# New Plymouth District Council
# Colson Road Landfill
## Monitoring Programme
## Annual Report
## 2023/24
## Technical Report 2024-06

Taranaki
Regional Council

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# Executive summary

The New Plymouth District Council (NPDC) operates a regional landfill located on Colson Road, New Plymouth, in the Waiwhakaiho Catchment. Stage 3 of the site has a design capacity of approximately 800,000m$^3$. Stage 3 ceased accepting waste in the 2020/21 year and is now in the process of being capped. There is capacity remaining within the design volume and NPDC have indicated that this may be used for contingency disposal. Stages 1 and 2 have been closed and are fully reinstated

This report for the period July 2023 to June 2024 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess NPDC's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of NPDC's activities.

**During the monitoring period, NPDC demonstrated a good level of environmental performance and high level of administrative performance.**

NPDC holds ten resource consents, which include a total of 135 conditions setting out the requirements that NPDC must satisfy. NPDC holds one consent to discharge uncontaminated stormwater into the Puremu Stream, two consents to discharge contaminated stormwater and minor amounts of leachate into the Puremu Stream, two consents to discharge emissions into the air, one consent to discharge solids onto and into land and three consents to discharge stormwater and sediment from earthworks. NPDC also holds one consent to divert water.

The Council's monitoring programme for the year under review included 12 routine compliance monitoring inspections, ten stormwater/discharge samples, 21 surface water samples, 20 groundwater samples, two biomonitoring surveys of receiving waters and two ambient air quality surveys. NPDC collected nine leachate samples and five under liner drainage samples for physicochemical analysis as part of their routine monitoring of the site.

Inspection found that the site was generally well managed during the year under review. It was considered that the erosion and sediment control at the site was carried out to a good standard. The site was stabilised for the winter period in a satisfactory manner following completion of the seasons capping activities.

Groundwater and under liner drainage sampling indicated that although there is no significant contamination occurring in the local aquifer as a result of the landfill's presence, there are emerging trends of increasing, but still low level, concentrations of some parameters in some of the bores and the under liner drainage. An Abatement Notice has previously been issued and the monitoring programme been expanded so that the potential for future adverse effects can be evaluated.

Chemical and bacteriological monitoring of the Puremu and Manganaha Streams found that the receiving water quality criteria on the consents were met at the time of the scheduled sampling surveys. During the year under review there were no non-compliances with the manganese concentrations in the receiving waters, however these did remain elevated in the discharge from the large silt pond and further investigation may be required to ensure continued consent compliance.

Overall, both biological monitoring surveys indicated that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site had not had any significant detrimental effect on the macroinvertebrate communities of the Puremu and Manganaha Streams.

Air quality monitoring showed that there were no significant adverse effects in relation to suspended particulates, dust deposition rates or odour beyond the site boundary.

An enclosed gas flare system was installed for air quality control during the 2017/18 monitoring period. This was well managed during the year under review and there were no substantiated odour complaints received during the 2023/24 period that were associated with the Colson Road landfill.

Overall, NPDC demonstrated a good level of environmental performance and a high level of administrative performance with the resource consents as defined in Appendix II. The Abatement Notice issued during the 2020/21 year in relation to water quality changes in the groundwater in the under liner drain, and monitoring plan requirements were still in effect during the 2023/24 monitoring period. There appear to be some legacy issues that are affecting the water quality in the receiving environment. These have resulted in some consent non-compliances however, they have not resulted in any non-compliant results in the surface waters or had significant adverse effects on the receiving waters during the year under review.

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of a total of 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance has improved.

This report includes recommendations for the 2024/25 year.

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# 1. Introduction

## 1.1 Compliance monitoring programme reports and the Resource Management Act 1991

### 1.1.1 Introduction

This report is for the period July 2023 to June 2024 by Taranaki Regional Council (the Council) on the monitoring programme associated with Resource Consents held by New Plymouth District Council (NPDC). NPDC operated a regional landfill situated on Colson Road, New Plymouth, in the Waiwhakaiho Catchment that ceased accepting waste during the year 2020/21 year and is now in the process of being capped.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by NPDC that relate to discharges of water, discharge to land, a stream diversion within the Waiwhakaiho Catchment and the two air discharge permits held by NPDC to cover emissions to air from the Colson Road landfill. This report is the 24th annual report to be prepared by the Council to cover NPDC's air, land and water discharges and their effects.

### 1.1.2 Structure of this report

**Section 1** of this report is a background section. It sets out general information about:

- consent compliance monitoring under the *Resource Management Act 1991* (RMA) and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the Resource Consents held by NPDC in the Waiwhakaiho Catchment that relate to the Colson Road landfill;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the Colson Road landfill.

**Section 2** presents the results of monitoring during the period under review, including scientific and technical data.

**Section 3** discusses the results, their interpretations and their significance for the environment.

**Section 4** presents recommendations to be implemented in the 2024/25 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

### 1.1.3 The Resource Management Act 1991 and monitoring

The RMA primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
b. physical effects on the locality, including landscape, amenity and visual effects;
c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
e. risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' in as much as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

### 1.1.4 Evaluation of environmental performance

Besides discussing the various details of the performance and extent of compliance by the consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix II.

For reference, in the 2023/24 year, consent holders were found to achieve a high level of environmental performance and compliance for 864 (89%) of a total of 967 consents monitored through the Taranaki tailored monitoring programmes, while for another 75 (8%) of the consents a good level of environmental performance and compliance was achieved. A further 26 (3%) of consents monitored required improvement in their performance, while the remaining two (<1%) achieved a rating of poor. [1]

## 1.2 Process description

The site no longer accepts wastes and is in the process of being closed in accordance with the conditions of the consent and the Colson Road Regional Landfill Management Plan (CRRLMP), prepared by NPDC, and approved by Council.

Daily operations at the site are governed by the requirements contained in the CRRLMP, which is written to ensure operations comply with the requirements of the consent and that effects are minimised. The CRRLMP is reviewed annually and updated as required.

### 1.2.1 Discharges to water

The leachate from Stages 1, 2 and 3 is collected and directed to the New Plymouth wastewater treatment plant, along with contaminated stormwater from Stage 3. Currently it is very unlikely that the stormwater will contain anything other than sediment. The only time when the stormwater may contain contaminant from the waste is in the case of a leachate breakout. NPDC have proactively put soak holes in place along both the western and eastern faces of Stage 3 that drain to within the landfill footprint in order to capture breakouts and direct them to the leachate system. NPDC has advised that the soak holes are all contained within the liner and are below final levels. They measure approximately 6m x 4m and 1.2m deep.

Contouring, preparation work and the application and stabilisation of areas of the final cap continued during the year under review (Photo 1 and Photo 2). A site closure plan (CP) has been prepared for NPDC that has been reviewed and accepted by Council, which NPDC is continuing to follow. This is discussed further in Section 2.1.3.

[1] The Council has used these compliance grading criteria for more than 20 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

Photo 1 Stabilised north-western toe of Stage 3, May 2024

Photo 2 Western batter of Stage 3 cap looking south, May 2024

To enable sufficient cover material to be accessed from within the property boundary, works have been undertaken in the south-eastern area of the site, which was the former composting area. These works included installing drainage around the composting area previously occupied by Return2Earth and Revital. Sediment discharges from the borrow area are treated by a separate sediment pond (Photo 3), with the catchment area to this pond having been expanded to enable treatment of the stormwater from the Stage 2 cap remediation works (Photo 4). These works were completed during the 2022/23 year, including stabilisation of the cap. The stormwater drainage from this area continues to flow through the borrow area sediment pond.

The sediment treatment system for Stage 3 was upgraded during the 2020/21 year. This was undertaken following an analysis of the erosion and sediment control measures in place at the site and associated recommendations. These upgrades included the addition of a pretreatment pond (Photo 5) prior to the large silt pond and floating decants in the large silt pond (Photo 6).

Photo 3 Borrow area sediment pond, April 2024

Photo 4 Amended drainage and access during capping works for Stage 2 remediation, June 2023

Photo 5 Pre-treatment pond for large silt pond, May 2024

Photo 6 Floating decant system in the large silt pond, April 2024

### 1.2.2 Discharges to air

With the composting area having been closed, the actual or potential discharges from the site are landfill gases (LFG) and dust.

#### 1.2.2.1 Landfill gas

The Resource Management (National Environmental Standards for Air Quality) Regulations 2004 as at 1 July 2017 (NES) requires the control of greenhouse gas emissions at landfills (Regulations 25 to 27). Regulation 25 discusses the applicability of the two following regulations. In the case of Stage 3 of the Colson Road landfill, Regulations 26 and 27 do not apply as this stage of the landfill has a total capacity of less than 1 million tonnes (the threshold for Regulations 26 and 27 to apply).

Landfill gas (LFG) is generated by the decomposition of organic waste materials by bacteria within a landfill. LFG consists mainly of methane and carbon dioxide with trace amounts (typically 1% or less) of odorous reduced sulphur compounds (including hydrogen sulphide) and other volatile organic compounds (VOCs). LFG can be distinctly odorous depending on the concentration of odorous components and dilution. It also presents an explosion/flammability hazard at certain concentrations and can present potential health risks due to low levels of various organic hazardous air pollutants. LFG monitoring of leachate pipework at Colson Road landfill in February 2016 showed the composition of LFG to be 63% methane, 33% carbon dioxide, 1% oxygen, 2% nitrogen and the remaining 1% trace constituents, which is a typical composition for landfill gas. These trace constituents include sulphurous compounds including hydrogen sulphide ($H_2S$).

Typically, LFG contains a small amount (0.4%) of non-methane organic compounds (NMOC), which can contain hazardous organic air pollutants. Most of the NMOC emissions result from the volatilisation of

organic compounds in the landfilled waste. Small amounts may be created by biological processes and chemical reactions within the landfill.

The most notable environmental effect associated with LFG emissions is the odour from $H_2S$ and the other sulphurous compounds. The odour threshold for $H_2S$ is very low and it is detectable at concentrations as low as 0.0005 parts per million (ppm). The odour becomes offensive at only 0.15ppm. Prolonged exposure at 2-5ppm can result in nausea, eye irritation, headaches and breathing problems in asthmatics. The current long term occupational exposure limit is 10ppm as a time weighted average, with a 2018 review by WorkSafe recommending that this be reduced to 1ppm.

Fugitive discharges of LFG are generally diffuse discharges through the landfill cap. The practice of closing the valve in the leachate line from Stage 3 and the resulting increase in the leachate level within the landfill increases the discharge of LFG. This is due to the water displacing the LFG from pockets within the waste, which will be forced up to the highest points in the leachate lines, which are the laterals that are close to the underside of the cap. It is noted that although the landfill is no longer accepting waste, the landfill could continue to produce potentially odorous gas for up to 30 years post closure.

NPDC chose to install a flare at the landfill to mitigate odour issues that were resulting in a significant number of complaints in the 2014 to 2016 years. Although the NES does not apply at the site, this was used to provide guidance in the development of the conditions attached to the varied consent and on the 'best practicable option' requirement contained in the pre-existing Consent.

During 2017/18 a fully enclosed gas flare was installed at the site. The gas capture system utilised the lateral leachate lines to capture and direct the LFG to the flare.

Commissioning of the landfill gas management system occurred during January to March 2018, with operational and monitoring procedures developed to ensure the gas system was managed effectively. NPDC operations staff have been provided with training in order to carry out operation of the system in a safe and effective manner, while ongoing support and maintenance is provided by consultants. The initial gas capture systems was built to capture the landfill gas from the leachate lines.

There has been a noticeable reduction in odour around the landfill perimeter since the flare became operational.

During the 2023/24 year, the gas capture system was modified so that the LFG from the north-eastern corner of Stage 3, which was achieved by installing pipework approximately diagonally across the landfill at around 500mm depth.

As the flare had been effective in preventing odour issues, and there had been no odour complaints during breakdown periods, it was agreed that the use of the deodorising sprayer on a daily basis could be discontinued. The system was turned off in early April 2024.

#### 1.2.2.2 Dust

In order to cap the landfill there is a significant amount of earthwork being undertaken that has the potential to result in dust issues. This is mitigated by:

- sweeping the roads to remove material that has been tracked onto the roads by the heavy vehicle movements before this dries and is disturbed by on-going truck movements; and
- the use of water carts to suppress the dust by wetting surfaces that are not stabilised (Photo 7).

Photo 7 Water carts in use, February 2024

Consent 10804-1.0 required that the borrow area be stabilised during periods of activity. NPDC had chosen to achieve this by applying a polymer product across the borrow area. Due to a combination of supply issues and stormwater accumulation in the area, it had not been possible to apply this product over the entire borrow area. During the year under review the need to use this product was reassessed. It was agreed that, so long as consent compliance was achieved, the product no longer needed to be used give that:

- The source of the borrow area was reasonably well compacted, either because it hadn't yet been disturbed, or truck movements had compacted the surface;
- complete coverage of the area with polymer had not been achieved; and
- there had been no issues with either sediment or dust discharge.

### 1.2.3 Operational history relevant to on-going discharges and emissions

Waste disposal at this site occurred from the 1970s to October 2020, with the site developed for use in a number of stages.

General and municipal waste was discharged to Stage 3 of the operation until early August 2019, with the site re-opening for special waste only later that month. The Council was informed early of NPDC's intent to continue to use the site for the disposal of special waste only (within the existing conditions of the various consents), and a significant amount of consultation occurred during the 2018/19 year around how this could be managed in such a way as to continue to comply with the conditions of the existing consents. During the 2020/21 year, the site accepted special waste only, with this activity ceasing in October 2020.

The special waste disposal cell is located on top of the Stage 3 towards the southern end of the landfill. A two metre deep clay cell was constructed that contained leachate collection lines, which were linked to the Stage 3 leachate collection system. Prior notification was required for the customers wanting to dispose of

special waste. Pits, which were generally sized to take only a single day's waste, were dug into the clay cell. The cell was covered at the end of the day.

When the landfill was fully operational, wastes originating from municipal refuse kerbside collection, the Colson Road transfer station, other municipal transfer stations around the region and commercial operators were discharged to the landfill. As of December 2007, Colson Road was the sole operating landfill in the Taranaki region. Once the waste was discharged it was compacted and covered daily with clay or a suitable alternative as per the requirements of the management plan. The composting area was operational from the 1996/97 year and ceased in February 2022.

An aerial plan of the site is shown in Figure 1.


Figure 1 Aerial view of the Colson Road landfill

Efforts are continuing to establish a clear three dimensional conceptual model for the entire site, in terms of potential sources of contaminants from leachate, flow paths and receptors, in order to inform the consent replacement applications. A recommendation reflecting this intent is presented in Section 4. An outline of the current understanding of the isolation, collection and treatment systems in place at the site is outlined below. This will be updated as the elements required for the conceptual model are investigated and confirmed.

Stage 1A is on the western side of the central access road, filling a valley on the western side of the property. This Stage was operational in the 1970's and 1980's. Landfilling methodology was in accordance

with the then NPDC's Operative District Plan. The area was not lined but does have a leachate drainage system that discharges to the leachate system.

Stage 1B is on the eastern side of the central access road between the northern ends of Stage 1A and Stage 3. This stage involved the development of a valley directly to the east of the site weighbridge and was developed to provide additional landfilling space to cover the period between the closure of Stage 1A and the granting of the consents for Stages 2 and/or Stage 3. Landfilling methodology was in accordance with the conditions applying to the development of Stage 1A. The finished landform was capped and profiled consistent with modern landfilling practice and was subsequently planted with pine trees to act as a visual barrier for Stage 3. The depth of the cap in this area was not recorded. The pine trees covering Stage 1B were felled and chipped at the end of the 2022/23 year, with the chippings spread on top of the cap.

Stage 2 was an overlay of Stage 1 and was established on top of a 300mm Taranaki ash (clay) liner. Leachate collection drains were installed to drain leachate to the leachate pump station. This area was operational in the mid to late 1990's. At the time of closure Stage 2 was capped, with Stage 1 being recapped and reshaped with excess cut from the Stage 3 valley. This ensured that the entire landfill footprint on the western side of the property was capped and profiled consistent with modern landfill practice.

Construction of Stage 3 began in 1999, with filling commencing in June 2002. This stage has a fully engineered liner consisting of high density polyethylene (HPDE) laid over compacted clay. Under liner groundwater drainage was also installed. This discharges to a large stormwater detention pond at the northern end of the site. Leachate is collected in porous pipes that have been put down in herring bone configuration over the polyethylene liner. On 12 July 2005, the waste at the southern end of Stage 3 slumped a distance of 8 to 10m, with the waste also rotating within the lined area. The slip involved 50,000 tonnes of compacted refuse. An operator on site at the time of the slip described the motion of the waste as 'sloshing backwards and forwards for about 30 seconds'. This resulted in a number of tears in the liner that were visible above the level of the settled refuse. All but one of the tears were considered to be due to items in the refuse puncturing and ripping the liner during the slump, with only one tear that may have been as a result of the liner tearing due to being stretched. All of the visible tears were repaired. With the 300mm clay cover over acting to protect the liner in the lower area of the landfill, it was considered reasonable to assume that damage under the waste lower down may have been less severe. It was agreed that 18 months of monitoring of the water quality in the under liner drainage would occur prior to attempting to remove the waste to visually inspect the liner. This monitoring did not detect any changes that would indicate contaminants escaping the landfill through the liner. Therefore, removal of the waste and a visual inspection was not considered necessary at that time, but that monitoring of the under liner groundwater quality would continue. In terms of the leachate collection system, it was found that movement of the refuse resulted in issues with the integrity of the leachate system. Although the leachate line was in good condition up to 130m from the northern end of the landfill, under the northeastern segment beyond that, it was compromised. These factors resulted in wet conditions developing in two areas within the landfill footprint. Bentonite matting was utilised and a secondary leachate drainage system was constructed on top of the clay cover over the slumped refuse in the southern end of the landfill.

During the 2013/14 year, the lining of Stage 3 was completed so that the liner covered Stage 3's entire footprint. From this point on, there was an increase in the amount of potentially contaminated stormwater generated due to the increase in the lined and filled area, and this was therefore directed to the leachate collection system for discharge via the New Plymouth wastewater treatment plant. From this point in time, the volumes of leachate/contaminated stormwater generated exceeded the instantaneous capacity of the pipe to the wastewater treatment plant on occasion. Therefore, the flow from Stage 3 to the leachate system is controlled via a shut off valve to minimise the potential for overflows to the Puremu Stream, when required. Under these circumstances excess leachate/contaminated stormwater is stored within Stage 3 of the landfill.

With respect to air discharges from the site, the landfill had been operated for most of its life without significant off site problems, but during the 2014/15 period, 20 complaints were received regarding odours from the landfill. The Council worked with NPDC to target on site odour sources, whilst a consultant was engaged by NPDC to provide expert advice on remedial actions and longer term solutions. A range of mitigations measures were implemented by NPDC that had been recommended by the consultant as a staged approach to addressing the odour issue, these included remediation in areas of the intermediate cover, capping the open ends of the lateral leachate lines, improved management of the special waste pits and the installation of fixed deodorant sprayers and an automated spray system prior to the installation of the flare.

## 1.3 Resource Consents

NPDC holds ten Resource Consents the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3 of this report.

A summary of the various consent types issued by the Council is included in Appendix I, as are copies of all permits held by NPDC during the period under review.

Table 1 Consents held by NPDC that relate to the Colson Road landfill

| Consent number | Purpose | Granted | Review | Expires |
|---|---|---|---|---|
| *Water discharge permits* | | | | |
| **2370-3** | To discharge leachate and contaminated stormwater from area A to the Puremu Stream | March 2003 | - | June 2026 |
| **4619-1** | To discharge treated stormwater and minor amounts of leachate from areas B1, B2, C1 & C2 to groundwater and the Puremu Stream | March 1999 | - | 1 June 2025 |
| **4620-1** | To discharge uncontaminated stormwater from areas B1, B2, C1 and C2 into the Puremu Stream | March 1999 | - | 1 June 2025 |
| **6177-2.0** | To discharge stormwater and sediment from earthworks associated with the capping of Stage 3 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream | October 2021 | - | 1 June 2025 |
| **10804-1.0** | To discharge stormwater and sediment arising from earthworks into an unnamed tributary of the Puremu Stream | February 2020 | - | 1 June 2026 |
| **10912-1.0** | To discharge stormwater and sediment from earthworks associated with the capping of Stage 2 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream | October 2021 | - | 1 June 2025 |
| *Air discharge permit* | | | | |
| **4622-1** | To discharge emissions to air from composting | March 1999 | - | 1 June 2025^ |
| **4779-1.1** | To discharge emissions to air from landfilling | January 2017* | - | June 2026 |
| *Discharges of waste to land* | | | | |
| **4621-1.1** | To discharge contaminants onto and into land in areas B1, C1 and C2 | May 2021* | | 1 June 2025 |
| *Land use permits* | | | | |
| **0226-1** | To divert the Puremu Stream by placing a culvert to provide road access | October 1986 | - | October 2026 |

* Commencement date of varied consent

^ Surrendered January 2025

## 1.4 Monitoring programme

### 1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of Resource Consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations and seek information from consent holders.

The monitoring programme for the 2021-2024 years is significantly different from that of the 2020/21 and prior years.

In the 2020/21 year, following a number of investigations undertaken by NPDC, it was confirmed that there were some changes in parameters in the groundwater in the under liner drain that likely exceeded the maximum natural background variation. It was also found that the 'trigger values' that should have been included in the site's monitoring plan had not been identified and documented. This was recorded as an unauthorised incident on the Council's incident register. An outline of the findings of the investigations is presented in Section 2.6, with the on-going matters that have impacted on the Council's monitoring programme for the site outlined below.

It was agreed that additional monitoring would be undertaken and that early consent replacements would be sought to ensure compliance with Abatement Notice EAC-23544 by the revised date of 31 January 2024.

A number of discussions took place focusing on ensuring that any monitoring programme addressed:

- current consent conditions; and
- the identification and evaluation of potential adverse effects on the environment in preparation for the application for early replacement of the landfill discharge consents; and
- the concerns raised by the submitters (including the Te Atiawa Tribal Council) during the processing of the application for the current consents.

Following these discussion Council developed the methodology that would be applied to the development of the monitoring programme during the transition of the site from a closing site with a recently emerged trend of increases in some of the indicator parameters, to a closed site with a clear conceptual model. The methodology is outlined in Table 2.

Table 2 Monitoring programme objectives and programme development methodology

| On-going monitoring | Baseline and site characterisation | Post closure monitoring |
|---|---|---|
| ***Objective:*** ***Compliance monitoring of discharges and effects in relation to current consent conditions*** | ***Objective:*** ***Investigation of emerging contamination issue and information gathering for the re-consenting Assessment of Environmental Effects (AEE)*** | ***Objective:*** ***Compliance monitoring of discharges and effects in relation to consent conditions on the closed site consent(s)*** |
| Monitoring of the existing site against the current consent conditions | Step 1. Baseline characterisation of contaminants in the actual or potential discharges from the site at the time of closure, as per the recommendation in 'A Guide to the Management of Closed and Closing Landfills in New Zealand' and international best practice landfills.<br>Presence or absence of seasonal variation needs to be understood | |

| On-going monitoring | Baseline and site characterisation | Post closure monitoring |
|---|---|---|
| | Step 2. Determination of groundwater flow directions and appropriate on-going groundwater monitoring locations (may be prior to or concurrent with step 1. This is required to enable the following steps) | |
| Appropriate modification of compliance monitoring programme against the current consent conditions | Step 3. Review results from Steps 1 and 2 and determine appropriate on-going monitoring locations and parameters for groundwater and surface water discharges and receiving water sites with respect to actual or potential adverse effects and current consent conditions | |
| | Step 4. Determine appropriate consultation, consent conditions and consent limits during the re-consenting process | Monitoring of the closed site against the new consent conditions with an understanding of the potential environmental effects and a clear conceptual model |

It is noted that the final programme developed for the monitoring of the closed site will need to include the 'contingency comprehensive monitoring' and details of the contaminants and levels at which more comprehensive monitoring will need to be undertaken based on 'indicator' results.

The first year of baseline and site characterisation monitoring commenced in the 2021/22 year.

The monitoring programme for the Colson Road landfill site for the 2023/24 year consisted of six primary components, as described in Sections 1.4.2 to 1.4.7. A summary of the monitoring undertaken by the Council is also provided in Table 3.

Table 3 Summary of monitoring activity for 2023/24

| Activity | Number |
|---|---|
| Inspections | 12 |
| Stormwater samples | 10 |
| Receiving water samples | 21 |
| Groundwater samples | 20 |
| Air deposition samples | 12 |
| Ambient methane readings | 3 |
| Ambient hydrogen sulphide readings | 3 |
| Ambient PM10 readings | 3 |
| Biomonitoring surveys | 2 |

### 1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application, including consultation on changes to the stormwater and leachate drainage systems and localised erosion and sediment controls;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

### 1.4.3 Site inspections

Twelve routine monitoring inspections were undertaken at the Colson Road landfill during the monitoring period. With regard to consents for the discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on site processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by the NPDC were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

### 1.4.4 Consent holder submitted data

#### 1.4.4.1 Water quality

Historically NPDC has collected samples of the combined leachate from the site at a point where the leachate discharges from Stages 1, 2 and 3 are combined. NPDC has also collected samples from the under liner groundwater drainage. The number of samples per year collected and the parameters determined have been as required by the relevant Colson Road Landfill Management Plan (CRRLMP). The data was provided to Council on an annual basis and generally consisted of:

- A minimum of four samples of the combined leachate from the site analysed for indicator parameters that included pH, biochemical oxygen demand, suspended solids, conductivity, turbidity, alkalinity, ammoniacal nitrogen, cadmium, chromium, chloride, copper, iron, lead, manganese, nickel and zinc; and
- A minimum of four samples of the under liner groundwater drainage analysed for indicator parameters that included pH, chemical and/or biochemical oxygen demand, suspended solids, faecal coliforms, conductivity, turbidity, alkalinity, ammoniacal nitrogen, cadmium, chromium, chloride, copper, iron, lead, manganese, nickel and zinc.

Following the review of the monitoring programme in the 2020/21 year, it was agreed that samples would be taken at quarterly intervals for the under liner groundwater drainage and twice a year for leachate from Stage 3 and combined leachate from Stages 1 and 2.

In addition, two sets of samples per year from the under liner groundwater drainage and the two samples from each of the leachate collection points were to be tested for an extended range of parameters to enable characterisation of the leachate discharges and to establish whether any of these contaminants are entering the under liner groundwater drainage.

This revised self-monitoring schedule was implemented in the 2021/22 year and was repeated in the 2023/24 year. The need for the expanded sampling protocol will be reviewed annually. Consideration will also need to be given to medium term monitoring of separate leachate samples (the Stages 1 and 2 and the Stage 3 leachate lines) for selected parameters on a biannual basis due to the waste in these areas being from different time periods and being in different stages of composition. It is also noted that there are different discharge pathways associate with the Stage 1 and 2 leachate and the Stage 3 leachate.

#### 1.4.4.2 Flare monitoring data

NPDC monitors the feed gas to the flare, the flare temperature and maintains an operational log as required by the conditions of the consent. This information is provided to the Council on an annual basis and the results of this monitoring are presented in Section 2.5.1.

### 1.4.5 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge points and mixing zones. Water quality and discharge sampling sites are shown in Figure 2.

The Puremu Stream, Manganaha Stream and stormwater were all sampled on three occasions during the period under review.

One survey is scheduled to be undertaken at the start of or following a period of wet weather that focuses on potential effects from surface water discharges. Samples collected during this survey are analysed for the indicator parameters of pH, temperature, suspended solids, faecal coliforms, conductivity, turbidity, alkalinity, ammoniacal nitrogen, chloride. This survey was undertaken on 26 September 2023.

Two surveys are scheduled to be undertaken during periods of dry weather, one during a period of high groundwater levels and one during a period of low groundwater levels. These surveys are focused on the potential discharges of contaminants from groundwater and any discharges from the stormwater network occurring under these conditions. These surveys were undertaken on 13 November 2023 and 29 April 2024.

In terms of the Manganaha Stream sampling, the consents prohibit the direct discharges to the Manganaha Stream. The samples collected from this stream, under these dry weather conditions, were analysed for a small range of indicator parameters to confirm that the discharges from the site are not impacting on the water quality of the Manganaha Stream.

The Puremu Stream samples were analysed for a range of indicator parameters and the parameters required to be able to confirm compliance with specific limits given in the consent conditions. The stormwater discharges to the Puremu Stream and tributary are permitted to contain minor amounts of leachate. The stormwater samples were therefore analysed for the above parameters, and in addition, a more comprehensive range of parameters to get a better understanding the water quality of these discharges in terms of the potential influence of leachate.

The groundwater monitoring aspect of the programme was revised prior to the start of the 2021/22 year, with nine bores in the vicinity of the landfill scheduled to be sampled on two occasions during the year under review at the locations identified in Figure 3. In the 2021/22 year, one of the monitoring bores (GND0572) was not sampled as the bore was found to be compromised. Investigation found that this bore could not be re-instated. Two replacement bores (GND3182 and GND3183) were installed down gradient of GND0573 and these replacement bores were sampling of these bores commenced in the 2022/23 year. The groundwater sampling sites are described in Table 15.

Prior to the 2021/22 monitoring year groundwater monitoring had only been undertaken once per year. Between June 2021 and July 2024 sampling has been undertaken biennially, but there have been a reasonable number of changes in the bores monitored during that time period. There have been a consistent set of bores sampled and parameters determined in both 2022/23 and 2023/24.

One of the groundwater surveys is programmed to be undertaken under high groundwater level conditions. This was predicted as most likely to be in the October/November period each year. In the year under review this sampling was undertaken over two days in mid-November 2023. Samples collected during this survey are analysed for a range of indicator parameters, inorganic nitrogen species, dissolved metals, volatile and semi-volatile organic compounds.

The second survey is scheduled to be carried out under low groundwater level conditions. This was predicted as most likely to be in the April/May period each year. Samples collected during this survey are analysed for a reduced range of parameters that is limited to: the same range of indicator parameters as the high groundwater level survey; inorganic nitrogen species; and a reduced range of dissolved metals. This survey was undertaken over two days in May 2024.

The two years of monitoring that have been undertaken with the same structured approach has enabled a review of the appropriateness of this structure for setting the timing of the high and low level surveys. This is discussed in Section 2.4.

### 1.4.6 Ambient air quality

The Council undertook sampling of the ambient air quality in the neighbourhood. The air monitoring sites are shown in Figure 4.

Six deposition gauges were placed at selected sites in the vicinity of the landfill and at the landfill on two occasions, and the collected samples analysed for solids.

The three programmed ambient suspended particulate, methane and hydrogen sulphide surveys were undertaken during the year under review.

### 1.4.7 Biomonitoring surveys

Biological surveys were performed on two occasions in the Puremu Stream (four sites) and Manganaha Stream (two sites) to determine whether or not the discharges from the site have had a detrimental effect upon the communities of the streams.

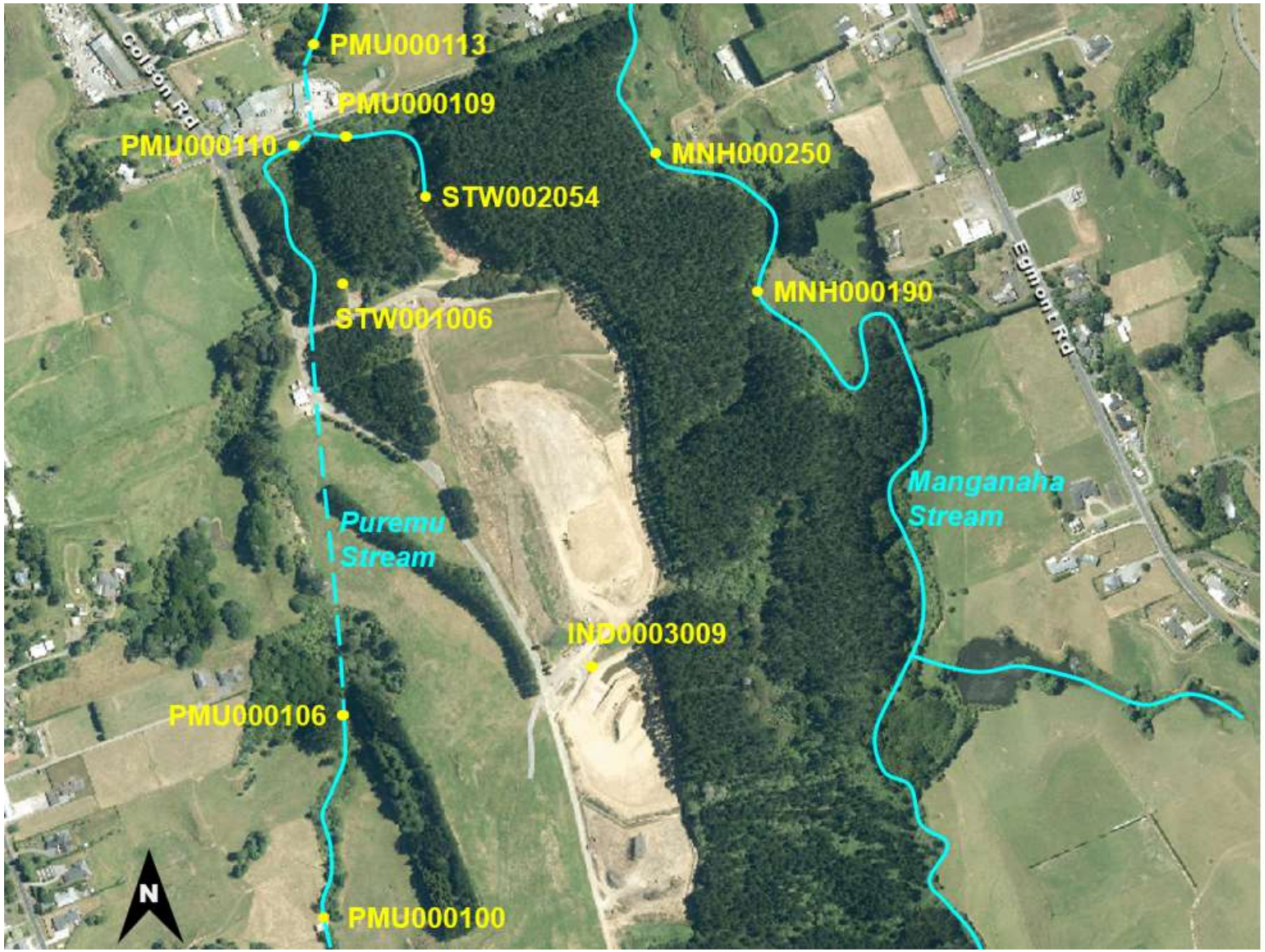


Figure 2 Aerial photo of the stormwater and receiving water sampling sites

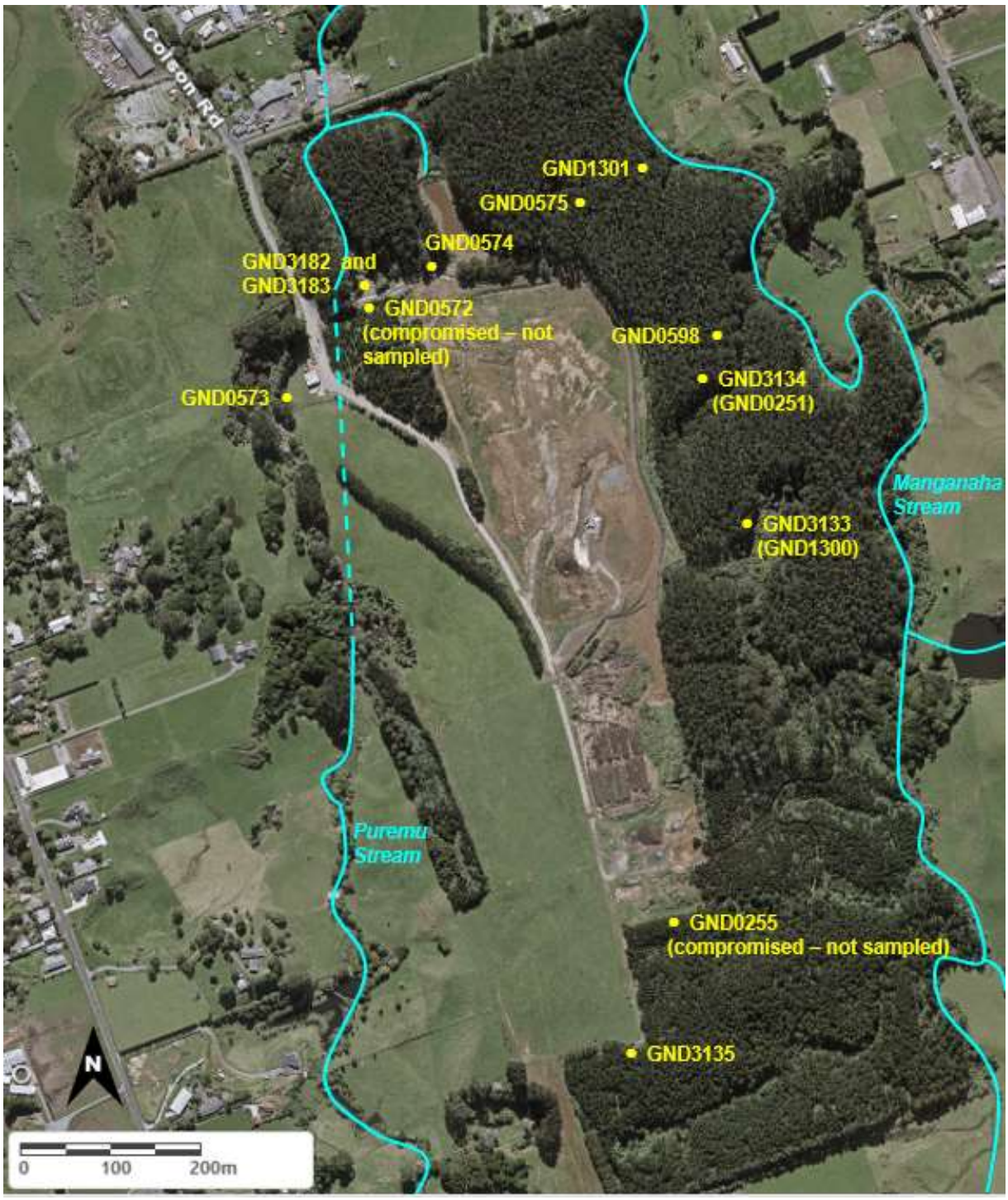


Figure 3 Aerial view of the groundwater sampling sites

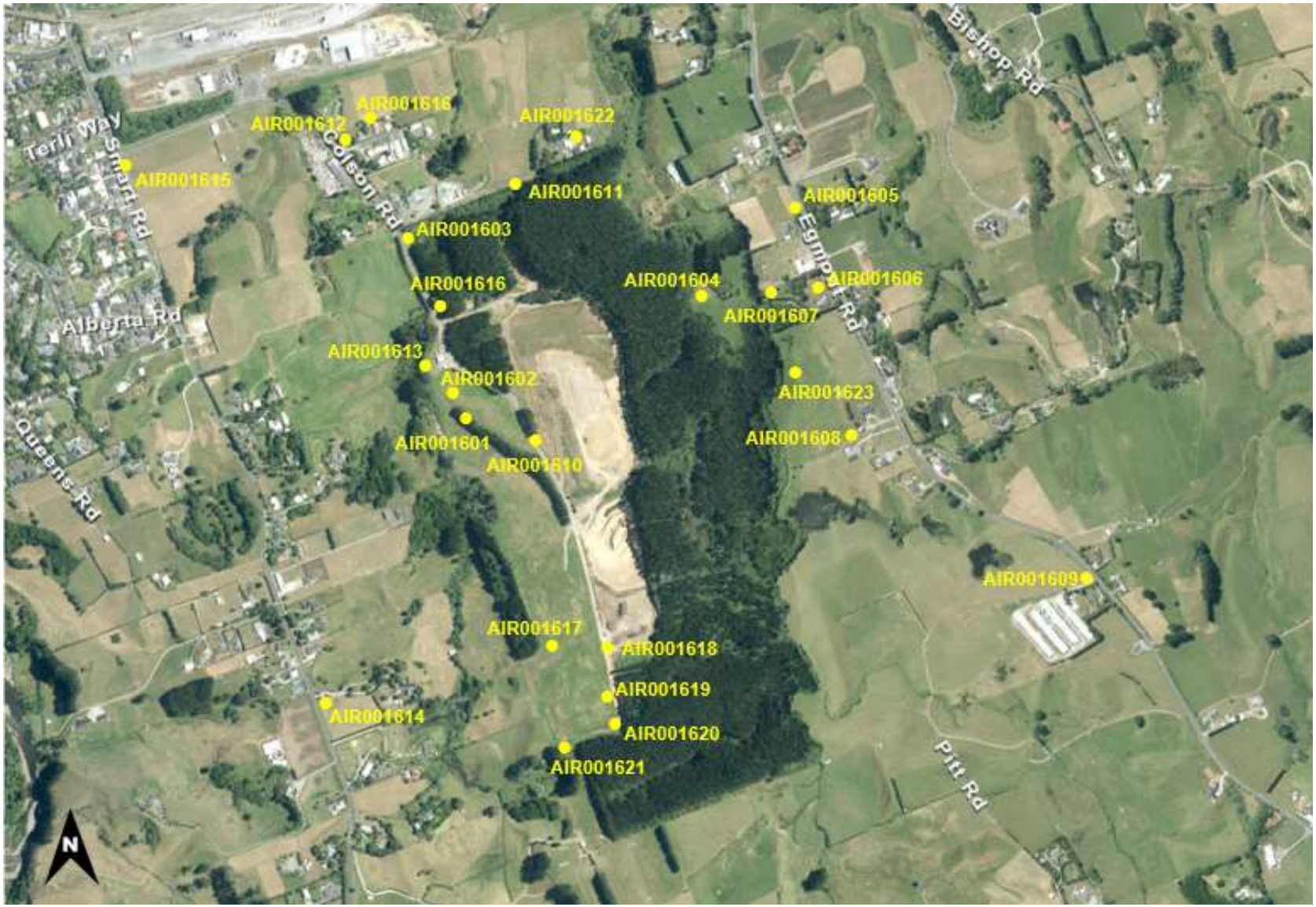


Figure 4 Aerial view of the positions of air quality monitoring sites

# 2. Results

## 2.1 Programme liaison and management

### 2.1.1 Erosion and sediment control plans

The consents that provide for the discharge of stormwater from earthworks at the site contain various conditions that relate to the provision and maintenance of an Erosion and Sediment Control Plan (ESCP) and require NPDC to manage the activities in accordance with the plan. The ESCP that was in place for the site during the year under review is dated July 2022. It was not necessary to review the plan during the year under review, however the Council was advised of the planned staging of work and any associated changes to the stormwater drainage and localised erosion and sediment controls as required by the ESCP and conditions of the consent

### 2.1.2 Landfill management and contingency plans

Daily operations at the site are governed by the requirements contained in the CRRLMP, which the consents require to be updated at not less than yearly intervals.

NPDC reviewed the CRRLMP early in the 2021/22 year, with the draft plan provided in September 2021. The Council requested that some minor changes and/or clarifications be made to the draft CRRLMP. This included updating the details around the stormwater management requirements to ensure that the installation and maintenance of the additional treatment systems recommended in the erosion and sediment control analysis was covered in the CRRLMP. During the 2022/23 year NPDC approached the Council to enquire as to whether principal documents could become as below:

1. Aftercare Plan becomes the principal operational document
2. CRRLMP becomes the operational document should NPDC re-open the landfill in an emergency, and to cover the final capping specification (currently being completed)

The Aftercare Plan is currently under development therefore a decision on this matter will be made once the Aftercare Plan has been finalised.

It is noted that the site is being transitioned towards being a closed landfill, with only site closure activities being undertaken during the year under review. Capping activities will be continuing in the 2024/25 year, and it is anticipated that an application will be submitted for early replacement of the consents issued for the construction and operation of Stage 3. It has been signalled to the Council that the application will be to provide for the discharges and emissions from the landfill as a closed site.

The contingency planning for the Colson Road landfill is included in the NPDC Infrastructure Group Resource Recovery Incident Response Plan (IRP). The IRP in place during the year under review was updated by NPDC in November 2023.

### 2.1.3 Stage 3 closure plan

The draft Closure Plan was provided to Council on 22 December 2020. Due to the technical nature of the plan, it was agreed that this would be subject to an external independent expert peer review. The principal finding of the review was that the proposed overall capping depth is likely to prove insufficient for the long term function of the site, given the absence of an intermediate drainage layer[2]. It was recommended that NPDC look to increase the cap depth and in particular include a subsoil layer between the compacted clay

[2] As per the 'enhanced minimum' cover design in the Technical Guidelines for the Disposal to Land (WasteMINZ, 2022)

and the topsoil. Additional suggestions were made around stormwater drains and landfill gas collection. In other respects the proposals were considered to be good practice and functional. NPDC provided additional clarification where requested and additional discussion on the suitability of design for local conditions. It was confirmed that the concerns raised about potential issues that could have an impact on the long term function of the cap were either not relevant given the local conditions and experience with the Stage 2 cap or could be adequately addressed as part of the monitoring, maintenance, contingency planning and restrictions that would be specified in the AP for the site. It had been agreed with NPDC that the Aftercare Plan will be provided prior to the completion of the capping activities.

The final version of the Closure Plan (October 2021) was provided to Council. This version of the plan included a number of appendices containing a copy of the discussion documents between the peer reviewer and Tonkin and Taylor (NPDC consultants). The appendices also included the correspondence confirming Council's conclusion that, in summary;

- the potential risks raised during the peer review could be mitigated by specific consent conditions around the on-going land use and maintenance, rather than them only appearing in the Aftercare Plan; and
- Council would be able to require works to be undertaken to repair the cap should this become necessary; and
- this would ensure the mitigation measures would remain in place for the duration of the 30-50 year post closure care period.

Prior to the re-issuing of the consents, it is expected that these matters will be addressed in the Aftercare Plan.

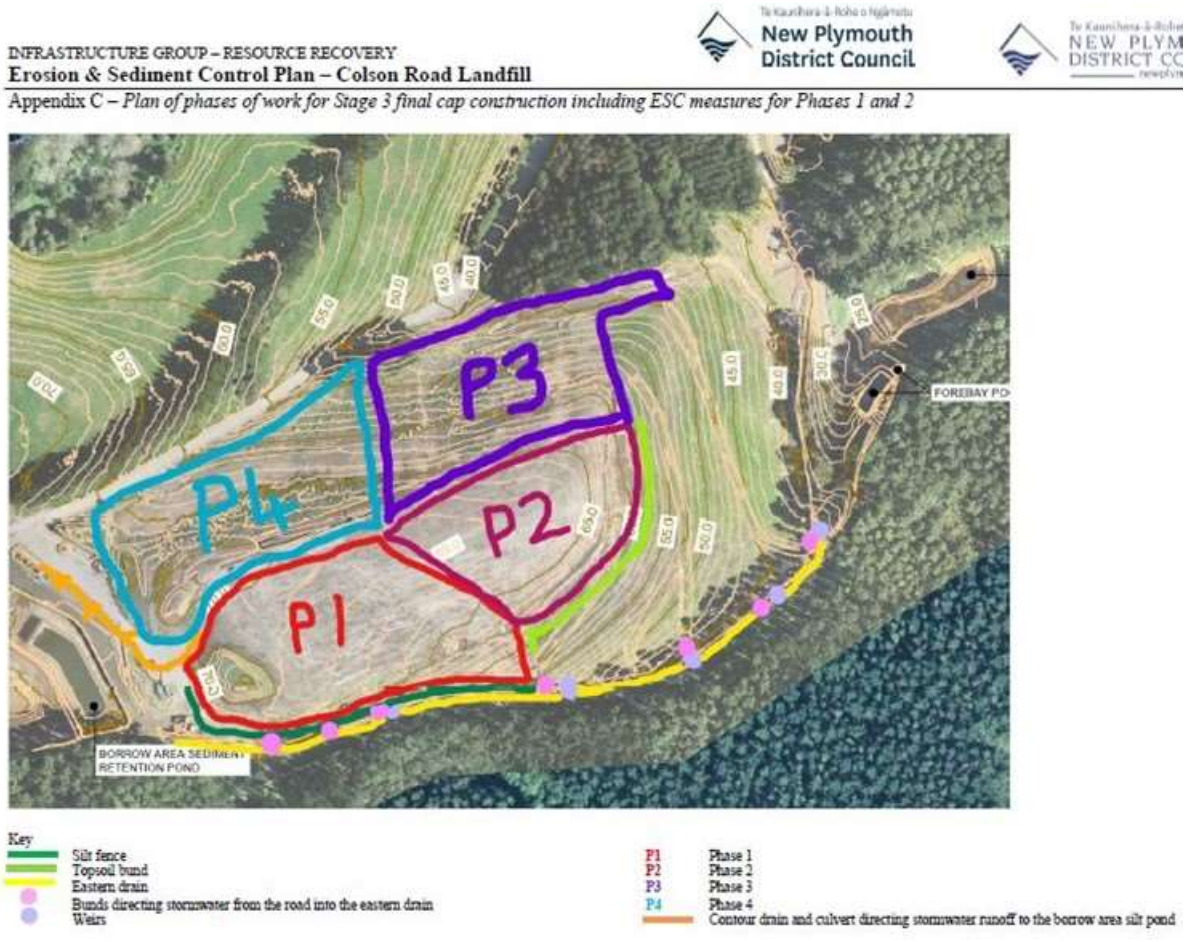


Figure 5 Plan of phases of work for Stage 3 final cap construction

Capping of Stage 3 also continued during the year under review in accordance with the phasing indicated in Figure 5. The area between phases 2 and 3 and the large silt pond was completed in the 2020/21 year. Phase 1 was completed in the 2021/22 year, phase 2 was completed in the 2022/23 year and Phase 3 was completed during the year under review. Activities relating to the capping of phase 4 will commence in the 2024/25 year.

### 2.1.4 Aftercare plan

An initial draft Aftercare Plan was provided in October 2022. The contents of the plan were discussed with NPDC at a meeting on 26 October 2022. A revised and expanded Aftercare Plan was drafted in April 2023 that was provided to Council for review. It was indicated in the Aftercare Plan that there were a number of matters that would be updated following the consent re-issue and that there were aspects of the end use of the site that were still under discussion with the community. The fundamental requirements around ensuring the stability and integrity of the cap and how any remediation would be undertaken as the site settles were addressed in the Aftercare Plan. A few matters were raised with NPDC, including leachate management and noting that the projected end of the aftercare period for parts of Area A of 2025 and 2032 may not be appropriate. The Aftercare Plan is likely to evolve over the coming years as the above matters are addressed.

### 2.1.5 Colson Road Landfill Liaison Committee

A liaison committee comprising representatives of NPDC, the Council, landfill contractor and neighbours of the landfill was set up in 1999 as required by condition 32 of the land use consent for Colson Road landfill. The purpose of the committee is to facilitate the raising of concerns by the neighbours in relation to the landfill operations and to ensure that the landfill's neighbours are kept abreast of the development of the landfill site.

It is also a requirement of condition 11 of Consent 4779 that the consent holder, staff of the Council, submitters to the application and any other party (at the Council's discretion) meet at least once per year. The liaison committee meetings also fulfil this consent requirement. In the 2022/23 year it was agreed that, as the only activity at the site was the earthworks associated with capping, the frequency of the meetings would be reduced.

During the period under review, the committee met on 27 March 2024. The meeting covered site development progress, operations at the landfill and future activities. It is also an opportunity for submitters and neighbours to be kept informed of any issues arising at the site, and mitigation measures NPDC is putting in place. Attendees of the meeting agree that they are worthwhile and provide a useful forum for neighbours to provide feedback to NPDC. As there was only one meeting held during the year under review, NPDC provided courtesy update emails to the members of the committee.

### 2.1.6 Independent consultant's reports

During the operational phase of the landfill's life, the inspections by the independent consultant were carried out three times per year. In the 2020/21 year, the Consultant recommended a reduction in the frequency of visits going forward. It was recommended that, as it was proposed to close the landfill in October 2020, this frequency be reduced to once a year, with a requirement for the NPDC's Engineering Manager to report any major changes in refuse acceptance levels or earthworks which may trigger an additional visit. NPDC consulted with the Council prior to accepting this recommendation. It was confirmed that there are no specific requirements in the Council's consents in relation to the independent consultant's inspections, therefore the Council had no objection to this reduction in frequency.

A site inspection was undertaken by WAI Environmental (independent consultant) on 17 October 2023.

This was the Consultant's third visit to the site since its closure. At the time of the Consultant's visit it was found that:

- capital works for Stage 3 were complete. All that remained was for a few remedial works to be completed and for the landfill to finish receiving final cover;
- a number of bunds and benches had been constructed to control the movement of surface water over the landfill, along with collapsible drains that expand to accommodate variable flows and direct the rainwater to the stormwater cut-off drains; and
- minimal landfill gas odour was detected during the walk around the site and dust control was adequate.

Additional matters that were noted were:

1. The abatement notice applying to cover Stage 2 area was complied with having been satisfied by 28 April 2023;
2. A significant number of trees had been felled and removed from the site. Whilst this has removed some screening, there are no longer any activities requiring screening and the trees could have become unstable in strong winds;
3. Cover continued to be applied on the most southerly parts of Stage 3;
4. Small potential breakouts of leachate continued to be investigated but were yet to be fully resolved; and
5. Investigations of the erratic failure of the gas flare were continuing. At that time it was considered possible that investigatory test pits, to check on the position of the liner amongst other things, could be allowing air into the gas pipelines, but this had still to be verified.

Overall, it was stated that the works were proceeding well and the site was generally clean and tidy

## 2.2 Inspections

Twelve routine inspections were undertaken during the 2023/24 monitoring period. Photos were taken on each inspection and these were shared with relevant NPDC staff and the landfill contractor following each inspection. The inspections were undertaken on 24 July, 25 August, 6 September, 6 October, 17 November and 20 December 2023 and 15 January, 8 February, 27 March, 11 April, 17 May and 7 June 2024.

The pre-season site meeting with NPDC and the contractor took place on 18 September 2023. Activities at the site during the year under review related to the capping of Stage 3 and progressing the remedial work required on the Stage 2 cap. The material for the capping was obtained from the borrow area. Localised erosion and sediment controls were installed as required during the progression of the works.

### 2.2.1 Pre-construction

A pre-construction season site meeting that is required by Consent 10804-1 (condition 6) and Consent 10912-1 (condition 5) was held on 18 September. This inspection happens each season in addition to the 12 scheduled routine compliance monitoring inspections. The meeting was held on site with the NPDC Operations Lead, Resource Recovery and Contract Manager (NPDC), and three staff from Whitaker Civil Engineering (WCE) that are responsible for the activities contracted to them at the landfill. A map with the area to be worked on over the 2023/24 construction season that covered contouring and intermediate and final cover was presented. The area to be focused on was north-western part of the site (phase 4 in Figure 5) and includes a strip of final cover that was not completed by the initial contractor. A temporary road was to be constructed using roading material from Stage 2, so that trucks carrying soil could loop around. A large earth bund, approximately 1m high, was to be constructed along the road edge. This was to be done so that any stormwater from the construction area could run off and be directed down to the main stormwater

pond. The bund was to be lined with cloth as a means of preventing erosion. A smaller bund would be built at the top end of the works to contain stormwater from the access road. The schedule of works was also outlined. The dirty water bunds and silt fences would be removed from the Stage 2 area and re-used where possible.

### 2.2.2 Routine inspections

There was rapid progression of the capping activities during the year under review, with the phase 4 area capped and stabilised by 1 May 2024 as required by earthworks Consents 6177-2 and 10912-1.0.

The stormwater ponds were found to be well managed, with no unacceptable levels of retained silt found in any of the ponds at the time of the inspections. De-silting of the large silt pond was scheduled for late September. Good preparations were made to ensure that there would be no adverse effects from this activity. Preparations included the construction of a bund in the back corner of the site near the borrow area silt retention pond. The intention was to use this location to allow the silt to dry before it was used in the capping of the landfill. At the inspection on 6 October, it was confirmed that the de-silting had occurred and that there were no adverse effects on the site discharges. The discharge from the large silt pond was reported to be visually compliant with consent conditions at the time of each of the inspections. The water contained in the pond was occasional discoloured. However, there were no visual adverse effects noted in the tributary below the discharge point. At the time of the inspections in December to February it was noted that the large silt pond was at a particularly low level to the extent that macrophytes on the bottom had been exposed.

The water contained in, and occasionally discharging from, the small western silt ponds continued to be significantly improved following the October 2021 diversion of the groundwater/leachate infiltration into the stormwater pipework that drained into these ponds.

For the majority of the year under review the leachate pond was found to be empty, or at a low level, at the time of the inspections

NPDC continued to keep the Council informed regarding the tree removal activities at the site. These were on-going between July and September. At the time of the October inspection, it was found that the tree felling equipment had been removed. There were no issues recorded in relation to these operations. It was also confirmed that there had been no damage to the concrete dish drain that conveys the Puremu Stream at the end of the diversion culvert permitted by Consent 0226-1 (Photo 8). While tree felling activities were being undertaken in the vicinity of the stretch of the stream a silt fence was erected along the edge of the Puremu Stream and concrete basin drain. This stayed in place until the areas above this part of the site had been stabilised.

At each inspection it was reported that Puremu Stream at the inlet to the SPCA driveway culvert was without sheens, foams or scums and clear or mostly clear in appearance, with only minor amounts of debris at the grate. Access to this area was not possible at the time of the August inspection due to the tree felling activities. At the time of the March inspection two fish were spotted darting away from the area upon approach. Fish have not been observed at this point for at least 10 to 15 years.

Overall, it was considered that the erosion and sediment control at the site was carried out to a good standard in a proactive way in relation to both forwards planning and maintenance of the silt control structures.

At the end of the construction period, in terms of progressing site stabilisation for the winter period, it was found that capping works were completed by the time of the inspection on 17 May previously exposed soil hay mulched and seeded with grass which was establishing well. The Borrow Area was stabilised for winter by compaction (Photo 9).

Photo 8 Puremu Stream dish drain northwest of Stage 3, October 2023

Photo 9 Borrow area stabilised for the winter by compaction, May 2024

# 2.3 Water

## 2.3.1 NPDC monitoring results

### 2.3.1.1 Leachate

Historically (between the 2010 and 2021 years) NPDC has collected between four and 12 samples of leachate per monitoring year. These samples were collected from the combined leachate discharge from all three stages landfill, with analyses being carried out for a range of indicator parameters. The leachate is pumped to and treated at the New Plymouth wastewater treatment plant.

In the 2020/21 year it was identified that it was likely that the under liner groundwater drain was being impacted by minor amounts of leachate. This drain discharges to the tributary of the Puremu Stream via the large silt pond. Whilst discharges of minor amounts of leachate are permitted along with the stormwater discharge covered by Consent 4619-1, contamination of the groundwater under the landfill requires that NPDC remedy, mitigate and if practicable prevent the continuation of any effects (condition 5 of Consent 4621-1). An abatement notice was issued and NPDC provided timetable for the programme of works that are to be undertaken to resolve the non-compliance. As a result of a separate leachate overflow incident during the 2020/21 year it was also identified by NPDC that the cause of the overflow was cumulative high rainfall at the site and high groundwater levels affecting the older parts of the landfill. The Stage 1 of the landfill has leachate drains but is not lined. Stage 2 areas of the Landfill (Area A) have a clay liner rather than a geo-membrane liner. The leachate discharge flow rates from this area can therefore be impacted by rising groundwater levels entering the leachate drainage network. This means that, conversely, during lower groundwater levels, minor amounts of leachate are likely to be discharging to groundwater through the leachate drainage network.

As a result of these findings the NPDC leachate monitoring was amended. In addition, the Council requested that the results of earlier leachate monitoring be provided to Council as had been done previously for NPDC's monitoring data for the under liner groundwater drainage. At the time of writing this report, the data had not been received.

Going forward, samples would continue to be collected from the combined leachate discharge to be analysed for the usual indicator parameters. NPDC undertook this sampling on seven occasions during the 2023/24 year. The results of this monitoring are given in Table 4, with any notable trends discussed.

In addition to the on-going monitoring of the indicator parameters, in the 2021/22 and 2023/24 years, two samples were collected from each of the Stage 1 and 2 leachate and the Stage 3 leachate that were analysed for a comprehensive range of parameters in order to characterise the quality of the leachate from the two leachate network. The intent of this monitoring was to allow assessment of the potential effects from the two separate areas and to assess the potential for seasonal variation in the leachate quality given that:

- Stages 1, 2 and 3 are in distinctly different phases of waste degradation; and
- there are different likely preferential pathways for the discharge of leachate from the two areas.

In the case of Stages 1 and 2, the pathways are discharge to groundwater through the permeable leachate network and direct discharge to the Puremu Stream during high rainfall and high groundwater levels. There was no direct discharge of leachate to the Puremu Stream during the 2023/24 year.

In the case of Stage 3, the discharge pathways are discharges to surface water and groundwater, including the under liner drainage network that is directed to the large silt pond, due to:

- leachate escaping from the areas of the liner that were likely to have been damaged in the slip of the 50,000m$^3$ of compacted waste in 2005; and

- potential for increased seepage through the undamaged areas of the liner as a result of the increased depth of leachate that occurs when the Stage 3 leachate valve is closed to mitigate the potential of effects of leachate overflows[3]; and
- increased potential for leachate breakouts under the same conditions.

Further details relating to the investigations and progress on the programme of works to be undertaken in relation to the early consent replacement and compliance with the Abatement Notice are also discussed in Section 2.6.

The results for the characterisation of the separate Stage 1 and 2, and Stage 3 leachate discharges that we collected during the year under review are presented in Table 5.

Table 4 Chemical analysis of Colson Road landfill combined site leachate discharge

| Parameter | Unit | Month | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Aug-23 | Sep-23 | Oct-23 | Nov-23 | Mar-24 | Apr-24 | May-24 |
| pH | pH | 6.9 | 6.9 | 7.3 | 7.2 | 7.4 | 7.5 | 7.0 |
| BOD | $g/m^3$ | 7 | 4 | 35 | 19 | 10 | 21 | <3 |
| Suspended solids | $g/m^3$ | 44 | 58 | 56 | 52 | 47 | 58 | 44 |
| Conductivity | mS/m | 202 | 172 | 462 | 328 | 241 | 333 | 146 |
| Alkalinity | $g/m^3CaCO_3$ | 804 | 686 | 1,825 | 1,328 | 990 | 1,493 | 575 |
| Ammoniacal N | $g/m^3$ | 124 | 10 | 362 | 255 | 3.8 | 232 | 72 |
| Cadmium | $g/m^3$ | - | <0.005 | - | - | <0.005 | - | - |
| Chromium | $g/m^3$ | 0.01 | <0.005 | 0.05 | 0.02 | <0.005 | 0.027 | <0.005 |
| Chloride | $g/m^3$ | - | - | - | - | 156 | - | - |
| Copper | $g/m^3$ | <0.005 | <0.005 | <0.005 | <0.05 | <0.005 | <0.005 | <0.005 |
| Iron | $g/m^3$ | 18 | 28 | 24 | 13 | 21 | 19 | 22 |
| Lead | $g/m^3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Manganese | $g/m^3$ | 4.0 | 4.3 | 3.1 | 3.0 | 2.6 | 2.9 | 4.0 |
| Nickel | $g/m^3$ | 0.005 | <0.005 | - | 0.01 | 0.007 | 0.012 | <0.005 |
| Zinc | $g/m^3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

The results gathered by NPDC during the year under review reflect typical leachate quality. It appears that there may be a trend of decreasing leachate strength in recent years (Figure 6). However, it is noted that the concentration variations within each parameter are also likely to reflect seasonal variations in leachate quality and the dilution afforded by the contaminated stormwater that is diverted through this system.

[3] Noting that slow seepage occurs through geotextile liners and therefore the best practice is to ensure that the leachate head on the liner does not exceed 300mm

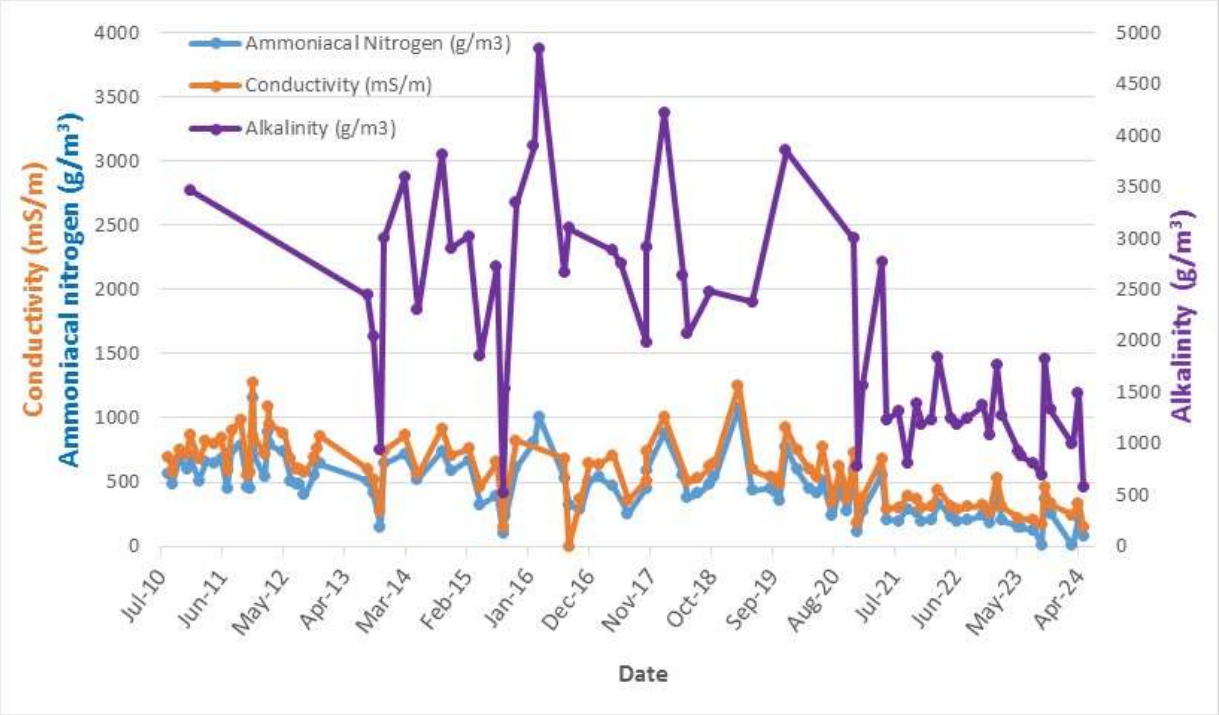


Figure 6 Alkalinity, conductivity and ammoniacal nitrogen of combined leachate, July 2010 to date

The wide variation in contaminant concentrations will also be as a result of differing volumes of leachate from Stages 1 and 2 and from Stage 3 in the combined discharge samples.

Table 5 Sample results for characterisation of Stage 1 and 2 and Stage 3 leachate

| Parameter | Units | Stage 1 and 2 Leachate | | Stage 3 Leachate | |
|---|---|---|---|---|---|
| | | 14-Sep-2023 | 30-May-2024 | 14-Sep-2023 | 30-May-2024 |
| Sum of Anions | meq/L | 14.3 | 8.5 | 92 | 14.8 |
| Sum of Cations | meq/L | 14.1 | 9.1 | 100 | 14.9 |
| Turbidity | NTU | 320 | 260 | 40 | 280 |
| pH | pH Units | 7.0 | 6.9 | 7.4 | 7.6 |
| Total Alkalinity | g/m$^3$ $CaCO_3$ | 580 | 330 | 3,700 | 600 |
| Bicarbonate | g/m$^3$ at 25°C | 710[a] | 410 | 4,500[a] | 730[a] |
| Total Hardness | g/m$^3$ $CaCO_3$ | 220 | 140 | 330 | 240 |
| Electrical Conductivity (EC) | mS/m@25°C | 144.1 | 81.7 | 884.0 | 145.1 |
| Total Suspended Solids | g/m$^3$ | 66 | 47 | 320 | 54 |
| Total Dissolved Solids (TDS) | g/m$^3$ | 520[a] | 340 | 3,100[a] | 510[a] |
| Sample Temperature | °C | 17.3 | 20.0 | 27.2 | 20.0 |
| Dissolved Aluminium | g/m$^3$ | <0.003 | <0.003 | 0.111[b] | <0.003 |
| Total Aluminium | g/m$^3$ | 0.022 | <0.0032 | 5.5[b] | 0.015 |
| Dissolved Boron | g/m$^3$ | 0.29 | 0.077 | 3.2[b] | 0.33 |
| Total Boron | g/m$^3$ | 0.3 | 0.077 | 3.3 | 0.34 |
| Dissolved Calcium | g/m$^3$ | 49 | 21 | 69[b] | 55 |
| Dissolved Cobalt | g/m$^3$ | 0.0026 | 0.0032 | 0.021[b] | 0.0021 |
| Total Cobalt | g/m$^3$ | 0.0028 | 0.0032 | 0.023 | 0.0023 |
| Dissolved Iron | g/m$^3$ | <0.02 | 29 | 7.7[b] | 0.02 |
| Total Iron | g/m$^3$ | 4.7 | 49 | 67 | 23 |
| Dissolved Magnesium | g/m$^3$ | 23 | 21 | 38[b] | 25 |

| Parameter | Units | Stage 1 and 2 Leachate | | Stage 3 Leachate | |
|---|---|---|---|---|---|
| | | 14-Sep-2023 | 30-May-2024 | 14-Sep-2023 | 30-May-2024 |
| Dissolved Manganese | $g/m^3$ | 4.6 | 10 | 1.5[b] | 4.2 |
| Total Manganese | $g/m^3$ | 5.4 | 9.5 | 2.6 | 4.0 |
| Dissolved Mercury | $g/m^3$ | <0.00008 | <0.00008 | <0.00008 | <0.00008 |
| Dissolved Potassium | $g/m^3$ | 48 | 24 | 340[b] | 53 |
| Dissolved Sodium | $g/m^3$ | 71 | 54 | 660[b] | 75 |
| Dissolved Arsenic | $g/m^3$ | <0.0010 | <0.0010 | 0.047[b] | <0.001 |
| Total Arsenic | $g/m^3$ | <0.0011 | <0.0011 | 0.076 | 0.0012 |
| Dissolved Cadmium | $g/m^3$ | <0.00005 | <0.00005 | <0.000053[b] | <0.00005 |
| Total Cadmium | $g/m^3$ | <0.000053 | <0.000053 | 0.000096 | <0.000053 |
| Dissolved Chromium | $g/m^3$ | <0.0005 | <0.0005 | 0.125[b] | 0.0005 |
| Total Chromium | $g/m^3$ | 0.00058 | <0.00053 | 0.36 | 0.00083 |
| Dissolved Copper | $g/m^3$ | <0.0005 | <0.0005 | 0.0031[b] | <0.0005 |
| Total Copper | $g/m^3$ | 0.00059 | <0.00053 | 0.023 | <0.00053 |
| Dissolved Lead | $g/m^3$ | <0.00010 | <0.00010 | 0.00034[b] | <0.0001 |
| Total Lead | $g/m^3$ | <0.00011 | <0.00010 | 0.0029 | <0.00011 |
| Dissolved Nickel | $g/m^3$ | 0.0020 | 0.0005 | 0.045[b] | 0.0022 |
| Total Nickel | $g/m^3$ | 0.0023 | <0.00053 | 0.057 | 0.0021 |
| Dissolved Zinc | $g/m^3$ | 0.0011 | <0.0010 | 0.0080[b] | 0.0012 |
| Total Zinc | $g/m^3$ | 0.0057 | <0.0011 | 0.06 | 0.0046 |
| Chloride | $g/m^3$ | 91 | 63 | 630 | 91 |
| Fluoride | $g/m^3$ | 0.11 | 0.07 | 0.38[d] | 0.11 |
| Total Ammoniacal-N | $g/m^3$ | 73 | 27[e] | 770[e] | 74 |
| Free Ammonia | $g/m^3$ | 0.3 | - | 15.8 | - |
| Nitrite-N | $g/m^3$ | 0.003 | 0.009 | 0.043 | 0.041 |
| Nitrate-N | $g/m^3$ | 0.059 | 0.003 | 0.039 | 0.59 |
| Nitrate-N+Nitrite-N | $g/m^3$ | 0.062 | 0.012 | 0.082 | 0.63 |
| Total Kjeldahl Nitrogen (TKN) | $g/m^3$ | 74 | 26[e] | 730[e] | 76 |
| Dissolved Reactive Phosphorus | $g/m^3$ | <0.004 | 0.005 | 0.5 | <0.004 |
| Total Phosphorus | $g/m^3$ | 0.015 | 0.006 | 5.5 | 0.023 |
| Reactive Silica | $g/m^3$ as $SiO_2$ | 18 | 19 | 30 | 19 |
| Sulphate | $g/m^3$ | 3.7 | 2.6 | 7.8 | 4.5 |
| Dissolved C-Biochemical Oxygen Demand (CBOD5) | $gO_2/m^3$ | <2 | <2 | 31 | <2 |
| Carbonaceous Biochemical Oxygen Demand (cBOD5) | $gO_2/m^3$ | <2 | <2 | 47 | <2 |
| Total Biochemical Oxygen Demand (TBOD5) | $gO_2/m^3$ | <2[c] | <2 | 76 | <2 |
| Chemical Oxygen Demand (COD) | $gO_2/m^3$ | 57 | 44 | 1,090 | 71 |
| Total Organic Carbon (TOC) | $g/m^3$ | 14 | 2 | 230 | <20 |
| Faecal Coliforms | MPN/100ml | < 2 | <18 | 33 | <18 |
| Escherichia coli | MPN /100ml | < 2 | <18 | 33 | <18 |
| **Organonitro & phosphorus Pesticides** | | | | | |
| Hexazinone | $g/m^3$ | 0.0008 | 0.0002 | <0.0002 | 0.0007 |
| Propiconazole | $g/m^3$ | <0.0003 | <0.0003 | 0.0036 | <0.003 |

| Parameter | Units | Stage 1 and 2 Leachate | | Stage 3 Leachate | |
|---|---|---|---|---|---|
| | | 14-Sep-2023 | 30-May-2024 | 14-Sep-2023 | 30-May-2024 |
| Tebuconazole | g/m$^3$ | <0.0004 | <0.0004 | 0.0075 | <0.0004 |
| **Semi volatile organic compounds (SVOC)** | | | | | |
| 2-Methylphenol (o-Cresol) | g/m$^3$ | <0.005 | < 0.005 | 0.005 | <0.005 |
| **Volatile organic compounds (VOC)** | | | | | |
| Benzene | g/m$^3$ | <0.003 | <0.003 | 0.005 | <0.003 |
| Ethlybenzene | g/m$^3$ | <0.005 | < 0.005 | 0.006 | <0.005 |
| m&p-Xylene | g/m$^3$ | <0.005 | <0.005 | 0.010 | <0.005 |
| o-Xylene | g/m$^3$ | <0.003 | <0.003 | 0.004 | <0.003 |
| Isopropylbenzene (Cumene) | g/m$^3$ | <0.003 | <0.003 | 0.006 | <0.003 |
| 1,2,4-Trimethylbenzene | g/m$^3$ | <0.005 | < 0.003 | 0.005 | <0.003 |

**Key:**

a Results indicative only due to high total dissolved solids content of the sample

b Aprecipitate was observed in the filtered nitric preserved fraction of this sample. In order to analyse this sample for dissolved metals, an additional digestion step was required on the filtrate to re-dissolve the precipitate prior to analysis

c Total Biochemical Oxygen Demand (TBOD5) performed on a sub-sample that had been frozen

d Fluoride result may be underestimated due to high aluminium content of the sample

e The Total Ammoniacal-N was greater than that for Total Kjeldahl Nitrogen, but within the analytical variation of these methods

As expected, the Stage 3 leachate contained higher concentrations of contaminants than the Stage 1 and 2 leachate. As noted in the 2021/22 monitoring period, the contaminant concentrations in the leachates were generally higher in the spring samples than in the late autumn samples.

#### 2.3.1.2 Under liner groundwater drainage

NPDC collects samples of the groundwater that drains from a network of pipes under the liner. The quality of this water is a useful indicator of whether leachate is passing through the liner. The water collected by this system is currently discharged to the unnamed tributary of the Puremu Stream via the large silt pond. Assessing the quality of this discharge is especially important in view of the slip that occurred in 2005, which ripped the liner in several places on the western side of Stage 3. The rips that were visible above the height of the settled waste were repaired, but it was not known if the liner had ripped underneath the slipped refuse. As outlined in Section 1.2.3, early monitoring of the water quality in the under liner groundwater indicated that there was no contamination occurring as a result of this incident, however more recent results indicate that this is no longer the case.

Rips in the liner at the edge of the landfill footprint were found at inspection in June 2017. The rips were small, but in an open drainage channel that (at that time) was capturing leachate breakouts from the south eastern area of the landfill. These were appropriately repaired early in July 2017.

Monitoring of the groundwater in the under liner drain has been undertaken on at least a quarterly basis as specified in the Colson Road Landfill Management Plan. In July 2020, a report prepared for NPDC confirmed that there were some parameters for which 2018/19 sample results were exceeding the calculated natural variation in the under liner drain. Condition 5 of Consent 4621-1 requires that in this event, NPDC should implement such measures as to remedy, mitigate and if practicable prevent the continuation of this effect on the groundwater. This was logged as an incident on Council's unauthorised incidents register and is discussed further in Section 2.6.

The monitoring undertaken by NPDC was expanded during the 2021/22 year as a result of this incident. During the year under review, NPDC collected five samples that were analysed for the usual parameters. The

results for the standard range of parameters are given in Table 6, followed by a discussion on trends observed for these indicator parameters. In addition to this, samples were collected under high and low groundwater conditions, and these were analysed for a comprehensive range of parameters, with the results presented in Table 7.

The additional parameters have been determined to better quantify potential contaminants of concern that may be discharging to the environment and any seasonal variation in concentrations.

Table 6 Results of analysis of under liner drainage for the year under review.

| Parameter | Unit | Date | | | | |
|---|---|---|---|---|---|---|
| | | 14-Sep-23 | 24-Nov-23 | 4-Dec-23 | 20-Mar-24 | 30-May-24 |
| pH | pH | 6.6 | 6.5 | 6.6 | 6.6 | 6.7 |
| BOD | $gO_2/m^3$ | <3 | <3 | <3 | <3 | <3 |
| Suspended solids | $g/m^3$ | 20 | 19 | 22 | 28 | 24 |
| Faecal coliforms | /100ml | <1 | - | 2 | 110 | <1 |
| Conductivity | mS/m | 42.6 | 46.4 | 42.1 | 48.3 | 39.0 |
| Alkalinity | $g/m^3$ $CO_3$ | 119 | 136 | 118 | 150 | 109 |
| Ammoniacal nitrogen | $g/m^3$-N | 3.1 | 3.7 | 3.8 | 3.7 | 2.8 |
| Dissolved cadmium | $g/m^3$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dissolved chromium | $g/m^3$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Chloride | $g/m^3$ | 58 | - | 52 | 59 | 48 |
| Dissolved copper | $g/m^3$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dissolved iron | $g/m^3$ | 6.2 | 5.6 | 0.67 | 6.5 | 0.08 |
| Dissolved lead | $g/m^3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| Dissolved manganese | $g/m^3$ | 2.2 | 1.8 | 1.1 | 1.7 | 1.1 |
| Dissolved nickel | $g/m^3$ | 0.006 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dissolved zinc | $g/m^3$ | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

Earlier Annual Reports typically reviewed each year's data in isolation. When viewed in this way it was considered that the results had shown that little, if any, contamination had been occurring in the groundwater immediately below the liner.

The initial review of time series data carried out by the Council from the 2017/18 to the 2019/20 Annual Reports compared the data collected from 1 June 2010 onwards only.

On the basis of these reviews, in the Annual Reports covering this period of time it was concluded that, although the level of key indicator species such as zinc and chloride appeared to have been relatively stable over the last several years (as per the example of the chloride results presented in Figure 7), there may have been an emerging trend of very slight increasing contaminants. In particular, the results for the 2017-2020 years indicated that some contaminant concentrations such as ammoniacal nitrogen had increased more noticeably.

Following the provision of the consultant's report in July 2020, the Council requested that the results of all of NPDC's under liner groundwater monitoring samples be provided to Council. These results were provided and the data to 30 June 2024 for selected parameters is illustrated in Figure 8 to Figure 12. It is noted that NPDC's monitoring of the under liner drainage commenced in the month following the July 2005 refuse slip, with no earlier or background data available.

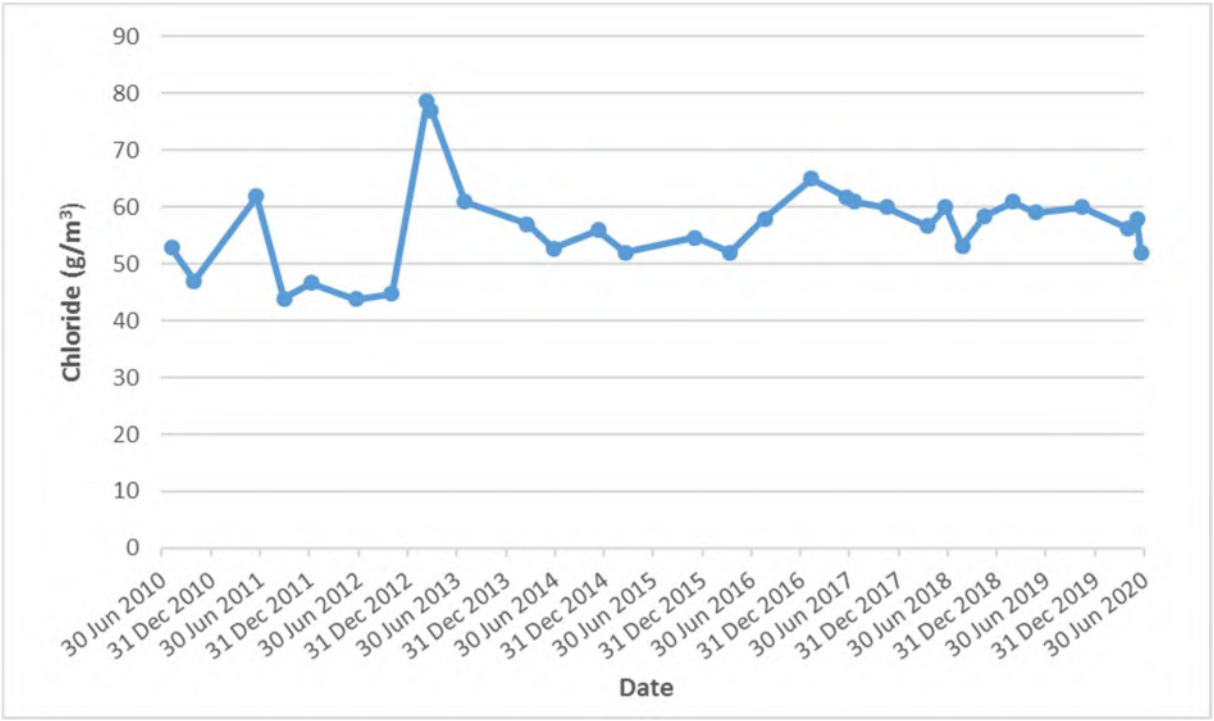


Figure 7 Chloride in the under liner drainage, June 2010 to June 2020

A review of the expanded time series data indicates that the trend of increasing levels of parameters may have started soon after the July 2005 slip.

The chloride results (as shown in Figure 8) indicate that although there was a trend of increasing chloride concentration in the 2005 to 2017 years, this may have stabilised somewhat in more recent years.

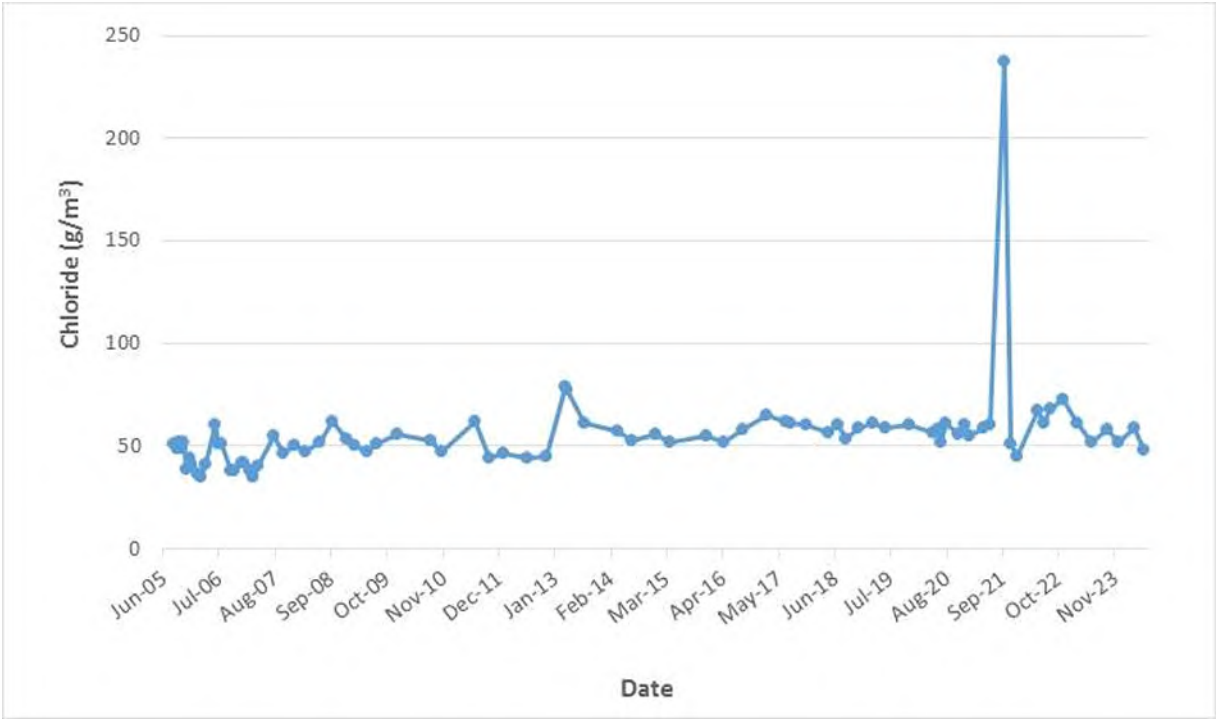


Figure 8 Time series data for the chloride of the under liner drainage

The trend of increasing conductivity continued during the year under review (Figure 9).

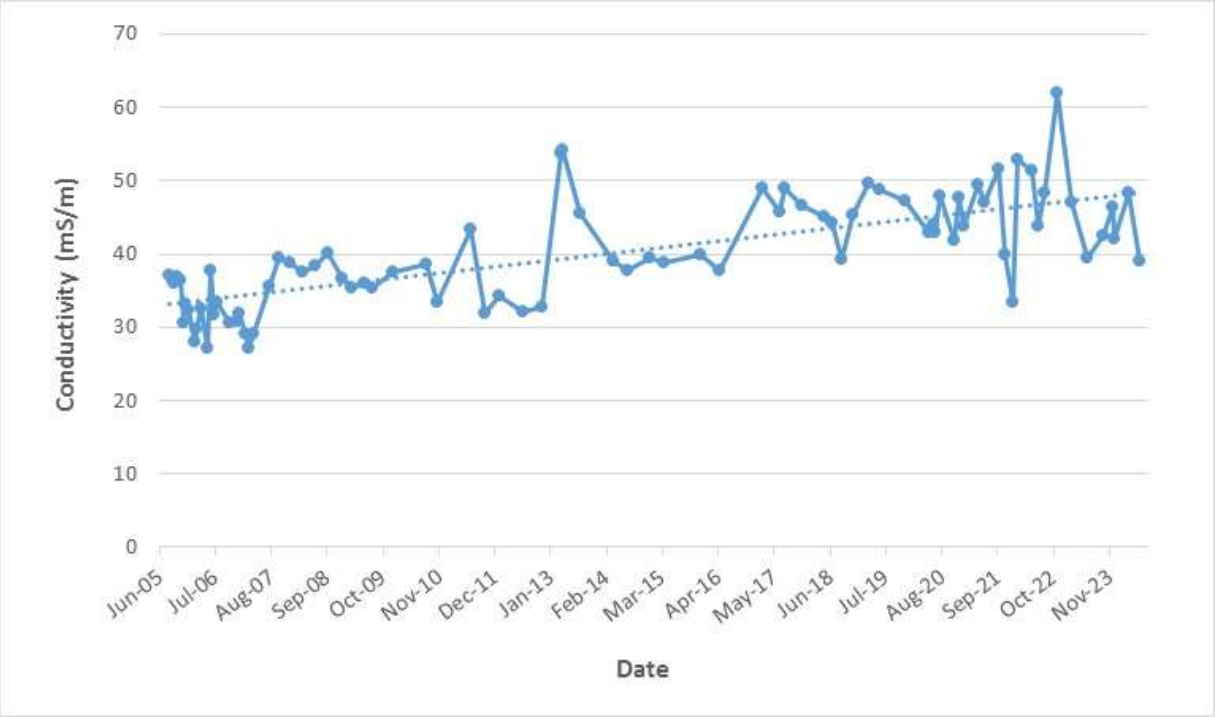


Figure 9 Time series data for the conductivity of the under liner drainage

The ammoniacal nitrogen concentration of the under liner groundwater drainage increased again after dropping in the previous monitoring period (Figure 10).

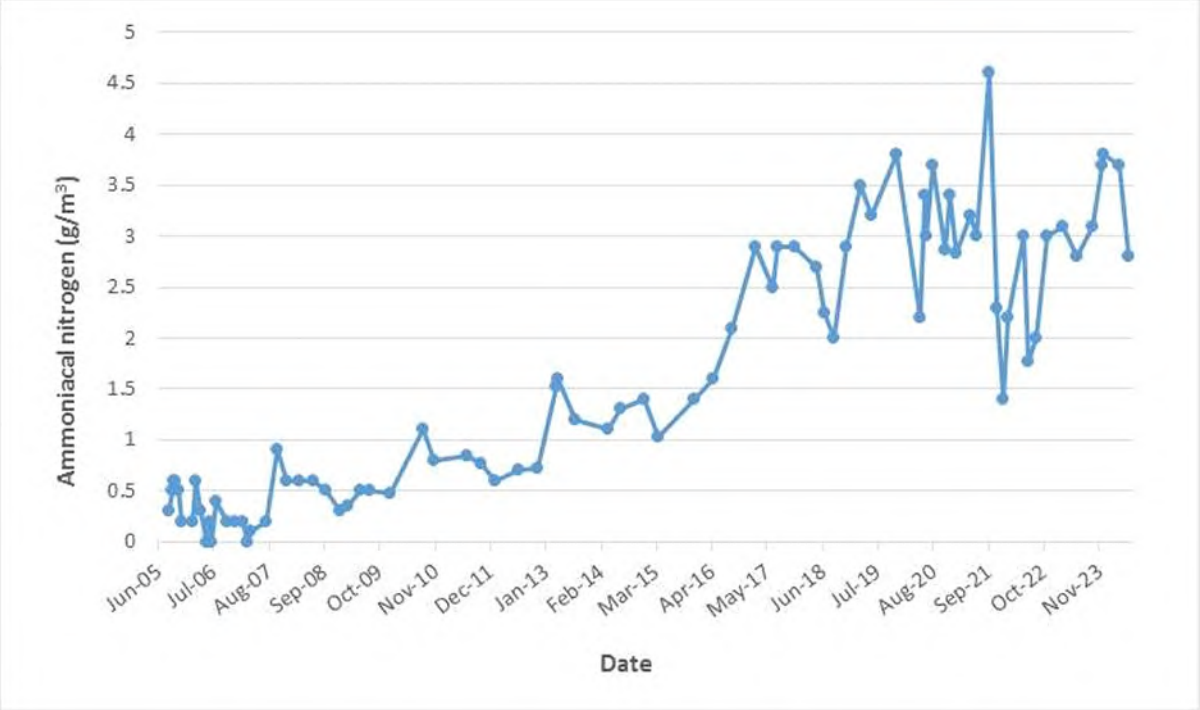


Figure 10 Time series data for the ammoniacal nitrogen of the under liner drainage

The alkalinity of the under liner groundwater drainage may have stabilised in recent years following the trend of increasing alkalinity that was apparent in the 2005 to 2021 years (Figure 11).

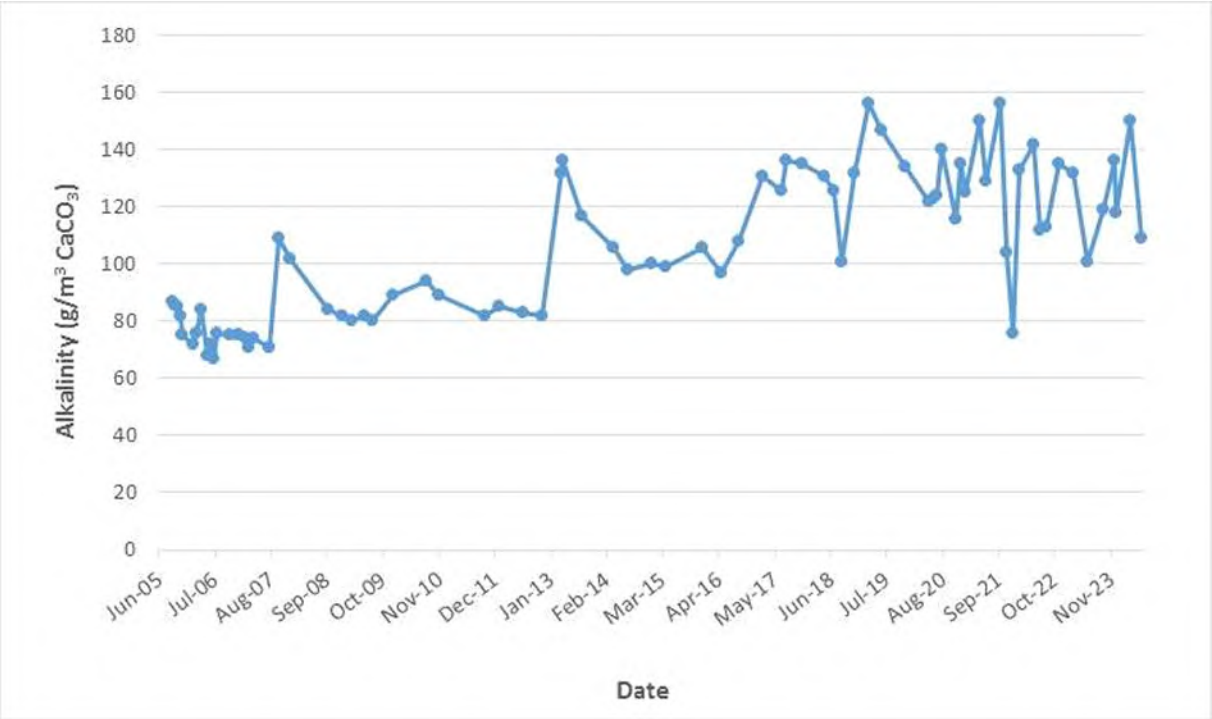


Figure 11 Time series data for the alkalinity of the under liner drainage

When looking the potential continuation in the trend for manganese concentration that may have occurred in more recent years, the change from determining the total manganese concentration to determining the dissolved manganese concentration has made this more difficult to evaluate. It is clear, however, that there have again been significant (potentially) seasonal variations (Figure 12).

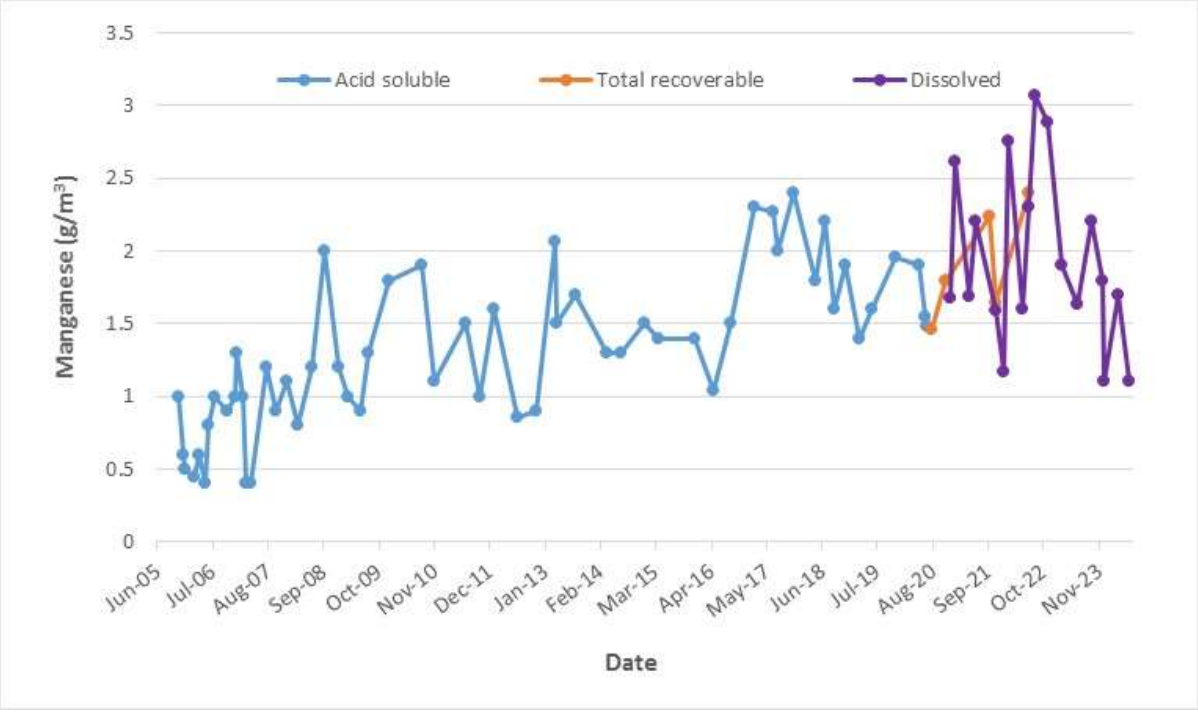


Figure 12 Time series data for the manganese of the under liner drainage

Although these indicator constituents show potential contamination of the groundwater and/or springs under the landfill, the levels are not currently of immediate environmental concern and would, for the most part, be considered minor.

At this stage it is difficult to assess whether the changes in the contaminant concentrations in the under liner drainage are as a result of changes in the leachate strength, or an increasing amount of leachate getting through the liner. It is possible that the practice of using Stage 3 as storage at times when the amount of leachate and contaminated stormwater being generated is greater than the system carrying this discharge to the wastewater treatment plant may impact on the amount of leachate escaping into the under liner groundwater drainage system. This may be as a result of the water level of the leachate rising above any potential damage to the liner, or as a result of the increased head of water. It is noted that the maximum recommended leachate head given in Table 5-6 of the Technical Guidelines for Disposal to Land (WasteMINZ, 2022) is 300mm. NPDC are currently unable to monitor the height of the leachate level contained by the Stage 3 liner.

The additional parameters determined in the under liner groundwater drainage on two occasions during the year under review included those that would enable characterisation of the groundwater and to evaluate what, if any, other contaminants of concern may be present in the discharge from this drained spring. The results of these samples are presented in the following table.

Table 7 Sample results for the characterisation of the under liner groundwater drainage

| Parameter | Units | Under liner groundwater drainage | |
|---|---|---|---|
| | | 14-Sep-2023 | 30-May-2024 |
| Sum of Anions | meq/L | 4.0 | 3.7 |
| Sum of Cations | meq/L | 3.9 | 3.9 |
| Turbidity | NTU | 38 | 22 |
| pH | pH Units | 6.6 | 6.8 |
| Total Alkalinity | g/m$^3$ $CaCO_3$ | 115 | 22 |
| Bicarbonate | g/m$^3$ at 25°C | 140 | 136 |
| Total Hardness | g/m$^3$ $CaCO_3$ | 92 | 95 |
| Electrical Conductivity (EC) | mS/m@25°C | 41.6 | 38.6 |
| Total Suspended Solids | g/m$^3$ | 22 | 18 |
| Total Dissolved Solids (TDS) | g/m$^3$ | 240 | 210 |
| Sample Temperature | °C | 19.9 | 20.0 |
| Dissolved Aluminium | g/m$^3$ | <0.003 | <0.003 |
| Total Aluminium | g/m$^3$ | 0.21 | 0.101 |
| Dissolved Boron | g/m$^3$ | 0.036 | 0.032 |
| Total Boron | g/m$^3$ | 0.037 | 0.031* |
| Dissolved Calcium | g/m$^3$ | 18 | 18 |
| Dissolved Cobalt | g/m$^3$ | 0.0028 | 0.0016 |
| Total Cobalt | g/m$^3$ | 0.0031 | 0.0016 |
| Dissolved Iron | g/m$^3$ | < 0.02 | 0.03 |
| Total Iron | g/m$^3$ | 8.8 | 2.5 |
| Dissolved Magnesium | g/m$^3$ | 12 | 12 |
| Dissolved Manganese | g/m$^3$ | 2.1 | 1.2 |
| Total Manganese | g/m$^3$ | 2.3 | 1.1* |
| Dissolved Mercury | g/m$^3$ | < 0.00008 | <0.00008 |
| Dissolved Potassium | g/m$^3$ | 4.5 | 4.6 |
| Dissolved Sodium | g/m$^3$ | 38 | 38 |
| Dissolved Arsenic | g/m$^3$ | < 0.0010 | < 0.0010 |
| Total Arsenic | g/m$^3$ | < 0.0011 | < 0.0011 |

| Parameter | Units | Under liner groundwater drainage | |
|---|---|---|---|
| | | 14-Sep-2023 | 30-May-2024 |
| Dissolved Cadmium | $g/m^3$ | < 0.00005 | < 0.00005 |
| Total Cadmium | $g/m^3$ | < 0.000053 | < 0.000053 |
| Dissolved Chromium | $g/m^3$ | < 0.0005 | < 0.0005 |
| Total Chromium | $g/m^3$ | < 0.00053 | < 0.00053 |
| Dissolved Copper | $g/m^3$ | < 0.0005 | < 0.0005 |
| Total Copper | $g/m^3$ | 0.00104 | 0.00061 |
| Dissolved Lead | $g/m^3$ | < 0.00010 | < 0.00010 |
| Total Lead | $g/m^3$ | < 0.00011 | < 0.00011 |
| Dissolved Nickel | $g/m^3$ | < 0.0005 | < 0.0005 |
| Total Nickel | $g/m^3$ | < 0.00053 | < 0.00053 |
| Dissolved Zinc | $g/m^3$ | 0.0011 | 0.0029 |
| Total Zinc | $g/m^3$ | 0.0025 | 0.0049 |
| Chloride | $g/m^3$ | 54 | 48 |
| Fluoride | $g/m^3$ | 0.07 | 0.06 |
| Total Ammoniacal-N | $g/m^3$ | 3.0 | 2.7 |
| Free Ammonia | $g/m^3$ | 0.0056 | - |
| Nitrite-N | $g/m^3$ | 0.018 | 0.015 |
| Nitrate-N | $g/m^3$ | 0.43 | 0.36 |
| Nitrate-N+Nitrite-N | $g/m^3$ | 0.45 | 0.37 |
| Total Kjeldahl Nitrogen (TKN) | $g/m^3$ | 3.1 | 3.0 |
| Dissolved Reactive Phosphorus | $g/m^3$ | < 0.004 | <0.004 |
| Total Phosphorus | $g/m^3$ | 0.057 | 0.037 |
| Reactive Silica | $g/m^3$ as $SiO_2$ | 43 | 49 |
| Sulphate | $g/m^3$ | 7 | 4.2 |
| Dissolved C-Biochemical Oxygen Demand (CBOD5) | $gO_2/m^3$ | < 2 | <2 |
| Carbonaceous Biochemical Oxygen Demand (cBOD5) | $gO_2/m^3$ | < 2 | <3 |
| Total Biochemical Oxygen Demand (TBOD5) | $gO_2/m^3$ | 2 | <2 |
| Chemical Oxygen Demand (COD) | $gO_2/m^3$ | 6 | 39 |
| Total Organic Carbon (TOC) | $g/m^3$ | < 5[a] | <2 |
| Faecal Coliforms | MPN /100ml | < 2 | <18 |
| Escherichia coli | MPN /100ml | < 2 | <18 |
| **Organonitro & phosphorus Pesticides** | | ND | ND |
| **Semi volatile organic compounds (SVOC)** | | ND | ND |
| **Volatile organic compounds (SVOC)** | | ND | ND |

[a] due to the nature of the sample a dilution was performed prior to analysis, resulting in a detection limit higher that that normally achieved for TOC analysis.

* the dissolved fraction was greater than the total fraction, but within analytical variation of the methods.

There were no organonitro or phosphorus pesticides, SVOC's or VOC's detected in the under liner groundwater drainage.

### 2.3.2 Results of wet weather stormwater and receiving environment monitoring

The Colson Road landfill site has two streams associated with it.

The Manganaha Stream follows alongside the eastern boundary of the site and is approximately 200m away from the landfill (at its closest point). As required by the landfill's water discharge permits, there are no direct discharges into the Manganaha Stream from the landfill.

The Puremu Stream has been culverted to run under the north-western quadrant of the landfill site. It emerges from the culvert near the driveway to the landfill entrance and then flows approximately 300m to a second culvert that takes it under two other properties. Just upstream of the second culvert, the unnamed tributary that carries the discharge from the large settling pond (STW002054), flows into the mainstream stem. The smaller silt pond (STW001006) discharges directly into the mainstream stem just upstream of the confluence (Figure 13).

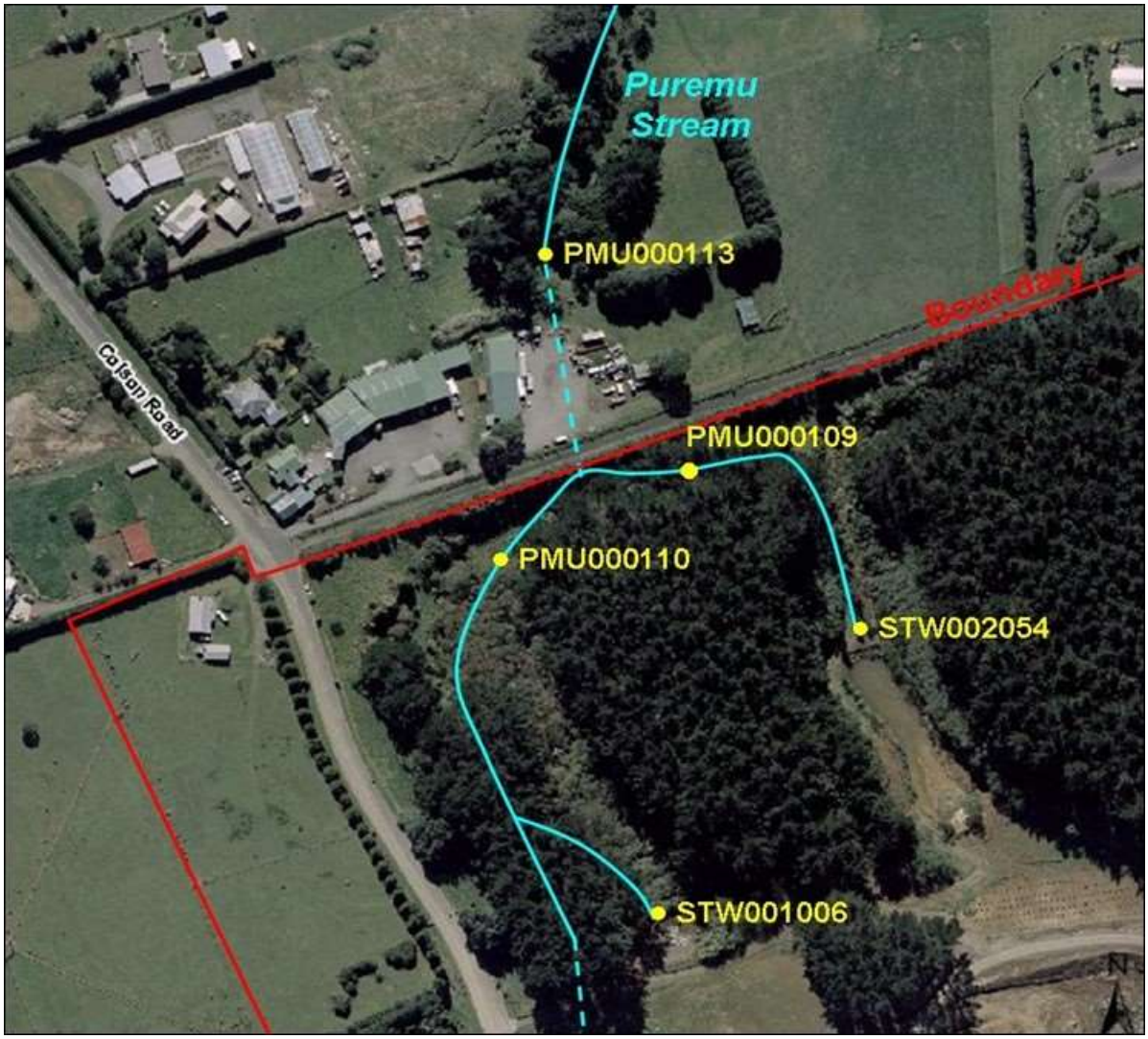


Figure 13 Sampling sites on the Puremu Stream downstream of the landfill

During the lifetime of the landfill, the catchment areas within the landfill footprint that drained through each of the stormwater ponds has changed as the active filling areas, and those areas with intermediate and/or final cover changed. The Stage 3 under liner groundwater drainage discharge via the large silt pond. In the 2020/21 year, NPDC commenced an investigation into the elevated levels of contaminants found in the discharge from the small eastern silt pond. During this investigation it was identified that groundwater seepages from underneath Stage 1B had been discharging into the small eastern silt pond via infiltration

into subsurface piped drains. The Council was advised that drainage works would be undertaken to divert clean stormwater away from these drains and to divert the groundwater seepages from underneath Stage 1B area to the leachate system. This work was completed in October 2021.

As outlined in Section 1.4.1, the sampling associated with the NPDC Colson Road landfill monitoring programme for the year under review had two primary objectives:

- Compliance monitoring of discharges and effects in relation to current consent conditions; and
- Investigation of the emerging contamination issue and information gathering for the re-consenting AEE.

A survey was conducted following a rainfall event and the results are given in the tables below. Table 8 shows the results for discharges and receiving water into which the discharges from within the landfill catchment flow (Puremu Stream). Table 9 shows the results for the Manganaha Stream, which lies adjacent to the landfill site and has no surface water discharges from the landfill directed to it.

The Puremu Stream system receives discharges from two stormwater ponds on the site. STW001006 discharges stormwater and historically, minor amounts of leachate from Stages 1 and 2. STW002054 discharges stormwater from Stage 3, some of the eastern forest of the site and the composting pad. STW001006 also receives leachate in the event that the leachate pumping system is overloaded, or fails. It is noted that Consent 2370 provides for minor amounts of leachate to be present in this discharge.

The results show that during this wet weather period, the site was complying with consent conditions in regards to the water quality parameters in both the Puremu and Manganaha Streams, with the exception of faecal coliforms at site PMU000113. It is noted however that the faecal coliform count was elevated upstream of the landfill site at both PMU000100 and PMU000106.

Table 8 Results of rain event monitoring–discharge and Puremu Stream, 26 September 2023

| Site | Alkalinity g/m$^3$ $CaCO_3$ | Chloride g/m$^3$ | Condy mS/m @25°C | Faecal Coliforms cfu/100ml | Unionised ammonia g/m$^3$-N | Ammoniacal nitrogen g/m$^3$-N | pH | Suspended solids g/m$^3$ | Temp. Deg.C | Turbidity NTU |
|---|---|---|---|---|---|---|---|---|---|---|
| IND003009+ | - | | - | - | - | - | - | - | - | - |
| STW001006 | 88 | 46 | 35.7 | 120 | 0.0039 | 3.3 | 6.7 | 26 | 14.3 | 102 |
| STW002054 | 60 | 40 | 27.1 | 8,000 | 0.0031 | 0.48 | 7.4 | 5 | 13.8 | 12.0 |
| PMU000100 | 22 | 17 | 12.1 | 1,400 | 0.00010 | 0.045 | 6.9 | < 3 | 13.7 | 2.8 |
| PMU000106 | 22 | 18 | 13.0 | 1,800 | 0.00020 | 0.064 | 7.1 | 4 | 13.8 | 3.2 |
| PMU000109 | 62 | 37 | 26.8 | 1,600 | 0.00066 | 0.24 | 7.1 | < 3 | 13.2 | 7.7 |
| PMU000110 | 38 | 25 | 18.5 | 960 | 0.0042 | 1.04 | 7.2 | < 3 | 13.6 | 3.1 |
| PMU000113 | 41 | 27 | 19.6 | 870 | 0.0037 | 0.93 | 7.2 | < 3 | 14.0 | 3.1 |
| ***Limits PMU000110*** | ***NA*** | | ***NA*** | ***NA*** | ***NA*** | ***2.5*** | ***[within ±0.5]*** | | ***≤ 16.3 [+2]*** | ***NA (visual)*** |
| ***Limits PMU000113*** | ***NA*** | | ***NA*** | ***≤ 1000*** | ***NA*** | ***2.0 at pH < 7.75*** | ***≥ 6.5 & ≤ 8.5*** | ***13 [+10]*** | | ***NA (visual)*** |

**Key:** [ ] indicates this is a maximum permitted change from the upstream value at PMU000100
+ no discharge occurring

As stated earlier, the Manganaha Stream receives no direct discharges from the landfill catchment, but it is a useful indicator for any groundwater contamination.

Additionally, the consents state that the water quality in the Manganaha Stream shall not be changed as a result of discharges from the landfilling activities.

The results show that water quality in the stream is quite high and there is negligible difference in water quality when comparing the results from the two Manganaha Stream sites. These results are comparable to those obtained in previous monitoring periods.

Table 9 Results of rain event monitoring-Manganaha Stream, 26 September 2023

| Parameter | Unit | Site | |
|---|---|---|---|
| | | MNH000190 | MNH000250 |
| Ammoniacal nitrogen | $g/m^3$-N | 0.013 | 0.013 |
| Conductivity | mS/m@25°C | 13.8 | 13.9 |
| pH | - | 7.4 | 7.4 |
| Suspended solids | $g/m^3$ | < 3 | < 3 |
| Temperature | Deg C | 12.7 | 12.8 |
| Turbidity | NTU | 1.4 | 1.9 |
| Unionised ammonia | $g/m^3$ | 0.00007 | 0.00008 |

## 2.3.3 Results of dry weather stormwater and receiving environment monitoring

### 2.3.3.1 Manganaha Stream

Dry weather samples were collected from two monitoring sites in the Manganaha Stream on two occasions during the year under review. On both sampling occasions the Manganaha Stream showed no adverse effects from the landfilling operation.

For the most part the upstream and downstream results showed little, if any, difference in water quality. There were small changes in the acid soluble iron concentrations, which are expected in a stream that has groundwater infiltration and runs through an agricultural area. All results were comparable to background levels, and were similar to those found over the last ten years.

Table 10 Chemical analysis of the Manganaha Stream

| Parameter | Units | 13 November 2023 | | 30 April 2024 | |
|---|---|---|---|---|---|
| | | MNH000190 u/s of landfill | MNH000250 d/s of landfill | MNH000190 u/s of landfill | MNH000250 d/s of landfill |
| Alkalinity | $g/m^3$ $CaCO_3$ | 29 | 30 | 24 | 25 |
| Conductivity | mS/m@25°C | 15.1 | 15.2 | 14.3 | 14.6 |
| Acid soluble iron | $g/m^3$ | 0.51 | 0.73 | 0.39 | 0.45 |
| Ammonia (unionised) | $g/m^3$ | 0.00013 | 0.00015 | 0.00009 | 0.00007 |
| Ammoniacal nitrogen | $g/m^3$-N | 0.016 | 0.015 | 0.015 | 0.013 |
| pH | pH | 7.4 | 7.5 | 7.4 | 7.3 |
| Suspended solids | $g/m^3$ | < 3 | 4 | <3 | <3 |
| Temperature | Deg C | 15.4 | 15.9 | 13.7 | 13.7 |
| Turbidity | NTU | 1.6 | 2.0 | 2.3 | 2.3 |
| Dissolved zinc | $g/m^3$ | < 0.0010 | < 0.0010 | 0.0012 | 0.0012 |

There are no specific consent conditions in regards to the Manganaha Stream water quality other than the requirements that the authorised discharges to land and to the Puremu Stream from the landfill shall not affect water quality in the Manganaha Stream.

Based on these results, and those from previous monitoring periods, the landfill's presence is having no measurable effect on water quality in the Manganaha Stream.

#### 2.3.3.2 Dry weather Puremu Stream and discharge sampling

Dry weather samples were collected from the stormwater pond discharges, the Puremu Stream and the Puremu Stream tributary upstream and/or downstream of the discharges on two occasions during the year under review at the locations shown in Figure 13.

There is only one consent limit on the discharges from the stormwater ponds, 10804-1.0 specifies a suspended solids concentration of 100g/$m^3$. The effects of the activity are controlled by contaminant concentration limits on the receiving waters. However, the results of the stormwater monitoring aid in the interpretation of the receiving water results, and give a better understanding of the potential for environmental effects, as both of the stormwater discharges are permitted to contain minor amounts of leachate.

In stream limits are given for a range of parameters for Stage 2 (2370-3), which has the compliance point at PMU000110, and for Stage 3 (4619-1), where the compliance point is at PMU000113. For certain constituents, the limit placed on the consent is in the form of a maximum change from the upstream value, which is determined at site PMU000100. These requirements are indicated within the square brackets in the following tables.

The Puremu Stream was sampled on two occasions in dry weather under low to moderate flow conditions. The results of the routine compliance monitoring parameters from these surveys are presented in Table 11 and Table 12.

The samples collected at the time of both surveys returned results that were below the contaminant concentrations specified on the consents.

Contaminants of note in the pond discharges are acid soluble iron, alkalinity, ammoniacal nitrogen and manganese. Historically, in the case of acid soluble iron, alkalinity and ammoniacal nitrogen, these had tended to be higher in the discharge from the eastern small silt pond, whereas manganese tends to be higher in the discharges from the large silt pond.

An investigation was undertaken by NPDC following a non-compliance with the ammoniacal nitrogen concentration in the 2020/21 year. This investigation identified that it was likely that leachate and/or contaminated groundwater from under Stage 1B was discharging to the STW001006 pond, via underground stormwater pipes. In October 2021, the clean stormwater was diverted away from the underground pipes, and the leachate/contaminated stormwater was diverted away from the stormwater pond to the leachate system. Figure 14 shows the significant reduction in the ammoniacal nitrogen concentration of the stormwater pond discharge samples collected following these diversions. The start date of June 2014 has been chosen for use in the following graphs due to the increased number of stormwater results for comparison with the receiving environment monitoring.

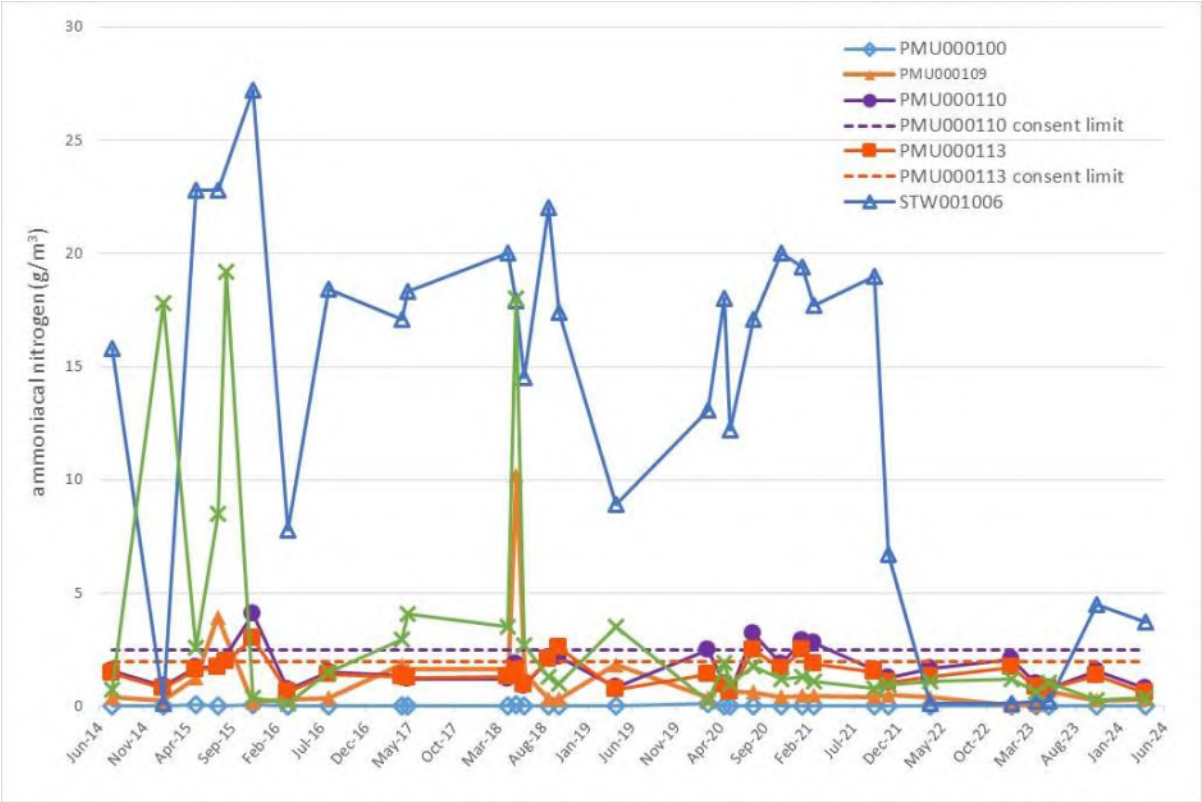


Figure 14 Ammoniacal nitrogen in the Puremu Stream and stormwater samples, June 2014 to date

*Note: includes wet weather samples*

Table 11 Chemical analysis of the Puremu Stream and discharges, sampled on 13 November 2023

| Parameter | Unit | PMU000100 500m u/s of landfill | PMU000106 u/s of landfill culvert | STW001006 Small western silt pond | PMU000110 d/s landfill culvert | *Consent limit at PMU000110* | STW002054 Large silt pond | PMU000109 Trib d/s large silt pond | PMU000113 d/s SPCA drive culvert | *Consent limits at PMU000113* |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Ammoniacal-N | $g/m^3$ | 0.033 | 0.052 | 4.5 | 1.54 | ***2.5*** | 0.28 | 0.26 | 1.37 | ***2.0 [at pH<7.75; limit is pH dependant]*** |
| Free Ammonia | $g/m^3$ N | 0.00010 | 0.00028 | 0.0068 | 0.0088 | | 0.0069 | 0.0009 | 0.0093 | |
| Turbidity | NTU | - | - | 36 | - | | 13.5 | - | - | |
| pH | $g/m^3$ | 7.0 | 7.3 | 6.7 | 7.3 | ***[within ± 0.5]*** | 6.9 | 7.1 | 7.3 | ***≥ 6.5 & ≤ 8.5*** |
| Total Alkalinity | $g/m^3$ $CaCO_3$ | 27 | 26 | 114 | 51 | | 94 | 86 | 55 | |
| Electrical Conductivity (EC) | mS/m@25°C | 13.8 | 14.6 | 43.3 | 23.2 | | 33.3 | 32.6 | 24.2 | |
| Total Suspended Solids | $g/m^3$ | < 3 | < 3 | 33 | < 3 | | 4 | 7 | < 3 | ***13 [+10]*** |
| Sample Temperature | °C | 16.8 | 16.3 | 16.0 | 16.7 | ***≤ 18.8 [+2]*** | 15.5 | 16.1 | 16.6 | |
| Dissolved Aluminium | $g/m^3$ | 0.010 | 0.008 | < 0.003 | 0.008 | | < 0.003 | < 0.003 | 0.003 | ***0.110 [+0.1]*** |
| Total Aluminium | $g/m^3$ | 0.021 | 0.090 | 0.027 | 0.014 | ***5.0*** | 0.0101 | 0.0041 | 0.010 | ***5.0*** |
| Dissolved Arsenic | $g/m^3$ | < 0.0010 | < 0.0010 | < 0.0010 | < 0.0010 | | < 0.0010 | < 0.0010 | < 0.0010 | ***0.05 [+0.05]*** |
| Total Arsenic | $g/m^3$ | < 0.0011 | < 0.0011 | < 0.0011 | < 0.0011 | ***0.1*** | < 0.0011 | < 0.0011 | < 0.0011 | ***0.2*** |
| Dissolved Boron | $g/m^3$ | 0.0180[a] | 0.0180[a] | 0.041 | 0.031 | | 0.024[a] | 0.024[a] | 0.030[a] | |
| Total Boron | $g/m^3$ | 0.0175[a] | 0.0178[a] | 0.041 | 0.031 | ***0.5*** | 0.023[a] | 0.022[a] | 0.029[a] | ***5.0*** |
| Dissolved Cadmium | $g/m^3$ | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | | < 0.00005 | < 0.00005 | < 0.00005 | ***0.001 [+0.001]*** |
| Total Cadmium | $g/m^3$ | < 0.000053 | < 0.000053 | < 0.000053 | < 0.000053 | ***0.01*** | < 0.000053 | < 0.000053 | < 0.000053 | ***0.05*** |
| Dissolved Chromium | $g/m^3$ | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | | < 0.0005 | < 0.0005 | < 0.0005 | ***0.02 [+0.02]*** |
| Total Chromium | $g/m^3$ | < 0.00053 | < 0.00053 | < 0.00053 | 0.00070 | ***0.1*** | < 0.00053 | < 0.00053 | < 0.00053 | ***1.0*** |
| Dissolved Cobalt | $g/m^3$ | 0.00030 | 0.00070 | 0.0014[a] | 0.0009[a] | | 0.00130[a] | 0.00120[a] | 0.00090 | |
| Total Cobalt | $g/m^3$ | 0.00037 | 0.00082 | < 0.00021 | 0.00092 | ***0.05*** | 0.00114[a] | 0.00123[a] | 0.00087 | ***1*** |
| Dissolved Copper | $g/m^3$ | < 0.0005 | 0.0005 | < 0.0005 | < 0.0005 | | < 0.0005 | < 0.0005 | < 0.0005 | ***0.007 [+0.002]*** |

| Parameter | Unit | PMU000100 500m u/s of landfill | PMU000106 u/s of landfill culvert | STW001006 Small western silt pond | PMU000110 d/s landfill culvert | *Consent limit at PMU000110* | STW002054 Large silt pond | PMU000109 Trib d/s large silt pond | PMU000113 d/s SPCA drive culvert | *Consent limits at PMU000113* |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Copper | $g/m^3$ | < 0.00053 | 0.00074 | < 0.00053 | 0.00062 | ***0.2*** | 0.00066 | < 0.00053 | < 0.00053 | ***0.5*** |
| Dissolved Iron | $g/m^3$ | 0.82 | 0.71 | 18 | 0.99 | | 0.11 | 0.09 | 0.08 | ***1.12 [+0.3]*** |
| Total Iron | $g/m^3$ | 1.32 | 1.40 | 25 | 1.89 | ***5.0*** | 1.62 | 2.4 | 1.69 | ***10*** |
| Dissolved Lead | $g/m^3$ | < 0.00010 | < 0.00010 | < 0.00010 | < 0.00010 | | < 0.00010 | < 0.00010 | < 0.00010 | ***0.002 [+0.002]*** |
| Total Lead | $g/m^3$ | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | ***0.1*** | < 0.00011 | < 0.00011 | < 0.00011 | ***0.1*** |
| Dissolved Manganese | $g/m^3$ | 0.099 | 0.12 | 1.9[a] | 0.55 | | 4.5[a] | 4.0 | 0.84[a] | |
| Total Manganese | $g/m^3$ | 0.11 | 0.13 | 1.9[a] | 0.56 | ***1.0*** | 3.8[a] | 4.0 | 0.81[a] | ***5.0*** |
| Dissolved Zinc | $g/m^3$ | < 0.0010 | 0.0013 | < 0.0010 | < 0.0010 | | < 0.0010 | < 0.0010 | 0.0012 | ***0.030 [+0.03]*** |
| Total Zinc | $g/m^3$ | < 0.0011 | 0.0023 | < 0.0011 | 0.0015 | ***2.0*** | < 0.0011 | 0.0012 | 0.0014 | ***2.4*** |
| Chloride | $g/m^3$ | 20 | 21 | 56 | 31 | | 40 | 45 | 32 | |
| Nitrite-N | $g/m^3$ | < 0.002 | 0.002 | < 0.02 | < 0.002 | | 0.005 | 0.003 | 0.008 | ***0.06*** |
| Nitrate-N+Nitrite-N | $g/m^3$ | 0.104 | 0.29 | < 0.02 | 0.75 | ***100*** | 0.27 | 0.113 | 0.76 | ***10*** |
| Dissolved Reactive Phosphorus | $g/m^3$ | < 0.004 | < 0.004 | < 0.04 | < 0.004 | | < 0.004 | < 0.004 | < 0.004 | |
| Sulphate | $g/m^3$ | 4.2 | 6.5 | 5.7 | 6.0 | ***500*** | 4.9 | 4.3 | 5.9 | ***1,000*** |
| Dissolved Oxygen | $g/m^3$ $O_2$ | 1.13 | 8.41 | - | 6.58 | ***≥ 5.0*** | - | 3.60 | 6.84 | ***≥ 0.13 [-1]*** |
| Total Biochemical Oxygen Demand | $g/m^3$ $O_2$ | < 2 | < 2 | < 2 | < 2 | | < 2 | < 2 | < 2 | |
| Faecal Coliforms | cfu/100ml | 310 | 1,100[b] | < 10[b] | 630[b] | | 100[b] | 130[b] | 580 | ***≤ 1,000*** |

**Key:** [ ] indicates this is a maximum permitted change from the upstream value at PMU000100

a It is noted that the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods

b Sample over 24 hours old at time of analysis – interpret result with caution

Table 12 Chemical analysis of the Puremu Stream and discharges, sampled on 29 April 2024

| Parameter | Unit | PMU000100 500 m u/s of landfill | PMU000106 u/s of landfill culvert | STW001006 Small western silt pond | PMU000110 d/s landfill culvert | Consent limit at PMU000110 | STW002054 Large silt pond | PMU000109 Trib d/s large silt pond | PMU000113 d/s SPCA drive culvert | Consent limits at PMU000113 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Ammoniacal-N | $g/m^3$ | 0.038 | 0.052 | 3.7 | 0.78 | ***2.5*** | 0.38 | 0.32 | 0.61 | ***2.0 [at pH<7.75; limit is pH dependant]*** |
| Free Ammonia | $g/m^3$ N | 0.000056 | 0.00014 | 0.086 | 0.0032 | | 0.00098 | 0.00075 | 0.0023 | |
| Turbidity | NTU | - | - | 179 | - | | 11 | - | - | |
| pH | $g/m^3$ | 6.8 | 7.0 | 7.0 | 7.2 | ***[within ± 0.5]*** | 7.0 | 7.0 | 7.2 | ***≥ 6.5 & ≤ 8.5*** |
| Total Alkalinity | $g/m^3$ $CaCO_3$ | 21 | 23 | 92 | 34 | | 37 | 46 | 36 | |
| Electrical Conductivity | mS/m@25°C | 13.5 | 14.5 | 33.5 | 18.4 | | 20.9 | 22.9 | 19.0 | |
| Total Suspended Solids | $g/m^3$ | <3 | 4 | 17 | <3 | | 8 | 5 | 4 | ***21 [+10]*** |
| Sample Temperature | °C | 13.8 | 13.9 | 14.0 | 13.8 | ***≤ 18.4 [+2]*** | 13.7 | 13.9 | 13.9 | |
| Dissolved Aluminium | $g/m^3$ | 0.014 | 0.012 | <0.003 | 0.008 | | 0.014 | <0.003 | 0.007 | ***0.106 [+0.1]*** |
| Total Aluminium | $g/m^3$ | 0.033 | 0.124 | 0.26 | 0.03 | ***5.0*** | 0.61 | 0.22 | 0.048 | ***5.0*** |
| Dissolved Arsenic | $g/m^3$ | <0.0010 | <0.0010 | <0.0010 | <0.0010 | | <0.0010 | <0.0010 | <0.0010 | ***0.05 [+0.05]*** |
| Total Arsenic | $g/m^3$ | <0.0011 | <0.0011 | <0.0011 | <0.0011 | ***0.1*** | <0.0011 | <0.0011 | <0.0011 | ***0.2*** |
| Dissolved Boron | $g/m^3$ | 0.0190[a] | 0.02 | 0.040[a] | 0.027[a] | | 0.021[a] | 0.022[a] | 0.025 | |
| Total Boron | $g/m^3$ | 0.0184 | 0.02 | 0.038 | 0.025 | ***0.5*** | 0.020 | 0.021 | 0.025 | ***5.0*** |
| Dissolved Cadmium | $g/m^3$ | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | | < 0.00005 | < 0.00005 | < 0.00005 | ***0.001 [+0.001]*** |
| Total Cadmium | $g/m^3$ | < 0.000053 | < 0.000053 | < 0.000053 | < 0.000053 | ***0.01*** | < 0.000053 | < 0.000053 | < 0.000053 | ***0.05*** |
| Dissolved Chromium | $g/m^3$ | < 0.0005 | < 0.0005 | < 0.0005 | < 0.0005 | | < 0.0005 | < 0.0005 | < 0.0005 | ***0.02 [+0.02]*** |
| Total Chromium | $g/m^3$ | < 0.00053 | < 0.00053 | < 0.00053 | < 0.00053 | ***0.1*** | < 0.00053 | < 0.00053 | < 0.00053 | ***1.0*** |
| Dissolved Cobalt | $g/m^3$ | 0.00030[a] | 0.00070 | 0.0011 | 0.00070 | | 0.00090 | 0.00080 | 0.00070 | |
| Total Cobalt | $g/m^3$ | 0.00028 | 0.00090 | 0.00130 | 0.00077 | ***0.05*** | 0.00091 | 0.00083 | 0.00070 | ***1.0*** |
| Dissolved Copper | $g/m^3$ | < 0.0005 | < 0.0005 | < 0.0005 | 0.0005 | | 0.0016 | 0.0008 | 0.0005 | ***0.007 [+0.002]*** |

| Parameter | Unit | PMU000100 500 m u/s of landfill | PMU000106 u/s of landfill culvert | STW001006 Small western silt pond | PMU000110 d/s landfill culvert | Consent limit at PMU000110 | STW002054 Large silt pond | PMU000109 Trib d/s large silt pond | PMU000113 d/s SPCA drive culvert | Consent limits at PMU000113 |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Copper | $g/m^3$ | 0.00065 | < 0.00053 | 0.00068 | 0.00053 | ***0.2*** | 0.0027 | 0.00142 | 0.00073 | ***0.5*** |
| Dissolved Iron | $g/m^3$ | 0.59 | 0.57 | 12 | 0.76 | | 0.12 | 0.26 | 0.73 | ***1.20 [+0.3]*** |
| Total Iron | $g/m^3$ | 1.18 | 1.62 | 22 | 1.65 | ***5.0*** | 1.27 | 1.90 | 1.59 | ***10*** |
| Dissolved Lead | $g/m^3$ | < 0.00010 | < 0.00010 | <0.00010 | < 0.00010 | | < 0.00010 | < 0.00010 | < 0.00010 | ***0.002 [+0.002]*** |
| Total Lead | $g/m^3$ | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | ***0.1*** | 0.00032 | < 0.00011 | < 0.00011 | ***0.1*** |
| Dissolved Manganese | $g/m^3$ | 0.059 | 0.12 | 1.4 | 0.33 | | 2.3 | 2.0[a] | 0.58[a] | |
| Total Manganese | $g/m^3$ | 0.063 | 0.16 | 1.5 | 0.34 | ***1.0*** | 2.3 | 2.0[a] | 0.56[a] | ***5.0*** |
| Dissolved Zinc | $g/m^3$ | 0.0011 | 0.0023 | < 0.0010 | 0.0013 | | 0.0035 | 0.0020 | 0.0016 | ***0.030 [+0.03]*** |
| Total Zinc | $g/m^3$ | 0.0014 | 0.0034 | 0.0011 | 0.0016 | ***2.0*** | 0.0039 | 0.0021 | 0.0017 | ***2.4*** |
| Chloride | $g/m^3$ | 20 | 20 | 46 | 26 | | 30 | 34 | 27 | |
| Nitrite-N | $g/m^3$ | 0.002 | <0.002 | 0.033 | 0.006 | | 0.024 | 0.019 | 0.008 | ***0.06*** |
| Nitrate-N+Nitrite-N | $g/m^3$ | 0.101 | 0.20 | 0.068 | 0.66 | ***100*** | 1.63 | 1.20 | 0.74 | ***10*** |
| Dissolved Reactive Phosphorus | $g/m^3$ | < 0.004 | < 0.004 | < 0.004 | < 0.004 | | < 0.004 | < 0.004 | < 0.004 | |
| Sulphate | $g/m^3$ | 9.9 | 11.3 | 5.2 | 10.7 | ***500*** | 7.0 | 6.4 | 9.9 | ***1,000*** |
| Dissolved Oxygen | g $O_2/m^3$ | 6.60 | 9.20 | 4.80 | 8.59 | ***≥ 5.0*** | 9.01 | 6.23 | 8.63 | ***≥ 6.30 [-1]*** |
| Total Biochemical Oxygen Demand | g $O_2/m^3$ | < 2 | < 2 | < 2 | < 2 | | < 2 | < 2 | < 2 | |
| Faecal Coliforms | cfu/100ml | 380 | 290 | 2 | 620 | | 230 | 330 | 390 | ***≤ 1,000*** |

**Key:** [ ] indicates this is a maximum permitted change from the upstream value at PMU000100

a It is noted that the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods

In previous years there have been exceedances of the manganese concentration in the Puremu Stream at the compliance point for Consent 2370-3 (PMU000110). This monitoring location is downstream of the small silt pond discharge STW001006. Monitoring of the manganese concentrations in the discharges from the ponds at STW001006 and STW002054 commenced in the 2020/21 year. During the year under review it was found that the manganese concentration in the discharge from both the small silt pond (STW001006) and the large silt pond (STW002054) was elevated at the time of both wet and dry weather surveys. There were no exceedances of the receiving water manganese limits on either of the consents.

A reduction in the total alkalinity (Figure 15) and conductivity (Figure 16) of the discharge from the small eastern silt ponds has also occurred following the diversion below Stage 1B. Historically, the influence of both the small western and large silt ponds had been notable at PMU000113.

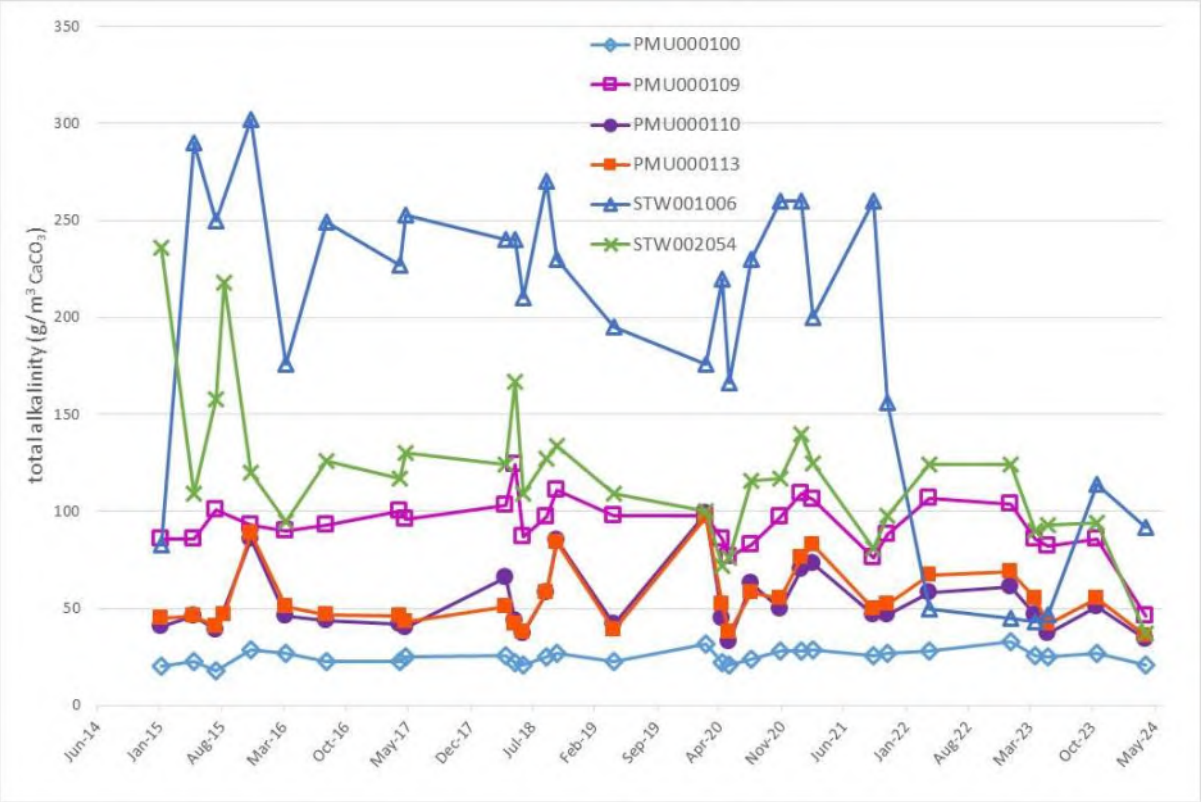


Figure 15 Total alkalinity in the Puremu Stream and stormwater samples, June 2014 to date

*Note: includes wet weather samples*

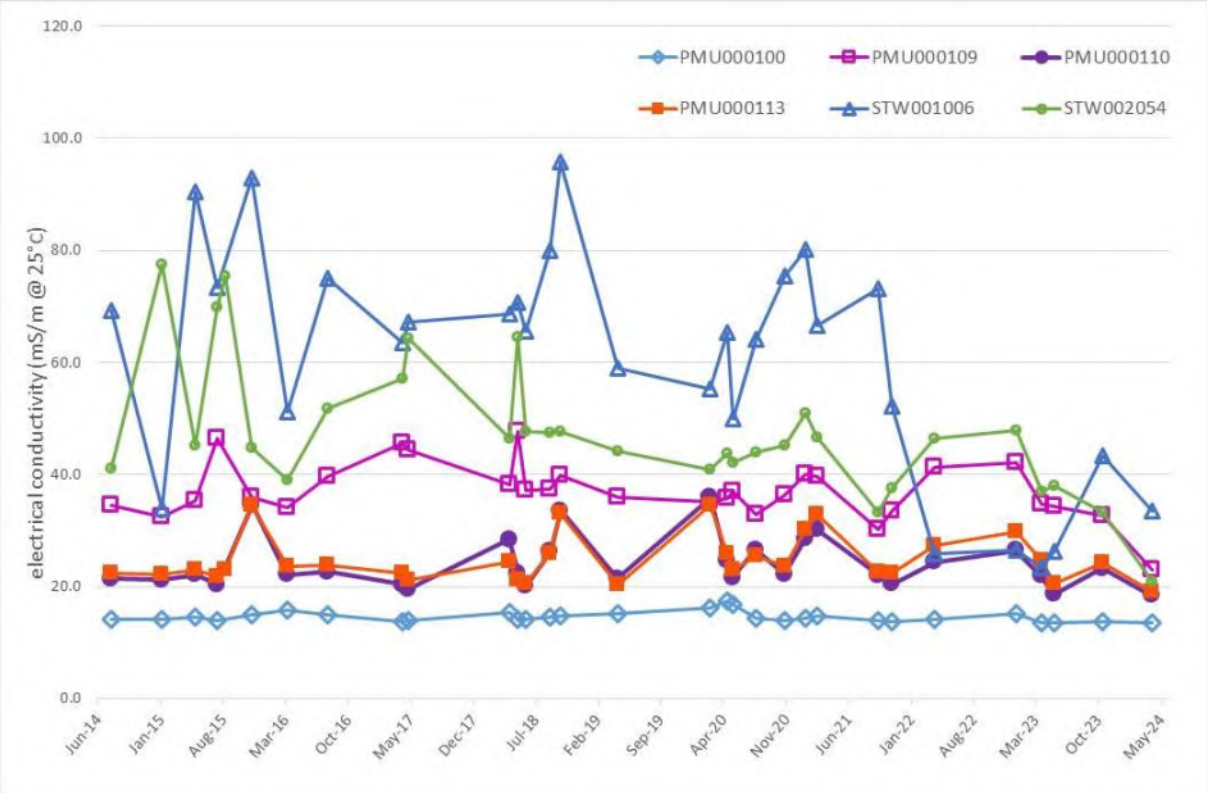


Figure 16 Conductivity in the Puremu Stream and stormwater samples, June 2014 to date

*Note: includes wet weather samples*

The results from the dry weather sampling during the year under review indicate that discharges from the landfill were not resulting in any significant adverse effect at the time of the surveys.

#### 2.3.3.3 Dry weather baseline characterisation of contaminants

During the year under review, the baseline characterisation focused on identifying the concentrations of a wider range of indicator parameters, the presence or absence of potential contaminants in the surface water discharges, and the potential for seasonal variation. The purpose of this monitoring is to establish reliable data that will enable consideration to be given to the most effective range of contaminants to be monitored in the discharges and receiving environment as the site transitions to a fully capped and closed site. The results of this monitoring are given in Table 13.

Table 13 Results for the dry weather stormwater pond discharge characterisation

| Parameter | Unit | STW001006 Small western silt pond | | STW002054 Large silt pond | |
|---|---|---|---|---|---|
| | | 13 Nov 2023 | 29 April 2024 | 13 Nov 2023 | 29 April 2024 |
| Sum of Anions | meq/L | 4.0 | 3.3 | 3.1 | 1.9 |
| Sum of Cations | meq/L | 4.4 | 3.5 | 3.5 | 1.9 |
| Bicarbonate | $g/m^3$ at 25°C | 139 | 112 | 115 | 45 |
| Total Hardness | $g/m^3$ $CaCO_3$ | 77 | 67 | 87 | 47 |
| Total Dissolved Solids (TDS) | $g/m^3$ | 210 | 179 | 200 | 130 |
| Dissolved Calcium | $g/m^3$ | 13.1 | 12.8 | 14.3 | 9.5 |
| Dissolved Magnesium | $g/m^3$ | 10.7 | 8.6 | 12.4 | 5.8 |
| Dissolved Mercury | $g/m^3$ | < 0.00008 | < 0.00008 | < 0.00008 | < 0.00008 |
| Dissolved Potassium | $g/m^3$ | 7.7 | 6.6 | 3.1 | 6.7 |

| Parameter | Unit | STW001006 Small western silt pond | | STW002054 Large silt pond | |
|---|---|---|---|---|---|
| | | 13 Nov 2023 | 29 April 2024 | 13 Nov 2023 | 29 April 2024 |
| Dissolved Sodium | $g/m^3$ | 38 | 29 | 34 | 16 |
| Fluoride | $g/m^3$ | < 0.05 | <0.05 | < 0.05 | <0.05 |
| Total Kjeldahl Nitrogen (TKN) | $g/m^3$ | 4.6 | 3.8 | 0.40 | 0.76 |
| Phosphate | $g/m^3$ | < 0.13 | <0.013 | < 0.013 | < 0.013 |
| Total Phosphorus | $g/m^3$ | 0.009 | 0.011 | 0.027 | 0.018 |
| Total Ammoniacal-N | $g/m^3$ | 4.5 | 3.7 | 0.28 | 0.38 |
| Nitrite-N | $g/m^3$ | < 0.02 | 0.033 | 0.005 | 0.024 |
| Nitrate-N | $g/m^3$ | < 0.02 | 0.035 | 0.26 | 1.60 |
| Reactive Silica | $g/m^3$ as $SiO_2$ | 16 | 15 | 24 | 15 |
| Dissolved carbonaceous biochemical oxygen demand | $gO_2/m^3$ | < 2 | <2 | < 2 | < 2 |
| Carbonaceous biochemical oxygen demand | $gO_2/m^3$ | < 2 | <2 | < 2 | < 2 |
| Chemical oxygen demand | $gO_2/m^3$ | 20 | 10 | < 6 | 10 |
| Total organic carbon | $g/m^3$ | 7 | 3.2 | 3.9 | 3.1 |
| Escherichia coli | cfu/100mL | 80[a] | 2 | < 10[a] | 220 |
| Dissolved Nickel | $g/m^3$ | < 0.0005 | <0.0005 | < 0.0005 | < 0.0005 |
| Total Nickel | $g/m^3$ | < 0.00053 | <0.00053 | < 0.00053 | < 0.00053 |
| **Organo nitrogen & phosphorus pesticides[b]** | | | | | |
| Hexazinone | $g/m^3$ | 0.00021 | 0.00009 | ND | ND |
| Terbuthylazine | $g/m^3$ | 0.00005 | 0.0033 | 0.00005 | 0.00067 |
| Terbuthylazine-desethyl | $g/m^3$ | ND | 0.00043 | ND | 0.00014 |
| Terbutryn | $g/m^3$ | 0.00004 | 0.00005 | ND | ND |
| **Semi volatile organic compounds** | | ND | ND | ND | ND |
| **Volatile organic compounds[b]** | | ND | ND | ND | ND |
| Chlorobenzene (monochlorobenzene) | $g/m^3$ | 0.0003 | ND | ND | ND |

**Key:** a Sample over 24 hours old at time of analysis – interpret result with caution
b Any compounds of this classification that were detected are listed below this heading
ND None detected

In the 2021/22 year, there were some notable differences in a number of the parameters determined in the samples collected from the small western silt pond (STW001006) when comparing the sample collected in November 2021 and the sample collected in April 2022. The work to divert the contaminated discharge from the pipework under the Stage 1B area commenced in October 2021, and therefore at that point in time it was unclear if these differences were due to seasonal variation or whether the water quality had not reached a stable state following the changes to the drainage. The water quality of the discharge from this pond has continued to show a significant improvement between the samples collected before the diversion (for example median ammoniacal nitrogen to October 2021 of 17.9g/m$^3$) and following the diversion (median November 2021 to June 2024 of 0.23g/m$^3$).

With respect to the other aim of characterising the water quality in relation to identifying the contaminants in the discharge that have the potential to have an adverse effect on the environment, it is noted that no semi volatile organic compounds were detected.

In the 2023/24 year, the compounds under the organo-nitrogen & phosphorus pesticide classification that were detected were hexazinone, terbuthyazine, terbuthyazine-desethyl and terbutryn.

Hexazinone is a non-selective contact herbicide that has a low reliability trigger level of 0.075g/$m^3$ in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council (ANZECC), 2000). The concentrations detected in the stormwater discharges were well below this trigger value during the year under review.

Terbuthylazine is also a herbicide. An ANZECC trigger value has not been determined for this contaminant, however there is a drinking water maximum acceptable value (MAV) of 0.008g/$m^3$. The concentrations detected in the stormwater discharges were well below this value during the year under review. Terbuthylazine-desethyl is a degradation compound from terbuthylazine.

Terbutryn is another herbicide. The Australian Drinking Water guidelines state a concentration of above 0.4mg/L as being concerning to health. Levels found in the discharge were well below this.

The volatile organic compound monochlorobenzene was detected in the sample collected from the small silt pond at the very low concentrations of 0.0003g/$m^3$ in the sample collect on 23 November 2023. To put this value in perspective the ANZECC trigger value for monochlorobenzene in a slight to moderately disturbed eco system is 0.055g/$m^3$. The Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment) has an interim guideline of 0.0013g/$m^3$ for long term exposure. The concentration detected in the discharge from the small western silt pond was below the acute and chronic levels.

## 2.3.4 Biological monitoring

### 2.3.4.1 Macroinvertebrate surveys

The Council's 'kick-sampling' technique, and a combination of the 'kick-sampling' and 'vegetation-sweep' sampling techniques were used at six sites (Table 14) to collect streambed macroinvertebrates from the Manganaha Stream, Puremu Stream and an unnamed tributary of the Puremu Stream. This has provided data to assess any potential adverse effects of leachate from the landfill on the macroinvertebrate communities of these streams.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of nutrient pollution in streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to pollution. The SQMCI takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. Significant differences in either the MCI or the SQMCI between sites indicate the degree of adverse effects (if any) of the discharges being monitored and enable the overall health of the macroinvertebrate communities to be determined.

Table 14 Biomonitoring sites in the Puremu and Manganaha Streams

| Stream | Site number | Site Code | Grid reference (NZTM) | Location |
|---|---|---|---|---|
| Puremu Stream | 1b | PMU000106 | E1697019 N5675802 | Immediately downstream of farm bridge |
| | 2 | PMU000110 | E1696974 N5676405 | 400m downstream landfill |
| | 3 | PMU000113 | E1696986 N5676534 | Downstream of the SPCA driveway |
| Unnamed tributary of Puremu Stream | PT1 | PMU000108 | E1697046 N5676450 | 60m upstream of the confluence with Puremu Stream |
| Manganaha Stream | M4 | MNH000190 | E1697483 N5676284 | 10m downstream of an unnamed tributary of the Manganaha Stream |

| Stream | Site number | Site Code | Grid reference (NZTM) | Location |
|---|---|---|---|---|
| | M6 | MNH000260 | E1697371<br>N5676665 | 500m downstream of site M4 |

### 30 October 2023

For the four sites on the Puremu Stream and unnamed tributary of the Puremu Stream, taxa richness was low to high and ranged between 9 and 17 taxa, with site 1b recording the highest taxa richness for the site to date. MCI scores were reflective of 'poor' health at all four sites (Figure 17). SQMCI scores were reflective of 'poor' to 'very poor' health. Poor habitat conditions, including unfavourable substrate composition for sensitive taxa, likely contributed to the overall degraded community health. Similarities in metrics between sites 1b and 3 suggest that the recorded degradation was likely localised and showed some improvement downstream.

The two sites on the Manganaha recorded a low taxa richness of 12 and 15 taxa at sites M4 and M6, respectively. Both MCI and SQMCI scores were reflective of 'fair' macroinvertebrate community health. Overall, there was no evidence of significant impacts from the Colson Road Landfill discharges on the Manganaha Stream.

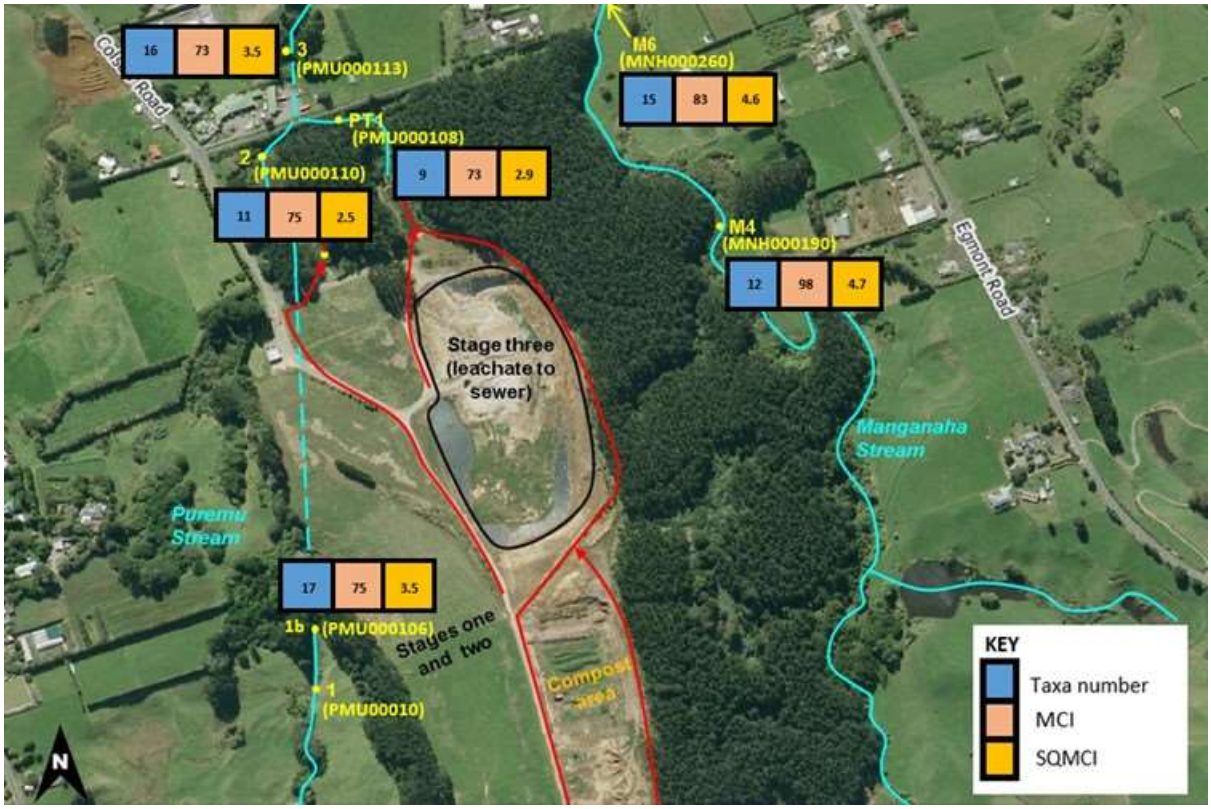


Figure 17 Biomonitoring sites related to the Colson Road landfill October 2023, with taxa number, MCI scores and SQMCI scores for each site. The red lines on the aerial photograph indicate the direction of stormwater runoff from the landfill site

### 19 February 2024

For the four sites on the Puremu Stream and unnamed tributary of the Puremu Stream, taxa richness was low and ranged between 6 and 11 taxa (Figure 18). MCI scores were reflective of 'fair' to 'very poor' macroinvertebrate community health. SQMCI scores were also reflective of 'fair to 'very poor' macroinvertebrate community health. Poor habitat conditions, including unfavourable substrate composition for sensitive taxa, likely contributed to the overall degraded macroinvertebrate community health. However, the disparity of macroinvertebrate community results suggests that the leachate from the

landfill is likely exacerbating the impact on the macroinvertebrate community health at site 2. Similarities in metrics between sites 1b and 3 suggest that the degradation recorded was likely localised to site 2 and showed some improvement downstream.

The two sites on the Manganaha recorded a low to moderate taxa richness of 16 and 12 taxa at sites M4 and M6, respectively. MCI and SQMCI scores recorded at site M4 were reflective of 'good' health, while the scores at site M6 were reflective of 'fair' health. Overall, there was no evidence of significant impacts from the Colson Road Landfill discharges on the Manganaha Stream.

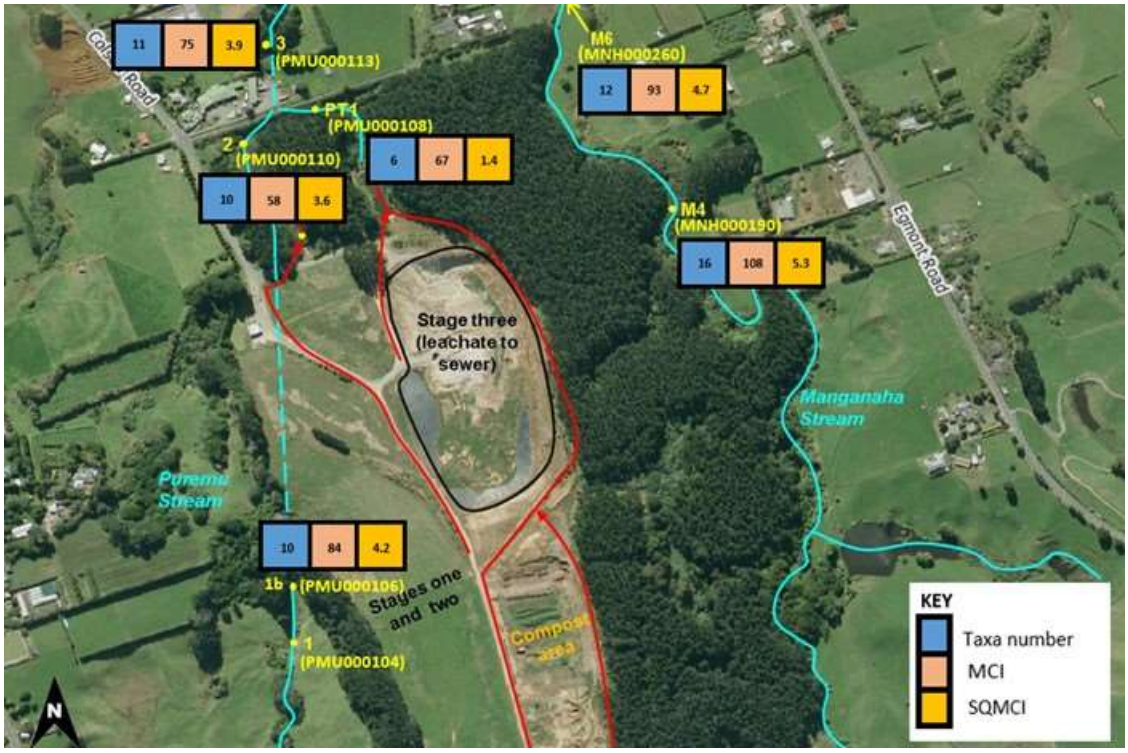


Figure 18 Biomonitoring sites related to the Colson Road landfill February 2024, with taxa number, MCI scores and SQMCI scores for each site. The red lines on the aerial photograph indicate the direction of stormwater runoff from the landfill site

There were no undesirable biological growths detected at any of the sites during either survey.

Overall, the results of the surveys indicated that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site had not had any recent significant detrimental effects on the macroinvertebrate communities of the Puremu Stream or Manganaha Stream.

## 2.4 Groundwater

As outlined in Section 1.4.5, the monitoring programme for the 2023/24 year was a continuation of the revised programme that had been altered from that undertaken up to June 2021. The bores that have been associated with the sampling carried out over the lifetime of this monitoring programme are described in Table 15. The bores that have been monitored previously have been included in this table to add context to the time series data shown in the figures presented later in this section.

During the 2019/20 year it was found that the bore depths of three of the bores had reduced from that provided in the original bore logs. The affected bores were GND0251, GND0255 and GND1300 (highlighted in blue). During the 2020/21 year replacement bores were installed. The impact bores GND0251 and GND1300 were replaced by GND3134 and GND3133 respectively. These replacement bores were located adjacent to the compromised bores. It was agreed that the compromised control bore (GND0255) would be replaced with a control bore that was also up gradient of the Stage 2 area (GND3135). Any additional bores

that were identified as being accessible and available for sampling were added to the groundwater monitoring surveys during the 2021/22 year. This was done to support the on-going investigation into the extent of environmental effects that might be occurring due to the changes in the groundwater quality that has been observed in the Stage 3 under liner groundwater drainage and some of the groundwater monitoring bores. Bores GND0572 (highlighted in green) and GND0574 (highlighted in orange) were the bores added to the scheduled monitoring from the start of the 2021/22 year, however it was identified that bore GND0572 had been compromised. In the 2022/23 year two new monitoring bores (GND3182 and GND3183) were installed down gradient of the compromised bore. These bores were first sampled in December 2022.

The results for the samples collected during the year under review are given in Table 16.

Table 15 Groundwater sampling sites

| Bore | Location description | Easting | Northing | Bore depth (mbgl) | Screened depth (mbgl) |
|---|---|---|---|---|---|
| GND0251[a] | Original L2, pine forest east of landfill | 1697412 | 5676148 | 22.6 | 21.6–22.6 |
| GND0572[b] | WQC, north of Stage 1B | 1697041 | 567622 | 8.7 | 4-9 |
| GND0255[c] (control bore) | L8, south of composting area | 1697388 | 5675542 | 20.8 | 19.8 – 20.8 |
| GND0573 | WQA, north and east of Stage 2 | 1696949 | 5676126 | 10 | 5-10 |
| GND0574[d] | AH7, north of eastern side of Stage 3 | 1697113 | 5676278 | 11.7 | 8-12 |
| GND0575 | AH1, north of eastern side of Stage 3 | 1697283 | 5676349 | 12 | 7-12 |
| GND0598 | WQD, pine forest east of northern toe | 1697415 | 5676245 | 20.5 | 18.6–20.6 |
| GND1300[e] | AH3, pine forest east of landfill | 1697451 | 5675966 | 26 | 19-21 |
| GND1301 | AH2, eastern property boundary north of landfill | 1697415 | 5676373 | 15.3 | unknown |
| GND3133 | AH3, pine forest east of landfill | 1697460 | 5675967 | 18.3 | 9–18 |
| GND3134 | L2, pine forest east of landfill | 1697424 | 5676150 | 23 | 8-23 |
| GND3135 (control bore) | L9, southern end of landfill, up gradient of Stage 2 | 1697322 | 5675396 | 15.0 | 6-15 |
| GND3182[f] | Deep bore between Stage 1B and eastern stormwater ponds | 1697029 | 5676259 | 19.5 | 14-9.5 |
| GND3183[f] | Shallow bore between Stage 1B and eastern stormwater ponds | 1697033 | 5676256 | 4 | 1.5-4 |

**Key:**

a Bore collapsed as at 18-Jun-19 depth to base 19.52m, replaced by GND3134

b Bore added to the 2021/22 programme, but found to be compromised at the time of sampling and was subbsequently replaced[f]

c Bore collapsed as at 18-Jun-19 depth to base 17.4m, new control bore GND3135 in different location

d monitoring of this bore recommenced in the 2021/22 year

e Bore collapsed as at 18-Jun -19 depth to base 19.71m, replaced by GND3133

f Bores added to replace GND0572

Table 16 Chemical analysis of the groundwater samples collected during the year under review

| Parameter name | Units | GND0573 | | GND0574 | | GND0575 | | GND0598 | | GND1301 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 15 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 15 Nov 2023 | 1 May 2024 |
| Water Level | m | 5.39 | 4.98 | 8.82 | 8.34 | 8.11 | 8.17 | 10.45 | 10.41 | 8.17 | 8.20 |
| Bicarbonate | g/m$^3$ at 25°C | 27 | 27 | 58 | 54 | 95 | 109 | 192 | 192 | 57 | 103 |
| Carbonate | g/m$^3$ at 25°C | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloride | g/m$^3$ | 94 | 88 | 47 | 42 | 55 | 55 | 21 | 22 | 27 | 27 |
| Dissolved oxygen | g/m$^3$ | 2.06 | 2.32 | 1.30 | 2.17 | 2.76 | 3.35 | 0.85 | 0.44 | 3.64 | 3.54 |
| Dissolved Oxygen Saturation % | % | 21 | 23 | 14 | 23 | 28 | 34 | 9 | 5 | 36 | 35 |
| Electrical Conductivity (EC) | mS/m at 25°C | 36.3 | 36.5 | 25.7 | 24.7 | 35.6 | 36.7 | 36.3 | 35.9 | 27.5 | 27.7 |
| pH | pH units | 6.2 | 5.9 | 6.5 | 6.3 | 6.3 | 6.4 | 7.8 | 7.9 | 7.2 | 7.1 |
| Sulphate | g/m$^3$ | 7.9 | 8.4 | 3.6 | 4.8 | 3.0 | 2.4 | < 0.5 | <0.5 | 5.2 | 5.7 |
| Total Alkalinity | g/m$^3$ $CaCO_3$ | 22 | 22 | 47 | 45 | 78 | 90 | 158 | 158 | 47 | 85 |
| Total Dissolved Solids (TDS) | g/m$^3$ | 230 | 220 | 193 | 171 | 240 | 260 | 230 | 240 | 185 | 178 |
| Total Hardness | g/m$^3$ $CaCO_3$ | 73 | 72 | 72 | 68 | 104 | 116 | 106 | 110 | 81 | 81 |
| Temperature | °C | 15.5 | 15.4 | 17.8 | 18.3 | 15.5 | 15.2 | 15.5 | 15.0 | 15.1 | 14.7 |
| Dissolved COD, trace level | g $O_2$/m$^3$ | <6 | <6 | <6 | <6 | <6 | <6 | 9 | <6 | <6 | <6 |
| Dissolved Total Biochemical Oxygen Demand (TBOD5) | g $O_2$/m$^3$ | 0.5 | - | 0.6 | - | 1.0 | - | 1.4 | - | 0.7 | - |
| Nitrate-N | g/m$^3$ | 0.045 | 0.062 | 0.29 | 0.51 | 1.8 | 1.7 | 0.020 | <0.002 | 2.1 | 1.9 |
| Nitrate-N+Nitrite-N | g/m$^3$ | 0.045 | 0.062 | 0.29 | 0.51 | 1.8 | 1.7 | 0.021 | <0.002 | 2.1 | 1.9 |
| Nitrite-N | g/m$^3$ | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Total Ammoniacal-N | g/m$^3$ | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 1.1 | 1.2 | < 0.010 | <0.010 |
| Total Kjeldahl Nitrogen (TKN) | g/m$^3$ | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | 0.19 | 1.3 | 1.5 | 0.13 | 0.13 |
| Total Nitrogen | g/m$^3$ | <0.11 | <0.11 | 0.38 | 0.57 | 1.8 | 1.9 | 1.4 | 1.5 | 2.2 | 2.0 |
| Dissolved Aluminium | g/m$^3$ | <0.003 | - | 0.004 | - | <0.003 | - | 0.005 | - | 0.003 | - |
| Dissolved Arsenic | g/m$^3$ | <0.0010 | - | <0.0010 | - | <0.0010 | - | <0.0010 | - | <0.0010 | - |
| Dissolved Boron | g/m$^3$ | 0.023 | 0.022 | 0.025 | 0.024 | 0.020 | 0.020 | 0.054 | 0.055 | 0.022 | 0.022 |
| Dissolved Cadmium | g/m$^3$ | <0.00005 | - | <0.00005 | - | <0.00005 | - | <0.00005 | - | <0.00005 | - |

| Parameter name | Units | GND0573 | | GND0574 | | GND0575 | | GND0598 | | GND1301 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 15 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 15 Nov 2023 | 1 May 2024 |
| Dissolved Calcium | g/m³ | 12 | 12 | 13 | 13 | 21 | 24 | 22 | 23 | 16 | 17 |
| Dissolved Chromium | g/m³ | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.0010 | 0.0008 | <0.0005 | <0.0005 | 0.0015 | 0.0012 |
| Dissolved Cobalt | g/m³ | <0.002 | - | <0.002 | - | <0.0002 | - | <0.0002 | - | <0.0002 | - |
| Dissolved Copper | g/m³ | <0.0005 | - | <0.0005 | - | <0.0005 | - | <0.0005 | - | 0.0007 | - |
| Dissolved Iron | g/m³ | < 0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.22 | 0.23 | <0.02 | <0.02 |
| Dissolved Lead | g/m³ | <0.00010 | - | <0.0001 | - | <0.00010 | - | 0.00018 | - | 0.00010 | - |
| Dissolved Magnesium | g/m³ | 10.5 | 10.4 | 9.8 | 8.9 | 12.7 | 13.7 | 12.5 | 12.5 | 9.7 | 9.4 |
| Dissolved Manganese | g/m³ | 0.0021 | 0.0051 | 0.0131 | 0.0104 | 0.0033 | 0.0103 | 0.0710 | 0.0710 | 0.0014 | 0.0028 |
| Dissolved Nickel | g/m³ | <0.0005 | - | <0.0005 | - | <0.0005 | - | <0.0005 | - | <0.0005 | - |
| Dissolved Potassium | g/m³ | 1.7 | 1.7 | 1.0 | - | 2.6 | 2.4 | 4.6 | 4.8 | 2.2 | 2.2 |
| Dissolved Sodium | g/m³ | 41 | 41 | 23 | 21 | 31 | 29 | 35 | 36 | 27 | 26 |
| Dissolved Zinc | g/m³ | 0.0021 | 0.0024 | 0.0061 | 0.0098 | 0.0022 | 0.0021 | 0.0062 | 0.0020 | 0.0123 | 0.0148 |
| **Semi volatile organic compounds[a]** | | | | | | | | | | | |
| Phenol | g/m³ | <0.0010 | - | <0.0010 | - | <0.0010 | - | 0.0052 | - | <0.0010 | - |
| **Volatile organic compounds[a]** | | | | | | | | | | | |
| Toluene | g/m³ | <0.0003 | - | 0.0031 | - | <0.0003 | - | 0.030 | - | 0.0013 | - |

| Parameter name | Units | GND3133 | | GND3134 | | GND3135 | | GND3182 | | GND3183 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 |
| Water Level | m | 13.33 | 13.41 | 13.13 | 13.23 | 10.68 | 8.87 | 0.93 | 0.84 | 2.61 | 2.51 |
| Bicarbonate | g/m³ at 25°C | 36 | 36 | 54 | 53 | 27 | 30 | 194 | 195 | 119 | 141 |
| Carbonate | g/m³ at 25°C | < 1.0 | <1.0 | < 1.0 | <1.0 | < 1.0 | <1.0 | < 1.0 | <1.0 | < 1.0 | <1.0 |
| Chloride | g/m³ | 24 | 28 | 22 | 24 | 67 | 80 | 22 | 24 | 36 | 35 |
| Dissolved oxygen | g/m³ | 3.53 | 4.14 | 4.99 | 4.90 | 4.21 | 3.72 | 0.14 | 0.22 | 0.08 | 0.20 |
| Dissolved Oxygen Saturation % | % | 36 | 40 | 50 | 49 | 43 | 38 | 1.4 | 2.2 | 0.8 | 2.0 |
| Electrical Conductivity (EC) | mS/m at 25°C | 16.5 | 17.7 | 17.2 | 17.8 | 29.6 | 32.9 | 37.5 | 37.7 | 32.1 | 35.1 |

| Parameter name | Units | GND3133 | | GND3134 | | GND3135 | | GND3182 | | GND3183 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 |
| pH | pH units | 6.0 | 6.0 | 6.1 | 6.1 | 6.1 | 5.9 | 7.8 | 7.5 | 6.8 | 6.7 |
| Sulphate | $g/m^3$ | 3.8 | 5.0 | 3.3 | 3.5 | 3.5 | 4.0 | < 0.5 | <0.5 | 0.8 | 0.8 |
| Total Alkalinity | $g/m^3$ $CaCO_3$ | 29 | 30 | 44 | 44 | 22 | 25 | 162 | 160 | 97 | 116 |
| Total Dissolved Solids (TDS) | $g/m^3$ | 100 | 113 | 120 | 126 | 176 | 187 | 250 | 250 | 197 | 187 |
| Total Hardness | $g/m^3$ $CaCO_3$ | 30 | 31 | 25 | 25 | 32 | 33 | 120 | 122 | 67 | 69 |
| Temperature | °C | 15.8 | 15.1 | 15.4 | 15.0 | 16.0 | 15.7 | 16.3 | 16.3 | 15.8 | 16.6 |
| Dissolved COD, trace level | g $O_2/m^3$ | < 6 | <6 | < 6 | <6 | < 6 | <6 | < 6 | <6 | < 6 | <6 |
| Dissolved Total Biochemical Oxygen Demand (TBOD5) | g $O_2/m^3$ | 0.7 | - | 0.6 | - | 0.5 | - | 0.9 | - | 0.4 | - |
| Nitrate-N | $g/m^3$ | 1.03 | 1.26 | 0.083 | 0.088 | 0.86 | 0.83 | < 0.002 | 0.008 | < 0.10 | <0.02 |
| Nitrate-N + Nitrite-N | $g/m^3$ | 1.03 | 1.26 | 0.083 | 0.088 | 0.86 | 0.83 | < 0.002 | 0.009 | < 0.10 | <0.02 |
| Nitrite-N | $g/m^3$ | < 0.002 | <0.002 | < 0.002 | <0.002 | < 0.002 | <0.002 | < 0.002 | <0.002 | < 0.10 | <0.02 |
| Total Ammoniacal-N | $g/m^3$ | < 0.010 | <0.010 | < 0.010 | <0.010 | < 0.010 | <0.010 | 0.86 | 1.07 | 2.9 | 3.0 |
| Total Kjeldahl Nitrogen (TKN) | $g/m^3$ | < 0.10 | <0.10 | 0.10 | <0.10 | 0.11 | 0.16 | 1.09 | 1.22 | 3.0 | 3.1 |
| Total Nitrogen | $g/m^3$ | 1.1 | 1.3 | 0.19 | 0.16 | 0.97 | 0.99 | 1.1 | 1.2 | 3.1 | 3.1 |
| Dissolved Aluminium | $g/m^3$ | 0.003 | - | 0.014 | - | 0.008 | - | < 0.003 | - | < 0.003 | - |
| Dissolved Arsenic | $g/m^3$ | < 0.0010 | - | < 0.0010 | - | < 0.0010 | - | < 0.0010 | - | < 0.0010 | - |
| Dissolved Boron | $g/m^3$ | 0.019 | 0.019 | 0.016 | 0.015 | 0.019 | 0.017 | 0.036 | 0.036 | 0.034 | 0.038 |
| Dissolved Cadmium | $g/m^3$ | < 0.00005 | - | < 0.00005 | - | 0.00007 | - | < 0.00005 | - | < 0.00005 | - |
| Dissolved Calcium | $g/m^3$ | 5.7 | 6.1 | 4.8 | 4.8 | 6.3 | 6.5 | 26 | 27 | 12 | 3 |
| Dissolved Chromium | $g/m^3$ | < 0.0005 | <0.00005 | < 0.0005 | 0.0012 | < 0.0005 | <0.0005 | < 0.0005 | <0.0005 | < 0.0005 | <0.0005 |
| Dissolved Cobalt | $g/m^3$ | < 0.0002 | - | 0.0002 | - | < 0.0002 | - | < 0.0002 | - | 0.0033 | - |
| Dissolved Copper | $g/m^3$ | < 0.0005 | - | < 0.0005 | - | 0.0006 | - | < 0.0005 | - | < 0.0005 | - |
| Dissolved Iron | $g/m^3$ | < 0.02 | <0.02 | < 0.02 | <0.02 | < 0.02 | <0.02 | 0.47 | 0.09 | 24 | 22 |
| Dissolved Lead | $g/m^3$ | < 0.00010 | - | < 0.00010 | - | < 0.00010 | - | < 0.00010 | - | < 0.00010 | - |
| Dissolved Magnesium | $g/m^3$ | 3.9 | 3.9 | 3.0 | 3.2 | 3.8 | 4.1 | 13 | 13 | 9.0 | 9.1 |
| Dissolved Manganese | $g/m^3$ | 0.0097 | 0.021 | 0.023 | 0.0065 | 0.021 | 0.031 | 0.27 | 0.28 | 1.9 | 2.0 |

| Parameter name | Units | GND3133 | | GND3134 | | GND3135 | | GND3182 | | GND3183 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 | 14 Nov 2023 | 1 May 2024 |
| Dissolved Nickel | g/m$^3$ | < 0.0005 | - | < 0.0005 | - | 0.0005 | - | < 0.0005 | - | < 0.0005 | - |
| Dissolved Potassium | g/m$^3$ | 1.6 | 1.8 | 1.2 | 1.3 | 2.3 | 2.5 | 5.0 | 5.2 | 6.8 | 7.2 |
| Dissolved Sodium | g/m$^3$ | 20 | 21 | 26 | 26 | 46 | 54 | 32 | 32 | 27 | 27 |
| Dissolved Zinc | g/m$^3$ | 0.0038 | 0.0141 | 0.0036 | 0.0085 | 0.0092 | 0.0099 | < 0.0010 | <0.001 | < 0.0010 | <0.001 |
| **Semi volatile organic compounds**[a] | | | | | | | | | | | |
| Phenol | g/m$^3$ | < 0.0010 | - | 0.0030 | - | 0.0015 | - | < 0.0010 | - | < 0.0010 | - |
| **Volatile organic compounds**[a] | | | | | | | | | | | |
| Toluene | g/m$^3$ | < 0.0003 | - | 0.0177 | - | 0.0054 | - | 0.0003 | - | 0.0003 | - |

**Key:** [a] Any compounds of this classification that were detected are listed below this heading

In terms of continuing to monitor the effects being observed in the groundwater in the vicinity of the site, historically, GND0598 has shown some elevation in alkalinity, conductivity, ammoniacal nitrogen, pH, dissolved manganese and dissolved iron when compared to the other bores. On the whole, the results have remained relatively consistent in this bore since the monitoring of each of these parameters began, which for the most part, was prior to the construction of Stage 3. The elevated levels of these parameters in this bore are therefore not considered to be a result of leachate contamination.

It is noted that the new bores that are down gradient of Stage 1B (GND3182 and GND3183) also contain elevated levels of alkalinity, conductivity, ammoniacal nitrogen, dissolved manganese and dissolved iron, with the dissolved manganese, iron and ammoniacal nitrogen concentrations being higher in the shallower bore (GND3183).

The November samples were analysed for SVOCs (semi-volatile organic compounds) and VOC's (volatile organic compounds). The SVOC phenol was detected in three of the bores.

The only VOC detected was a low concentration of toluene found in GND0574, GND0598, GND1301, GND3134, GND3135, GND3182 and GND3183. This compound is highly volatile and has a relatively low water solubility. This means that should the toluene enter a surface water body, it would be rapidly lost to the atmosphere. The concentrations detected were also well below the low reliability trigger levels for these compounds given in the ANZECC Guidelines (2000). A copy of the full SVOC and VOC results is available on request.

Although the NPDC subsurface drainage samples (Section 2.3.1.2) are showing slight contamination from the impact of leachate for some parameters, on the whole, the groundwater results show little evidence of leachate contamination. During the year under review, all parameters measured for all the bores, were well within the ranges expected in Taranaki groundwater. However, the changes in recent years, particularly in the chloride, conductivity and nitrate/nitrite nitrogen concentrations, are indicative of recently emerging trends.

It had been found that the chloride concentration and conductivities in bore GND0255 (up gradient of the landfill) had been stabilising at a decreased level since the spike found in April 2008. However, this bore was confirmed as having become compromised during the 2021/22 year. The new up gradient bore (GND3135) is in a different location, being up gradient of Stages 1 and 2, rather than Stage 3. Following the elevated conductivity and chloride found in the new control bore in the February 2022 sample, the historical information on file at the Council was reviewed. During this review a site plan/drawing was found, that indicated that the area where the new bore is located may have been impacted by special waste disposal and storage of materials for recycling. This is to be investigated further to clarify where these historic activities took place in relation to the current Stage 1 and 2 landfill boundaries.

It is noted that the nitrate/nitrite nitrogen concentration in the replacement control bore is significantly lower than that in the original control bore.

In bores GND0573 (down gradient of Stages 1 and 2) and GND0575 (down gradient of Stage 3) there had been an emerging trend of increasing chloride concentrations and conductivity in the groundwater at these locations. It was thought that this may be indicative of some minor leachate contamination. It was noted in the 2022/23 annual report that these trends had continued in GND0573, but not in GND0575. In the case of chloride at GND0575, there had been successive reductions in this parameter in the samples collected during the previous three sampling surveys. During the 2023/24 monitoring period both parameters increased again in GND0575, while in GND0573 both parameters decreased.

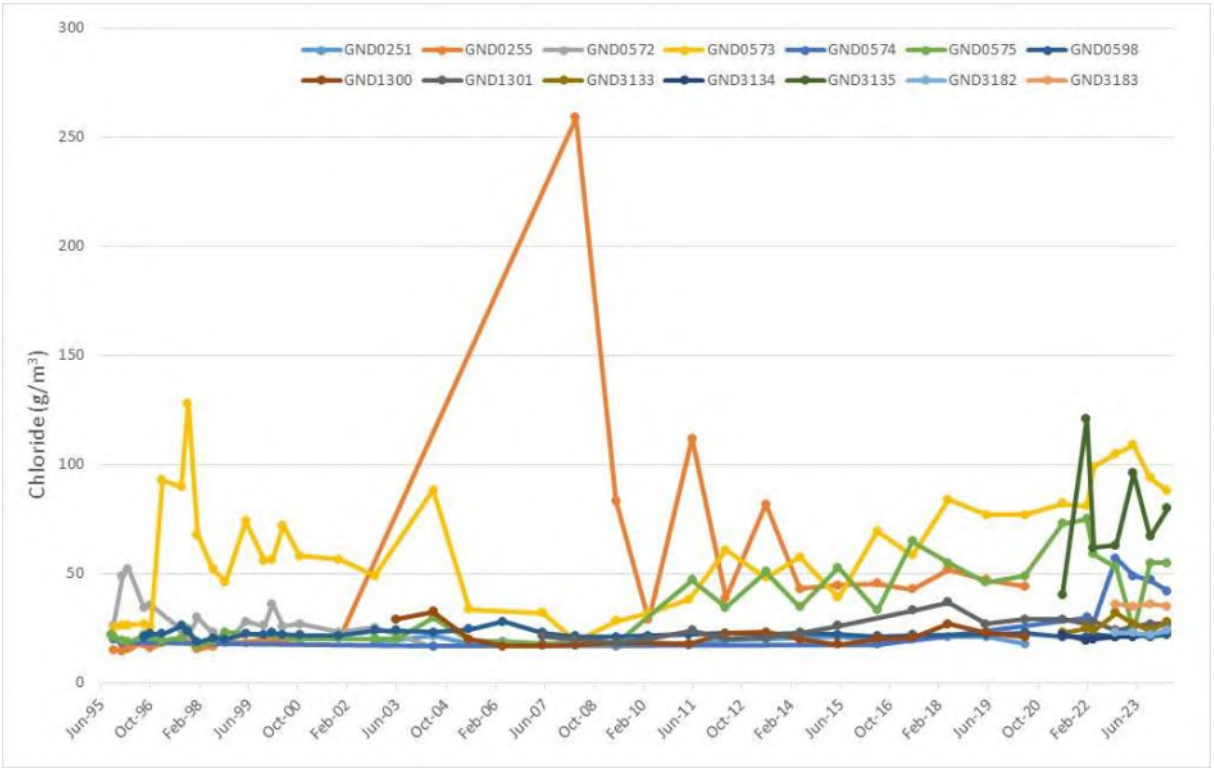


Figure 19 Chloride concentrations in the Colson Road groundwater bores

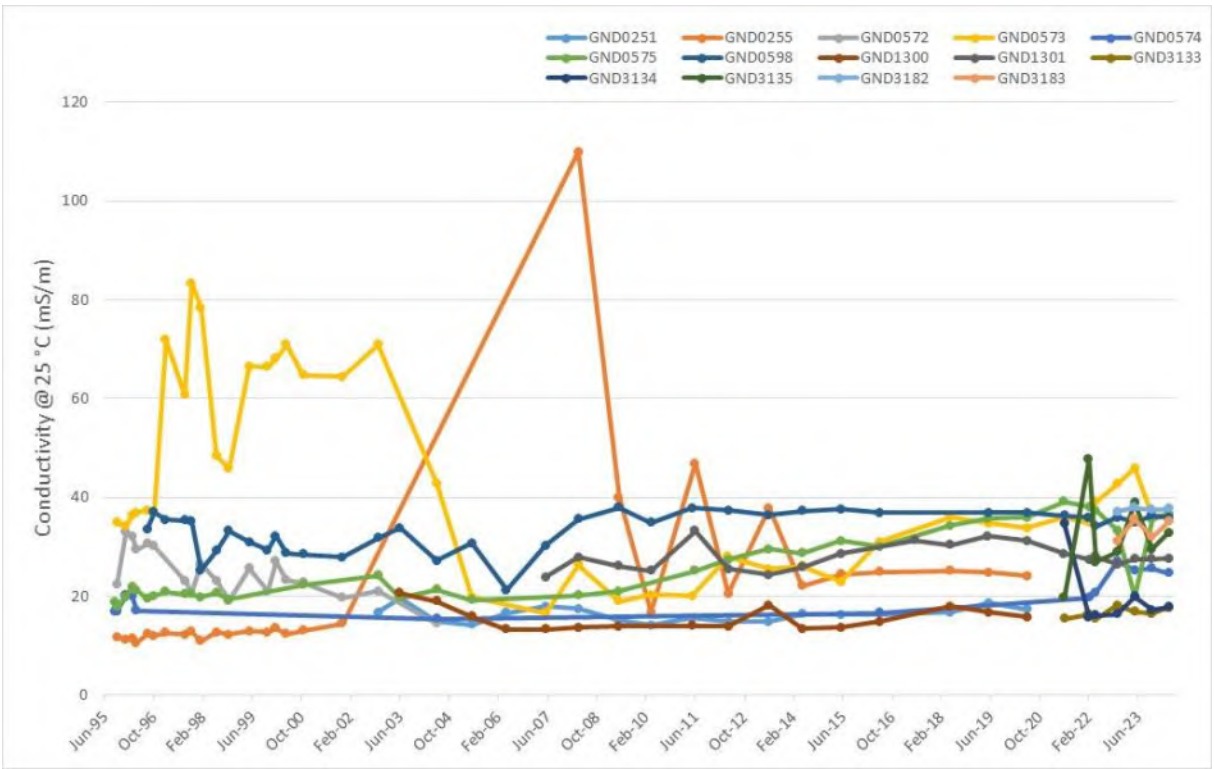


Figure 20 Conductivity in the Colson Road groundwater bores

Figure 21 shows an emerging trend of increasing nitrate/nitrite nitrogen concentrations in GND0575 (north of Stage 3), although concentrations appear to be decreasing since the results of December 2022. The nitrate/nitrite nitrogen concentration obtained at GND1301 (further east of the landfill than GND0575) during the year under review was again elevated above the historical median of 1.2g/m$^3$ for this monitoring location. The nitrate/nitrite nitrogen concentrations of the samples collected from GND3133 were above the

historical median of the bore that this site replaced (GND1300), indicating that there is also potentially a trend of increasing nitrate/nitrite nitrogen concentration in the groundwater in the vicinity of these bores.

From the data gathered during the year under review, it appears that there may be a seasonal variation in some of the parameters in some of the bores. The extent of these variations will be evaluated in the on-going high and low groundwater level monitoring surveys over the next few years.

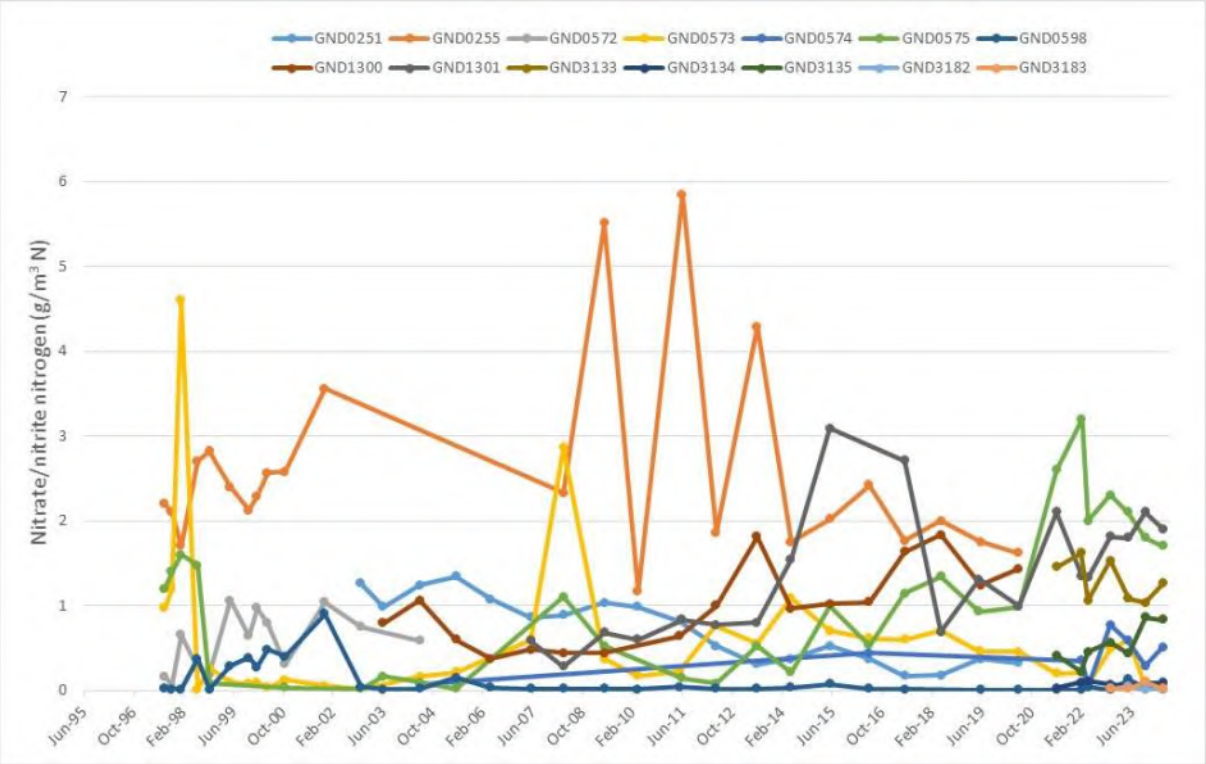


Figure 21 Nitrate/nitrite nitrogen in the groundwater bores

In general terms, the groundwater quality in the vicinity of the landfill is good, and all parameters are comparable with typical Taranaki groundwater. The data gathered in this, and other monitoring periods, indicates that the effect that the Colson Road landfill is having on groundwater quality at this time is minor.

## 2.5 Air

### 2.5.1 Data review – landfill gas flare

Consent 4779 was varied in October 2021 to provide for the discharge to air from the flare.

#### Condition 1

Condition 1 required NPDC to provide a measurement of the temperature of the flare together with a measurement of the concentrations of methane and of hydrogen sulphide in the flare feedstock. Then annually provide updated information on flare temperature and feedstock composition. Commissioning of the flare was completed on 28 March 2018, with testing undertaken by an independent consultant on the same day. The information required to satisfy the first part of condition 1 was received within the three months stipulated by consent conditions, and has been presented in the 2017/18 Annual Report.

The assessment of environmental effects stated that the enclosed flare for the site would have an operating temperature between 750 and 1200°C, with a residence time greater than 0.3 seconds. This was to ensure a destruction efficiency of at least 0.9 (90%) for both methane and NMOC.

The full year's data was provided for daily temperature (Figure 22), along with data from four occasions on the composition of the feed gas that is collected by the monitoring system that is integrated into the flare system (Table 17).

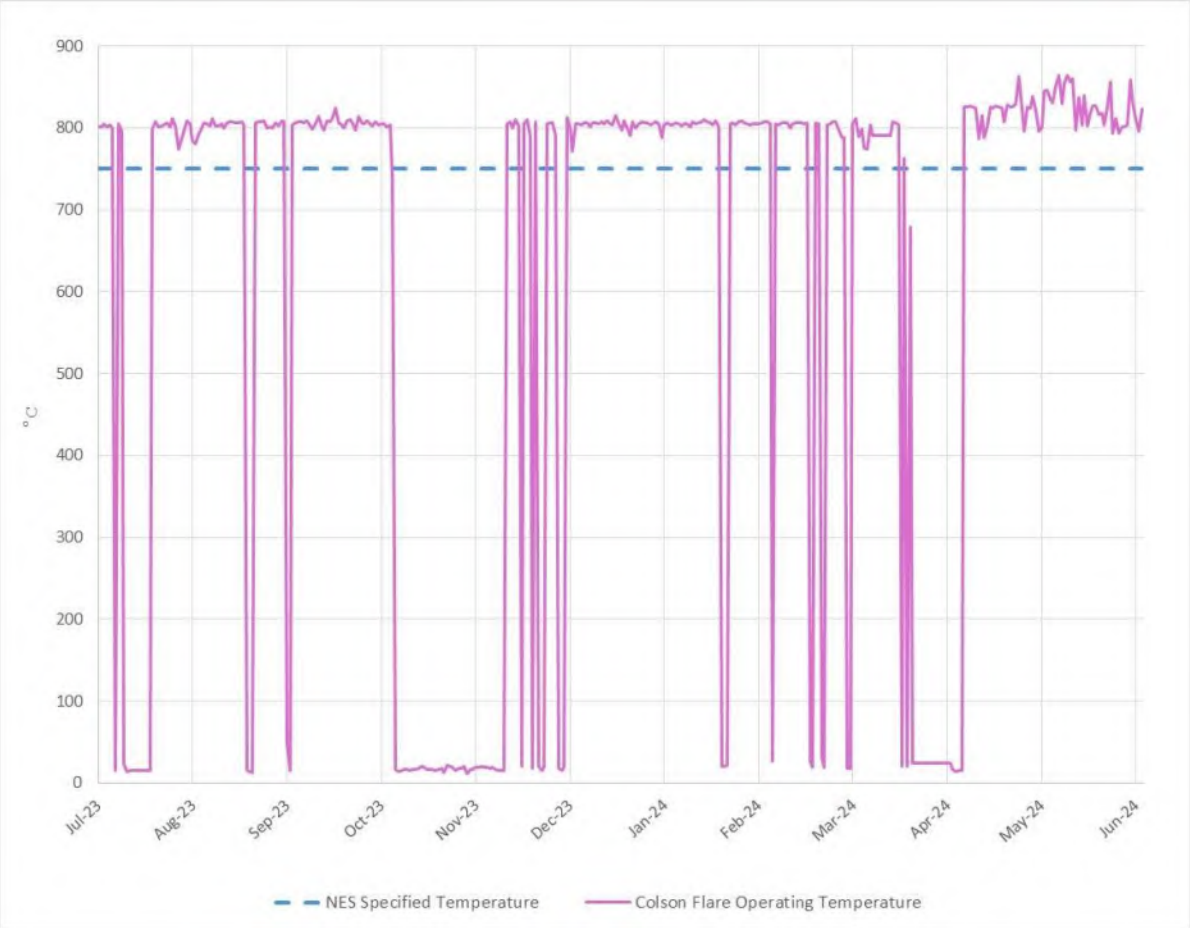


Figure 22 Colson Road landfill flare temperature for the year under review

Table 17 Feedstock composition 2023/24

| Date | Gas flow $m^3/hr$ | $CH_4$ % | $CO_2$ % | $O_2$ % | CO ppm | $H_2S$ ppm | Balance gas % |
|---|---|---|---|---|---|---|---|
| 20-Sep-2023 | - | 45 | 25 | 2.6 | 5.0 | 6.0 | 27 |
| 12-Dec-2023 | - | 55 | 28 | 2.3 | 4.0 | 7.0 | 16 |
| 21-Mar-2024 | 42 | 36 | 24 | 2.7 | 3.0 | 1.0 | 37 |
| 7-Jun-2024 | 132 | 41 | 27 | 1.6 | 4.0 | 4.0 | 30 |

In previous years, due to the number of occasions that the flare temperature was recorded to be less than is optimal for complete combustion of the landfill gas components, to check that the flare was being operated in accordance with the best practicable option (condition 4 of Consent 4779-1.1) based on the guidance provided by the NES, NPDC has previously confirmed that:

- The system incorporates automatic isolation valves and a flame arrestor so that there are no emissions of unburnt gas from the flare during periods when the flare is not operational;
- While the flare is not operating the landfill gas is not extracted. It accumulates in the landfill and vents passively as is the case with all smaller landfills that are not required to have an engineered extraction and flaring system;

- There is a process for manually restarting the flare given that for safety reasons, the flare does not have an auto-ignition system. Council was informed that a text alarm is sent to NPDC staff, who will respond during work hours and attempt to restart the flare, resulting in varying response times.
- a logic control to shut the flare down if the temperature drops below 750°C for 10 minutes.

**Condition 3**

When the CRRLMP was updated in June 2018 it included a general description of the flare and outlined that the flare's performance is continually monitored by means of real time electronic data. The plan also clarified that NPDC, with the support of external contractors, have responsibility for the maintenance, inspections and calibration of the flare. The CRRLMP referenced a separate specific NPDC procedure for the management and operation of the flare that must be adhered to, which has also been received by Council. It has previously been confirmed that the CRRLMP covers the required procedures, schedules and records keeping information. The latest iteration of the CRRLMP retains this information.

A flare fault log was provided for the year under review. This showed that there was a total of 94 non-operational days in the 2023/24 year (31 shutdowns in total). This is 26% of the year (compared to 5% in the 2022/23 year). The length of the outages varied and were affected by the response being possible only during normal working hours. The shortest outage was under one hour, while the longest outage was 35 days due to capping work. A summary of the monthly non-operational hours is given in Table 18.

Table 18 Statistical summary of the landfill gas flare non-operational hours, year under review

| Month | No. shutdowns | Monthly total non- operational time |
|---|---|---|
| Jul-23 | 2 | 9 days |
| Aug-23 | 2 | 2 days |
| Sep-23 | 2 | 1 day |
| Oct-23 | 4 | 20 days |
| Nov-23 | 2 | 22 days* |
| Dec-23 | 3 | 7 days |
| Jan-24 | 0 | - |
| Feb-24 | 3 | 6 days |
| Mar-24 | 6 | 4 days |
| Apr-24 | 5 | 23 days |
| May-24 | 0 | - |
| Jun-24 | 0 | - |
| Totals | 29 | 95 days |

* flare off for a continuous period between 16 October and 20 November 2023

## 2.5.2 Results of receiving environment monitoring

### 2.5.2.1 Deposition gauging

Many industries emit dust from various sources during operational periods. In order to assess the effects of the emitted dust, industries have been monitored using deposition gauges.

Deposition gauges are basically buckets elevated on a stand to about 1.6m. The buckets have a solution in them to ensure that any dust that settles out of the air is not re-suspended by wind.

Gauges are placed around the site and within the surrounding community. The gauges were left in place for three weeks, on two separate occasions.

The rate of dustfall is calculated by dividing the weight of insoluble material (g) collected by the cross-sectional area of the gauge ($m^2$) and the number of days over which the sample was taken. The units of measurement are $g/m^2/day$.

Guideline values used by the Taranaki Regional Council for dust deposition are $4g/m^2/30$ days or $0.13g/m^2/day$ deposited matter. Consideration is given to the location of the industry and the sensitivity of the surrounding community, when assessing results against these values.

Material from the gauges was analysed for solid particulates, the results of which are presented in Table 19.

Table 19 Air deposition monitoring results for January and February 2024

| Site code | Site description | Particulate $g/m^2/day$ | |
|---|---|---|---|
| | | 17 January to 7 February 2024 (21 days) | 7 February to 28 February 2024 (21 days) |
| AIR001603 | At entrance to landfill | 0.07 | 0.04 |
| AIR001604 | Adjacent to Manganaha Stream, behind rose nursery | **0.14**[a] | 0.03 |
| AIR001608 | 124 Egmont Road, paddock boundary, west of house | 0.04 | 0.02 |
| AIR001611 | Driveway to SPCA | 0.03 | 0.01 |
| AIR001613 | Grass lawn, behind work shed | 0.09 | 0.05 |
| AIR001623 | Behind 194 Egmont Road | 0.01 | 0.06 |

**Key:** a sample comments indicate organic contamination – gauge contents were dark yellow.

All results of both surveys were below guideline deposition values of $0.13g/m^2/day$, with the exception of AIR001604 at the time of the first survey. It is noted that this gauge contained organic contamination, so the exceedance of the guideline value is unlikely to be as a result of dust deposition from site activities.

### 2.5.2.2 Ambient suspended particulate and landfill gas component monitoring

Ambient monitoring of suspended particulates (dust) and/or landfill gas components was undertaken under dry weather conditions on three occasions during the year under review at six monitoring locations on and in the neighbourhood of the landfill. The particulate (dust) monitoring was undertaken using a DustTrak, and the methane whilst $H_2S$ monitoring was undertaken using a MultiRae. The results are shown in Table 20, Table 21 and Table 22.

#### Particulates

Particulates can derive from many sources, including motor vehicles (especially diesels), solid and oil-burning processes for industry and power generation, incineration and waste burning, photochemical processes and natural sources such as pollen, abrasion and sea spray.

$PM_{10}$ particles (those of less than 10 micrometres in diameter) are linked to adverse health effects that arise primarily from the ability of particles of this size to penetrate the defences of the human body and enter deep into the lungs. Health effects from inhaling $PM_{10}$ include increased mortality and the aggravation of existing respiratory and cardiovascular conditions such as asthma and chronic pulmonary diseases. The national guideline for air quality (averaged over a 24hr period) is $50\mu g/m^3$ $PM_{10}$.

#### Landfill gas components

The landfill gas components monitored during the ambient surveys in the year under review were methane and $H_2S$.

The monitoring showed that there were no exceedances of the $PM_{10}$ guideline. There were no landfill gas components detected at the time of any of the surveys.

Table 20 Ambient $PM_{10}$ and methane survey results, 28 March 2024

| Site | On or off site | Methane (%LEL) | $H_2S$ (ppm) | $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|
| AIR001603 | on-site | 0 | 0 | 6 |
| AIR001610 | on-site | 0 | 0 | 7 |
| By old compost ponds | on-site | 0 | 0 | 5 |
| SE corner | on-site | 0 | 0 | 5 |
| Top of Stage 3 | on-site | 0 | 0 | 6 |
| AIR001609 | off-site | 0 | 0 | 3 |
| **Average** | | **0** | **0** | **5** |

Table 21 Ambient $PM_{10}$ and methane survey results, 4 April 2024

| Site | | Methane (%LEL) | $H_2S$ (ppm) | $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|
| AIR001603 | on-site | 0 | 0 | 8 |
| AIR001610 | on-site | 0 | 0 | 7 |
| By old compost ponds | on-site | 0 | 0 | 7 |
| Beside flare | on-site | 0 | 0 | 7 |
| AIR001612 | off-site | 0 | 0 | 15 |
| AIR001615 | off-site | 0 | 0 | 6 |
| **Average** | | **0** | **0** | **8** |

Table 22 Ambient $PM_{10}$ and methane survey results, 17 May 2024

| Site | | Methane (%LEL) | $H_2S$ (ppm) | $PM_{10}$ (µg/m$^3$) |
|---|---|---|---|---|
| AIR001603 | on-site | 0 | 0 | 28 |
| AIR001610 | on-site | 0 | 0 | 28 |
| SE corner | on-site | 0 | 0 | 26 |
| Beside flare | on-site | 0 | 0 | 6 |
| AIR001612 | off-site | 0 | 0 | 12 |
| AIR001615 | off-site | 0 | 0 | 15 |
| **Average** | | **0** | **0** | **22** |

It is noted that there were no air quality issues found at the time of the inspections and there were no complaints received by Council.

## 2.6 Incidents, investigations and interventions

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data and liaison with NPDC. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach, that in the first instance avoids issues occurring, is favoured.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified individual/organisation is indeed the source of the incident (or that the allegation cannot be proven).

No incidents were logged in relation to the Colson Road landfill during the 2023/24 period.

There is one ongoing Abatement notice (EAC-23544) in relation to the site, the details are summarised in Table 23 below.

Table 23 Proposed timeline for resolution of consent 4621-1 non compliances and progress to date

| Action | Timeframe | Comment/Update |
|---|---|---|
| Complete Part 2 investigation | 18 September 2020 | Completed |
| Complete Part 3 investigation | 20 November 2020 | Completed |
| Confirm new bore locations with Council | December 2020 | Completed |
| Apply for variation to Consent 4621-1 in relation to the specified bores that are listed as needing to be maintained in condition 1 | February 2021 | Completed |
| Install new bores (subject to supplier availability and weather) | By 30 April 2021 | Bores installed and two sets of samples collected. Abatement Notice compliance achieved |
| Lodge renewal applications for the landfill consents that are due to expire in June 2025 | Ongoing | Revised schedule was provided to ensure that there is sufficient information available to inform the assessment of environmental effects and to allow pre-application consultation. An Abatement Notice (EAC-23544) has been issued with the works required to be undertaken by 31 January 2024. Further extensions to abatement notice for finalising the Cultural Impact Assessment from Ngāti Tawhirikura to 30 March 2024 then 31 May 2024 and then extended to 31 July 2024 following meeting with Ngāti Tawhirikura who asked for a consideration of alternatives be provided before the Hapū made their decision on giving their approval for non-notification of the non-notified approval for the processing of the re-issued consents. This was further extended to October 2024. |

# 3. Discussion

## 3.1 Discussion of site performance

At inspection the site was found to be well managed. The site was adequately stabilised at the end of the construction season.

During the year under review progress was made on:

- the capping on Stage 3; and
- the works required in order to comply with the Abatement Notice issued in September 2020, that is, working towards an early application for replacement of the consents for the site.

There were no new non compliances found in the 2023/24 year.

Despite several non-operational periods the operation of the flare was well managed during the year under review. Consent conditions were complied with, this included ensuring that the operating temperature of 750°C was maintained to ensure a destruction efficiency of at least 0.9 (90%).

## 3.2 Environmental effects of exercise of Consents

In the 2020/21 year, an evaluation of NPDC's monitoring of the water quality of the groundwater captured by the under liner drain confirmed that there were a significant number of parameters that either exceeded the calculated natural maximum values and/or showed increasing trends over time. It was concluded that the findings suggested that:

- contamination of the groundwater collected by the under liner drain had occurred between 2008 and 2019; and
- it was likely to be as a result of damage caused to the liner by the slumping of the refuse within the landfill in July 2005.

The results to the end of the 2019/20 year showed that the groundwater beneath the landfill has been 'significantly affected' as defined by the conditions of the consent, with the trends of increasing contaminant concentrations continuing during the year in question.

The data for the under liner drain analysis performed by NPDC in the 2019-2024 years indicated that:

- whilst ammoniacal nitrogen concentrations may have increased slightly (from an annual average of 3.1g/$m^3$ in the 2019/20 year to an annual average of 3.4g/$m^3$ in the 2023/24 year);
- conductivity, total alkalinity and chloride concentrations may have stabilised or reduced in recent years (from annual averages of 44.3mS/m, 126g/$m^3$ $CaCO_3$ and 57g/$m^3$ in the 2019/20 year to annual averages of 43.7mS/m, 126g/$m^3$$CaCO_3$ and 54g/$m^3$ respectively in the 2023/24 year).

The under liner drainage results, and the monitoring of the wider groundwater and surface water in the vicinity of the landfill indicate that, although some of the indicator parameters have increased in some of the bores, this would not currently be considered a significant adverse effect as defined in the RMA. In the short term, it is considered that the groundwater and surface water monitoring related to this site should be continued in this expanded form to ensure that a clear conceptual model of the site, and the potential effects of discharges from the site, can be better understood.

Council's chemical sampling and biological monitoring found that there was no evidence of contaminants entering the Manganaha Stream from the landfill, and that there were no significant adverse effects occurring in the Puremu Stream during the period under review. There were also no direct discharges found to the Manganaha Stream during the year under review.

In the 2015 to 2021 years, the total manganese concentration at the compliance point for Consent 2370-3 was exceeded in five out of 12 samples. In contrast, no exceedances occurred during the year under review. The historical results for the more bioavailable dissolved manganese are shown in Figure 23.

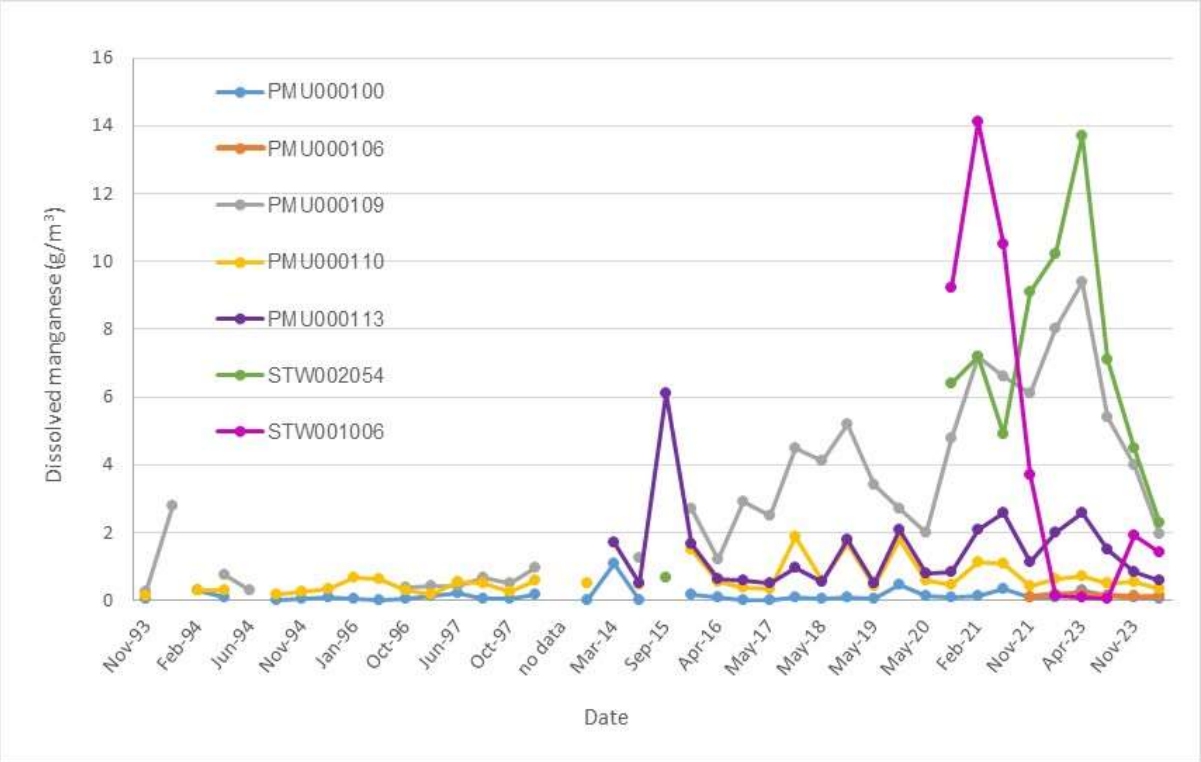


Figure 23 Dissolved manganese in the wetland polishing area and Puremu Stream

In order to assist data interpretation monitoring of the manganese concentration in the discharges from the stormwater ponds commenced in the 2020/21 year. The marked reduction in manganese concentration in the discharge from the western silt ponds following the diversion of contaminated groundwater/leachate from down gradient of Stage 1B is clearly evident (from a maximum of 14.1g/m$^3$ in February 2021 to 1.9g/m$^3$ in the samples collected during the 2023/24 year). The trend of increasing manganese concentration at site PMU000109 appeared to reverse, with the level dropping back down under 2g/m$^3$.

Groundwater sampling found that the groundwater in the vicinity of the site was such that no remedial actions, as contained in special condition 5 of Consent 4621-1, were required at this time. Overall, there is no evidence of significant adverse environmental effects from contamination either in the groundwater or in the under liner drainage system. However, there are increasing trends in conductivity, chloride and/or nitrate/nitrite nitrogen observed in some of the bores, and in ammoniacal nitrogen in the under liner drainage (groundwater and springs from under the landfill). Monitoring will continue to ensure that remedial actions will be undertaken, if required, as per the conditions of Consent 4621-1.

The ambient deposited particulate levels obtained during the year under review were below the Council guideline level for dust deposition in residential areas (0.13g/m$^2$/day), with the exception of one of the gauges during one of the surveys. It was noted that the gauge contained organic contamination, so the exceedance is unlikely to be attributable to site activities.

The flare was initially installed as a mitigation measure due to the number of odour complaints that were being received by Council in relation to discharges to air from the site. The flare was operational for 74% of the time during the year under review. There were no odour complaints received during the 2023/24 monitoring year.

## 3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 24 to Table 33.

Table 24 Summary of performance for diversion Consent 0226-1

| **Purpose: To divert the Puremu Stream in the Waiwhakaiho Catchment by culverting stream to provide road access to refuse tip** | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Comply with Water Right 226 | Site inspections | Yes |
| 2. Pipe laid in accordance with manufacturer's specifications | Site inspection | Yes |
| Overall assessment of environmental performance and compliance in respect of this Consent | | **High** |
| Overall assessment of administrative performance in respect of this Consent | | **High** |

Table 25 Summary of performance for contaminated stormwater and leachate Consent 2370-3

| **Purpose: To discharge up to 1000m$^3$/day [5L/s] of leachate and contaminated stormwater from the closed section, Area A, of Colson Road municipal landfill to groundwater in the vicinity of and into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho Catchment** | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Best practice to be adopted | Site inspection | Yes |
| 2. Consent undertaken in accordance with information supplied in the application | Site inspection and review of documentation on file | Yes |
| 3. Discharge not alter colour, clarity or pH of Puremu Stream | Site inspection and water sampling | Yes |
| 4. No significant adverse effects on aquatic life | Site inspection, sampling and biomonitoring | Yes |
| 5. Monitor surface water on/near the site | Undertaken by the Council via site specific monitoring programme, inspections and water sampling | Yes |
| 6. Satisfy all requirements of the District Plan of the New Plymouth District Council | N/A | N/A |
| 7. Management and site contingency plan | Site inspection and review of documentation on file | Yes |
| 8. Maintain a landfill capping barrier and vegetative cover | Site inspection (Stages 1 and 2) | Yes |
| 9. Area is closed and managed in accordance with the management plan | Site inspection and review of documentation on file | Yes |
| 10. Maintain drains, ponds and contours on site to minimise unwanted water movement and ponding on site | Site inspections | Yes |
| 11. No cleaning or hosing out of refuse vehicles on site | Site inspections | Yes |
| 12. Mixing zone definition | N/A | N/A |
| 13. Impacts on water quality not to occur downstream | Site inspection and water sampling | Yes |
| 14. Discharge shall not alter the water quality of the Puremu Stream below the given criteria | Site inspection and water sampling | Yes |
| 15. Discharge shall not reduce the concentration of dissolved oxygen below 5 mg/litre | Site inspection and water sampling | Yes |

| Purpose: To discharge up to 1000m$^3$/day [5L/s] of leachate and contaminated stormwater from the closed section, Area A, of Colson Road municipal landfill to groundwater in the vicinity of and into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho Catchment | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 16. Discharge shall not render the Puremu Stream unfit for stock consumption | Site inspection and water sampling | Yes |
| 17. Satisfactorily maintain and manage the leachate collection and treatment systems | Site inspection | Yes |
| 18. Optional review provision re environmental effects | No further opportunities to review prior to expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent<br>Overall assessment of administrative performance in respect of this Consent | | **High**<br>**High** |

N/A = not applicable

Table 26 Summary of performance for Consent 4619-1 treated stormwater and leachate discharge

| Purpose: To discharge up to 675L/s of treated stormwater and minor amounts of leachate from areas B1, B2, C1 and C2 of the Colson Road landfill to groundwater in the vicinity of and into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho Catchment | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Water quality in the Manganaha Stream shall not be changed | Site inspection and water sampling | Yes |
| 2. Water quality of the Puremu Stream shall not exceed the given criteria | Site inspection and water sampling | Yes |
| 3. Impacts on water quality not to occur downstream | Site inspection and water sampling | Yes |
| 4. Operate according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan' | Site inspection and review of documentation on file. | Yes |
| 5. Maintain and comply with a monitoring programme. Programme to include guidelines for determining if contamination is occurring | Site inspection and review of documentation on file. Monitoring programme included in the Colson Road Landfill Management Plan | Yes |
| 6. Consent will lapse after six years if not exercised | Consent exercised | N/A |
| 7. Optional review provision re environmental effects | No further opportunity for review prior to Consent expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent<br>Overall assessment of administrative performance in respect of this Consent | | **High**<br>**High** |

N/A = not applicable

Table 27 Summary of performance for uncontaminated stormwater Consent 4620-1

| Purpose: To discharge up to 675L/s of uncontaminated stormwater from areas B1, B2, C1 and C2 of the Colson Road landfill into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho Catchment | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Water quality in the Manganaha Stream shall not be altered | Inspections and water sampling | Yes |
| 2. Discharge to have pH 6.5-8.5, maximum suspended solids 100g/m$^3$ and maximum ammoniacal nitrogen 0.5g/m$^3$ as nitrogen | Inspections and water sampling | Not able to assess as discharge is mixed with that of Consent 4619 |
| 3. No leachate discharge | Sampling and inspection | Yes |

| Purpose: To discharge up to 675L/s of uncontaminated stormwater from areas B1, B2, C1 and C2 of the Colson Road landfill into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho Catchment | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 4. Channels shall minimise erosion | Site inspections | Yes |
| 5. Channels shall minimise instability of the surrounding land | Site inspections | Yes |
| 6. Repair land eroded/made unstable due to construction/maintenance | Site inspections | Yes |
| 7. Notification of any proposal which may affect areas contributing runoff | Site inspections and liaison with consent holder | Yes |
| 8. Discharge shall not alter the Puremu Stream in the way of films, foams or suspended materials, change colour or visibility, objectionable odour, harm aquatic or farm animals, or increase temperature by more than 2.0°C | Site inspections and water sampling | Not able to assess as discharge is mixed with that of Consent 4619 |
| 9. No excavation or landfilling if any runoff to Manganaha Stream will contain suspended solids or any other contaminant | Site inspection and water sampling | Yes |
| 10. Operate according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan | Site inspection and review of documentation on file. | Yes |
| 11. Maintain and comply with a monitoring programme that contains guidelines for determining if contamination is occurring | Site inspection and review of documentation on file. Monitoring programme included in the Colson Road Landfill Management Plan. | Yes |
| 12. Consent will lapse after six years if not exercised | Consent has been exercised | N/A |
| 13. Optional review provision re environmental effects | No further opportunity for review prior to Consent expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent<br>Overall assessment of administrative performance in respect of this Consent | | **High**<br>**High** |

N/A = not applicable

Table 28 Summary of performance for discharge to land Consent 4621-1.1

| Purpose: To discharge up to 500 tonnes/day of contaminants onto and into land in areas B1, C1 and C2 at the Colson Road landfill | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Install and maintain network of groundwater monitoring bores | Sampling and liaison with consent holder | Yes |
| 2. Prevent surface runoff into the Manganaha Stream from any area used for the deposition of refuse | Site inspection and water sampling | Yes |
| 3. All drainage channels, bunds and contouring is complete prior to use | N/A | N/A |
| 4. Civil works relating to construction of Stage 3 be certified by a registered engineer prior to use | N/A | N/A |

| Purpose: To discharge up to 500 tonnes/day of contaminants onto and into land in areas B1, C1 and C2 at the Colson Road landfill | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 5. Mitigate if spring and/or groundwater 'significantly affected'. Defined as increase above natural variation. | Changes observed in spring water that are above natural variation. Monitoring and investigations continuing. Although under liner groundwater drainage is 'significantly affected'. No significant environmental effects found, so no mitigation required at this stage. | No[4]. Early consent replacement to be sought to ensure compliance with Abatement Notice EAC-23544 by 1 October 2024 |
| 6. Maintain and comply with a monitoring programme | Review of documentation on file. Monitoring programme is provided in CRRLMP | Yes |
| 7. Operate according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan | Site inspection and review of documentation on file. | Yes |
| 8. Disposal of waste shall comply with the 'criteria for calculating landfill potentials' and the 'Draft Health and Environment Guidelines for selected Timber Treatment Chemicals' | Not assessed during period under review | N/A |
| 9. Consent will lapse after six years if not exercised | Consent exercised | N/A |
| 10. Optional review provision re environmental effects | No further opportunity for review prior to Consent expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent | | **Good** |
| Overall assessment of administrative performance in respect of this Consent | | **High** |

N/A = not applicable

Table 29 Summary of performance for composting air Consent 4622-1

| Purpose: To discharge emissions into the air from composting and ancillary activities at the Colson Road landfill | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Minimise adverse effects on the environment | No compost on site therefore Consent not exercised during the year under review | N/A |
| 2. No offensive odours | | N/A |
| 3. No adverse ecological effects on any ecosystem | Consent not exercised during year under review | N/A |
| 4. Materials accepted for composting | Consent not exercised during year under review | N/A |
| 5. All composting to occur at least 300m from any dwelling | Consent not exercised during year under review | N/A |
| 6. Composting piles must consist of no less than 95% plant-derived material | Consent not exercised during year under review | N/A |
| 7. Composting to occur on a trial basis until the Consent is approved or reviewed on receipt of a full report | Consent not exercised during year under review | N/A |
| 8. Consent will lapse after six years if not exercised | Consent has previously been exercised | N/A |
| 9. Optional review provision re environmental effects | No further opportunity for review prior to Consent expiry | N/A |

[4] Although this consent condition has not been complied with, Council will not undertake any further enforcement action whilst the Abatement Notice is in effect, so long as steps are being undertaken to comply with the notice and the scale of the environmental effects do not increase significantly. Extensions to the deadline on the Abatement Notice may be approved by Council if there are sufficient extenuating circumstances.

| Purpose: To discharge emissions into the air from composting and ancillary activities at the Colson Road landfill | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| Overall assessment of environmental performance and compliance in respect of this Consent | | **N/A** |
| Overall assessment of administrative performance in respect of this Consent | | **N/A** |

N/A = not applicable

Table 30 Summary of performance for air discharge Consent 4779-1.1

| Purpose: To discharge contaminants into the air associated with operation of the municipal landfill at Colson Road, New Plymouth | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Provision of temperature and feedstock composition data annually | Data provided | Yes |
| 2. Provision of as built plans and suppliers operating instructions within three months of operation of the flare | Data previously provided | Yes |
| 3. First revision of the landfill management plan following the installation of the flare is to include specified aspects of the flares operation, monitoring, maintenance and record keeping | CRRLMP previously revised, and is supported by a separate flare specific document (SW-G-20) | Yes |
| 4. Best practicable option to prevent or minimise adverse effects on the environment | Site inspection, air surveys, complaint response | Yes |
| 5. No offensive odours or dust or noxious concentrations | Site inspection, air surveys, complaint response | Yes |
| 6. No burning on site with the exception of the flare | Site inspection, complaint response | Yes |
| 7. No adverse ecological effects on any ecosystem | Inspections of site and neighbouring areas | Yes |
| 8. No venting untreated landfill gases within 200m of any boundary | Site inspection | Yes |
| 9. Comply with 'Air Discharge Consent Application Supporting Documentation' and 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan | Site inspection and review of documentation on file. | Yes |
| 10. Council approval to be sought in the event of alterations at the site or to site operations | Site inspections and liaison with consent holder and site operator | Yes |
| 11. Meet once a year to discuss any matter relating to the Consent | Landfill liaison committee meetings | Yes |
| 12. Provide a report within a year on the collection, extraction, venting and combustion of landfill gas | Report previously provided | Yes |
| 13. Optional review provision re environmental effects | No further opportunity for review prior to Consent expiry | N/A |
| 14. Optional review provision re landfill gas combustion | No further opportunity for review prior to Consent expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent | | **High** |
| Overall assessment of administrative performance in respect of this Consent | | **High** |

N/A = Not applicable

Table 31 Summary of performance for earthworks stormwater Consent 6177-2.0

| **Purpose: To discharge stormwater and sediment from earthworks associated with the capping of Stage 3 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream** | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Adopt best practice | Site inspection and liaison with content holder | Yes |
| 2. Site to be managed in accordance with a certified Soil Erosion and Sediment Control Plan (ESCP) | Site inspection | Yes |
| 3. Principal to be appointed and contact details to be provided to Council | Liaison with consent holder | Yes |
| 4. Pre-construction site meeting to be held | Meeting held | Yes |
| 5. Up to date copy of certified ESCP to be kept available on site | Liaison with consent holder | Yes |
| 6. As built certification statements to be provided before commencement of bulk earthworks | Site inspection and check of Council records | Yes |
| 7. Discharge of untreated stormwater from unstabilised areas prohibited | Site inspection | Yes |
| 8. Suspended solids concentration in combined discharge from the SRP not to exceed $100gm^{-3}$ | Visual assessment at site inspection, sampling by Council and NPDC | Yes |
| 9. Clean water run-off from stabilised surfaces must be separated from the exposed areas via a stabilised system to prevent erosion | Review and certification of ESCP, as built certification statements and site inspection | Yes |
| 10. Progressive stabilisation to a specified standard to be completed as soon as practically | Site inspection and liaison with consent holder | Yes |
| 11. Further to condition 10, any area that is not to be worked within a 21 day period is to be stabilised | Site inspection and liaison with consent holder | Yes |
| 12. Stabilisation must be undertaken by providing adequate measures to achieve immediate stabilisation. | Site inspection | Yes |
| 13. Kaitiaki Forum to be established to enable Ngāti Tawhirikura Hapū and Te Kotahitanga o Te Atiawa Trust to provide advice to the consent holder on specified matters. | Liaison with the consent holder and review of Council records. | Yes |
| 14. Except as provided for in condition 15, no earthworks shall occur between 1 May and 1 October | Site inspection and liaison with consent holder | Yes |
| 15. Maintenance work may be undertaken between 1 May and 1 October, in accordance with the ESCP required by condition 2, or an activity specific ESCP that has been certified by the Council | Site inspection, review of ESCP and liaison with consent holder | Yes |
| 16. Provision for review | No further opportunities prior to expiry | N/A |
| 17. Additional opportunity for review within 3 months of any ESCP update if it is determined that the $100gm^{-3}$ suspended solids limit does not adequately avoid or mitigate adverse effects | Review of ESCP and monitoring information. Reviews not required following updates to the plan. | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent<br>Overall assessment of administrative performance in respect of this Consent | | **High**<br>**High** |

Table 32 Summary of performance for earthworks stormwater Consent 10804-1.0

| Purpose: To discharge stormwater and sediment arising from earthworks into an unnamed tributary of the Puremu Stream | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Consent to be exercised in accordance with application | Site inspection | Yes |
| 2. Adopt best practice | Site inspection | Yes |
| 3. Notification of commencement required | Previously supplied | Yes |
| 4. Site and stormwater to be managed as per ESCP | Site inspection | Yes |
| 5. Requirements of Condition 4 and control measures cease only after suitable stabilisation has been established | Site inspection. Control measures still in place | Yes |
| 6. On site meeting required prior to exercise of Consent | Site meeting held | N/A |
| 7. Sediment control measures to be installed prior to works other than construction of sediment control pond | Site inspection and liaison with consent holder | Yes |
| 8. Stabilisation required as soon as is practicable, but no longer than 6 month post completion of earthworks | No areas needing final stabilisation as earthworks not completed | N/A |
| 9. Suspended solids limit of 100g/m$^3$ from 'large silt pond' | Visual assessment at inspection and sampling | Yes |
| 10. Provision for review | No further opportunities prior to expiry | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent | | **High** |
| Overall assessment of administrative performance in respect of this Consent | | **High** |

N/A = Not applicable

Table 33 Summary of performance for earthworks stormwater Consent 10912-1.0

| Purpose: To discharge stormwater and sediment from earthworks associated with the capping of Stage 2 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 1. Area of soil disturbance limited to 2.6ha | Works completed in 2022/23 monitoring year | N/A |
| 2. Adopt best practice | Works completed in 2022/23 monitoring year | N/A |
| 3. Site to be managed in accordance with a certified Soil Erosion and Sediment Control Plan (ESCP) | Works completed in 2022/23 monitoring year | N/A |
| 4. Principal to be appointed and contact details to be provided to Council | Works completed in 2022/23 monitoring year | N/A |
| 5. Pre-construction site meeting to be held | Works completed in 2022/23 monitoring year | N/A |
| 6. Up to date copy of certified ESCP to be kept available on site | Works completed in 2022/23 monitoring year | N/A |
| 7. As built certification statements to be provided before commencement of bulk earthworks | Works completed in 2022/23 monitoring year | N/A |
| 8. Discharge of untreated stormwater from unstabilised areas prohibited | Works completed in 2022/23 monitoring year | N/A |
| 9. Suspended solids concentration in combined discharges from the site not to exceed 100g/m$^3$ | Works completed in 2022/23 monitoring year | N/A |

| Purpose: To discharge stormwater and sediment from earthworks associated with the capping of Stage 2 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream | | |
|---|---|---|
| **Condition requirement** | **Means of monitoring during period under review** | **Compliance achieved?** |
| 10. As far as practicable, all clean water run-off from stabilised surfaces must be separated from the exposed areas via a stabilised system to prevent erosion | Works completed in 2022/23 monitoring year | N/A |
| 11. The outlet valve on the 'borrow area' SRP must be kept closed, and may only be opened once there is only dead storage remaining in SRP | Works completed in 2022/23 monitoring year | N/A |
| 12. Progressive stabilisation to a specified standard to be completed as soon as practically possible | Works completed in 2022/23 monitoring year | N/A |
| 13. Further to condition 12, any area that is not to be worked within a 21 day period is to be stabilised | Works completed in 2022/23 monitoring year | N/A |
| 14. Stabilisation must be undertaken by providing adequate measures to achieve immediate stabilisation. | Works completed in 2022/23 monitoring year | N/A |
| 15. Kaitiaki Forum to be established | Works completed in 2022/23 monitoring year | N/A |
| 16. All exposed areas shall be stabilised between 1 May and 1 October | Works completed in 2022/23 monitoring year | N/A |
| 17. Provision for review | No further opportunities prior to expiry | N/A |
| 18. Additional opportunity for review | Works completed in 2022/23 monitoring year | N/A |
| Overall assessment of environmental performance and compliance in respect of this Consent<br>Overall assessment of administrative performance in respect of this Consent | | **N/A**<br>**N/A** |

Table 34 Evaluation of environmental performance over time

| Year | Consent numbers | High | Good | Improvement req | Poor | N/A |
|---|---|---|---|---|---|---|
| 2019/20 | 0226-1, 4622-1, 4779-1.1, 6177-1, 10804-1.0, 4619-1, 4621-1, 2370-3, 4620-1 | 5 | 2 | 1 | - | 1 |
| 2020/21 | 0226-1, 4622-1, 4779-1.1, 6177-1, 10804-1.0, 4620-1, 4621-1, 2370-3, 4619-1 | 6 | 1 | 2 | - | - |
| 2021/22 | 0226-1, 4622-1, 4779-1.1, 10912-1.0, 4619-1, 4620-1, 4621-1, 6177, 10804-1.0, 2370-3 | 4 | 5 | 1 | - | - |
| 2022/23 | 0226-1, 4779-1.1, 6177-2, 10804-1.0, 10912-1.0, 4619-1, 4620-1, 4621-1, 2370-3, 4622-1 | 4 | 4 | 1 | - | 1 |
| 2023/24 | 0226-1, 4779-1.1, 6177-2, 10804-1.0, 10912-1.0, 4619-1, 4620-1, 4621-1, 2370-3, 4622-1 | 7 | 1 | - | - | 2 |

Overall, NPDC demonstrated a good level of environmental performance and a high level of administrative performance with the resource consents as defined in Appendix II. The Abatement Notice issued during the 2020/21 year in relation to water quality changes in the groundwater in the under liner drain, and monitoring plan requirements were still in effect during the 2023/24 monitoring period. There appear to be some legacy issues that are affecting the water quality in the receiving environment. These have resulted in some consent non-compliances however, they have not resulted in any non-compliant results in the surface waters or had significant adverse effects on the receiving waters during the year under review.

## 3.4 Recommendations from the 2022/23 Annual Report

In the 2022/23 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2023/24 year continue at the same level as in 2022/23.
2. THAT should there be issues with environmental or administrative performance in 2023/24, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of Resource Consent 10804-1.0 in June 2024, as set out in condition 10 of the Consent, not be exercised, on the grounds that the conditions of the Consent are adequate to deal with the potential effects of this activity.
4. THAT NPDC establish and confirm a clear dimensional conceptual model for the entire site, in terms of potential sources of contaminants from leachate, flow paths and receptors, in order to inform the applications for the replacement Consents.
5. THAT NPDC continue with the more comprehensive characterisation of contaminants present in the Stage 1&2 leachate, the Stage 3 leachate and the under liner drain on two of the regular sampling occasions per year.
6. THAT the NPDC continue with the review of the CRRLMP to ensure that the criteria for determining whether any contamination is occurring that is greater than the natural variation be included along with measure to be taken remedy, mitigate or if practicable prevent continuation of any effect on the groundwater quality as per conditions 5, 6 and 7 of Consent 4621-1, and guidelines for determining contamination is occurring as per condition 5 of Consent 4619-1, are included in the plan.

Recommendation one was implemented by Council. Implementation of recommendation two was not required. Recommendation three was adopted by Council. Recommendation five was implemented and NPDC is continuing towards implementation of recommendations four and six.

## 3.5 Alterations to monitoring programmes for 2024/25

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;
- the record of administrative and environmental performances of the consent holder; and
- reporting to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki exercising Resource Consents.

No planned changes have been made to the 2024/25 monitoring programme.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2024/25.

# 4. Recommendations

1. THAT in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2024/25 year continue at the same level as in 2023/24.
2. THAT should there be issues with environmental or administrative performance in 2024/25, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

# Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

| | |
|---|---|
| Al* | Aluminium. |
| As* | Arsenic. |
| Biomonitoring | Assessing the health of the environment using aquatic organisms. |
| BOD | Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate. |
| BODF | Biochemical oxygen demand of a filtered sample. |
| Bund | A wall around a tank to contain its contents in the case of a leak. |
| CBOD | Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate. |
| cfu | Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample. |
| COD | Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction. |
| Condy | Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in µS/cm. |
| Cu* | Copper. |
| DO | Dissolved oxygen. |
| DRP | Dissolved reactive phosphorus. |
| *E.coli* | *Escherichia coli*, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample. |
| Ent | Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample. |
| ESCP | Erosion and Sediment Control Plan |
| F | Fluoride. |
| FC | Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample. |
| FNU | Formazin nephelometric units, a measure of the turbidity of water. |
| Fresh | Elevated flow in a stream, such as after heavy rainfall. |
| $g/m^2/day$ | grams/metre$^2$/day. |
| $g/m^3$ | Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures. |
| HDPE | High density polyethylene. |
| Incident | An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred. |

| | |
|---|---|
| Intervention | Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring. |
| Investigation | Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident. |
| Incident register | The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan. |
| L/s | Litres per second. |
| $m^2$ | Square Metres. |
| MCI | Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats. |
| Mixing zone | The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to seven times the width of the stream at the discharge point. |
| MPN | Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample. |
| µS/cm | Microsiemens per centimetre. |
| $NH_4$ | Ammonium, normally expressed in terms of the mass of nitrogen (N). |
| $NH_3$ | Unionised ammonia, normally expressed in terms of the mass of nitrogen (N). |
| $NO_3$ | Nitrate, normally expressed in terms of the mass of nitrogen (N). |
| NTU | Nephelometric Turbidity Unit, a measure of the turbidity of water. |
| O&G | Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons). |
| Pb* | Lead. |
| pH | A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5. |
| Physicochemical | Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment. |
| $PM_{10}$, $PM_{2.5}$, $PM_{1.0}$ | Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively). |
| Resource Consent | Refer Section 87 of the RMA. Resource Consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15). |
| RMA | *Resource Management Act 1991* and including all subsequent amendments. |
| SS | Suspended solids. |
| SQMCI | Semi quantitative macroinvertebrate community index. |
| SVOC | Semi-volatile organic compounds |
| Temp | Temperature, measured in °C (degrees Celsius). |
| Turb | Turbidity, expressed in NTU or FNU. |

Zn* Zinc.

*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

For further information on analytical methods, contact a manager within the Environment Quality Department.

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# Appendix I

# Resource Consents held by NPDC

(For a copy of the signed Resource Consent please contact the TRC Consents department)

## Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a Resource Consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

## Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a Resource Consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

## Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a Resource Consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

## Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a Resource Consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

## Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a Resource Consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

## Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a Resource Consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

TRK750226

# WATER PERMIT

**Pursuant to the RESOURCE MANAGEMENT ACT 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

Name of NEW PLYMOUTH DISTRICT COUNCIL
Consent Holder: PRIVATE BAG 2025 NEW PLYMOUTH

Change to
Conditions Date: 8 October 1986

## CONDITIONS OF CONSENT

Consent Granted: TO DIVERT THE PUREMU STREAM A TRIBUTARY OF THE MANGAONE STREAM IN THE WAIWHAKAIHO CATCHMENT BY CULVERTING THE STREAM TO PROVIDE ROAD ACCESS TO THE REFUSE TIP AT OR ABOUT GR: P19:070-380

Expiry Date: 1 October 2026 [as per section 386(2) of the Resource Management Act 1991]
[originally granted 2 April 1975 under the Water and Soil Conservation Act 1967 `at the pleasure of the Commission']

Site Location: COLSON ROAD NEW PLYMOUTH

Legal Description: SEC 223 HUA DIST BK VI PARITUTU SD

Catchment: WAIWHAKAIHO 392.000

Tributary: MANGAONE 392.010
PUREMU 392.012

For General, Standard and Special Conditions pertaining to this consent please see reverse side of this document.

TRK750226

**Conditions of right**

(a)The Commission may prescribe the method of management of this right, including the limitation of periods during which the right may be fully exercised, if a water shortage or other abnormal circumstances occur in the locality.

(b)This right may be operated only by the person holding the right or his agent and only for the purpose stated in the right.

(c)The right may, with the consent of the Commission in writing, be transferred to a new owner or occupier of the property to which the right relates, but only on the same conditions as contained in this right.

(d)The conditions relating to this right cannot be varied without the prior consent in writing of the Commission.

(e)This right is not a guarantee that the quantity and quality of water specified will be available.

(f)Unless specifically authorised by this right the discharge of water or waste containing pollutants into natural water is not permitted.

(g)This right is not an authority to obtain access to a source of water or a point of discharge.

(h)The grantee of the right shall keep such records as may reasonably be required by the Commission and shall if so requested supply this information to the Commission.

(i)This right may be cancelled by the Commission, or Commission may take such other action as the Act provides, if the right is not exercised within 12 months of its granting or such longer time as the Commission may approve.

(j)This right may be cancelled by the Commission if in the opinion of the Commission it is not diligently and beneficially exercised.

(k)This right is granted subject to the Commission or its servants or agents being permitted access at all reasonable times for the purpose of carrying out inspections and measurements.

(l)The design and maintenance of any works relating to the right must be to a standard adequate to meet the conditions of the right so that neither the works nor the exercise of the right is likely to cause damage to any property or injury to any person.

(m)Should the grantee in the opinion of the Commission commit any breach of the right or its conditions the Commission may cancel the right.

(n)This right is granted, subject to the Commission retaining the right to review the terms and conditions attached hereto including the period of the right at intervals of not less than five [5] years.

(o)This right will expire upon the date shown overleaf or upon 14 days notice, whichsoever comes sooner.

(p)The cost of supervision of this right, including water sampling deemed necessary by the Commission shall be carried by the grantee.

(q)The final drawings of the culvert are to be submitted to the Commission for approval before work is commenced.

TRK750226

**VARIATION OF 14 MAY 1986:**

**Additional General Conditions**

(a)The grantee shall provide to the Manager, Taranaki Catchment Commission, on request plans, specifications and maintenance programmes of works associated with the exercise of this right, showing that the conditions of this right are able to be met.

(b)The standards, techniques and frequency of monitoring of this right shall be to the specific approval of the Manager, Taranaki Catchment Commission.

(c)The actual and reasonable cost of administration supervision and monitoring of this right, deemed necessary by the Manager, Taranaki Catchment Commission, shall be met by the grantee.

(d)This right may be cancelled in writing to the grantee by the Commission if the right is not exercised within twelve months of the date of grant of such longer time as the Manager, Taranaki Catchment Commission, may approve.

(e)This right may be terminated by the Commission upon not less than six months notice in writing to the grantee if, in the opinion of the Commission, the public interest so requires, but without prejudice to the grantee to apply for a further right in respect of the same matter.

**Additional Special Conditions**

1)The terms and conditions pertaining to Water Right 226 shall apply.

2)**[Note: Condition 2 was subsequently deleted as per variation of 8 October 1986.]**

3)The new 900 mm pipe shall be laid in accordance with the manufacturers specifications.

**VARIATION OF 8 OCTOBER 1986:**

**Deletion of special condition 2.**

Signed at Stratford on 8 October 1986

For and on behalf of
TARANAKI REGIONAL COUNCIL

_____
OPERATIONS MANAGER

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council<br>Private Bag 2025<br>NEW PLYMOUTH |
| Consent Granted Date: | 19 March 2003 |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge up to 1000 cubic metres/day [5 litres/second] of leachate and contaminated stormwater from the closed section, Area A, of Colson Road municipal landfill to groundwater in the vicinity of and into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho catchment at or about GR: P19:074-372 |
| Expiry Date: | 1 June 2026 |
| Review Date(s): | June 2004, June 2006, June 2008, June 2014, June 2020 |
| Site Location: | Colson Road Landfill, Colson Road, New Plymouth |
| Legal Description: | Sec 223 Hua Dist Blk VI Paritutu SD |
| Catchment: | Waiwhakaiho |
| Tributary: | Mangaone<br>Puremu |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*

**General conditions**

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

**Special conditions**

1. That any discharge shall not alter to a conspicuous extent the natural colour, clarity or pH of the receiving water, nor shall it contain visible oil or grease, nor shall it emit objectionable odours, nor shall it increase the temperature of the Puremu Stream by more than 2.0°C.

2. That there shall be no significant adverse impact upon natural aquatic life downstream of the landfill as a result of the exercise of this permit.

3. Monitoring of surface waters and groundwater on or in the vicinity of the site shall be undertaken to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. That the Grantee shall satisfy all relevant requirements, obligations and duties of the District Plan of the New Plymouth District Council.

5. That the consent holder shall maintain and comply with a current management and contingency plan as per condition 9 for Area A and associated activities on the site, to the approval of the Chief Executive, Taranaki Regional Council.

6. The consent holder shall at all times adopt the best practicable option, as defined in the Resource Management Act 1991, to prevent or minimise any or likely adverse effects on the environment associated with the discharges of leachate and/or stormwater from the site, including but not limited to the collection, containment and removal from the site of any discharge of leachate and/or contaminated stormwater.

7. The consent holder shall maintain an adequate landfill capping barrier and vegetative cover on the site to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. The consent holder shall ensure that the area to which this consent is attributed to is closed and subsequently managed in accordance with the amended Management Plan provided November 2001 or as subsequently amended provided that subsequent amendments do not reduce the level of environmental protection set out in the amendment of November 2001.

9. The consent holder shall maintain stormwater drains, the sediment detention pond, and/or ground contours at the site, in order to minimise stormwater movement across, or ponding on the site.

10. The consent holder shall ensure that any discharge from the cleaning and hosing out of refuse containing vehicles shall not occur on site.

11. The mixing zone in each condition of this consent shall extend for a distance downstream of the point of the culvert outlet of the Puremu Stream to 2 metres above the confluence of the unnamed tributary of the Puremu Stream and the Puremu Stream at the sites legal boundary.

12. After allowing for reasonable mixing the consent holder shall ensure that the discharge shall not give rise to any of the following effects in the receiving waters of the Puremu Stream:

    a) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
    b) any conspicuous change in colour or visual clarity;
    c) any emission of objectionable odour;
    d) the rendering of fresh water unsuitable for consumption by farm animals;
    e) any significant adverse effects on aquatic life.
    f) an increase in the temperature of the Puremu Stream by more than 2.0° Celsius

13. The discharge shall not be shown to reduce the quality of the Puremu Stream at or beyond the mixing zone below the following criteria:

| **Constituent** | **Max. Concentration or level** |
|---|---|
| Aluminium | 5.0 mg/l |
| Arsenic | 0.1 mg/l |
| Beryllium | 0.1 mg/l |
| Boron | 0.5 mg/l |
| Cadmium | 0.01 mg/l |
| Chromium | 0.1 mg/l |
| Cobalt | 0.05 mg/l |
| Copper | 0.2 mg/l |
| Fluoride | 1.0 mg/l |
| Iron | 5.0 mg/l |
| Lead | 0.1 mg/l |
| Manganese | 1.0 mg/l |
| Nitrate + Nitrite ($NO_3$-N + $NO_2$-N) | 100 mg/l |
| Nitrite -N | 5.0 mg/l |
| Selenium | 0.02 mg/l |
| Vanadium | 0.1 mg/l |
| Zinc | 2.0 mg/l |
| Ammoniacal nitrogen | 2.5 mg/l |
| pH | 6.5 - 8.5 |
| Sulphate | 500 mg/l |

Note: Levels of trace metals expressed as total recoverable metals

14. The discharge shall not be shown to reduce the concentration of dissolved oxygen in the Puremu Stream below 5 mg/litre, beyond the mixing zone specified in special condition 12 above.

15. The discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, contain substances or constituents other than those listed in Condition 15, nor pathogenic organisms, which would render the water of the Puremu Stream, beyond the mixing zone specified in special condition 12 above, unpalatable or unfit for stock consumption purposes.

16. The maintenance, management and operation of the leachate and collection and treatment systems shall be to the satisfaction of the Chief Executive, Taranaki Regional Council, to ensure that the conditions attached to this permit can be met.

17. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2004 and/or June 2006 and/or June 2008 and/or June 2014 and/or June 2020, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 19 March 2003

For and on behalf of
Taranaki Regional Council

_____

**Chief Executive**

TRK994619

# DISCHARGE PERMIT

**Pursuant to the RESOURCE MANAGEMENT ACT 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | NEW PLYMOUTH DISTRICT COUNCIL<br>PRIVATE BAG 2025 NEW PLYMOUTH |
| Consent Granted Date: | 21 March 1999 |

## CONDITIONS OF CONSENT

| | |
|---|---|
| Consent Granted: | TO DISCHARGE UP TO A MAXIMUM OF 675 LITRES/SECOND OF TREATED STORMWATER AND MINOR AMOUNTS OF LEACHATE FROM AREAS B1, B2, C1 AND C2 OF THE COLSON ROAD LANDFILL TO GROUNDWATER IN THE VICINITY OF AND INTO THE PUREMU STREAM A TRIBUTARY OF THE MANGAONE STREAM IN THE WAIWHAKAIHO CATCHMENT AT OR ABOUT GR: P19:074-372 |
| Expiry Date: | 1 June 2025 |
| Review Date[s]: | June 2006, June 2012, June 2018 and/or within six months of the first exercise of this consent |
| Site Location: | COLSON ROAD LANDFILL, COLSON ROAD, NEW PLYMOUTH |
| Legal Description: | SEC 223 HUA DIST BLK VI PARITUTU SD |
| Catchment: | WAIWHAKAIHO 392.000 |
| Tributary: | MANGAONE 392.010<br>PUREMU 392.012 |

For General, Standard and Special Conditions pertaining to this consent please see reverse side of this document.

TRK994619

**General conditions**

a) That on receipt of a requirement from the General Manager, Taranaki Regional Council (hereinafter the General Manager), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) That unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

**Special conditions**

1. THAT the water quality in the Manganaha Stream above its confluence with the Mangaone Stream shall not be changed as a result of this discharge.

2. THAT the exercise of this consent shall not cause the water quality of the Puremu Stream at the northern boundary of the site to exceed the following criteria:

| **Component** | **Criteria** |
|---|---|
| pH | range within 6.5-8.5 |
| Dissolved oxygen | maximum reduction of 1.0 $gm^{-3}$ in the upstream dissolved oxygen concentration |
| Ammoniacal nitrogen | 2.0 $gm^{-3}$ for pH below 7.75<br>1.3 $gm^{-3}$ for pH between 7.75-8.00<br>1.0 $gm^{-3}$ for pH between 8.00-8.50 |
| Nitrate | 10 $gm^{-3}$ as nitrogen |
| Nitrite | 0.06 $gm^{-3}$ as nitrogen |
| Faecal coliforms | 1000/100 mL |
| Sulphate | 1000 $gm^{-3}$ |
| Oil and grease | 10 $gm^{-3}$ |
| Suspended solids maximum permitted increase in instream concentration<br>[dry weather conditions]<br>[wet weather conditions]<br>of upstream concentration | <br>10 $gm^{-3}$<br>10% |

| | Maximum instream concentration Total Recoverable Metals $gm^{-3}$ | Maximum permitted increase in concentration Filtered Metals $gm^{-3}$ |
|---|---|---|
| Aluminium | 5.0 | 0.1 |
| Arsenic | 0.2 | 0.05 |
| Beryllium | 0.1 | n/a |
| Boron | 5.0 | n/a |
| Cadmium | 0.05 | 0.001 |
| Chromium | 1.0 | 0.02 |
| Cobalt | 1.0 | n/a |
| Copper | 0.5 | 0.002 |
| Iron | 10.0 | 0.3 |
| Lead | 0.1 | 0.002 |
| Manganese | 5.0 | n/a |
| Selenium | 0.05 | 0.001 |
| Vanadium | 0.1 | n/a |
| Zinc | 2.4 | 0.03 |

3. THAT the discharge authorised by this consent, in conjunction with the exercise of any other consent associated with the landfill property, shall not give rise to any of the following effects in the Puremu Stream at the northern boundary of the site:

   a) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials [other than storm debris and suspended solids as permitted under condition 2 above];
   b) any conspicuous change in the colour or visual clarity;
   c) any emission of objectionable odour;
   d) the rendering of fresh water unsuitable for consumption by farm animals;
   e) any significant adverse effects on aquatic life.

4. THAT this consent shall be exercised in a manner conforming with the relevant requirements of the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan 1994', or any subsequent version of that document which does not lessen environmental protection standards. The Management Plan shall be updated at not greater than yearly intervals, to the satisfaction of the General Manager, Taranaki Regional Council.

5. THAT the consent holder shall provide, maintain and comply with a monitoring programme, to the satisfaction of the General Manager, Taranaki Regional Council, setting out details of monitoring to be carried out and containing guidelines for the determination of whether contamination is occurring, the initial plan to be provided at least three months prior to the exercise of this consent.

6. THAT this consent shall lapse on the expiry of six years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional

Council fixes a longer period pursuant to section 125(b) of the Resource Management Act 1991.

7. THAT pursuant to section 128(1)(a) of the Resource Management Act 1991, the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006, June 2012, June 2018 and/or within six months of the first exercise of this consent, to deal with any significant adverse ecological effects on any ecosystems, including but not limited to, habitats, plants, animals, microflora and microfauna, arising from discharges licensed by this consent.

Signed at Stratford on 21 March 1999

For and on behalf of
TARANAKI REGIONAL COUNCIL

_____
GENERAL MANAGER

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | | |
|---|---|---|
| Name of Consent Holder: | New Plymouth District Council<br>Private Bag 2025<br>New Plymouth 4342 | |
| Decision Date (Change): | 4 May 2021 | |
| Commencement Date (Change): | 4 May 2021 | (Granted Date: 21 March 1999) |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge up to 500 tonnes/day of contaminants onto and into land in areas B1, C1 and C2 at the Colson Road landfill |
| Expiry Date: | 1 June 2025 |
| Site Location: | Colson Road Landfill, Colson Road, New Plymouth |
| Grid Reference (NZTM) | 1697310E-5675450N |
| Catchment: | Waiwhakaiho |
| Tributary: | Puremu |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*

### General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

### Special conditions

1. The consent holder shall install and maintain a network of groundwater monitoring sites in consultation with The Chief Executive, Taranaki Regional Council at locations, and to depths, that enable monitoring to determine any change in groundwater quality resulting from the exercise of this consent. Any new bores shall be installed in accordance with NZS 4411:2001 at locations and depths approved by The Chief Executive, Taranaki Regional Council.

2. That the consent holder shall prevent surface runoff of water or contaminants to the Manganaha Stream from any surface area being used or previously used for the deposition of refuse, or for extraction of soil, clay, or other cover material, or prepared for the deposition of refuse, unless such surface area has been covered and rehabilitated to the satisfaction of the Chief Executive, Taranaki Regional Council.

3. That prior to commencing any use of any part of Area B, C1 or C2 for the deposition of refuse or for composting activities, the consent holder shall demonstrate to the satisfaction of the Chief Executive, Taranaki Regional Council, that drainage channels, bunds, surface contouring, or other engineering and landscaping works associated with an Area or part of an Area have been undertaken and completed to the extent that compliance with condition 2 above will be achieved.

4. That the construction, installation, placement, integrity and performance of groundwater drainage systems, landfill lining systems, and leachate interception, collection, holding, recirculation, and discharge systems in any part of Areas B1, B2, C1 and C2 of the Colson Road Landfill as described in the 'Colson Road Landfill Assessment of Effects on the Environment' July 1994 and the 'New Plymouth District Council Colson Road Landfill Management Plan' July 1994 be certified by a registered engineer prior to any discharge of solid wastes in such part of those areas.

5. That should groundwater quality be significantly affected by activities or processes associated with the landfill or composting, then the consent holder shall implement such measures as are necessary to remedy or mitigate and if practicable to prevent the continuation of any effect upon quality of the groundwater. 'Significantly affected' for the purposes of this condition is defined as a change greater than the maximum natural variation in any parameter for water in any piezometer, bore, or spring, and the criteria for this shall be set out in the monitoring programme under condition 6.

6. That the consent holder shall provide, maintain and comply with a monitoring programme, to the satisfaction of the Chief Executive, Taranaki Regional Council, setting out details of monitoring to be carried out and containing guidelines for the determination of whether contamination is occurring, the initial plan to be provided at least three months prior to the exercise of this consent.

7. That the disposal of wastes shall be carried out in a manner conforming with the relevant requirements of the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan July 1994', or any subsequent version of that document which does not lessen environmental protection standards. The Management Plan shall be updated at not greater than yearly intervals, to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. That the acceptance and disposal of waste types at the landfill for disposal shall conform to Section 2.5, Section 5.6 and Appendix E [or their equivalent] of the Landfill Management Plan referred to in condition 7 above, and in particular shall conform to the following:

   Table 11.2 'Criteria for calculating landfill potentials' Hazardous Waste Management Handbook, Ministry for the Environment, 1994;

   **and**

   Chapter 5 of the 'Draft Health and Environmental Guidelines for Selected Timber Treatment Chemicals', Ministry for the Environment/Ministry of Health, September 1993, in compliance with the requirement for a Class 2 landfill.

9. That this consent shall lapse on the expiry of six years after the date of commencement of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(b) of the Resource Management Act 1991.

10. That pursuant to section 128(1) of the Resource Management Act 1991, the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006, June 2102, June 2018 and/or within six months of the first exercise of this consent, to deal with any significant adverse ecological effects on any ecosystems, including but not limited to, habitats, plants, animals, microflora and microfauna, arising from discharges licensed by this consent.

Signed at Stratford on 4 May 2021

For and on behalf of
Taranaki Regional Council

_____

A D McLay
**Director - Resource Management**

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council<br>Private Bag 2025<br>New Plymouth 4342 |
| Decision Date (Change): | 24 January 2017 |
| Commencement Date (Change): | 24 January 2017 (Granted Date: 21 March 1999) |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge contaminants into the air associated with operation of the municipal landfill at Colson Road, New Plymouth |
| Expiry Date: | 1 June 2025 |
| Review Date(s): | June 2018 and in accordance with special condition 14 |
| Site Location: | Colson Road, New Plymouth |
| Grid Reference (NZTM) | 1697239E-5676071N (approx. centre of landfill)<br>1697127E-5676249N (approx. location of flare) |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*

### General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

### Special conditions

1. Within 3 months of the first operation of any landfill gas flare, the consent holder shall provide the Chief Executive, Taranaki Regional Council with a measurement of the temperature of the flare together with a measurement of the concentrations of methane and of hydrogen sulphide in the flare feedstock. Thereafter the consent holder shall annually provide updated information on flare temperature and feedstock composition.

2. Within 3 months of the first operation of any landfill gas flare, the consent holder shall provide the Chief Executive, Taranaki Regional Council with a copy of 'as built' drawings for the flare, including a figure to scale showing the location of the flare relative to the boundaries of the landfill property, and a copy of the supplier's or manufacturer's operating instructions.

3. The first revision of the landfill plan, described in condition 9(c) following installation of any landfill gas flare shall describe, variously, methods of, schedules for, and/or the recording of: observations and inspections of the flare, its operation, and its effects, including downwind odour and smoke plume details; a calibration schedule; records of maintenance; and any complaints. Information gathered under these provisions shall be made available to the Chief Executive, Taranaki Regional Council upon request.

4. That the consent holder shall at all times adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment arising from emissions from the landfill operation. 'Best practicable option' [as defined in section 2 of the Act] shall be determined by the Taranaki Regional Council, following review of the conditions of this consent as set out under conditions 13 and 14 of this consent and having regard to the requirements of condition 9 of this consent.

5. That the discharge of contaminants into the air from the landfill operation shall not result in any of the following – offensive or objectionable odours; offensive or objectionable dust; or dangerous or noxious ambient concentrations of any airborne contaminant -- as determined by at least one enforcement officer of the Taranaki Regional Council, at or beyond the boundary of the site.

6. That no material is to be burnt at the landfill site with the exception of landfill gas in a flare.

7. That the discharges authorised by this consent shall not give rise to any significant adverse ecological effects on any ecosystem, including but not limited to, habitats, plants, animals, microflora and microfauna.

8. That no extraction venting of untreated landfill gases be located closer than 200 metres to any boundary of the landfill property site.

9. That the operation of the landfill shall give effect to:

   (a) the 'Air Discharge Consent Application Supporting Documentation' July 1995, prepared for the New Plymouth District Council by Woodward Clyde;
   (b) *Variation to Air Discharge Consent – Colson Road Landfill*, prepared by Tonkin & Taylor Ltd and dated December 2016; and
   (c) the New Plymouth District Council Colson Road Landfill Management Plan July 1994 or any subsequent version of that document which does not lessen the standard of environmental protection afforded by that document. The management plan shall be updated at not greater than yearly intervals, to the satisfaction of the Chief Executive, Taranaki Regional Council.

10. That prior to undertaking any alteration to the site or site operations other than as specified and discussed in the application and supporting documentation lodged with the Taranaki Regional Council for this consent, and any subsequent application to change the conditions of this consent, which may significantly alter the nature or quantities of contaminants discharged from the site into the air, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991.

11. That the consent holder and staff of the Taranaki Regional Council shall meet as appropriate, and at least once per year, with the submitters to the consent, and any other interested party at the discretion of the Chief Executive, Taranaki Regional Council, to discuss any matter relating to the exercise of this consent, and in order to facilitate ongoing consultation.

12. That the consent holder shall, within one year of the commencement of this consent, provide a report on the feasibility of collecting, extracting, venting, or combusting of landfill gas at the Colson Road landfill, to the satisfaction of the Chief Executive, Taranaki Regional Council.

13. That pursuant to section 128(1)(a) of the Resource Management Act 1991, the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2006, June 2012, June 2018 and/or within six months of the first exercise of this consent, for the purpose of reviewing the best practicable option or options available to reduce or remove any adverse effects on the environment, or to deal with any significant adverse ecological effects on any ecosystems, including but not limited to, habitats, plants, animals, microflora and microfauna, arising from discharges licensed by this consent.

14. That in addition to the review provisions of condition 13 above, pursuant to section 128(1)(a) of the Resource Management Act 1991 the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review:

    (a) within six months of receipt of the report required by condition 12; and/or
    (b) during June 2001, June 2003, June 2006, June 2012 and/or June 2018; and/or
    (c) within the 6 months following the installation of any landfill gas collection and treatment at the site;

    for the purposes of:

    (i) considering the options of collecting, extracting, venting or combusting landfill gas; and/or
    (ii) monitoring landfill gas combustion and its effects.

Signed at Stratford on 24 January 2017

For and on behalf of
Taranaki Regional Council

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A D McLay
**Director - Resource Management**

Consent 6177-1

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council<br>Private Bag 2025<br>NEW PLYMOUTH |
| Consent Granted Date: | 11 June 2003 |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge stormwater [due to earthworks in providing an area for Stage 3 of the municipal landfill] onto land and into the Puremu Stream a tributary of the Mangaone Stream in the Waiwhakaiho catchment at or about GR: P19:074-372 |
| Expiry Date: | 1 June 2020 |
| Review Date(s): | June 2004, June 2006, June 2008, June 2014 |
| Site Location: | Colson Road Landfill, Colson Road, New Plymouth |
| Legal Description: | Sec 223 Hua Dist Blk VI Paritutu SD |
| Catchment: | Waiwhakaiho |
| Tributary: | Mangaone<br>Puremu |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*

**General conditions**

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

**Special conditions**

1. The water quality of uncontaminated stormwater discharge to the Puremu Stream shall meet the following criteria:

| | |
|---|---|
| pH | 6.5-8.5 |
| suspended solids | maximum concentration of 100$gm^{-3}$ |
| ammoniacal nitrogen | maximum concentration of 0.5 $gm^{-3}$ as nitrogen |

2. No leachate discharge shall be permitted by the exercise of this consent.

3. All stormwater diversion and channels shall be designed, constructed and maintained so as to prevent or minimise erosion of the channel in all circumstances.

4. Any discharge shall not alter to a conspicuous extent the natural colour or clarity of the receiving water in the Puremu Stream.

5. There shall be no significant adverse impact upon natural aquatic life downstream of the landfill as a result of the exercise of this permit.

6. Monitoring of surface waters on or in the vicinity of the site shall be undertaken to the satisfaction of the Chief Executive, Taranaki Regional Council.

7. The consent holder shall prepare and maintain a management plan and site contingency plan for the site and associated activities on the site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. The consent holder shall prepare and maintain a site erosion and sediment control management plan for the site and associated activities on the site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

9. The consent holder shall at all times adopt the best practicable option, as defined in the Resource Management Act 1991, to prevent or minimise any or likely adverse effects on the environment associated with the discharges of stormwater from the site, including but not limited to the collection, containment and removal from the site of any discharge of contaminated stormwater.

10. The consent holder shall repair and rehabilitate any land made unstable and any erosion occurring due to the construction or maintenance of the diversion channels.

11. The consent holder shall maintain stormwater drains, sediment detention ponds, and ground contours at the site, in order to minimise stormwater movement across, or ponding on the site, to the satisfaction of the Chief Executive, Taranaki Regional Council.

12. After allowing for reasonable mixing the consent holder shall ensure that the discharge shall not give rise to any of the following effects in the receiving waters of the Puremu Stream:

    a) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
    b) any conspicuous change in colour or visual clarity;
    c) any emission of objectionable odour;
    d) the rendering of fresh water unsuitable for consumption by farm animals;
    e) any significant adverse effects on aquatic life.
    f) an increase in the temperature of the Puremu Stream by more than 2.0 degrees Celsius.

13. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2004 and/or June 2006 and/or June 2008 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 11 June 2003

For and on behalf of
Taranaki Regional Council

_____

**Chief Executive**

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council |
| Decision Date: | 13 October 2021 |
| Commencement Date: | 13 October 2021 |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge stormwater and sediment from earthworks associated with the capping of Stage 3 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream |
| Expiry Date: | 1 June 2025 |
| Review Date(s): | June 2022 and in accordance with special condition 17 |
| Site Location: | Colson Road Landfill, 76 Colson Road, New Plymouth |
| Grid Reference (NZTM) | 1697110E-5676383N (discharge point)<br>1697265E-5676055N (approximate centre of earthworks) |
| Catchment: | Waiwhakaiho |
| Tributary: | Puremu |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*



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## General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

## Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

2. The site shall be managed and any stormwater treated in accordance with a Soil Erosion and Sediment Control Plan (ESCP) that has been approved by the Taranaki Regional Council acting in a technical certification capacity. This plan is to be prepared and maintained in accordance with the *"Erosion and sediment control plan preparation guideline"* (Waikato Regional Council, 2019), taking account of the principles and practices given in *"Erosion & Sediment Control Guidelines for Soil Disturbing Activities"* (Waikato Regional Council, 2009), and any subsequent amendments. The plan shall include, but not be limited to:

   a) the way in which the work will be phased, and

   b) stormwater drainage plans, and

   c) estimates of sediment loss from each area, and

   d) the erosion and sediments controls, and

   e) how these will be developed prior to the start of each phase, and

   f) the location capacity and design of each structure, and

   g) monitoring and maintenance, record keeping and reporting, and

   h) preparation and responses in relation to heavy rainfall, and

   i) contingency measures, including for matters that may arise such as ponding, rilling, vehicle tracking, erosion.

3. Prior to this consent being exercised the consent holder must appoint a principal contact for matters relating to this consent. The representative's name and how they can be contacted shall be provided to the Taranaki Regional Council.

4. The consent holder must arrange and conduct a pre-construction site meeting and invite, with a minimum of five working days' notice, the Taranaki Regional Council, the site representative(s) nominated under condition 3 of this consent, the contractor, and any other party representing the consent holder prior to any work authorised by this consent commencing on site.

   ***Advice note:*** *In the case that any of the invited parties, other than the site representative does not attend this meeting, the Consent Holder will have complied with this condition, provided the invitation requirement is met.*

5. The consent holder must ensure that a copy of the certified ESCP required by condition 2, including any certified amendments, is kept onsite in a place where it is available to officers of Taranaki Regional Council, and this copy is updated within five working days of any amendments being certified.

6. The consent holder shall, prior to bulk earthworks commencing in any phase, submit to the Taranaki Regional Council "As Built Certification Statements" signed by an appropriately qualified and experienced professional certifying that the erosion and sediment controls have been constructed in accordance with the certified ESCP. Information contained in the certification statement shall include at least the following:

   a) confirmation of contributing catchment areas;

   b) the location, capacity and design of each structure;

   c) position of inlets and outlets; and

   d) any other relevant matter.

7. There shall be no discharge of untreated stormwater from any unstabilised areas to the Puremu Stream or its tributaries.

8. Any discharge authorised by this consent from the SRP (Pond 1) (NZTM: 1697110E-5676383N) to the unnamed tributary of the Puremu Stream, in combination with the other discharges at the same location, shall have a suspended solids concentration no greater than 100 $gm^{-3}$.

9. As far as practicable, all clean water run-off from stabilised surfaces including catchment areas above the site must be separated from the exposed areas via a stabilised system to prevent erosion.

10. The consent holder must progressively stabilise, re-contour and re-vegetate any disturbed areas, to minimise sediment runoff and erosion until the site has been stabilised in accordance with the measures detailed in the document Waikato Regional Council document titled "Erosion and Sediment Control – Guidelines for Soil Disturbing Activities", as soon as practically possible and within a period not exceeding five days after completion of any phase authorised by this resource consent.

11. Further to condition 10, any area that is not to be worked within a 21 day period is to be stabilised.

12. Stabilisation must be undertaken by providing adequate measures (vegetative and/or structural) that will immediately stabilise disturbed areas, and will minimise sediment runoff and erosion. The consent holder must monitor and maintain the site until vegetation is established to such an extent that it prevents erosion and prevents sediment from entering any water body.

13. Before exercising this consent, the consent holder shall establish a 'Kaitiaki Forum'. The purpose of the Kaitiaki Forum shall be to provide advice to the consent holder, regarding but not limited to the following:

    a) avoiding, remedying and mitigating adverse effects on the cultural, traditional, historical and spiritual values of the Puremu Stream associated with exercising this consent; and

    b) recognising and providing for the relationship of Ngāti Tawhirikura and their culture and traditions with their ancestral lands, waters, sites, taonga and wāhi tapu associated with exercising this consent; and

    c) the exercise of kaitiakitanga by Ngāti Tawhirikura Hapū associated with exercising this consent.

    The make-up of the Kaitiaki Forum, its operations and procedures are to be determined by the consent holder, Ngāti Tawhirikura Hapū and Te Kotahitanga o Te Atiawa Trust and detailed in a forum collaboration agreement. A copy of the forum collaboration agreement shall be provided to the Chief Executive, Taranaki Regional Council.

14. Except as provided for in condition 15 no earthworks shall occur, and all exposed areas shall be stabilised between 1 May and 1 October.

15. Maintenance work may be undertaken between 1 May and 1 October, in accordance with the ESCP required by condition 2, or an activity specific ESCP that has been approved by the Taranaki Regional Council acting in a technical certification capacity.

16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

17. In addition to the review provision of condition 16 above, in accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may review condition 8 of this consent by giving notice within 3 months of receiving the ESCP required by condition 2 or subsequent amendments, if it is determined that the 100 $gm^{-3}$ suspended solids limit does not adequately avoid or mitigate adverse effects.

Signed at Stratford on 13 October 2021

For and on behalf of
Taranaki Regional Council

A D McLay
**Director - Resource Management**

Taranaki Regional Council

# Discharge Permit

**Pursuant to the Resource Management Act 1991 a resource consent is hereby granted by the Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council<br>Private Bag 2025<br>New Plymouth 4342 |
| Decision Date | 7 February 2020 |
| Commencement Date | 7 February 2020 |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge stormwater and sediment arising from earthworks into an unnamed tributary of the Puremu Stream |
| Expiry Date: | 1 June 2026 |
| Review Date(s): | June 2022, June 2024 |
| Site Location: | 76 Colson Road, Waiwhakaiho |
| Grid Reference (NZTM) | 1697110E-5676383N |
| Catchment: | Waiwhakaiho |
| Tributary: | Puremu |

*For General, Standard and Special conditions pertaining to this consent please see reverse side of this document*



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**General condition**

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

**Special conditions**

1. This consent shall be exercised in general accordance with the information provided in support of the original application. If there is conflict between the application and consent conditions the conditions shall prevail.

2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

3. No less than 2 and no more than 20 working days before commencing work the consent holder shall notify the Chief Executive, Taranaki Regional Council ('the Chief Executive'). Notification shall include the consent number, a brief description of the work, and the intended commencement date. Unless the Chief Executive advises that an alternative electronic method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (http://bit.ly/TRCWorkNotificationForm).

4. During and immediately following earthworks the site shall be managed and any stormwater discharged, shall be in general accordance with the Soil Erosion and Sediment Control Plan provided with the application (Document #2392643).

5. The obligation described in condition 4 above shall cease to apply, and accordingly the erosion and sediment control measures may be removed, in respect of any particular area only when the site is stabilised.

   *For the purpose of this consent 'stabilised' in relation to any site or area means inherently resistant to erosion or rendered resistant, such as by using rock or by the application of base course, colluvium, grassing, mulch, or another method to the reasonable satisfaction of the Chief Executive, Taranaki Regional Council and as specified in the Waikato Regional Council's Guidelines for Soil Disturbing Activities, 2009. Where seeding or grassing is used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once, on reasonable visual inspection by an officer of the Taranaki Regional Council, an 80% vegetative cover has been established.*

6. Before commencing any earthworks, the consent holder shall ensure that they (or their representative) meet on site with a Taranaki Regional Council officer who is directly responsible for monitoring compliance with the conditions of this consent. The purpose of the meeting shall be for the consent holder to detail the measures proposed to ensure compliance with the conditions of this consent.

7. The sediment control measures necessary to comply with the conditions of this consent shall be constructed before any additional soil is exposed, except for further earthworks necessary for the construction of any required sediment control measures, and shall remain in place, in respect of any particular area, until that area is stabilised.

8. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable and no longer than 6 months after completion of soil disturbance activities.

9. Any discharge authorised by this consent from the 'large silt pond' (NZTM: 1697110E-5676383N) to the unnamed tributary of the Puremu Stream, in combination with the other discharges at the same location, shall have a suspended solids concentration no greater than 100 $gm^{-3}$.

10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2022 and/or June 2024, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 7 February 2020

For and on behalf of
Taranaki Regional Council

A D McLay
**Director - Resource Management**

# Discharge Permit

**Pursuant to the Resource Management Act 1991**
**a resource consent is hereby granted by the**
**Taranaki Regional Council**

| | |
|---|---|
| Name of Consent Holder: | New Plymouth District Council |
| Decision Date: | 13 October 2021 |
| Commencement Date: | 13 October 2021 |

## Conditions of Consent

| | |
|---|---|
| Consent Granted: | To discharge stormwater and sediment from earthworks associated with the capping of Stage 2 of the Colson Road landfill onto land and into an unnamed tributary of the Puremu Stream |
| Expiry Date: | 1 June 2025 |
| Review Date(s): | June 2022 and in accordance with special condition 18 |
| Site Location: | Colson Road Landfill, 76 Colson Road, New Plymouth |
| Grid Reference (NZTM) | 1697110E-5676383N (discharge point)<br>1697259E-5675542N (approximate centre of earthworks) |
| Catchment: | Waiwhakaiho |
| Tributary: | Puremu |

*For General, Standard and Special conditions*
*pertaining to this consent please see reverse side of this document*



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## General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

## Special conditions

1. The discharge of stormwater shall be generated from an area of soil disturbance activity not exceeding 2.6 hectares.

2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.

3. The site shall be managed and any stormwater treated in accordance with a Soil Erosion and Sediment Control Plan (ESCP) that has been approved by the Taranaki Regional Council acting in a technical certification capacity. This plan is to be prepared and maintained in accordance with the "*Erosion and sediment control plan preparation guideline*" (Waikato Regional Council, 2019), taking account of the principles and practices given in "*Erosion & Sediment Control Guidelines for Soil Disturbing Activities*" (Waikato Regional Council, 2009), and any subsequent amendments. The plan shall include, but not be limited to:

   a) the way in which the work will be phased, and

   b) stormwater drainage plans, and

   c) estimates of sediment loss from each area, and

   d) the erosion and sediments controls, and

   e) how these will be developed prior to the start of each phase, and

   f) the location capacity and design of each structure, and

   g) monitoring and maintenance, record keeping and reporting, and

   h) preparation and responses in relation to heavy rainfall, and

   i) contingency measures, including for matters that may arise such as ponding, rilling, vehicle tracking, erosion.

4. Prior to this consent being exercised the consent holder must appoint a principal contact for matters relating to this consent. The representative's name and how they can be contacted shall be provided to the Taranaki Regional Council.

5. The consent holder must arrange and conduct a pre-construction site meeting and invite, with a minimum of five working days' notice, the Taranaki Regional Council, the site representative(s) nominated under condition 4 of this consent, the contractor, and any other party representing the consent holder prior to any work authorised by this consent commencing on site.

   ***Advice note:*** *In the case that any of the invited parties, other than the site representative does not attend this meeting, the Consent Holder will have complied with this condition, provided the invitation requirement is met.*

6. The consent holder must ensure that a copy of the certified ESCP required by condition 3, including any certified amendments, is kept onsite in a place where it is available to officers of Taranaki Regional Council, and this copy is updated within five working days of any amendments being certified.

7. The consent holder shall, prior to bulk earthworks commencing in any phase, submit to the Taranaki Regional Council "As Built Certification Statements" signed by an appropriately qualified and experienced professional certifying that the erosion and sediment controls have been constructed in accordance with the certified ESCP. Information contained in the certification statement shall include at least the following:

   a) confirmation of contributing catchment areas;

   b) the location, capacity and design of each structure;

   c) position of inlets and outlets; and

   d) any other relevant matter.

8. There shall be no discharge of untreated stormwater from any unstabilised areas to any neighbouring properties or to the Puremu Stream, or its tributaries.

9. Any discharge from the site that reaches a waterbody, or discharges onto a neighbouring property shall have a suspended solids concentration no greater than 100 $gm^{-3}$. This condition also applies to any discharge authorised by this consent from the SRP (pond 1) (NZTM: 1697110E-5676383N) to the unnamed tributary of the Puremu Stream, in combination with the other discharges at the same location.

10. As far as practicable, all clean water run-off from stabilised surfaces including catchment areas above the site must be separated from the exposed areas via a stabilised system to prevent erosion.

11. The outlet valve on the "borrow area" SRP must be kept closed, and may only be opened once there is only dead storage remaining in SRP (Pond 1).

12. The consent holder must progressively stabilise, re-contour and re-vegetate any disturbed areas, to minimise sediment runoff and erosion until the site has been fully stabilised in accordance with the measures detailed in the document Waikato Regional Council document titled "Erosion and Sediment Control – Guidelines for Soil Disturbing Activities", as soon as practically possible and within a period not exceeding three days after completion of any works authorised by this resource consent.

13. Further to condition 12, any area that is not to be worked within a 21 day period is to be stabilised.

14. Stabilisation must be undertaken by providing adequate measures (vegetative and/or structural) that will immediately stabilise disturbed areas, and will minimise sediment runoff and erosion. The Consent Holder must monitor and maintain the site until vegetation is established to such an extent that it prevents erosion and prevents sediment from entering any water body.

15. Before exercising this consent, the consent holder shall establish a 'Kaitiaki Forum'. The purpose of the Kaitiaki Forum shall be provide advice to the consent holder, regarding but not limited to the following:

    a) avoiding, remedying and mitigating adverse effects on the cultural, traditional, historical and spiritual values of the Puremu Stream associated with exercising this consent; and

    b) recognising and providing for the relationship of Ngāti Tawhirikura and their culture and traditions with their ancestral lands, waters, sites, taonga and wāhi tapu associated with exercising this consent; and

    c) the exercise of kaitiakitanga by Ngāti Tawhirikura Hapū associated with exercising this consent.

    The make-up of the Kaitiaki Forum, its operations and procedures are to be determined by the consent holder, Ngāti Tawhirikura Hapū and Te Kotahitanga o Te Atiawa Trust and detailed in a forum collaboration agreement. A copy of the forum collaboration agreement shall be provided to the Chief Executive Taranaki Regional Council.

16. No earthworks shall occur and all exposed areas shall be stabilised between 1 May and 1 October.

17. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2022, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

18. In addition to the review provision of condition 17 above, in accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may review condition 9 of this consent by giving notice within 3 months of receiving the ESCP required by condition 3, or subsequent amendments, if it is considered that the 100 $gm^{-3}$ suspended solids limit does not adequately avoid or mitigate adverse effects.

Signed at Stratford on 13 October 2021

For and on behalf of
Taranaki Regional Council

A D McLay
**Director - Resource Management**

# Appendix II

# Categories used to evaluate environmental and administrative performance

# Categories used to evaluate environmental and administrative performance

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

## Environmental Performance

**High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving environmental impacts and was not obliged to issue any Abatement Notices or infringement notices in relation to such impacts.

**Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively and quickly. The Council was not obliged to issue any Abatement Notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.

**Improvement required**: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement Notices and infringement notices may have been issued in respect of effects.

**Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

## Administrative performance

**High:** The administrative requirements of the Resource Consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

**Good:** Perhaps some administrative requirements of the Resource Consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

**Improvement required:** Repeated interventions to meet the administrative requirements of the Resource Consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an Abatement Notice to attain compliance.

**Poor:** Material failings to meet the administrative requirements of the Resource Consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.