of October in 2024, 2029 and 2034. The reviews shall be for the purpose of:
    i. reviewing the effectiveness of these conditions in avoiding or mitigating any adverse effects on the environment; and/or
    ii. reviewing the adequacy of the monitoring programme required by this discharge permit.

    The review of conditions shall allow for:
    i. the deletion or amendment to any conditions of this permit; and
    ii. the amendment or addition of new conditions as necessary to avoid, remedy or mitigate any adverse effects on the environment

    If necessary and appropriate, the review provided for under this condition shall require the Permit Holder to adopt the best practicable options to avoid, remedy or mitigate any significant adverse effects on the environment.

This is discussed under Condition 31 of Resource Consent 6009.
Compliance Rating: Not Applicable

20. Charges, set in accordance with section 36(1)c of the Resource Management Act 1991, and section 690 A of the Local Government Act 1974, shall be paid to horizons.mw for the carrying out of its functions in relation to the administration, monitoring and supervision of this resource consent and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

[**Note:** Section 36(1)c of the Act provides that horizons.mw may from time to time fix charges payable by holders of resource consents. The procedure for setting administrative charges is governed by section 36(2) of the Act and is currently *carried out as part of the formulation of horizons.mw's Annual Plan.]*

There are no outstanding charges in relation to this consent.
Compliance Rating: Comply – Full

Overall Compliance Rating for Resource Consent 102259: Comply – Full

9. GENERAL CONDITIONS APPLICABLE TO 106798

Descriptive Specification

1. The consent holder shall undertake the activity in general accordance with the consent application including all accompanying plans and documents first lodged with Manawatu-Wanganui Regional Council on 19 December 2014, and the original application lodged 30 August 2013 and further information received:

2. Emails received on 17 April 2015, 24 April 2015, 23 June 2015 and 30 June, confirming timeframes, changes requested to monitoring conditions and status of existing flare.

   Where there may be inconsistencies between information provided by the applicant and conditions of the resource consent, the conditions of the resource consent apply.

   Advice Note: Any change from the location, design concepts and parameters, implementation and / or operation may require anew resource consent or a change of consent conditions pursuant to section 127 of the Resource Management Act 1991.

   [Condition 1 amended as per variation APP-2013016220.01 dated 29 July 2015]

Further to Condition 6 below, HDC failed to meet the timeframe specified to install the replacement flare.
Compliance Rating: Low Risk Non-Compliance

3. The discharges authorised by this consent shall be restricted to the discharge of contaminants including Methane, CO_2, PM_{10}, NO_2, SO_2 and odour from the operation of a gas flare at the Levin Landfill on land legally described as Lot 3 DP 40743 at approximate map reference NZTopo50 BN33:871-025.

Landfill gas from the Levin landfill is discharged via a flare in accordance with the above.
Compliance Rating: Comply – Full

Pre-Development Assurance

4. The landfill gas flare shall be designed, operated and monitored in accordance with the requirements of the United States EPA Code of Federal Regulations 40 CFR Part 60, Subpart A – General Provisions, Section 60.18 (1997) and shall have the following minimum specifications:

(i) flame arrestor and back flow prevention devices, or similar equivalent system, approved in writing by the Manawatu-*Wanganui Regional Council's Regulatory* Manager acting in a technical certification capacity, to prevent flashback;
(ii) a continuous automatic ignition system; and
(iii) a temperature detection system to detect circumstances when temperature drops below 750^0C.

The flare currently in use at the Levin Landfill comprises an Elmac DFB-100AD flash back arrestor (which prevents any flame passing back through to the safety valves and the pipework), with a pilot light system in place and is setup up with a temperature control point of 750 ^{0}C.
Compliance Rating: Comply – Full

Environmental Standards

5. There shall be no objectionable or offensive odour, dust or particulate matter (PM_{10}), including smoke, as a result of the operation of the flare to an extent where it causes an adverse effect at or beyond the property boundary.

   Advice Note: Dust and odour will only be considered offensive or objectionable, after a Manawatu-Wanganui Regional Council officer has considered the Frequency, Intensity, Duration, Offensiveness and Location of the odour (i.e. the FIDOL Factors).

Further to Condition 3 of Resource Consent 6011, eleven odour complaints were received during the reporting period. None of the odour complaints received during the reporting period were verified as being objectionable.
Compliance Rating: Comply – Full

6. The consent holder shall ensure that the replacement flare is installed by **1 July 2016** and shall notify the Manawatu-*Wanganui Regional Council's Regulatory Manager in* writing within **two working days** of the flare being installed. The replacement flare maybe installed prior to this date.

   Advice Note: The Manawatu-*Wanganui Regional Council's Regulatory Manager or* team representative can be contacted on 0508 800 800 or by emailing compliance.shared@horizons.govt.nz.

   [Condition 6 amended as per variation APP-2013016220.01 dated 29 July 2015]

Horizons was advised by HDC on 24 May 2016 that this date would not be able to be met and asked for an extension to 31 January 2017. The Operation and Maintenance Manual prepared by Windsor Engineering Group Ltd indicates that the gas flare was commissioned 15-17 May 2017. The flare was operational as of 27 June 2017 as per an email sent that day by HDC to Horizons and various members of the NLG.
Compliance Rating: Low Risk Non-Compliance

Operational Restrictions

7. The consent holder shall ensure that any combustion of landfill gases are only undertaken via the flare, except under the following circumstances:
   (i) in the event of combustion equipment failure; or
   (ii) for combustion equipment maintenance purposes.

   Advice Note: Condition 7 only applies when the flare is being used. This consent is solely for the discharge of contaminants associated with flaring of landfill gas. When the flare is not in use, the restrictions imposed by this consent do not apply.

   [Condition 7 amended as per variation APP-2013016220.01 dated 29 July 2015]

The Annual Report for the gas flare states landfill gas is collected and transmitted to the flare where it is combusted. In the circumstances listed above landfill gas is discharged un-combusted.
Compliance Rating: Comply – Full

8. The consent holder shall operate the gas collection system in a manner that ensures the rate of extraction of landfill gas is maximised, while the risk of landfill fires due to over extraction is minimised.

   [Condition 8 added as per variation APP-2013016220.01 dated 29 July 2015]

The OMP states that well field adjustments are carried out as required when monitoring is carried out. Well field adjustments help to achieve a steady state of operation of the gas collection system by stabilising the flow and quality of the extracted landfill gas. This helps to maximise extraction of landfill gas across the landfill footprint and helps to prevent subsurface fires.
Compliance Rating: Comply – Full

9. To achieve compliance with condition 8 the consent holder shall ensure the landfill gas extraction system is operated to minimise oxygen ingress, and the extraction system shall be shut down if oxygen concentrations exceed 4 per cent.

   [Condition 9 added as per variation APP-2013016220.01 dated 29 July 2015]

HDC have confirmed that the system is set to a maximum value of 4%.
Compliance Rating: Comply – Full

Post-Development Assurance

10. **2 months** prior to the installation of the new flare, the consent holder shall provide an Operation and Management Plan to Manawatu-*Wanganui Regional Council's* Regulatory Manager. The operation and management plan shall include but not be limited to the following:
    a. Detail on the type, design specifications and timing of installation of the new flare;
    b. Procedures for regular inspections (both visual and maintenance inspections) of the flare, landfill gas collection field and any associated equipment;
    c. Scheduled maintenance events for the flare, landfill gas collection field and associated equipment for the upcoming 12 month period;
    d. Details of procedures for the design and installation of the landfill gas collection field;
    e. Procedures for the connections of landfill gases to the flaring unit, monitoring and reporting of the flow rates and composition of the gases;
    f. Detail on the flaring regime/s;
    g. Detail on the planned contingency measures for dealing with malfunctions, repair and incidents; and
    h. Records of the details of all maintenance events or any system malfunction (i.e. date, time, what was done, what went wrong, who repaired it and how

    [Condition 10 amended as per variation APP-2013016220.01 dated 29 July 2015]

The current Operations and Management Plan is appended to the Gas Flare Annual Report. Windsor Engineering Group also provided an Operations and Management Plan upon installing and commissioning the flare and this is appended to the Odour Management Plan. It is unclear which of these is the current and operative version being used by HDC. When read in conjunction with each other, both plans still do not provide for all the requirements of this condition and specifically with reference to the landfill gas collection field. Please review the plan, amend accordingly and provide to Horizons **by 16 July 2021**.
Compliance Rating: Low Risk Non-Compliance

11. The consent holder shall review the Operation and Management Plan annually in the month of **June** (commencing June 2017) and provide the Regulatory Manager with an updated version of any subsequent revisions or amendments to the Operation and Management Plan within one month of the amendment(s) being made.

    Advice Note: Updated versions of the Operation and Management Plan can be made available to the Regulatory Manager by emailing to compliance.shared@horizons.govt.nz.

    [Condition 11 amended as per variation APP-2013016220.01 dated 29 July 2015]

The Annual Report states that the Operation and Management Plan was reviewed in June 2020 and two amendments made. These were to Maintenance Procedure 8 and Monitoring Procedure 21. The updated plan was provided with the Annual Report on 30 June 2020.
Compliance Rating: Comply – Full

12. The consent holder shall ensure that the activity is undertaken in accordance with the Operation and Management Plan provided in accordance with Condition 10 and any subsequent amendments provided under Condition 11 at all times for the duration of this consent.

    [Condition 12 amended as per variation APP-2013016220.01 dated 29 July 2015]

The discharge of landfill gas via a gas flare is undertaken in accordance with the Operation and Management Plan and the Odour Management Plan.
Compliance Rating: Comply – Full

Monitoring Provision

13. The consent holder shall notify the Manawatu-*Wanganui Regional Council's* Regulatory Manager **two working days** prior to:
    (i) The commencement of flaring from the existing flare; and
    (ii) The commencement of flaring from the replacement flare required under condition 6.

    [Condition 13 added as per variation APP-2013016220.01 dated 29 July 2015]

Horizons was notified upon commencement of flaring from the replacement flare, via email.
Compliance Rating: Comply – Full

14. The consent holder shall maintain a record dates and duration of all flare outages (due to equipment failure or maintenance) in excess of 48 hours and for any occasion for which landfill gas was discharged un-combusted. A copy of this record shall be forwarded to the Manawatu-*Wanganui Regional Council's Regulatory* Manager **annually** in the month of June, commencing **June 2016** or on request.

    [Condition 14 amended as per variation APP-2013016220.01 dated 29 July 2015]

The Annual Report, provided on 30 June 2020, summarises all flare outages between July 2019 and June 2020. During this period there were eleven outages.
Compliance Rating: Comply – Full

15. The consent holder shall, once every month sample each extraction wellhead and at the flare for each of the following parameters:
    (i) gas flow rate;
    (ii) methane (percentage);
    (iii) carbon dioxide (percentage);
    (iv) oxygen (percentage);
    (v) nitrogen (percentage);
    (vi) carbon monoxide (parts per million);
    (vii) hydrogen sulphide (parts per million);
    (viii) gas pressure;
    (ix) barometric pressure; and
    (x) Temperature.

    The sampling required under this condition 15 is only required if flaring is occurring from the existing flare. Sampling is to occur at the frequency outlined in the condition.

    Advice Note: The sampling required by condition 15 only requires the consent holder collect one sample of gas and analyse it for the listed parameters once month.

    [Condition 15 amended as per variation APP-2013016220.01 dated 29 July 2015]

The monitoring records presented in the Annual Report shows that all parameters were tested for once a month with the exception of nitrogen (percentage). Please ensure nitrogen is included in the sample analyses going forward.
Compliance Rating: Low Risk Non-Compliance

16. The results of the sampling required by Condition 15 shall be provided to the Manawatu-*Wanganui Regional Council's Regulatory* Manager within one month of monitoring being undertaken.

    [Condition 16 amended as per variation APP-2013016220.01 dated 29 July 2015]

The results of the monitoring were provided with the Annual Report. Please provide the results as required to ensure ongoing compliance with this condition.
Compliance Rating: Low Risk Non-Compliance

17. The consent holder shall maintain a log of all complaints (including those received via third parties including the Manawatu-Wanganui Regional Council) regarding dust, odour or other contaminants as follows:

(i) Time and type of complaint including details of the incident, e.g. duration, location and any effects noted;
(ii) Name, address and contact phone number of the complainant (if provided);
(iii) Where practicable, the weather conditions including wind direction at the time of the incident;
(iv) The likely cause of the complaint and the response made by the consent holder including any corrective action undertaken;
(v) Future actions proposed as a result of the complaint; and
(vi) The response from the consent holder to the complainant.

A complaints log is provided with the Annual Report. The log includes the information as listed above.
Compliance Rating: Comply – Full

18. A copy of the complaint log required by Condition 17 shall be forwarded to the Manawatu-*Wanganui Regional Council's Regulatory Manager* **annually** in the month of June, commencing **June 2014** and be made available on request.

[Condition 18 amended as per variation APP-2013016220.01 dated 29 July 2015]

The complaints log was included in the Annual Report which was received on 30 June 2020.
Compliance Rating: Comply – Full

Review

19. The Manawatu-Wanganui Regional Council, under section 128 of the Act, may initiate a review of all conditions of this resource consent during July in the year(s) 2015, 2024 and 2034 for the purpose of reviewing the effectiveness of these conditions in avoiding or mitigating any adverse effects on the environment. The review of conditions shall allow for:
    a. deletion or amendments to any conditions of this resource consent to ensure adverse effects are appropriately mitigated; or
    b. addition of new conditions as necessary, to avoid, remedy or mitigate any unforeseen adverse effects on the environment; or
    c. if necessary and appropriate, the adoption of the best practicable options to avoid, remedy or mitigate any adverse effects on the environment.

This is discussed under Condition 31 of Resource Consent 6009.
Compliance Rating: Not Applicable

Overall Compliance Rating for Resource Consent 106798: Low Risk Non-Compliance

10. RECOMMENDATIONS

It is recommended that the following are incorporated into the operation and management of the Levin Landfill to ensure ongoing compliance with the resource consents.

Resource Consent 6009:

- Condition 2: Please add observations to the weekly site walkovers to demonstrate compliance with this condition.
- Conditions 15 – 21: Provide volumes/quantity of offal and/or dead animals disposed of and photographic examples with future annual reports in order to demonstrate that these practices are being strictly followed.
- Conditions 23 – 26: Provide volumes/quantity of biosolids and sludges disposed of and the location of where they were placed with future annual reports in order to demonstrate that these practices are being strictly followed.

Resource Consent 6011:

- Condition 5 (c) and (d): It is recommended that observations of the daily cover and intermediate cover placement are undertaken regularly to demonstrate compliance with these conditions, respectively.

Resource Consent 7289:

- Conditions 2 – 18: Provide volumes/quantity of liquid wastes disposed of and the location of where they were placed with future annual reports in order to demonstrate that these practices are being strictly followed.

Resource Consent 102259:

- Condition 4: Please update the LMP to include the standard and/or guideline used to design and construct all stormwater structures.

It is recommended that the Levin Landfill – Site Walkover Sheet is also reviewed to ensure all monitoring/observation requirements are included in accordance with the conditions.

11. ACTIONS

The following actions need to be executed within the required timeframes in order to prevent further non-compliances with the following consent conditions:

Resource Consent 6010:

- Conditions 11(a) and 11(aa): Please ensure the significance of any exceedance is appropriately reported.
- Condition 11(aa): Prepare a plan to undertake and/or implement the following recommendations:
    - Wet weather monitoring to determine if cumulative inputs change during wet weather events;
    - Assessment of high groundwater level events against surface water quality data in Tatana Drain and Hōkio Stream to determine if inputs change at times of differing groundwater levels;
    - Temporal analysis of data as ammoniacal-nitrogen appears to be increasing;
    - Undertake surface water mixing modelling to determine concentrations after mixing with Hōkio Stream over both short and longer term timeframes, as it is not considered that effects of ammonia toxicity have been accurately calculated;
    - Monitoring site SW1 is reinstated to further understand the effects of leachate migration into the Tatana Drain under a range of groundwater level conditions.

  A draft of this plan shall be provided to Horizons for discussion **prior to 16 July 2021**.

- Condition 11(d): Implement the corrections to the contaminant mass loading calculations including:
    - *"*In Table 7-1 of the annual monitoring report, the effect of background groundwater concentrations is removed from the observed maximum and median concentrations of various parameters in the bores representing the leachate plume. However, it is unclear how this is applied. Furthermore, in some cases the resulting concentrations are negative (for example for nitrate and DRP). The negative concentrations are reportedly due to the landfill having no effect on the downgradient concentrations which seems implausible. Concentrations of nitrate in bore B2 are currently around 20 mg/L (although concentrations of up to 133 mg/L have occurred), but bore B2 is not included in the list of bores representing the leachate plume. This should be addressed in the report.
    - Table 7-2 of the annual monitoring report indicates concentrations of nitrate in *Hōkio* Stream of more than 21 mg/L, which again seems implausible and indicates an error in the reporting.*"*

  Please update the contaminant mass loading calculations and reissue the Annual Monitoring Report **by 16 July 2021**.

Resource Consent 6011:

- Conditions 5 (e) and (g): Immediately commence monitoring as required and submit methodology for approval.
- Condition 5 (i): Engage an appropriately qualified person to undertake a comprehensive assessment of the bio-filter performance as required. Please provide this report to Horizons by 16 July 2021.
- Condition 5 (j): Please provide evidence of the monthly monitoring and quarterly raking by 16 July 2021 to demonstrate compliance with this condition.
- Condition 5 (k): Please provide a summary of these sampling results by 16 July 2021 to demonstrate compliance with this condition.
- Conditions 5 (p) and (q): Record all meteorological data and, provide the data in accordance with the requirements of the conditions.
- Conditions 8, 8E and 8F: Provide all information as required.
- Condition 8D: Please ensure assessments are undertaken

Resource Consent 106798:

- Condition 10: Amend the Operations and Management Plans to ensure all required information is referenced and included in a single document. Please provide this plan to Horizons by 16 July 2021.
- Condition 15: Include nitrogen (percentage) in the sample analyses.
- Condition 16: Provide sample results within one month of monitoring being undertaken as required.

12. ENFORCEMENT ACTION

Condition 5(e) of Resource Consent 6011 requires HDC to undertake monthly methane surface monitoring. The Annual and Quarterly Monitoring Reports submitted within this reporting period (19 December 2019 to 31 December 2020) do not refer to this monitoring having been undertaken. HDC advised that this monitoring was not undertaken as there were health and safety concerns to work through as well as problems resourcing the clay material used to remediate the cap. Therefore, by failing to undertake monthly methane surface monitoring between the period 19 December 2019 to 31 December 2020, HDC has significantly non-complied with Conditions 5 (e) and (g) of Resource Consent 6011. Subsequently, Horizons determined the appropriate enforcement action in this circumstance was an infringement notice for an unauthorised discharge to air.

13. CONCLUSION

Based on this assessment, HDC has received the following compliance ratings for the Levin Landfill resource consents:

- 6009 (ATH-2002003982.03): Comply – Full
- 6010 (ATH-2002003983.02): Low Risk Non-Compliance
- 6011 (ATH-2002003984.02): Significant Non-Compliance
- 6012 (ATH-2002003680.02): Comply – Full
- 7289 (ATH-2002009801.02): Comply – Full
- 102259 (ATH-2002003985.01): Comply – Full
- 106798 (ATH-2014015044.01): Low Risk Non-Compliance

14. REPORT CLOSURE

If you have any queries about the attached report, please contact me via email adam.hynes@horizons.govt.nz or on 0508 800 800.

Kind regards,

Adam Hynes

CONSENTS MONITORING OFFICER

Table 1. Compliance Assessment Guidelines for Individual Consents

Site Compliance Grade	Explanation
Comply – Full	Complying with all conditions of consent.
Comply – At Risk	At Risk grading identified against key condition(s) of one or more of consents for the site.
Low Risk Non-Compliance	Compliance with most of the relevant consent conditions. Non-compliance carries a low risk of adverse environmental effects or is technical in nature (e.g. failure to submit a monitoring report).
Moderate Non-Compliance	Non-compliance with one or more of the relevant consent conditions, where there are some environmental consequences and/or there is a moderate risk of adverse environmental effects.
Significant Non-Compliance	Non-compliance with one or more of the relevant consent conditions, where there are significant environmental consequences and/or a high risk of adverse environmental effects.
Not Assessed	Monitoring has not been undertaken of this consent during the reporting period.

Table 2. Compliance Assessment Guidelines for Individual Conditions

Condition Compliance Grade	Explanation/Examples (not exhaustive)
Comply – Full	Conditions of consent are fully complied with.
Comply – At Risk	Compliant at time of inspection but management / system deficiencies indicate there is a real risk of a non-compliance occurring (e.g. insufficient effluent storage, poor irrigator performance).
Low Risk Non-Compliance	One-off failure to comply with a condition of consent (e.g. one off minor exceedance in key parameter in sampling.)
Moderate Non-Compliance	Four minor exceedances of key parameters for one year's worth of sampling/data.
Significant Non-Compliance	Water quality results indicate there is a potential for or an actual effect which is more than minor that is not authorised by the resource consent.
Not Applicable	Applies to conditions that are no longer applicable. Generally relates to historic conditions that may require provision of a management plan, which has been provided and consent requires no further action.
Not Assessed	Monitoring not undertaken of consent condition.

APPENDIX 1

PDP Memorandum – Review of Levin Landfill Annual Monitoring Report

PATTLE DELAMORE PARTNERS LTD
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memorandum

TO	Adam Hynes	FROM	Neil Thomas and Laura Drummond
	Horizons Regional Council	DATE	30 April 2021
RE	Review of Levin Landfill Annual Monitoring Report		

1.0 Introduction

Pattle Delamore Partners Limited (PDP) have been engaged by Horizons Regional Council to review the Levin Landfill Annual Monitoring Report, with a specific focus on the following areas:

- assessing whether the discharge of leachate from the landfill has an adverse impact on groundwater quality;
- confirm the contaminant mass load projections; and
- assessing whether the discharge of leachate from the landfill has an adverse impact on surface water quality.

The Levin Landfill is located approximately 6.5 km to the north-west of Levin and is around 300 m south of Hokio Stream. The landfill is operated by Horowhenua District Council and monitoring of the potential impact of the landfill on surface water and groundwater quality is required under the conditions of consent (Discharge consent 6010). Monitoring includes water quality sampling from a variety of locations including groundwater bores, surface water within Hokio Stream and from the landfill leachate pond.

The overall site includes both an old, unlined landfill and a newer lined landfill. The old unlined landfill is located to the north of the site, closer to Hokio Stream, while the newer lined landfill is located towards the south of the site. The Hokio Stream runs from east to west just outside the northern site boundary, while the Tatana Drain (also flowing from east to west) is located between the old unlined landfill and Hokio Stream. Tatana Drain is around 100 m from the Hokio Stream and discharges into the Hokio Stream downstream of the landfill site.

Groundwater flow directions are reportedly north-west, towards Hokio Stream and it is likely that the Tatana Drain intercepts shallow groundwater. However, groundwater levels do not appear to be recorded in all bores at the time of sampling and shallow groundwater levels are likely to be poorly defined.

2.0 Groundwater quality

Groundwater quality is monitored in observation bores located at several points across the site and at two main depths. The shallower bores reportedly monitor a sand aquifer, while the deeper bores reportedly monitor a gravel aquifer. Based on the data supplied in the report, the deep and shallow bores are a variety of depths, with the shallow bores ranging from 2.3 m to 20 m, while the depth of the deep bores ranges from around 15 m to 37 m. The overlapping depth range may be due to topography on the site although that does not always appear to be the case; bores E2d and C2D(D) both reportedly monitor the

deep aquifer and are located to the north of the old landfill (at approximately the same relative elevation), but bore E2d is 28.66 m deep, while bore C2D(D) is 18 m deep. The 'shallow' bore E2s (at the same location as bore E2d) is 15 m deep.

The classification of a shallow sand aquifer and a deeper gravel aquifer is likely to simplify the actual situation and it is also unclear where domestic supply bores are sourced or whether groundwater in the shallower strata migrates downward to the deeper strata.

Groundwater quality concentrations are compared to the drinking water standards for New Zealand in the bores screened in the 'deep' aquifer (Condition 12 of the discharge consent) and the ANZECC livestock drinking water standards for the bores in the 'shallow' aquifer (Condition 11(a) of the discharge consent). The classification of the bores in terms of the 'aquifer' they monitor is therefore important. If these thresholds are exceeded then further investigation is required under condition 11(c).

Background groundwater quality is monitored in two adjacent bores located at the south eastern corner of the site (bores G1s (15 m deep) and G1d (31.5 m deep)). However, there are also three other bores (D5 (18 m deep), F2 (10 m deep), and F3 (10 m deep) located towards the southern perimeter of the landfill which, while not specifically installed as upgradient monitoring bores, are unlikely to be affected by the landfill. Water quality results from these bores are variable; chloride (216 mg/L) (see Figure 1 below), conductivity (101.8 mS/m) and iron (6.87 mg/L) are all significantly elevated in bore G1s. However, these parameters are much lower in the remaining bores, which implies that the concentrations in bore G1s are not generally representative of the wider aquifer, although concentrations are clearly variable. In our opinion, bore G1s may not be a suitable bore to use as an upgradient reference bore because it appears to be impacted by localised effects and does not represent background water quality in the wider upgradient area.

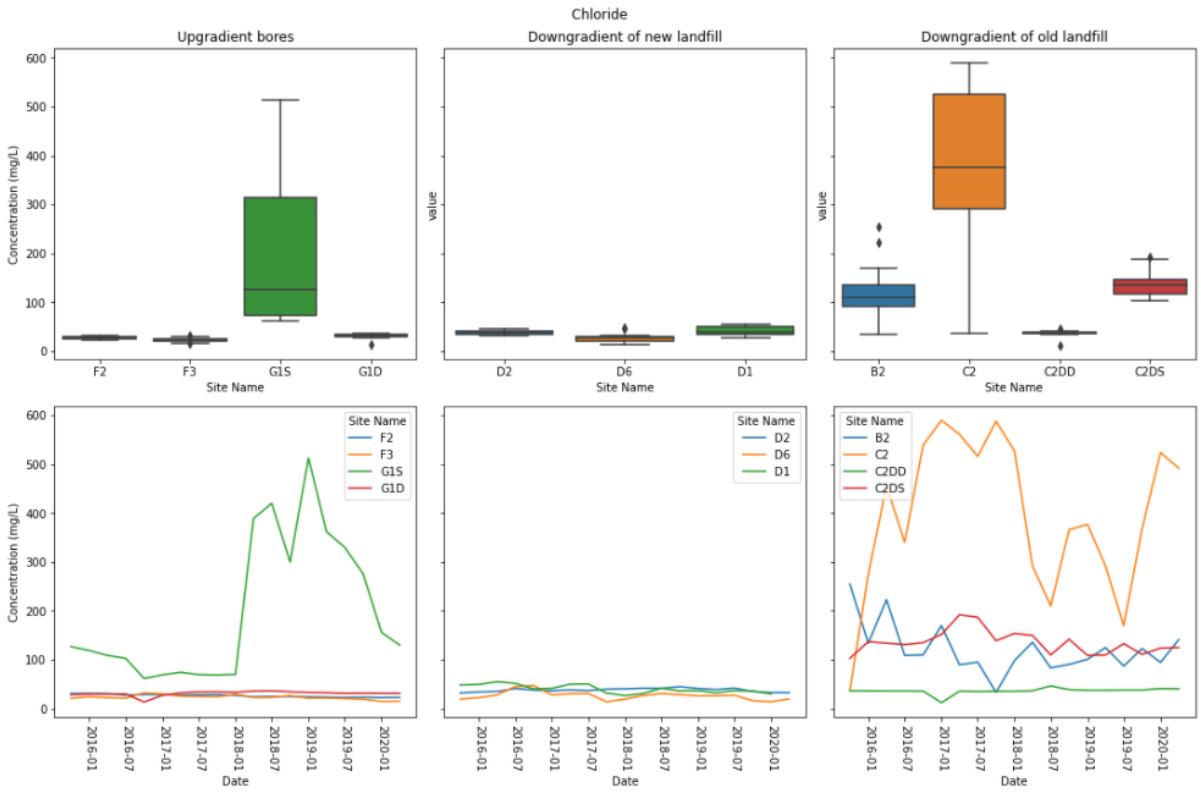


Figure 1: Chloride concentrations in selected monitoring bores shown as box and whisker plots and time series plots (data since 2016)

Ammonia, boron and chloride concentrations in the bores located downgradient of the new, lined landfill are generally similar to the water quality in the upgradient bores (with the exception of bore G1s). However, nitrate concentrations are significantly elevated in bores located downgradient of the new landfill compared with the upgradient bores (see figure 2 below). Concentrations of nitrate in bores D6 and D1 are comparable to concentrations observed in bore B2, which is located downgradient of the old, unlined landfill. This pattern may indicate some effect from the new landfill, although because the same pattern is not observed in other water quality parameters this conclusion is uncertain.

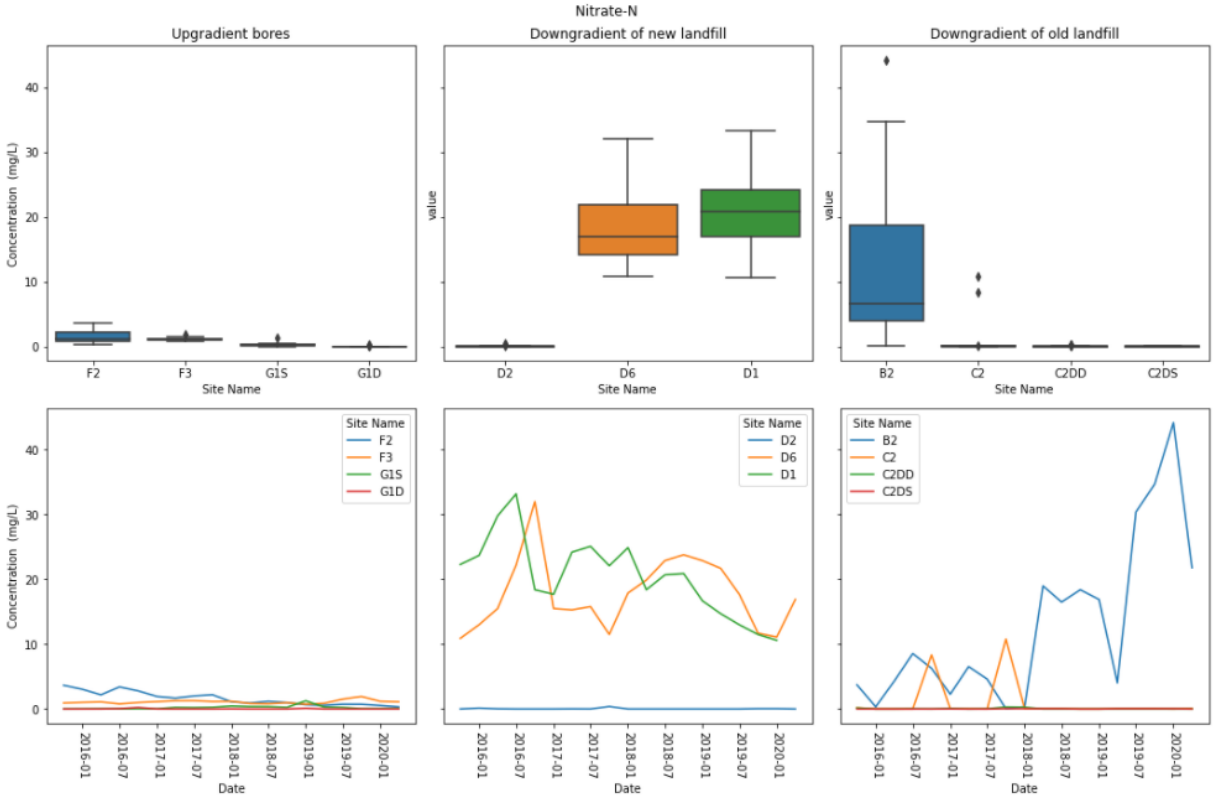


Figure 2: Nitrate concentrations in selected monitoring bores shown as box and whisker plots (top) and time series plots (bottom plots) (data since 2016)

Concentrations of most water quality parameters are significantly elevated in shallow bores located downgradient of the old, unlined landfill compared to upgradient concentrations. Specifically, ammonia concentrations are elevated up to 175 mg/L (Figure 3). Furthermore, plots provided in the applicant's report indicate a long-term rising trend (since 2006) in ammonia concentrations in bores C2 and B3 (not shown in the plots). Although there is no specified ANZECC Livestock Drinking Limit for ammonia, these very high ammonia concentrations will have an effect on surface water downgradient (see comments on surface water below).

In addition, concentrations of nitrate nitrogen are significantly elevated in bore B2 and the most recent quarterly monitoring report indicates concentrations in bore B2 reached 133 mg/L in July 2020, which exceeded the ANZECC LDW limit of 90 mg/L and corresponds to a requirement to trigger the actions specified in consent conditions 11(a) and 11(c).

Concentrations of water quality parameters are generally much lower in deeper bores and do not appear to exceed the drinking water standards. These concentrations are therefore consistent with condition 12 of the discharge consent conditions. If further investigation is undertaken, it would be sensible to review the definition of the 'shallow' and 'deep' aquifer and the pertinent monitoring bores; as noted above, these definitions do not appear to be consistent.

A component of local groundwater discharges into Tatana Drain, which subsequently discharges into the Hokio Stream. Monitoring in the Tatana Drain indicates very high concentrations of ammonia (and other parameters) which is derived from high concentrations in groundwater seepage into the drain. Further comments on the impacts of these ammonia concentrations in surface water quality and ecology are discussed below.

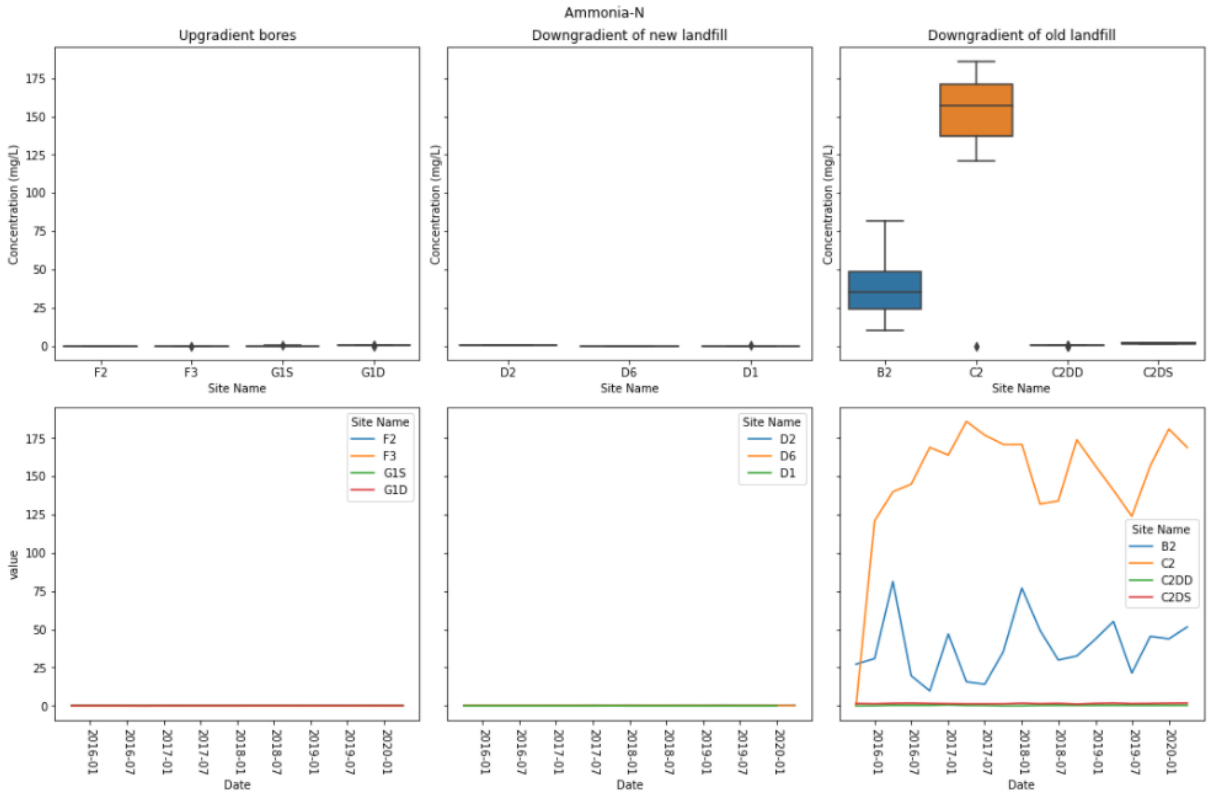


Figure 3: Ammonia concentrations in selected monitoring bores shown as box and whisker plots (top) and time series plots (bottom plots) (data since 2016)

3.0 Mass Loading Calculations

In general terms, the mass balance calculation methodology appears to be reasonable. However, there are a number of issues regarding the input data as well as the output of the calculations, including:

- In Table 7-1 of the annual monitoring report, the effect of background groundwater concentrations is removed from the observed maximum and median concentrations of various parameters in the bores representing the leachate plume. However, it is unclear how this is applied. Furthermore, in some cases the resulting concentrations are negative (for example for nitrate and DRP). The negative concentrations are reportedly due to the landfill having no effect on the downgradient concentrations which seems implausible. Concentrations of nitrate in bore B2 are currently around 20 mg/L (although concentrations of up to 133 mg/L have occurred), but bore B2 is not included in the list of bores representing the leachate plume. This should be addressed in the report.
- Table 7-2 of the annual monitoring report indicates concentrations of nitrate in Hokio Stream of more than 21 mg/L, which again seems implausible and indicates an error in the reporting.

The mass loading calculations appear to indicate that effects from the old, unlined landfill could exceed the ANZECC guidelines in some circumstances, for example for ammonia, nitrate and DRP in Hokio Stream. The annual monitoring report and mass loading calculations do not include the most recent nitrate data

from bore B2, where exceedances of the ANZECC LDW standard occurred in both July 2020 (133 mg/L) and in October 2020 (93 mg/L).

The contaminant mass load model is based on averaged 5 year maximums and 5 year median values. Whilst this may be reasonable in terms of identifying a long-term effect, it may not allow for short term pulses of very high nitrate or ammonia entering the Hokio Stream, which are important in terms of acute short term impacts on the stream.

4.0 Surface Water

Overall, the methodology to assess surface water quality monitoring data appears sound. Median values and laboratory non-detect values (section 3.1 and 3.2 in the 2019 report) have been calculated as per standard practice and we agree with the exceptions to this including where sites are sampled less than quarterly and non-detects for faecal coliforms. It is assumed that ANZECC AE refers to the ANZG (2018) guideline values, which superseded the ANZECC (2000) guidelines in August 2018. It would be helpful if the report explicitly stated this.

The reports state that monitoring of Hokio Stream and Tatana's Drain indicate non-compliance with the required ANZECC AE (95%) trigger values; however, there is no comment on the significance of the non-compliance or on the need for further investigation or remedial measures (as required by condition 11(aa). In future, providing a summary data report where 5-year median values are calculated (as specified in the National Objectives Framework) would be helpful, along with temporal trends over time to track changes.

4.1 Hokio Stream

As per the consent for Horowhenua District Council to discharge landfill leachate onto and into land at the Levin landfill, surface water monitoring is required under condition 3 for Hokio Stream. The objective of the sampling is to investigate if landfill leachate present within the shallow groundwater down-gradient of the landfill is affecting the water quality of Hokio Stream.

Four sites are located on Hokio Stream at locations to determine effects from leachate leaving the landfill. Two upstream sites (HS1 and HS1a) have been monitored, but no explanation of why an additional upstream site has been added is provided. The downstream site (HS3) appears to be in a good location to capture inputs from groundwater and Tatana Drain. A summary of the available monitoring data for ammonia and nitrate from the annual monitoring report for Hokio Stream and Tatana Drain is provided in Figures 4 and 5. Note that site HS1a has a very short monitoring record, so the low concentrations shown for that site are not representative of the long-term pattern.

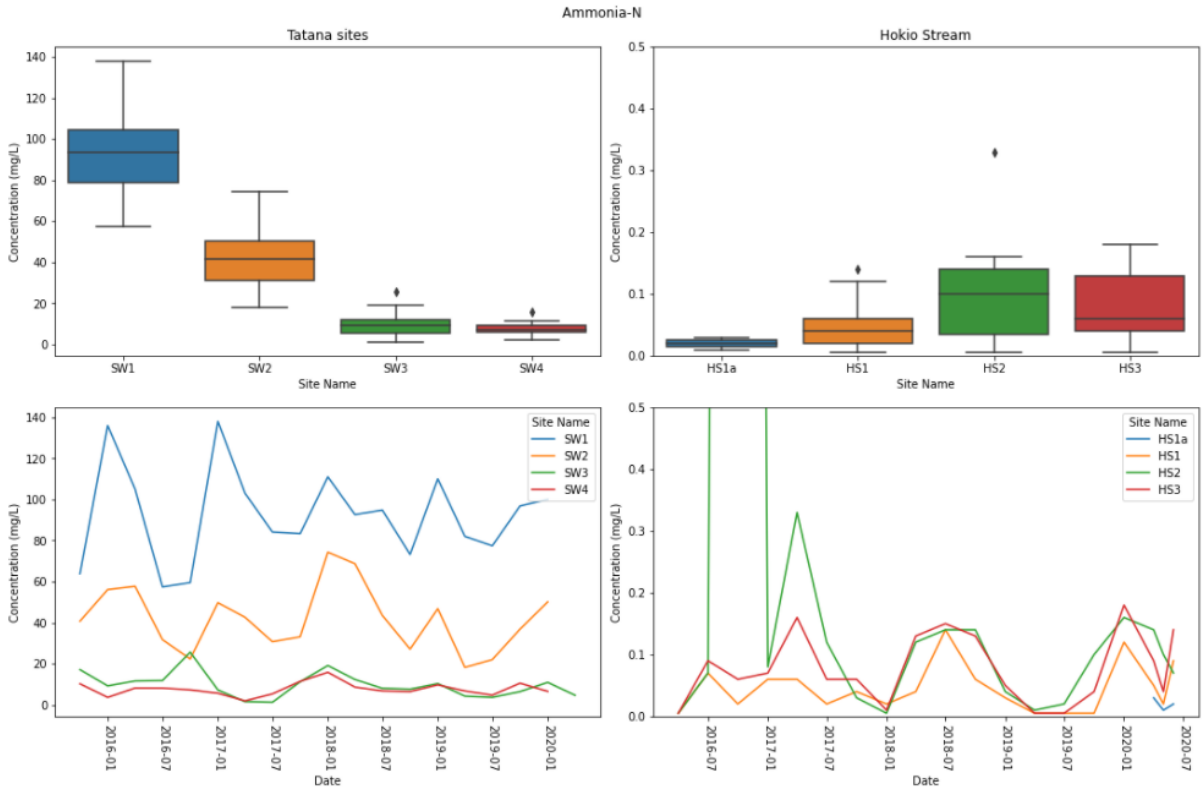


Figure 4: Ammonia concentrations in surface water monitoring sites on Tatana Drain and Hokio Stream shown as box and whisker plots (top) and time series plots (bottom plots) (data since 2016)

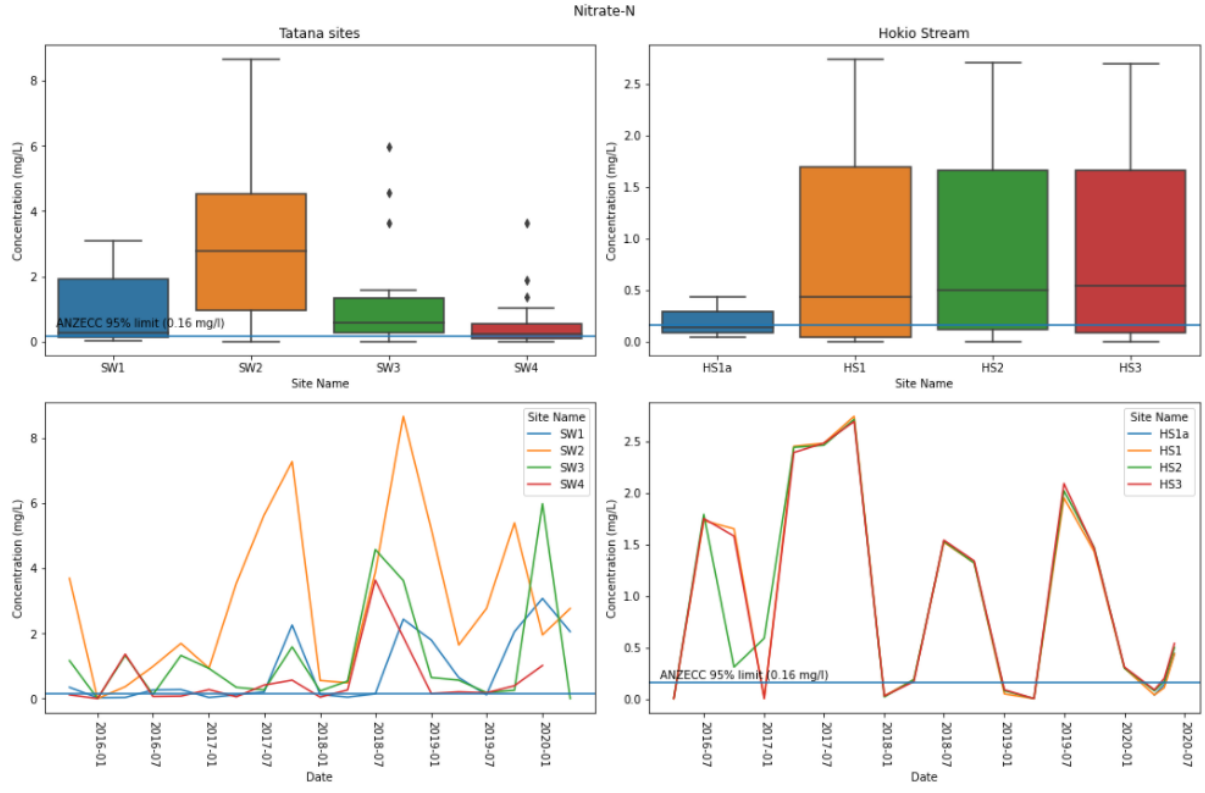


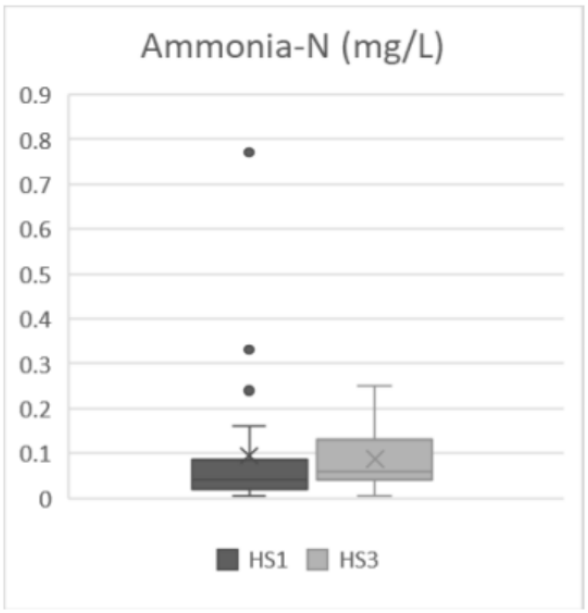
Figure 5: Nitrate concentrations in surface water monitoring sites on Tatana Drain and Hokio Stream shown as box and whisker plots (top) and time series plots (bottom plots) (data since 2016)

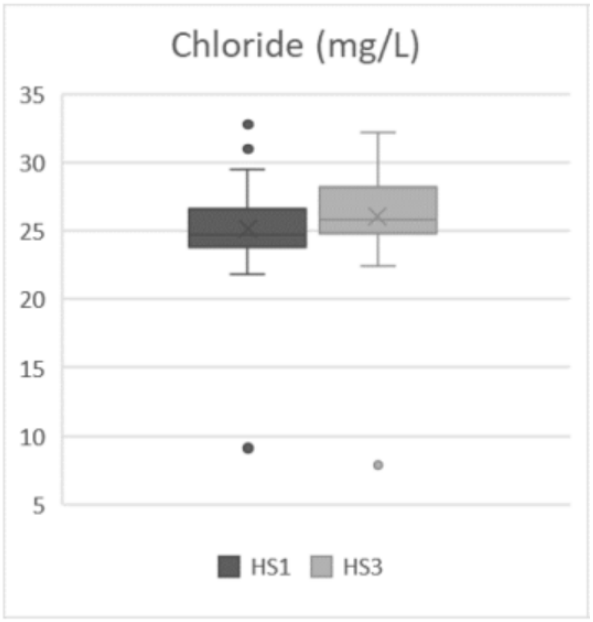
The report (Stantec 2020) provides a high-level overview of Hokio Stream in section 5.1 but provides no information on its current state (water quality or ecology), which is relevant to the interpretation of monitoring data. Hokio Stream is not monitored regularly near the landfill; however, a site is located at the outlet of Lake Horowhenua which gives an overview of its current state (5-year median nutrient data provided below). Nutrients are a key concern for the outlet of Lake Horowhenua site, with concentrations of total nitrogen at the national bottom line of 2.4 mg/L and dissolved reactive phosphorus concentrations of 0.017 mg/L. Nitrate concentrations at this level indicate growth effects on up to 2% of species, but no acute effects. DRP at this level is at the bottom end of NPS-FM (2020) attribute state C, which can result in ecological communities being impacted by increased algal and plant growth, loss of sensitive macroinvertebrate and fish taxa and high rates of respiration and decay.

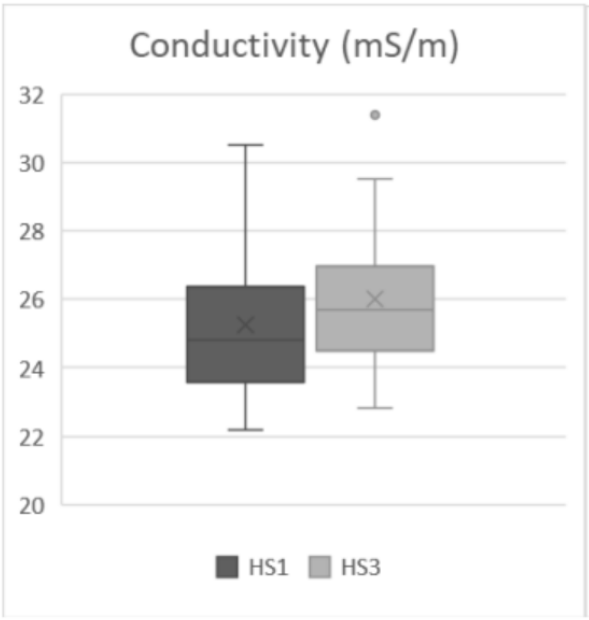
Summary results tables (2019-2020) and box plots of select contaminants from 2011 to 2020 are provided which show an increase in ammoniacal-nitrogen, chloride, and conductivity increase between sites HS1 (upstream) and HS3 (downstream) and pH decreases. It is unclear why the data ranges are different for these outputs and makes interpretation of the data more difficult. The box plots, which are reportedly based on a 10-year record, are provided below and indicate a deterioration in water quality in Hokio Stream between the upstream and downstream monitoring sites. While concentrations of the above parameters are not expected to cause acute effects to instream life in Hokio Stream, they will contribute to the cumulative load that is being added to the Hokio Stream catchment, which is already under pressure from landuse. This is discussed further in section 3 of this letter (mass loading).

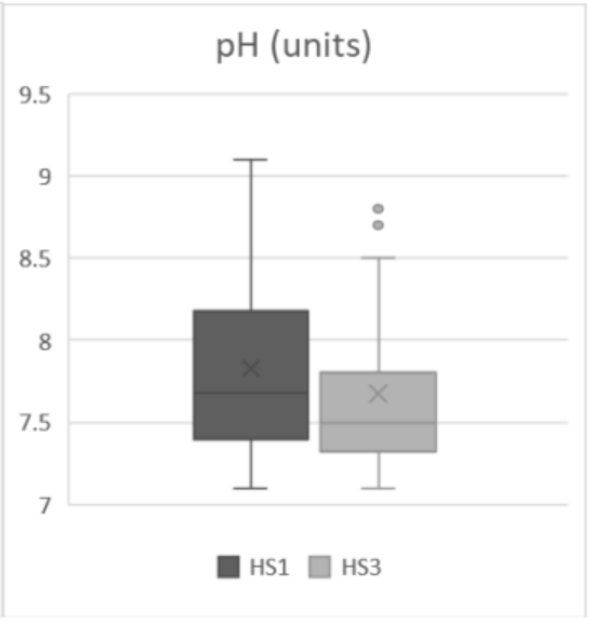
Both the plots below (reproduced from the annual monitoring report) and the plots shown in Figures 4 and 5 above indicate that the Levin landfill contributes to deteriorating instream concentrations in Hokio Stream. These observed effects do not appear to exceed the ANZECC guideline thresholds. However, monitoring is undertaken at quarterly intervals which may not capture the full range of impacts. As discussed in Section 3 of this memo, the contaminant mass balance calculations suggest that impacts could occur that exceed the ANZECC guideline thresholds. The rising trend in ammonia (and other parameters) concentrations observed in some monitoring bores located downstream of the old, unlined landfill are also a cause for concern in this regard.

Although surface water monitoring data is stated to be available from 2011 to 2020 (in box plots below) there is no trend analysis conducted therefore no comment can be made if these parameter increases (from upstream to downstream) have improved or declined over time. It is noted that this is not required in the consent conditions, but it would be helpful to better understand the effects. Statistical analysis was added to the consent conditions in 2019, this does not appear to have been done in the reports provided.









4.2 Tatana Drain

Monitoring in Tatana Drain, a private drain located to the north of the Levin Landfill was also added in 2015 (data for 2019-2020 available in report) after a separate investigation by Stantec 2015, which found "*water in the shallow drain was being impacted by landfill leachate within the vicinity of the unlined closed section of the landfill. The drain also interacts with the shallow groundwater aquifer, with groundwater emerging (daylighting) as surface water to the north of the landfill.*"

The report (Stantec 2020) states *"The Tatana Property drain appears to be intercepting leachate-contaminated shallow groundwater, and then discharging directly to the Hokio Stream"*. This is true; however, the report does not discuss the effects sufficiently, only stating that certain parameters were above the ANZECC AE (95%) trigger values. The results (see Figures 4 and 5 above) however show a clear and strong toxic effect of landfill leachate on Tatana Drain, which may impact a reach of Hokio Stream downstream of the confluence. Ammoniacal-nitrogen levels are acutely toxic to aquatic life (especially in SW1 and SW2), and this is not represented in the report, with the explanation of the results only stating

that ammoniacal-nitrogen didn't meet the ANZECC AE (95%) trigger values. There is also no background to the ecological state of Tatana Drain (fish passage from Hokio Stream, permanent flow etc.) which limits the ability to interpret the data.

Concentrations of ammoniacal-nitrogen at the upper Tatana Drain site (TS1) are 96.8 mg/L which is well above acute toxicity levels. Concentrations do decrease along the length of the drain, dropping from 96.8 mg/L at SW1 to 6.5 mg/L at SW4; however, this level is still well above guideline levels and indicate acute impact level (risk of death) for sensitive species. Tatana Drain sites were reduced from four to one in 2020; however, no reasoning is provided for discontinuing these sites or why SW3 was chosen as the long-term sampling location. It is noted that SW3 (now TS1) had the lowest recorded concentrations of many parameters including ammoniacal-nitrogen, nitrate, total Kjeldahl nitrogen, chloride and conductivity. This does not give an accurate depiction of what is happening in the Tatana Property Drain.

More recent monitoring data (September and November 2020 reports) show the SW1 site ammoniacal-nitrogen concentration of 43.2 mg/L and 57.8 mg/L, which are toxic for instream life. With reference to condition 11(aa), further investigation is recommended including:

- wet weather monitoring to determine if cumulative inputs change during wet weather events;
- assessment of high groundwater level events against surface water quality data in Tatana Drain and Hokio Stream to determine if inputs change at times of differing groundwater levels;
- temporal analysis of data as ammoniacal-nitrogen at this site appears to be increasing; and,
- surface water mixing models to determine concentrations after mixing with Hokio Stream over both short and longer term timeframes, as it is not considered that effects of ammonia toxicity have been accurately calculated.

It is also recommended that the SW1 site is reinstated to further understand the effects of leachate migration into this waterway under a range of groundwater level conditions, as it is noted only four samples have been taken and high groundwater levels could result in high levels of ammonia flowing into Hokio Stream that have not been captured in the monitoring data. Mitigation and treatment options should be investigated for the Tatana Drain, to remove the extremely high level of ammonia before it is discharged into Hokio Stream.

5.0 Conclusion

The annual monitoring report and quarterly monitoring reports for July 2020 and October 2020 indicates that groundwater quality downgradient of the Levin Landfill exceeds the criteria for shallow groundwater (Condition 11(a)) for nitrate nitrogen concentrations, which exceed the ANZECC Livestock Drinking Water Guidelines on at least two occasions in bore B2. However, water quality in the deeper bores appears to be within the New Zealand Drinking Water Standards guidelines and maximum acceptable values with the exception of some exceedances of the guideline values for iron, although elevated iron concentrations are common in groundwater in this area and may not represent an effect from the landfill. The data therefore suggest that the discharge from the landfill complies with Condition 12 of the discharge consent.

The methodology for the contaminant mass loading calculations appears to have carried out in general accordance with the consent conditions. However, there appear to be errors in the reported values and in our opinion the method by which 'background' concentrations have been considered does not appear to be correct. These aspects of the report should be corrected and the annual monitoring report should be reissued.

Hokio Stream is likely to be the ultimate receiving environment for groundwater discharging from the landfill area. However, the Tatana Drain appears to intercept groundwater and discharges directly into Hokio Stream. Therefore, the Tatana Drain also represents a receiving environment for groundwater discharging from the landfill. Water quality within the Tatana Drain is poor, although the data appears to suggest that it improves as water is conveyed downstream towards the confluence with the Hokio Stream. Regardless of the improvement, concentrations of parameters such as ammonia are significantly in excess of the toxicity thresholds for aquatic life in the Tatana Drain at the most downstream sampling site.

Sampling data indicates that discharges from the landfill affect water quality in Hokio Stream, although the effects do not appear to exceed the relevant guideline thresholds. Whilst this may be the case based on the current dataset, rising concentrations of ammonia and other parameters in bores located downgradient of the old, unlined landfill are a potential cause for concern, as are the recent breaches of the nitrate thresholds for shallow groundwater in bore B2. Notwithstanding the comments above, we also note that the contaminant mass balance calculations indicate that effects from the landfill could cause effects on Hokio Stream that exceed the guideline values.

Combined, the pattern of rising concentrations and potential for effects in Hokio Stream should be considered as early warning signs and preparations to manage those effects should be put in place.

Overall, the Levin landfill has localised effects on groundwater quality which exceed the consent conditions in bore B2. In that respect, the effects from the landfill on groundwater quality could be described as adverse and as per condition 11(a), further investigation is required. The landfill also has significant effects on the Tatana Drain, where ammonia concentrations exceed the acute toxicity thresholds. As a result, effects on the Tatana Drain can be described as adverse. The data indicates that there are effects from the landfill on water quality in Hokio Stream, but these effects do not exceed the relevant ANZECC or ANZG guideline thresholds.

6.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Horizons Regional Council and others (not directly contracted by PDP for the work), including Stantec Limited. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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