NPDC Colson Road Landfill Monitoring Programme Annual Report 2021-2022

Technical Report 2022-37

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Taranaki Regional Council

Taranaki Regional Council
Private Bag 713
Stratford

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NPDC Colson Road Landfill
Monitoring Programme
Annual Report
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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 800,000 m^3. Stage 3 ceased accepting waste in the 2020-2021 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 2021 to June 2022 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 an overall good level of environmental performance and improvement was required in their 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 consent to discharge stormwater and sediment from earthworks. One of these earthworks consents was re-issued and one was granted during the year under review. NPDC also holds one consent to divert water.

The Council's monitoring programme for the year under review included 12 routine compliance monitoring inspections, six stormwater/discharge samples, 21 surface water samples, 16 groundwater samples, two biomonitoring surveys of receiving waters, and four ambient air quality surveys. NPDC also collected eight leachate samples and six under liner drainage samples for physicochemical analysis.

Inspection issues found that the site was generally well managed during the year under review, however continued attention to the installation and maintenance of localised erosion and sediment controls is required.

The issue of cap management and maintenance on Stage 2 remained unresolved at the end of the monitoring period. Extensive investigations into the cap depth and compaction were carried out during the 2018-2019 year and the remediation necessary was identified. It was found that there were areas where the cap depth needed to be increased. An abatement notice was issued allowing NPDC until March 2020 to complete the work so that the appropriate methodology could be developed and then be undertaken during the next dry weather construction season. It was agreed that this could be delayed to prioritise working on the Stage 3 cap following the landfill closure to municipal waste (August 2019) and special waste (October 2020) on the basis that this would minimise the potential discharge of contaminants from the site as a whole. During the year under review, the due date on the abatement notice was extended to May 2023.

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 chloride and nitrate/nitrite nitrogen in some bores and a number of parameters in the under liner drainage. An abatement notice has been issued and the monitoring programme been expanded so that the potential for future adverse effects can be evaluated. The abatement notice has an extended date of 30 April 2023 so that these potential effects can be taken into account during an early consent renewal application.

Chemical and bacteriological monitoring of the Puremu and Manganaha Streams found that the receiving water quality criteria on the consents were met for the majority of parameters at the time of the three scheduled sampling surveys. The exceptions to this were faecal coliforms that were above the consent limit at the time of two of the three surveys. In each case, the faecal coliforms was elevated in the upstream

samples, so this was not considered to be a consent non-compliance. 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. In the unnamed tributary, no significant detrimental effects were found at the time of the November survey. At the time of the March survey the results suggested poor preceding water quality that may be indicative of adverse effects associated with the landfill leachate.

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 2017-2018 monitoring period and there were no substantiated odour complaints received during the 2021-2022 period that were associated with the Colson Road landfill. However, the flare was not continuously maintained at above 750°C for periods of time between January and the end of May 2022. Suitable mitigation measures have now been put in place.

Overall, NPDC demonstrated a good level of environmental performance, however an improvement is required in their administrative performance and compliance with the resource consents as defined in Appendix II. During the year under review there were on-going, and still unresolved, issues with the compliance of the cap on Stage 2, with an abatement notice in place requiring the works to be undertaken by 1 May 2023. The abatement notices issued during the 2020-2021 year in relation to, water quality changes in the groundwater in the under liner drain, and monitoring plan requirements is still in effect with works required to be undertaken by 30 April 2023. 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. Monitoring requirements have been revised and evaluation is on-going. Additional investigations are also being undertaken by NPDC, when required, to ensure that any appropriate interventions are implemented where improvements are required. There were two non-compliances during the year under review in relation to ponding within the landfill footprint, and inadequate localised erosion and sediment controls. There was one non-compliance in relation to the landfill gas flare not being continuously operated above the required temperature. There were no significant adverse effects found as a result of these non-compliances.

For reference, in the 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% of the consents, a good level of environmental performance and compliance was achieved.

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 had improved. However, in the year under review and in the previous two years, there is still an improvement required with their administrative performance and compliance with some consent conditions.

This report includes recommendations for the 2022-2023 year.

Table of contents

List of tables

List of figures

List of photos

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 2021 to June 2022 by the 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 2020-2021 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.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of NPDC's use of water, land and air, and is the 21st site specific Annual Report by the Council for NPDC covering only this site. Prior to this, during the period from 1990-1999, the Council produced ten combined NPDC landfills' Annual Reports that included the Colson Road landfill.

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 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 2020-2021 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' inasmuch 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 and administrative 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 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% of the consents, a good level of environmental performance and compliance was achieved.[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, prepared by NPDC, and approved by Council.

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 2018-2019 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 220-2021 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

[1] The Council has used these compliance grading criteria for 18 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

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.

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

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.

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

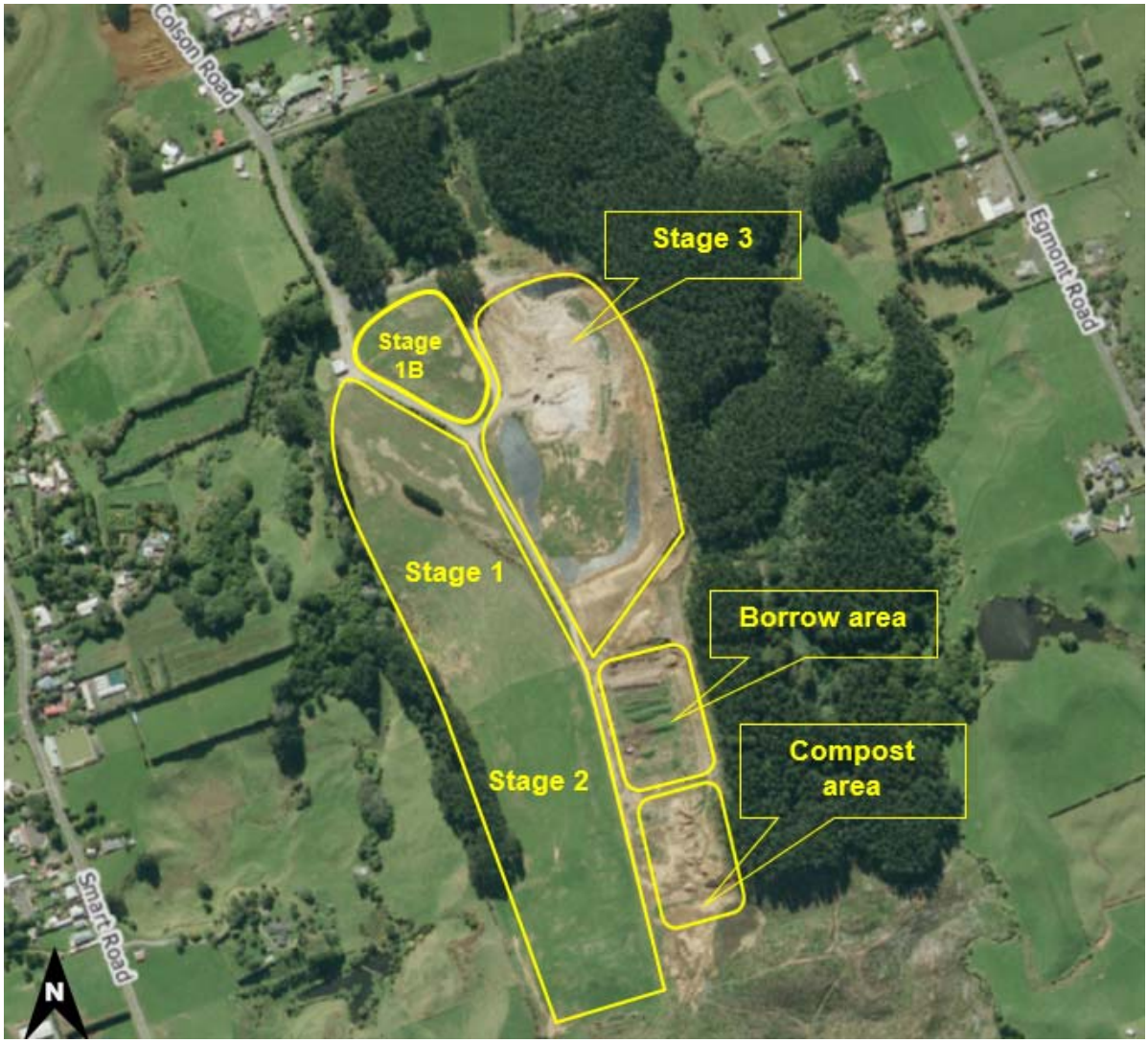

Figure 1 Aerial view of the Colson Road landfill

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.

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

Photo 1 Stabilised northern toe of Stage 3, May 2022

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, in the composting area, These works included installing drainage around the composting area previously occupied by Return2Earth, allowing Revital to relocate to the southern end of the composting area. This was done so that additional cover material could be safely accessed and borrowed from the northern end of the compositing area. Sediment discharges from the borrow area are treated by a separate sediment pond (Photo 2), with the catchment area to this pond having been expanded to enable treatment of the stormwater from the Stage 2 cap remediation works (Photo 3).

Photo 2 Borrow area sediment pond, November 2020

Photo 3 Amended drainage and access to enable capping works for Stage 2 remediation, March 2022

The sediment treatment system for Stage 3 was upgraded during the 2020-2021 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 4) prior to the large silt pond and floating decants in the large silt pond (Photo 5).

Photo 4 Pretreatment pond for large silt pond, May 2021

Photo 5 Floating decant system in the large silt pond, March 2021

1.2.1 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. Efforts are continuing to establish a clear 3 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 renewal 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, which 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.

Stage 2 was an overlay of Stage 1 and was established on top of a 600 mm 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 10 metres, 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 300 mm 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 130 m from the northern end of the landfill, under the north eastern 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. The layout of the leachate drains, as surveyed in September 2006, are shown in Figure 2.

During the 2013-2014 year, the lining of Stage 3 was completed so that the liner covered Stage 3's entire footprint (Photo 6). 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 waste water treatment plant on occasion. Therefore the flow from Stage 3 to the leachate system was controlled via a shut off valve to prevent overflows to the Puremu Stream tributaries, when required. Under these circumstances excess leachate/contaminated stormwater is stored within Stage 3 of the landfill.

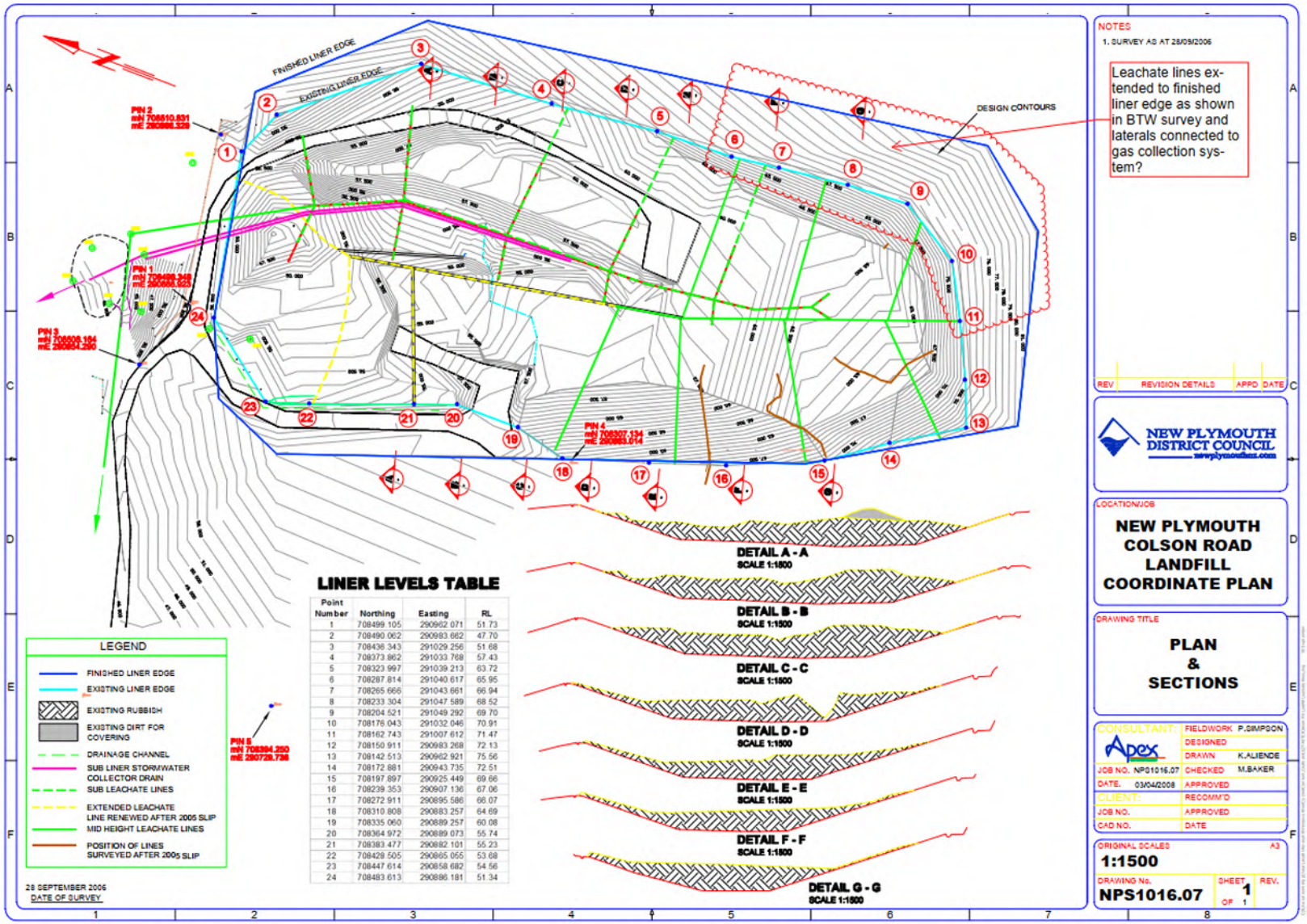

Figure 2 Location of Stage 3 leachate and under liner groundwater collection lines

Photo 6 Stage 3 extension works, February 2011

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 2014-2015 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.

During 2017-2018 a fully enclosed gas flare was installed at the site. 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.

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.

Photo 7 Leachate pipes feeding into the gas collection system

Figure 3 As built drawing of the stage 1 landfill gas collection system

There has been a noticeable reduction in odour around the landfill perimeter since all of the above measures have been initiated and the operation of the flare began.

Photo 8 The fully enclosed flare

1.3 Resource consents

NPDC holds ten resource consents in relation to the Colson Road landfill, 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.

Two consents were applied for during the 2020-2021 year that NPDC requested be put on hold to allow time for a Cultural Impact Statement to be provided in support of the applications. Processing of these consents recommenced during the year under review.

The earthworks consent for the Stage 3 area (6177-1) expired on 1 June 2020. An application to renew this consent was received on 17 February 2020. Section 124 of the RMA provides for consent holder to continue to operate under the terms and conditions of their existing consent until a decision is made on the renewal. As the application was received between three and six months prior to the expiry of the consent, the Council exercised its discretion to allow NPDC to do so. Consent 6177-2.0 was granted on 13 October 2021.

During the 2020-2021 year, a consent application was received to provide for the discharge of stormwater and sediment associated with the earthworks required to remediate the Stage 2 cap. Consent 10912-1.0 was also granted on 31 October 2021.

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
6177-1	To discharge stormwater from earthworks	June 2003	-	Expired – S.124 protection until 13 October 2021
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	Feb 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	Jan 2017*	-	June 2026

Consent number	Purpose	Granted	Review	Expires
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	Oct 1986	-	Oct 2026

Key *Commencement date of varied consent

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 2021-2022 year is significantly different from that of the 2020-2021 and previous years.

In the 2020-2021 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 renewals would be sought to ensure compliance with abatement notice EAC-23544 by 30 April 2023.

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 renewal 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. Presence or absence of seasonal variation needs to be understood	
	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 2021-2022 year.

The monitoring programme for the Colson Road landfill site for the 2021-2022 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 2021-2022

Activity	Number
Inspections	12
Compost pond discharge samples	0
Stormwater samples	6
Receiving water samples	21
Groundwater samples	16
Air deposition samples	12
Ambient methane readings	13
Ambient hydrogen sulphide readings	13
Ambient PM_{10} readings	13
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;
- in 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.

During the year under review NPDC commissioned a consultant to prepare a number of plans that were provided to Council. These included:

- A number of updates to the Erosion and Sediment Control Plan.
- Final version of the Site Closure Plan, October 2021.

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. 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 2020-2021 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&2. These samples would continue to be tested for the selected parameters above, which are principally leachate indicators.

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 are 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 commenced in the 2021-2022 year. The results for the year under review are presented in section 2.3.1.

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 4.

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 11 October 2021.

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 26 November 2021 and 20 April 2022.

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 2021-2022 year. Nine bores in the vicinity of the landfill were scheduled to be sampled on two occasions during the year under review at the locations identified in Figure 5.

One survey is programmed to be undertaken under high groundwater level conditions. Samples collected during this survey are analysed for a range of indicator parameters, inorganic nitrogen species, dissolved metals, volatile and semi-volatile organic compounds. This survey was undertaken over three days in late February and early March 2022. One of the monitoring bores was not sampled as the bore was found to be compromised. NPDC were advised of the issue and they undertook to investigate whether the bore could be reinstated.

The second survey is scheduled to be carried out under low groundwater level conditions. Samples collected during this survey are analysed for a range of indicator parameters, inorganic nitrogen species, and a reduced range of dissolved metals. This survey was undertaken over three days in early May 2022. At the time of this survey, again only eight of the nine monitoring bores were able to be sampled. NPDC had identified that the remaining bore (GND0572) could not be re-instated and the Council asked NPDC to identify a suitable location for a replacement bore to be installed. At the time of writing this report, replacement bores had been installed at an agreed location.

1.4.6 Ambient air quality

The Council undertook sampling of the ambient air quality in the neighbourhood.

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.

Two ambient suspended particulate, methane and hydrogen sulphide surveys were also undertaken. The air monitoring sites are shown in Figure 6.

1.4.7 Biomonitoring surveys

Biological surveys were performed on two occasions in the Puremu Stream (five 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.

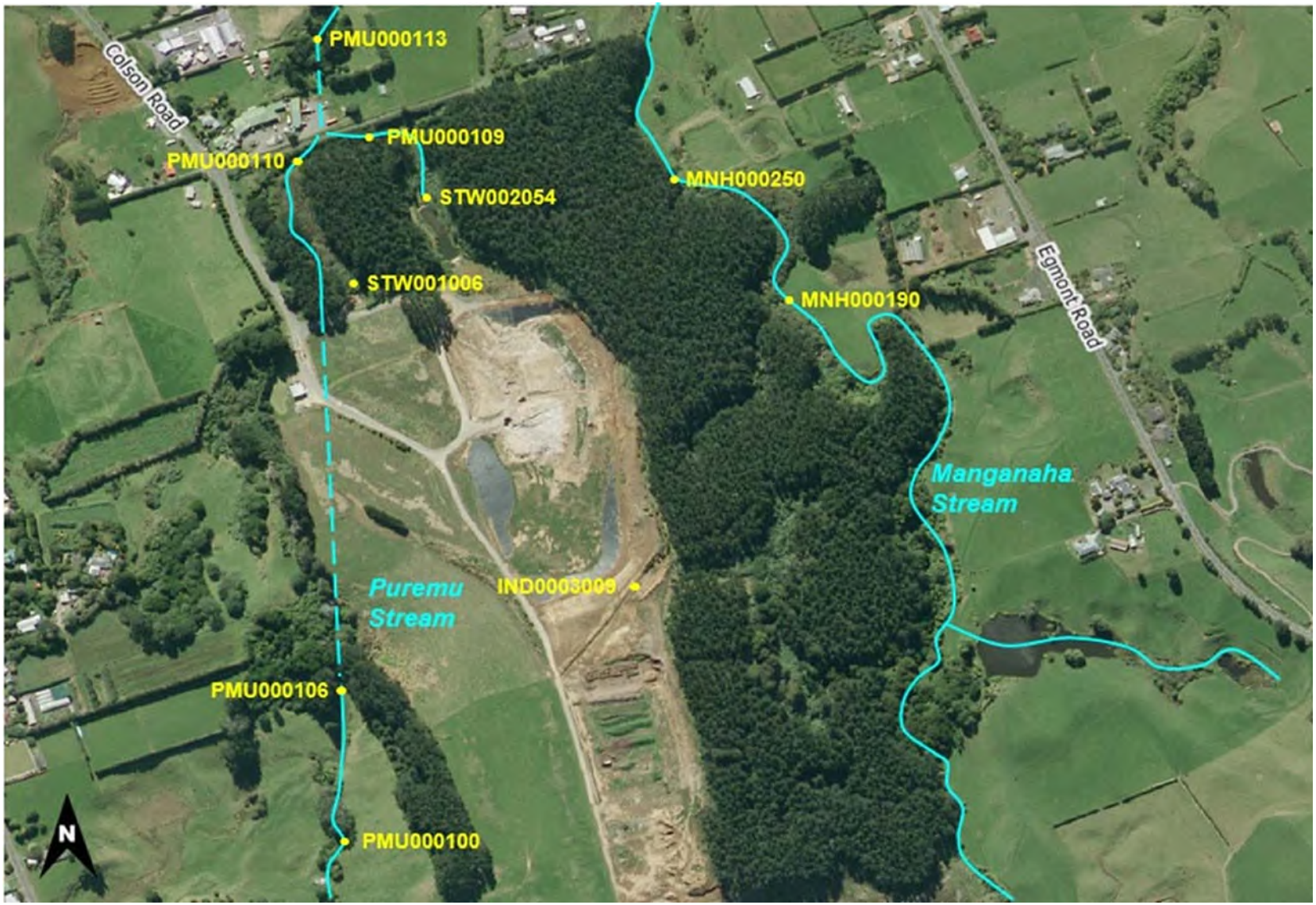

Figure 4 Aerial photo showing the stormwater and receiving water sampling sites at Colson Road landfill

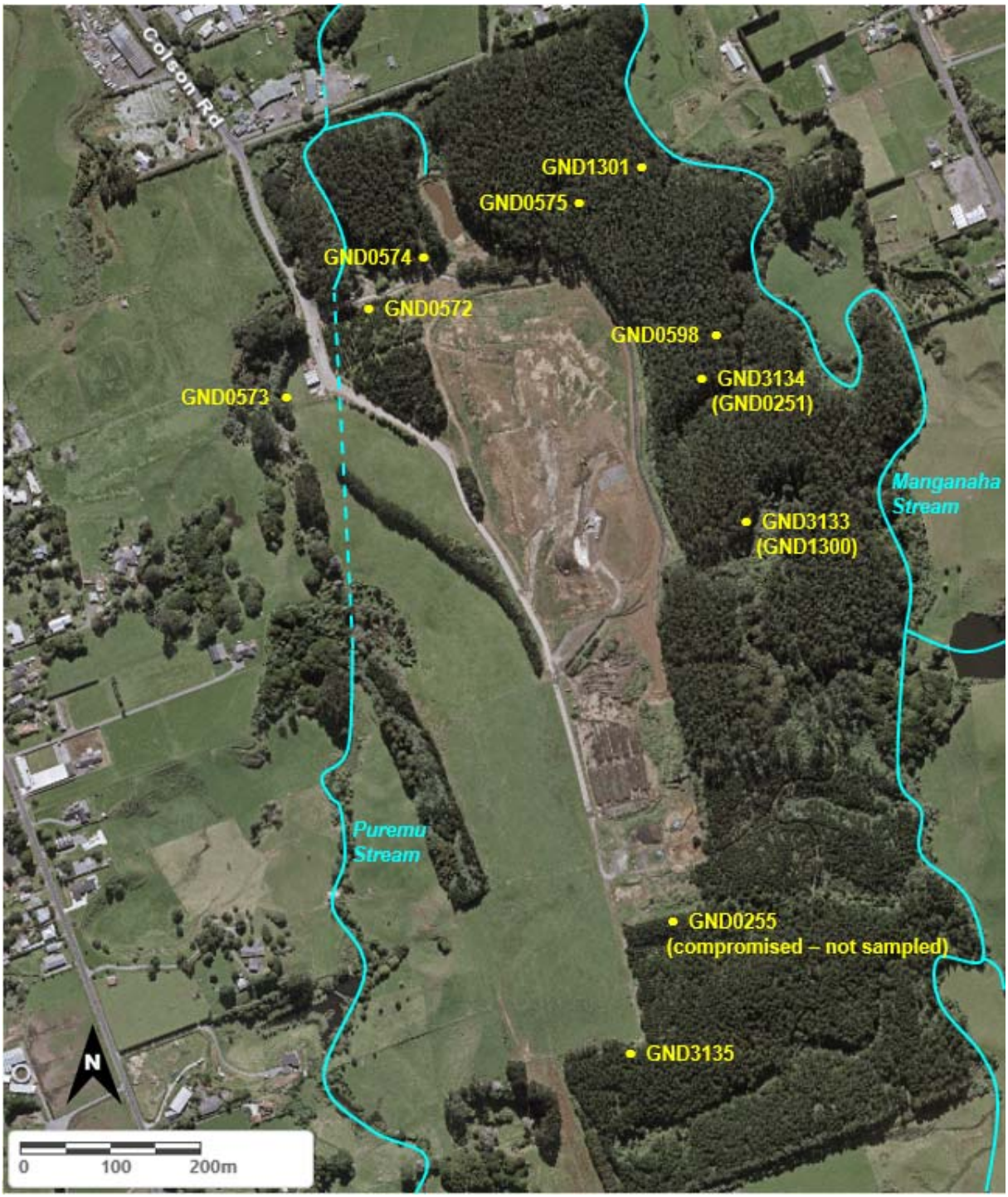

Figure 5 Aerial view showing the groundwater sampling sites at Colson Road landfill

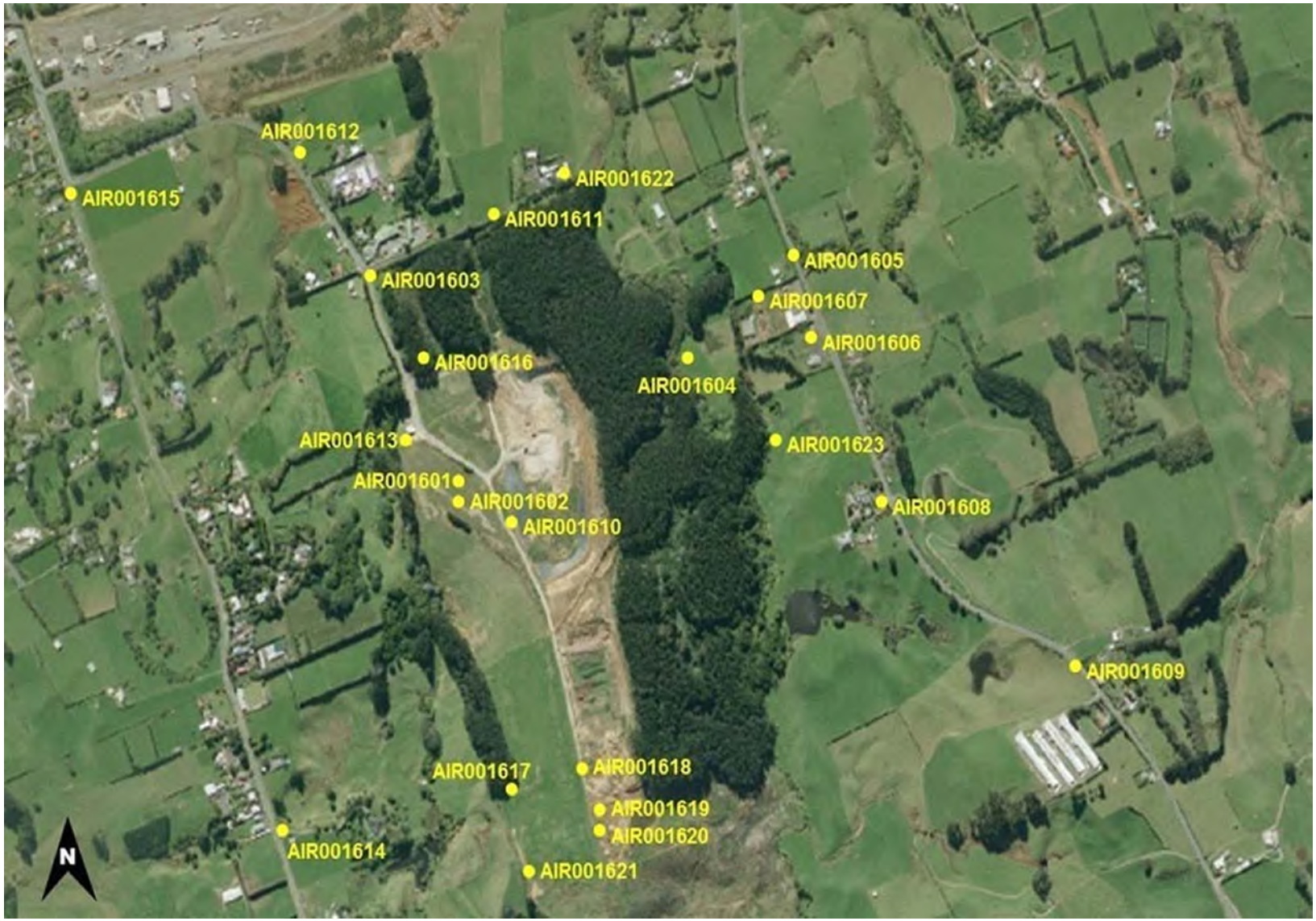

Figure 6 Aerial view showing the positions of air quality monitoring sites at and around Colson Road landfill

2 Results

2.1 Programme liaison and management

2.1.1 Erosion and sediment control plans

There were a number of updates to the Erosion and Sediment Control Plan for the site. The initial pan was prepared to address only the areas that were covered by consent 6177-1 and 10804-1. The 2019 plan was revised to incorporate the erosions and sediment control analysis (July 2020) and the erosion and sediment controls that would be put in place for the Stage 2 cap remediation works. This document was reviewed and amended again following the site meeting undertaken during the following the non-compliance found at inspection in July 2021. The revised draft plan (November 2021) was reviewed by Council, and the finalised plan was received and accepted following some minor changes.

It was requested that a further improvement be made to the plan following the inspection in June 2022 to ensure that corrective actions are identified for the contingency matters that may arise (including in wet weather conditions) as per condition 2.9 of 6177-2. The revised plan, dated July 2022, was received by Council on 3 August 2022.

2.1.2 Landfill management and contingency plans

Daily operations at the site are governed by the requirements contained in the Colson Road Regional Landfill Management Plan, which the consents require to be updated at not less than yearly intervals.

A contingency plan is also required for the site by special condition 7 of consent 6177-1.

NPDC reviewed the management plan early in the year under review. The draft plan was provided in September 2021. The Council requested that some minor changes and/or clarifications be made to the draft plan. 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 landfill management plan. At the end of the 2021-2022 year the draft plan had yet to be finalised. At the time of writing this report, NPDC had approached the Council to enquire as to whether principal documents could become as below:

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

This is to be discussed further to ensure that the requirement of the Management Plan conditions of the consents are still complied with. This will be discussed further in the 2022-2023 Annual Report.

The contingency planning for the Colson Road landfill is included in the NPDC Three Waters and Resource Recovery Incident Response Plan. The plan in place during the year under review was updated by NPDC in July 2021.

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 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 Aftercare Plan for the site. It has 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 Pan (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 After Care 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. Work on the drafting of the Aftercare Plan commenced during the year under review.

The capping of Stage 3 continued during the year under review in accordance with the phasing indicated in Figure 7, with Phase 1 now complete. It is noted that the area between phases 2 and 3 and the large silt pond was completed in the 2020-2021 year.

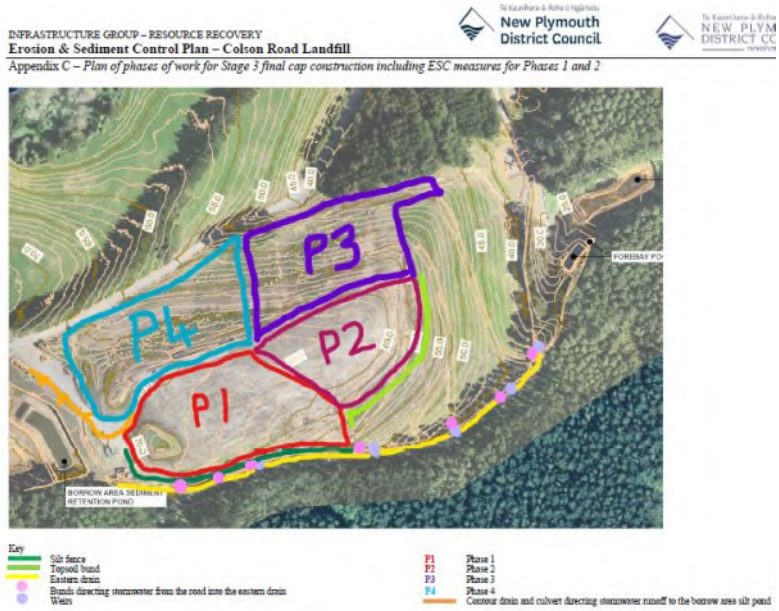

Figure 7 Plan of phases of work for Stage 3 final cap construction.

[2] As per the "enhanced minimum" cover design in the Technical Guidelines for the Disposal to Land (WasteMINZ, 2018)

2.1.4 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.

During the period under review, the committee met on 28 July 2021 and 2 February and 18 May 2022. This periodicity of meetings was agreed by all parties. The meetings 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.

The Colson Road landfill liaison committee has been very successful to date. During the 2021-2022 year discussions have taken place around the timing of meetings now that the site has been closed, and works at the site are primarily taking place only in the construction season. It was decided that the scheduling of the meetings would take this into account, with the next dates being agreed at the meetings. At the meeting on 18 May, it was agreed that the next meeting be scheduled for 16 November 2022.

2.1.5 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 2020-2021 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 18 October 2021.

It was noted that this was the Consultant's first visit to the site since its closure. There was still some remedial work to be carried out for the cover of Stage 2, and the cover to Stage 3 still has to be completed. It was reported that the site was generally clean and tidy.

A number of bunds and benches had been constructed to control the movement of surface water over the landfill and this was commended by the Consultant. Collapsible drains that expand to accommodate the flow, direct the rainwater to the stormwater cut-off drains had been installed although it was noted that, significant surface erosion was still apparent in places.

At the time of this visit, the planned remedial works to rectify the thickness of the final cover on Stage 2 had yet to start.

2.2 Inspections

Twelve routine inspections were undertaken during the 2021-2022 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 30 July, 13 September, 8 October, 5 November, 25 November and 14 December 2021 and 24 January, 10 February, 9 March, 13 April, 24 May and 15 June 2022.

Activities at the site during the year under review related to the capping of Stage 3, the installation of the access and erosion and sediment controls at the southern end of the site in preparation for the remedial work required on the Stage 2 cap, and then progressing the remedial work required on the Stage 2 cap. The material for the capping was obtained from the borrow area.

At each inspection it was noted that there were no visible effects in the Puremu Stream downstream below the confluence of the eastern landfill tributary and the Puremu Stream, at the inlet to the SPCA culvert. The SPCA culvert was found to be partially obstructed on only one occasion during the year under review and this was found to have been cleared of debris the following day.

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. At the January inspection it was noted that works were being undertaken in the pre-treatment pond/forebay to the large silt pond to fix the slip that had occurred during the heavy rain in late December.

The water contained in, and discharging from, the small western silt pond had improved significantly following the diversion of the groundwater infiltration into the stormwater pipework that drained into these ponds (Photo 9, Photo 10, Photo 11, Photo 12). This was identified as a remedial action following the investigation into the unauthorised incident (in-stream ammoniacal nitrogen and manganese concentration consent exceedances) in the latter half of the 2020-2021 monitoring year. This was completed in October 2021.

Photo 9 Western small silt pond, 13 September 2021

Photo 10 Western small silt pond, 15 June 2022

Photo 11 Eastern small silt pond and tributary, 13 September 2021

Photo 12 Eastern small silt pond and tributary, 15 June 2022

The leachate pond was found to be empty, or at a low level, at the time of each of the inspections. In the inspection notice issued following the December inspection it was noted that a further 89 mm of rain fell later in the day and NPDC notified the Council that leachate had overflowed to the stream. The follow-up actions, including the results of sampling undertaken by NPDC and the Council are reported in Section 2.6.

At the inspection on 30 July 2021 it was found that, although all stormwater appeared to be directed to bunds and drains, there was ponding and riling on the top part of the Stage 3 landfill area. There were some quite extensive areas where grass had either failed to establish or had been washed off. Further earthworks (hay, coconut matting, weirs etcetera) were required to stabilise these areas to prevent further sediment loss and comply with condition 9 of consent 6177-1. There were also some silt fences along the bottom of the north side that needed to be fixed and/or emptied. These findings were considered non-compliant with consent conditions and it was proposed that an on-site meeting be held to clarify Council's expectations, to discuss the further measures required and acceptable timeframes. This was logged as an incident/enforcement and the further measures required are discussed in Section 2.6.

It was found that the works had been undertaken as agreed at the inspection in October 2021. Examples of the improvements are shown in Photo 13.

Between the October inspection and the April inspection, only minor maintenance matters were noted and these were addressed promptly. Localised silt controls continued to be erected/installed as needed in relation to the progression of the works on site. The silt controls were found to be effective and were maintained satisfactorily. Inspection findings indicated that the measure that had been put in place were able to cope with heavy rainfall during this period of time.

Photo 13 Examples of the type of weirs installed in the stormwater drains to retain sediment.

The pre-construction meeting required by the new consents (6177-2.0 and 10912-1.0) was carried out in November 2021.

At the February inspection it was noted that the compost operator had relocated off site and the compost area had been emptied.

There had been approximately 230 mm of rain (measured at the Hillsborough monitoring station) in the week prior to the February inspection. At the time of this inspection it was found that there was some water in the bunds, but there was no flowing water on the northern side of the site. There was evidence of maintenance of sediment traps, bunds and other silt control structures. There was silt/sediment build up behind the weirs along the north eastern drain indicating that these had worked as desired to trap silt/sediment and reduce the sediment load on the treatment ponds. The silt fence along the northern side of the site appeared to be in good condition.

At the April inspection it as noted that a significant amount of work had occurred since the previous inspection and that there was a lot of exposed soil at the southern end of the site. NPDC were reminded that this would need to be stabilised by 1 May as per the two earthworks consents.

At the May inspection it was noted that the only work occurring on site was a sweeper on the access road. The majority of the open areas of the site had been stabilised with hay mulch. There was very good grass growth over most of the northern face. Some maintenance was required in the north eastern drain, and a few other places, where silt/sediment had built up. The silt fence across the middle of the north face required maintenance, especially around the middle section. Hay mulch was sparse across the clay on the northern end of Stage 3 and further work would need to be carried out in this area to stabilise the area for the winter.

Subsequent to this inspection NPDC advised the Council that over the weekend of 21 May (prior to the May inspection) the site was broken into and some minor cosmetic damage had occurred on the surface from motorbikes riding over the area. The contractor was advised and they would make the minor fixes (smoothing over and adding additional grass seed) as soon as the weather allowed.

At the June inspection it was found that, overall stormwater appeared to be being directed to the right places and the Stage 2 area looked good. There was good grass growth on the cap and there was no ponding or rilling. Grass was also establishing in the area along the bund below Stage 2 that had been covered with hay mulch. There was also very good grass growth over the northern face. There were, however some areas of concern that were non-compliant. This was registered on Council's database as an unauthorised incident. The concerns are outlined below, with the incident and corrective actions discussed in Section 2.6.

The borrow area had not yet been stabilised. NPDC had advised that this area was to be stabilised using a spray on stabiliser. The Council was advised that this product had been on back order and was expected to arrive in the first week of June. A period of dry weather would be needed to apply the product to avoid run-off during the application process. The Hillsborough gauging station showed that there had been almost daily rainfall leading up to the 15 June inspection.

Although hay mulch had been applied to the capping area up on Stage 3 and grass was slowly establishing. The capped area was wet, with some ponding in places.

There was an area of ponding on the bottom north eastern corner of Stage 3. Stormwater was being directed appropriately along the north eastern side but there was quite a bit of silt/sediment build up in the north eastern drain behind the check dams. The silt fence across the middle of the north face required maintenance, especially around the middle section which was full to almost overtopping. Hay mulch was sparse across the clay on the northern end of Stage 3 and further work would need to be carried out in this area to stabilise this area for winter.

In summary, the action items identified at inspection during the year under review were:

30 July 2021

- Continue to work towards complying with abatement notice EAC-22506.
- Implement further measures to prevent sediment loss in order to comply with condition 9 of consent 6177-1.
- Monitor ground contours and drainage at the site, and undertake works as required, in order ensure on-going compliance with condition 11 of consent 6177-1.
- Fix and or empty silt fences where required.

13 September 2021

- Continue to work towards complying with abatement notice EAC-22506.

- Continue to work towards complying with conditions 9 and 11 of consent 6177-1 as soon as possible.

8 October 2021

- Continue to work towards complying with abatement notice EAC-22506.
- Continue to ensure compliance with consent conditions/best practicable option, this includes undertaking on-going maintenance of silt fences etc. as required as per sediment control plan for the site dated August 2021.
- Ensure on-gong compliance with condition 10 of consent 6177-1 by stabilising drains below check dams or install them as per guideline principles to maintain the integrity of the drain and structures, and that where erosion is occurring, stabilise flow paths/diversion drains as per the sediment control plan for the site dated August 2021.

5 November 2021

- Continue to work towards complying with abatement notice EAC-22506.
- Undertake works to ensure compliance with consent conditions/best practicable option, this includes undertaking on-going monitoring and maintenance of silt fences etcetera as required as per the sediment control plan for the site dated August 2021.

14 December 2021 and 24 January 2022

- Continue to work towards complying with abatement notice EAC-22506.

10 February and 9 March 2022

- Continue to work towards complying with abatement notice EAC-22506.

13 April 2022

- Continue to work towards complying with abatement notice EAC-22506.
- Ensure all exposed areas are stabilised by 1 May as per condition 14 of consent 6177-2.0. '*Except as provided for in condition 15 no earthworks shall occur, and all exposed areas shall be stabilised between 1 May and 1 October.*'

Subsequent to this inspection NPDC sought to be allowed to extend this period to 31 May. Given the dry conditions prevailing at this time, the small amount of work required to complete the capping in the exposed areas, and NPDC's commitment to ensure that adequate stabilisation would be undertaken by this date, the Council agreed to this extension.

24 May 2022

- Continue to work towards complying with abatement notice EAC-22506.
- Ensure all exposed areas are stabilised as per condition 14 of consent 6177-2.0 and the extension granted until 31 May.

15 June 2022

- Continue to work towards complying with abatement notice EAC-22506.
- Ensure all exposed areas are stabilised as per condition 14 of consent 6177-2.0 and the extension that had been granted until 31 May.
- Address areas of ponding within the landfilled areas.
- Ensure that site is managed as per the Erosion and Sediment Control Plan required by various consent conditions.

- Update the Erosion and Sediment Control Plan to ensure that corrective actions are identified for the contingency matters that may arise (including in wet weather conditions) as per condition 2.9 of 6177-2.

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 2020-2021 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 2020-2021 year it was also identified by NPDC that the cause of the overflow was cumulative high rainfall and high groundwater levels. The Stage 1 and Stage 2 areas of the Landfill (Area A) do not have a geomembrane liner and the leachate discharge flow rates from this area can therefore be impacted by rising groundwater levels. 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 eight occasions during the 2021-2022 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, from the start of the 2021-2022 year, two samples per year are to be collected from each of the Stage 1 & 2 leachate and the Stage 3 leachate to be analysed for a comprehensive range of parameters in order to characterise the quality of the leachate from the areas that are in distinctly different phases of waste degradation, and to assess the potential for seasonal variation in the leachate quality. The intent of this monitoring is to allow assessment of the potential effects from the two separate areas to be made. The data from these analyses are presented in Table 5.

Further details relating to the investigations and progress on the programme of works to be undertaken are discussed in Section 2.6.

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

Parameter	Unit	Date							
		23-Jul-21	8-Sep-21	28-Oct-	25-Nov-21	20-Jan-	23-Feb-	5-May-22	9-Jun-22
pH	pH	7.2	7.3	7.0	6.9	7.1	7.4	7.4	7.2
BOD	g/m^3	16	22	18	10	15	27	22	14
Suspended solids	g/m^3	40	50	35	38	46	55	31	44
Conductivity	mS/m	302	388.6	365	301	308	441	314	285
Alkalinity	g/m^3	1311	807	1390	1190	1228	1835	1244	1179
Ammoniacal N	g/m^3	196	287	259	196	203	337	230	194
Cadmium	g/m^3	-	-	-	-	-	-	-	<0.005
Chromium	g/m^3	0.02	0.03	0.03	0.02	0.02	0.033	0.03	0.02
Copper	g/m^3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.011	<0.005	<0.005
Iron	g/m^3	18	11.1	17	14.3	18.8	22	11.5	16
Lead	g/m^3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.0021	<0.05	<0.05
Manganese	g/m^3	1.7	1.37	1.41	3.04	2.98	3.0	1.6	3.24
Nickel	g/m^3	0.008	0.01	0.01	0.01	0.01	0.016	0.01	0.009
Zinc	g/m^3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.021	<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 8). 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.

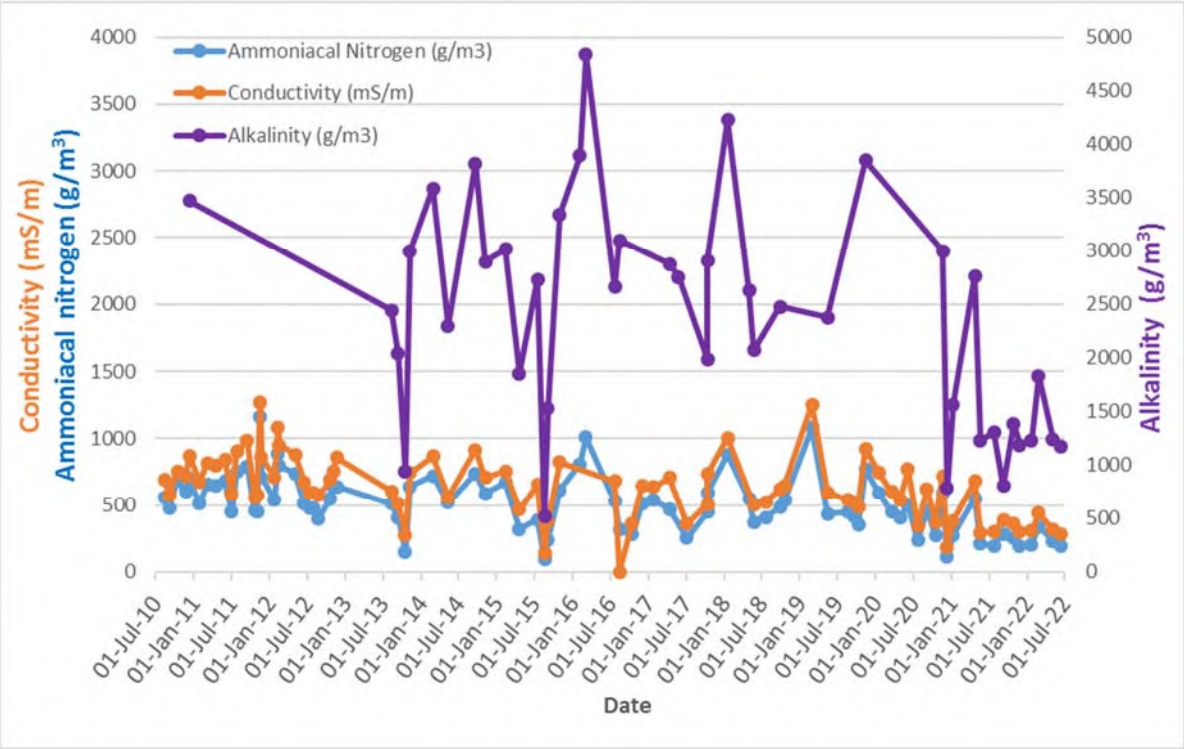

Figure 8 Combined site leachate discharge alkalinity, conductivity and ammoniacal nitrogen, July 2010 to date

The results of the separate Stage 1 & 2 and Stage 3 leachate discharges that we collected during the year under review are presented in the following table.

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

Parameter	Units	Stage 1&2 Leachate		Stage 3 Leachate	
		27-Oct-2021	15-Jun-2022	27-Oct-2021	15-Jun-2022
Sum of Anions	meq/L	25	17.9	105	66
Sum of Cations	meq/L	24	15.5	112	56
Turbidity	NTU	167	300	14.9	38
pH	pH Units	6.9	6.8	7.6	7.2
Total Alkalinity	g/m^3 $CaCO_3$	1,060	790	4,200	2,700
Bicarbonate	g/m^3 at 25°C	1,290[a]	960[a]	5,100[a]	3,300[a]
Total Hardness	g/m^3 $CaCO_3$	330	270	320	290
Electrical Conductivity (EC)	mS/m@25° C	237	148.7	1,016	551
Total Suspended Solids	g/m^3	41	57	50	8
Total Dissolved Solids (TDS)	g/m^3	870[a]	530[a]	3,800[a]	1,980[a]
Sample Temperature	°C	19	20	24	20
Dissolved Aluminium	g/m^3	< 0.003	< 0.003	0.143	0.048

Parameter	Units	Stage 1&2 Leachate		Stage 3 Leachate	
		27-Oct-2021	15-Jun-2022	27-Oct-2021	15-Jun-2022
Total Aluminium	g/m^3	0.036	0.03	0.64	0.125
Dissolved Boron	g/m^3	0.60	0.37	3.3	2.1 [b]
Total Boron	g/m^3	0.60	0.38	3.3	2.0 [b]
Dissolved Calcium	g/m^3	89	70	72	66
Dissolved Cobalt	g/m^3	0.0021	0.0018	0.025[b]	0.0147
Total Cobalt	g/m^3	0.0021	0.002	0.024[b]	0.0156
Dissolved Iron	g/m^3	0.16	0.02	4.7	9.6
Total Iron	g/m^3	15.7	27	6.4	16.3
Dissolved Magnesium	g/m^3	27	24	34	30
Dissolved Manganese	g/m^3	1.47	3.9[b]	1.12	3.2
Total Manganese	g/m^3	1.64	3.8[b]	1.21	3.8
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00015	< 0.00008
Dissolved Potassium	g/m^3	93	53	390	210
Dissolved Sodium	g/m^3	101	67	770	380
Dissolved Arsenic	g/m^3	0.002	< 0.0010	0.069	0.028
Total Arsenic	g/m^3	0.0039	0.0029	0.073	0.034
Dissolved Cadmium	g/m^3	< 0.00005	< 0.00005	0.00006	< 0.00005
Total Cadmium	g/m^3	< 0.000053	< 0.000053	< 0.000053	< 0.000053
Dissolved Chromium	g/m^3	0.0016	0.0009	0.162	0.062
Total Chromium	g/m^3	0.00197	0.00123	0.164	0.077
Dissolved Copper	g/m^3	< 0.0005	< 0.0005	0.0021	0.0015
Total Copper	g/m^3	0.00074	0.00056	0.0053	0.002
Dissolved Lead	g/m^3	< 0.00010	< 0.00010	0.00051	0.00021
Total Lead	g/m^3	< 0.00011	0.00012	0.00084	0.00034
Dissolved Nickel	g/m^3	0.0033	0.0019	0.05	0.021
Total Nickel	g/m^3	0.0034	0.00192	0.05	0.023
Dissolved Zinc	g/m^3	0.0039	0.0025	0.0108	0.0058
Total Zinc	g/m^3	0.0073	0.0062	0.0187	0.0084
Chloride	g/m^3	119	71	720	390
Fluoride	g/m^3	0.14	0.12	0.43	0.27
Total Ammoniacal-N	g/m^3	150	79[d]	870	400

Parameter	Units	Stage 1&2 Leachate		Stage 3 Leachate	
		27-Oct-2021	15-Jun-2022	27-Oct-2021	15-Jun-2022
Free Ammonia	g/m^3	0.52	0.26	22	3.3
Nitrite-N	g/m^3	< 0.002	0.002	0.081	0.03
Nitrate-N	g/m^3	0.022	0.025	0.018	0.09
Nitrate-N + Nitrite-N	g/m^3	0.024	0.027	0.098	0.12
Total Kjeldahl Nitrogen (TKN)	g/m^3	150	77[d]	880	460
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004	3.5	0.46
Total Phosphorus	g/m^3	0.059	0.043	5.2	1.86
Reactive Silica	g/m^3 as SiO_2	22	21	37	31
Sulphate	g/m^3	1.8	5.5	17.2	36
Dissolved C-Biochemical Oxygen Demand (CBOD5)	gO_2/m^3	< 2	3	86	32
Carbonaceous Biochemical Oxygen Demand (cBOD5)	gO_2/m^3	3	4[c]	100[c]	35
Total Biochemical Oxygen Demand (TBOD5)	gO_2/m^3	4	3[c]	90[c]	37
Chemical Oxygen Demand (COD)	gO_2/m^3	107	70	1,190	580
Total Organic Carbon (TOC)	g/m^3	58	29	550	200
Faecal Coliforms MPN	/100 ml	< 180	< 18	< 180	< 18
Escherichia coli MPN	/100 ml	< 180	< 18	< 180	< 18
Organonitro&phosphorus Pesticides					
Diuron	g/m^3	0.0005	< 0.0004	< 0.0004	0.0005
Hexazinone	g/m^3	0.0014	0.0006	< 0.0002	0.0004
Propiconazole	g/m^3	< 0.0003	< 0.0003	0.0048	0.0044
Tebuconazole	g/m^3	< 0.0004	< 0.0004	0.009	0.0078
Semi volatile organic compounds (SVOC)		**ND**	**ND**	**ND**	**ND**
Volatile organic compounds (VOC)					
Chlorobenzene (monochlorobenzene)	g/m^3	0.004	0.003	< 0.003	< 0.003
Isopropylbenzene (Cumene)	g/m^3	< 0.003	0.003	< 0.003	0.004
1,2,4-Trimethylbenzene	g/m^3	< 0.005	< 0.003	0.005	0.008

Key: a results indicative only due to high total dissolved solids content of the sample

b the result for the dissolved fraction was greater than that for the total fraction, but within analytical variation of the methods

c the result for Carbonaceous Biochemical Oxygen Demand (CBOD5), was greater than that for Total Biochemical Oxygen Demand (TBOD5), but within the analytical variation of these methods

d the result for 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 contains higher concentrations of contaminants than the Stage 1 & 2 leachate. However, the Stage 1 & 2 leachate continues to contain high concentrations of some contaminants as indicated by the cation and anion balances.

The contaminant concentrations in the leachates were generally higher in the October samples than in the June 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 1.2.1, 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 2018-2019 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 year under review as a result of this incident. During the year under review, NPDC continued to collect four samples per year that were analysed for the usual parameters. In addition to this, samples were collected under high and low groundwater conditions and these were analysed for a comprehensive range of 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.

The results for the additional parameters determined to better quantify potential contaminants of concern that may be discharging to the environment, and any seasonal variation in concentrations, for the samples collected on 27 October 2021 (high groundwater level) and 15 June 2022 (lower groundwater level) are given in Table 7.

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

Parameter	Unit	Date					
		8-Sep-21	27-Oct-21[a]	15-Dec-21	20-Jan-22	5-May-22	15-Jun-22[a]
pH	pH	7.0	6.5	6.3	6.4	6.5	6.5
COD	gO_2/m^3	-	8	-	-	-	-
CBOD	gO_2/m^3	<3	<2	<3	<3	<3	<2

Parameter	Unit	Date					
		8-Sep-21	27-Oct-21[a]	15-Dec-21	20-Jan-22	5-May-22	15-Jun-22[a]
Suspended solids	g/m^3	108	15	<5	54	190	17
Faecal coliforms	/100 ml	-	<18	2	<1	<1	<18
Conductivity	mS/m	51.5	39.8	33.4	52.9	51.3	43.9
Turbidity	N.T.U.	-	43.0	-	-	-	45
Alkalinity	g/m^3	156	104	76	133	142	112
Ammoniacal nitrogen	g/m^3-N	4.60	2.30	1.40	2.20	3.00	1.77
Dissolved cadmium	g/m^3	-	<0.00005	<0.005	<0.005	<0.005	<0.00005
Total cadmium	g/m^3	<0.005	<0.000053	-	-	-	<0.000053
Dissolved chromium	g/m^3	-	<0.00005	<0.005	<0.005	<0.005	<0.00005
Total chromium	g/m^3	0.0050	<0.00053	-	-	-	<0.00053
Chloride	g/m^3	237.0	51.0	45.0	-	67.0	61.0
Dissolved copper	g/m^3	-	<0.00005	<0.005	<0.005	<0.005	<0.00005
Total copper	g/m^3	0.0080	<0.00053	-	-	-	0.00075
Dissolved iron	g/m^3		1.67	3.14	6.48	4.90	1.79
Total iron	g/m^3	44.60	5.1	-	-	-	5.9
Dissolved lead	g/m^3	-	<0.00010	<0.05	<0.05	<0.05	<0.00010
Total lead	g/m^3	<0.005	<0.00010	-	-	-	<0.00010
Dissolved manganese	g/m^3	2.24	1.59	1.17	2.75	1.60	2.30
Total manganese	g/m^3	-	1.64	-	-	-	2.4
Dissolved nickel	g/m^3	-	<0.0005	<0.005	<0.005	0.008	<0.0005
Total nickel	g/m^3	<0.005	<0.00053	-	-	-	<0.00053
Dissolved zinc	g/m^3	-	0.0028	<0.05	<0.05	<0.05	0.0029
Total zinc	g/m^3	<0.05	0.0032	-	-	-	0.0032

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 2017-2018 to the 2019-2020 Annual Reports compared the data collected from 1 June 2010 onwards only.

On the basis of this review, it was concluded that, although the level of key indicator species such as zinc and chloride (Figure 9) appeared to have been relatively stable over the last several years, 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.

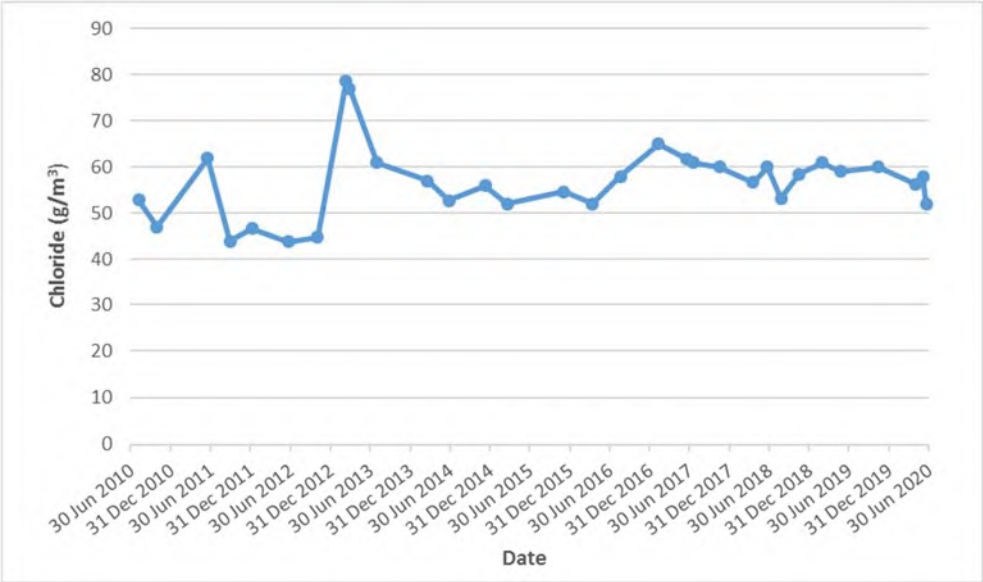

Figure 9 Chloride concentration in the under liner drainage, June 2010 to June 2020

Following the provision of the consultant's report, the Council requested that the results of all of NPDC's under liner groundwater monitoring samples be provided to Council. These were provided. It is noted that NPDC's monitoring of the under liner drainage commenced in the month following the slip, with no earlier or background data available.

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 trend of increasing conductivity continued during the year under review (Figure 10).

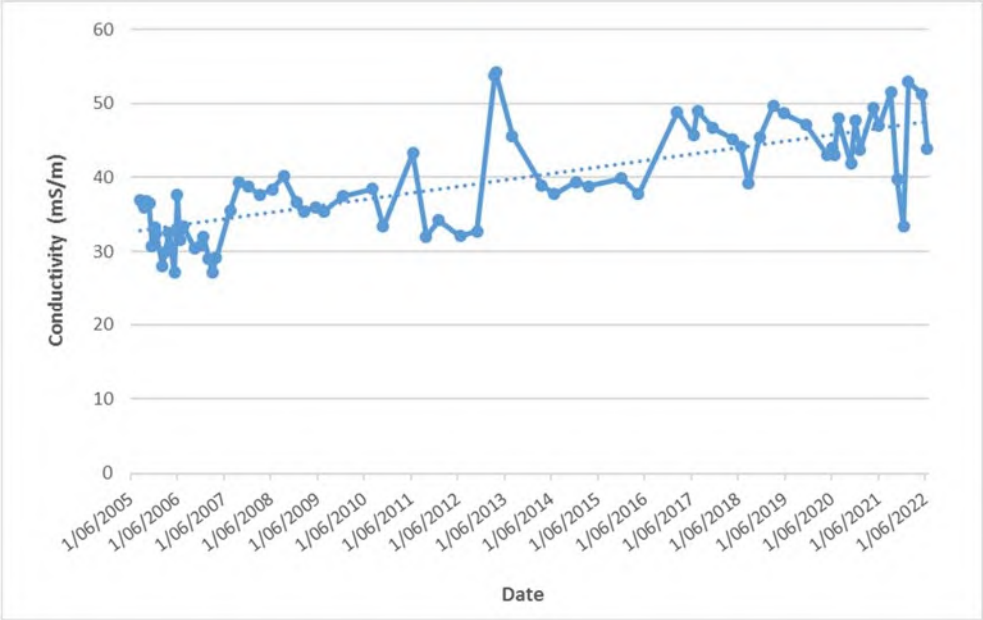

Figure 10 Full time series data for the conductivity of the under liner drainage

The ammoniacal nitrogen concentration of the under liner groundwater drainage varied considerably during the year under review, returning a results that were both the highest result on record for this site and one that was the lowest concentration recorded since December 2015 (Figure 11).

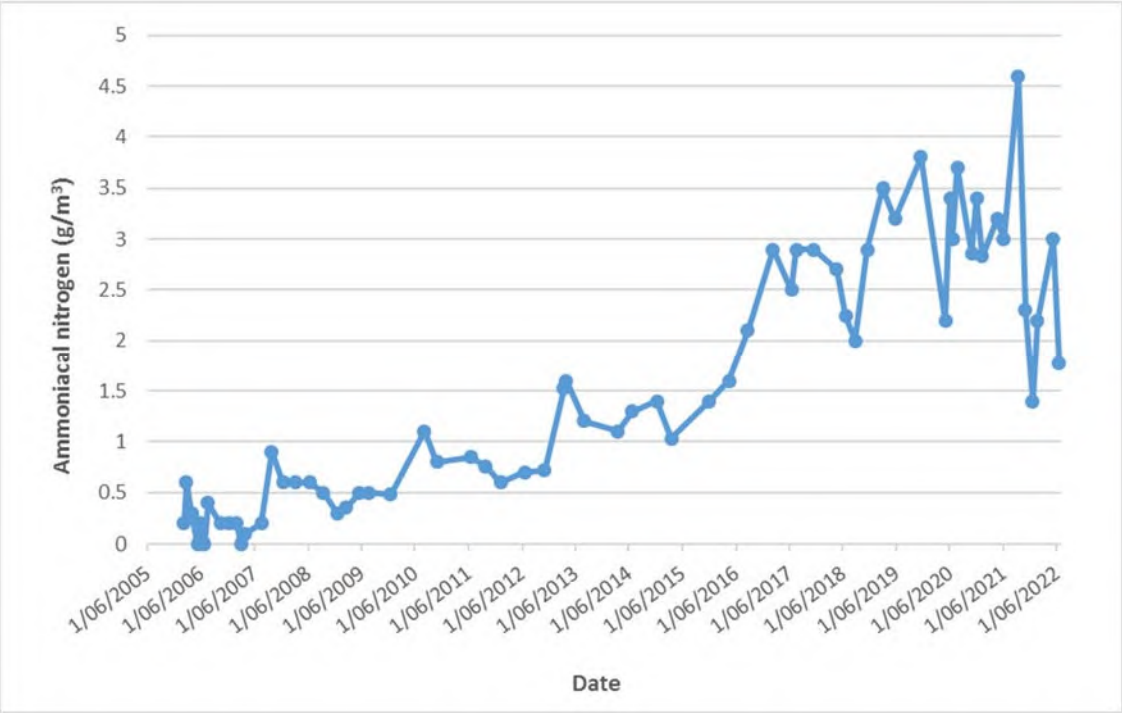

Figure 11 Full time series data for the ammoniacal nitrogen concentration of the under liner drainage

The alkalinity of the under liner groundwater drainage also varied considerably during the year under review. The sample collected on 8 September 2021 equalled the highest concentration on record, whilst the result for the sample collected on 15 December was the lowest since September 2007 (Figure 12).

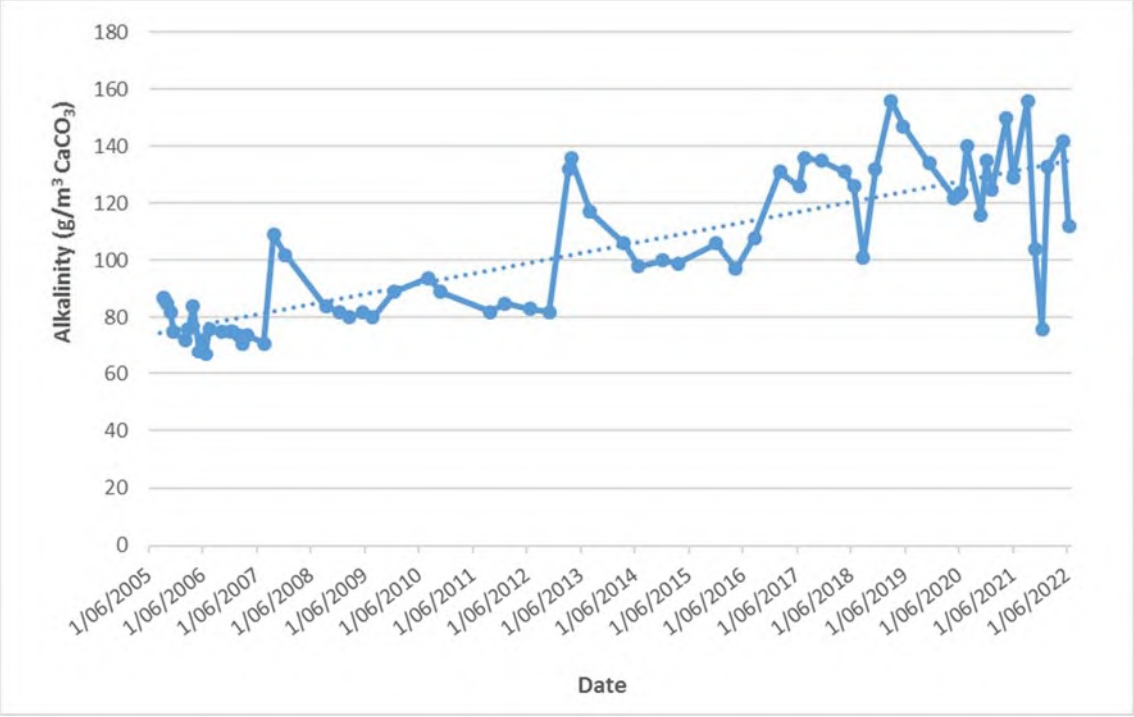

Figure 12 Full time series data for the alkalinity of the under liner drainage

The chloride results are shown in Figure 13.

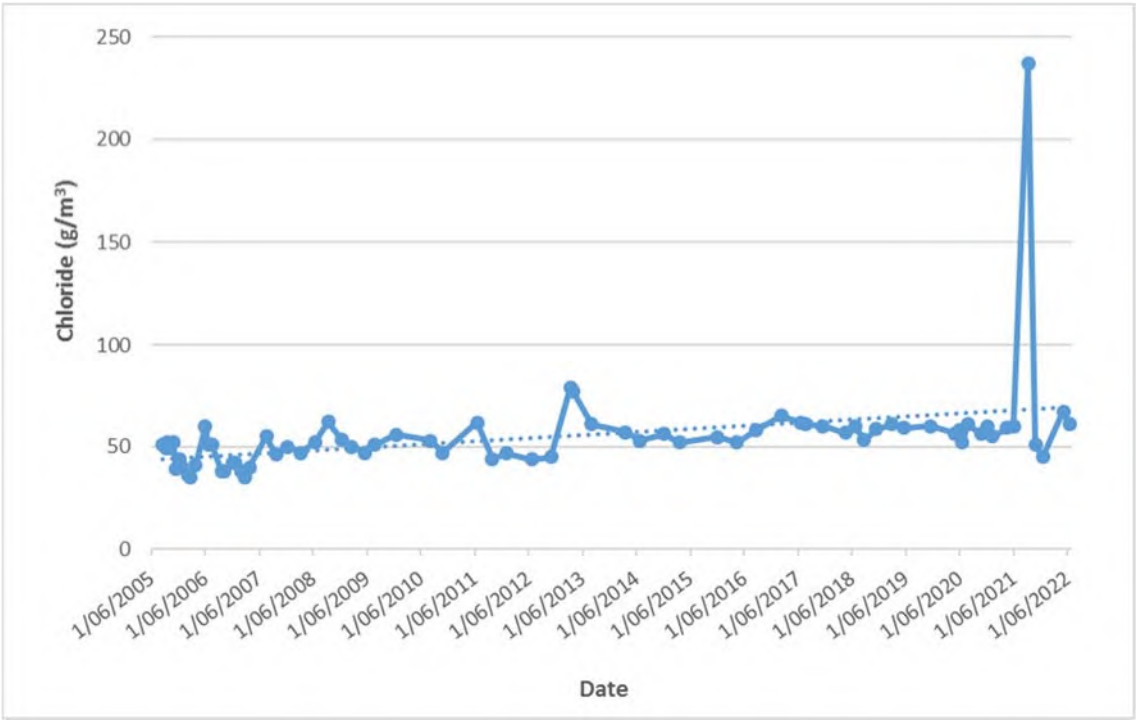

Figure 13 Full time series data for the chloride concentration of the under liner drainage

When looking the potential continuation in the trend for manganese concentration that may have occurred in more recent year, 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.

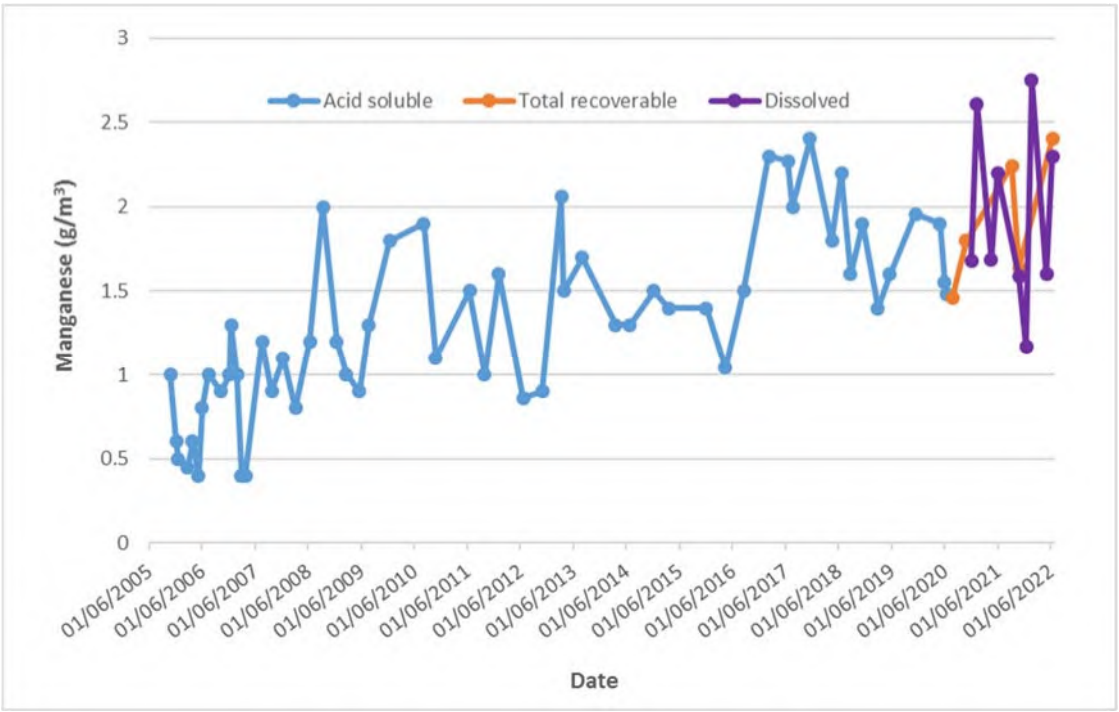

Figure 14 Full time series data for the manganese concentration of the under liner drainage

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 as they remain within normal ranges for Taranaki groundwater, and would for the most part, be considered

minor. They are however comparatively higher than any of the monitoring bores surrounding the landfill, with the possible exception of GND0575 (Section 2.4).

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 waste water 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, 2018) is 300 mm. 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**	
		27-Oct-2021	**15-Jun-2022**
Sum of Anions	meq/L	3.7	4.3
Sum of Cations	meq/L	3.7	4.4
Turbidity	NTU	43	45
pH	pH Units	6.5	6.5
Total Alkalinity	g/m^3 $CaCO_3$	104	112
Bicarbonate	g/m^3 at 25°C	127	136
Total Hardness	g/m^3 $CaCO_3$	85	101
Electrical Conductivity (EC)	mS/m@25°C	39.8	43.9
Total Suspended Solids	g/m^3	15	17
Total Dissolved Solids (TDS)	g/m^3	230	240
Sample Temperature	°C	23	20
Dissolved Aluminium	g/m^3	< 0.003	< 0.003
Total Aluminium	g/m^3	0.023	0.165
Dissolved Boron	g/m^3	0.03	0.036
Total Boron	g/m^3	0.03	0.041
Dissolved Calcium	g/m^3	16.5	18.6
Dissolved Cobalt	g/m^3	0.0021[a]	0.0036
Total Cobalt	g/m^3	0.0020[a]	0.0037

Parameter	Units	Under liner groundwater drainage	
		27-Oct-2021	15-Jun-2022
Dissolved Iron	g/m^3	1.67	1.79
Total Iron	g/m^3	5.1	5.9
Dissolved Magnesium	g/m^3	10.6	13.2
Dissolved Manganese	g/m^3	1.59	2.3
Total Manganese	g/m^3	1.64	2.4
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008
Dissolved Potassium	g/m^3	4.4	4.8
Dissolved Sodium	g/m^3	37	45
Dissolved Arsenic	g/m^3	< 0.0010	< 0.0010
Total Arsenic	g/m^3	< 0.0011	< 0.0011
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	< 0.00053	0.00075
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	0.0028	0.0029
Total Zinc	g/m^3	0.0032	0.0032
Chloride	g/m^3	51	61
Fluoride	g/m^3	0.06	0.06
Total Ammoniacal-N	g/m^3	2.3	1.77
Free Ammonia	g/m^3	0.0043	0.0025
Nitrite-N	g/m^3	0.011	0.059
Nitrate-N	g/m^3	0.69	1.3
Nitrate-N + Nitrite-N	g/m^3	0.7	1.36
Total Kjeldahl Nitrogen (TKN)	g/m^3	2.4	1.9
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004

Parameter	Units	Under liner groundwater drainage	
		27-Oct-2021	15-Jun-2022
Total Phosphorus	g/m^3	0.042	0.051
Reactive Silica	g/m^3 as SiO_2	47	44
Sulphate	g/m^3	6.8	9.9
Dissolved C-Biochemical Oxygen Demand (CBOD5)	gO_2/m^3	< 2	< 2
Carbonaceous Biochemical Oxygen Demand (cBOD5)	gO_2/m^3	< 2	< 2
Total Biochemical Oxygen Demand (TBOD5)	gO_2/m^3	< 2	< 2
Chemical Oxygen Demand (COD)	gO_2/m^3	8	< 6
Total Organic Carbon (TOC)	g/m^3	6	5.1
Faecal Coliforms MPN	/100 ml	< 18	< 18
Escherichia coli MPN	/100 ml	< 18	< 18
Organonitro & phosphorus Pesticides		ND	ND
Semi volatile organic compounds (SVOC)		ND	ND
Volatile organic compounds (SVOC)		ND	ND

Key: a the result for the dissolved fraction was greater than that for 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. However, it is noted that the detection limit for the analytical methods used was approximately 10 times higher than the detection limits for the analyses of the stormwater and groundwater samples collected by Council.

2.3.2 Results of wet weather stormwater and receiving environment monitoring

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 minor amounts of leachate from Stages 1 and 2, and 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 only 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.

Although the small eastern silt pond was again found to be the main contributor of ammoniacal nitrogen (19.0 g/m^3), this had reduced to an acceptable level in the receiving waters at the compliance points.

Table 8 Results of rain event monitoring – discharge and Puremu Stream samples, 11 October 2021

Site	Alkalinity g/m^3 $CaCO_3$	Chloride g/m^3	Condy mS/m @25°C	Faecal Coliforms cfu/100 ml	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	260	60	73.2	< 10	0.029	19.0	6.7	30	15.6	230
STW002054	81	46	33.3	< 10	0.0029	0.78	7.1	12	16.1	38
PMU000100	26	20	14.0	130	0.000077	0.043	6.8	< 3	15.3	2.8
PMU000106	26	21	14.8	340	0.00009	0.042	6.9	3	15.2	2.7
PMU000109	76	40	30.2	2300	0.00124	0.43	7.0	7	15.3	20
PMU000110	47	27	22	430	0.0072	1.64	7.2	4	15.1	6.8
PMU000113	50	29	22.5	640	0.0061	1.49	7.2	3	15.1	7.4
Limits PMU000110	***NA***		***NA***	***NA***	***NA***	***2.5***	***[within ±0.5]***		***≤ 17.2 [+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, 11 October 2021

Parameter	Unit	Site	
		MNH000190	MNH000250
Ammoniacal nitrogen	g/m^3-N	0.014	0.013
Conductivity	mS/m@25 °C	14.7	14.5
pH	-	7.1	7.1
Suspended solids	g/m^3	< 3	< 3
Temperature	Deg C	13.7	13.6
Turbidity	NTU	1.8	2.6
Unionised ammonia	g/m^3	0.00004	0.00004

2.3.3 Results of dry 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 200 m 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. Dry weather samples were collected from two monitoring sites in the Manganaha Stream on two occasions during the year under review. The results of the Manganaha Stream monitoring are presented in Section 2.3.3.1.

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 300 m 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 main stream stem. The smaller silt pond (STW001006) discharges directly into the main stream stem just upstream of the confluence. 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 15.

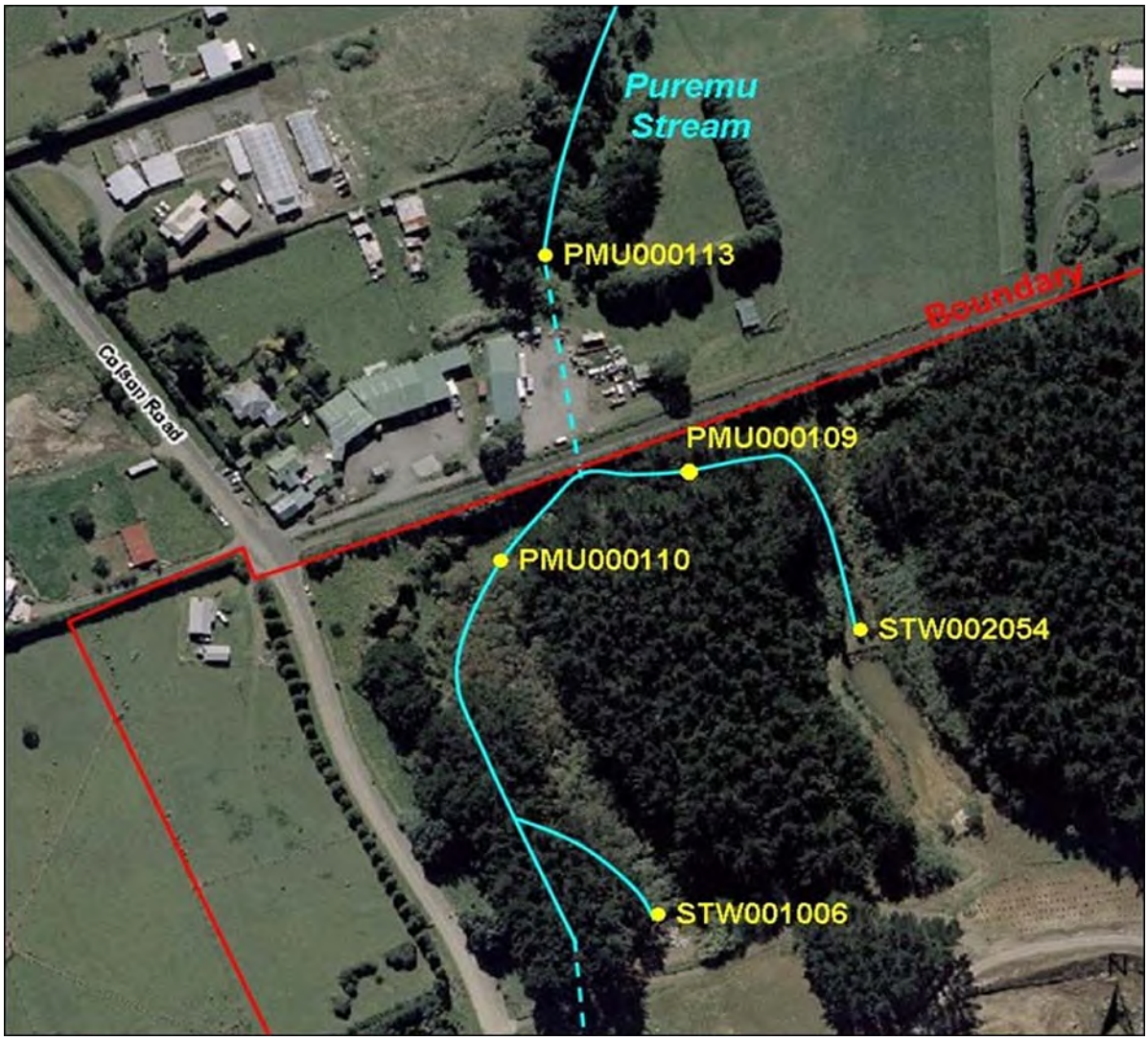

Figure 15 Sampling sites on the Puremu Stream downstream of the landfill

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 compost pond discharge and the Stage 3 under liner groundwater drainage discharge via the large silt pond. In the 2020-2021 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 commenced on 11 October 2021.

There was also provision in the programme for the discharge from the composting area (IND0003009) to be sampled, if flowing. There was no discharge from the pond that served the composting area during the year under review. It is also noted that the compost area was found to be almost empty of compost at the time of the inspection on 24 January 2022, and completely empty of compost at the inspection on 10 February 2022.

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.

The results of the site discharges and Puremu Stream monitoring associated with compliance monitoring of the current consents are presented in Section 2.3.3.2. The additional monitoring related to the investigation of the emerging contamination issue in the Puremu Stream catchment and information gathering for the re-consenting AEE is presented in Section 2.3.3.3.

2.3.3.1 Manganaha Stream

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 and ammoniacal nitrogen 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	26-Nov-21		20-Apr-2022	
		MNH000190 u/s of landfill	MNH000250 d/s of landfill	MNH000190 u/s of landfill	MNH000250 d/s of landfill
Alkalinity	g/m^3 – $CaCO_3$	26	27	34	29
Conductivity	mS/m@25°C	14.7	14.8	15.1	15.3
Acid soluble iron	g/m^3	0.49	0.61	0.70	0.89
Ammonia (unionised)	g/m^3	<0.00004	<0.00004	0.00011	0.00023
Ammoniacal nitrogen	g/m^3-N	<0.010	0.011	0.015	0.023
pH	pH	7.1	7.2	7.4	7.5
Suspended solids	g/m^3	< 3	< 3	< 3	< 3

Parameter	Units	26-Nov-21		20-Apr-2022	
		MNH000190 u/s of landfill	MNH000250 d/s of landfill	MNH000190 u/s of landfill	MNH000250 d/s of landfill
Temperature	Deg C	15.5	15.6	17.2	17.9
Turbidity	NTU	2.1	1.81	2.7	1.99
Dissolved zinc	g/m^3	<0.001	<0.001	<0.001	0.0011

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 – compliance monitoring

There are no consent limits on the discharges from the stormwater ponds, rather 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, with the exception of faecal coliforms. In the case of the faecal coliforms, although the results returned were above the permitted level, quality control issues were experienced in relation to the time between collection and the determination. This means that the results are indicative only. In addition to this, at the time of the November survey, the faecal coliforms were already above the permitted level at the intermediate upstream site PMU000106, with a reduction observed between this site and the compliance point (PMU000113). It is also noted that the count obtained for both of the landfill stormwater discharges were below the detection limit. The faecal coliform counts were elevated above the landfill site at the time of the April 2022 survey. Historically, the compost pond discharge was usually found to be the major source of faecal coliforms at the time of sampling surveys. At the time of the dry weather surveys undertaken during the year under review there was insufficient water in the compost ponds to obtain a sample. In the 2019-2020 year it was found that the wildlife population in the wetland area below the landfill can affected faecal coliform counts. Therefore NPDC has continued to monitor this contaminant, so that appropriate actions can be undertaken as and when required.

Contaminants of note in the pond discharges are acid soluble iron, alkalinity, ammoniacal nitrogen, and manganese. In the case of acid soluble iron, alkalinity and ammoniacal nitrogen, these have 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 2020-2021 year. This investigation identified that it was likely that leachate and/or contaminated groundwater from under Stage IB 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 pond to the leachate system. Figure 16 shows the significant reduction in the ammoniacal nitrogen concentration of the stormwater pond discharge samples collected in the year under review 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.

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 2020-2021 year. During the year under review it was found that the manganese concentration in the discharge from the small silt pond was elevated only at the time of the November survey. The manganese concentration was elevated in the discharge from the large silt pond (STW002054) at the time of both of the dry weather surveys. There were no exceedances of the manganese limits on either of the consents.

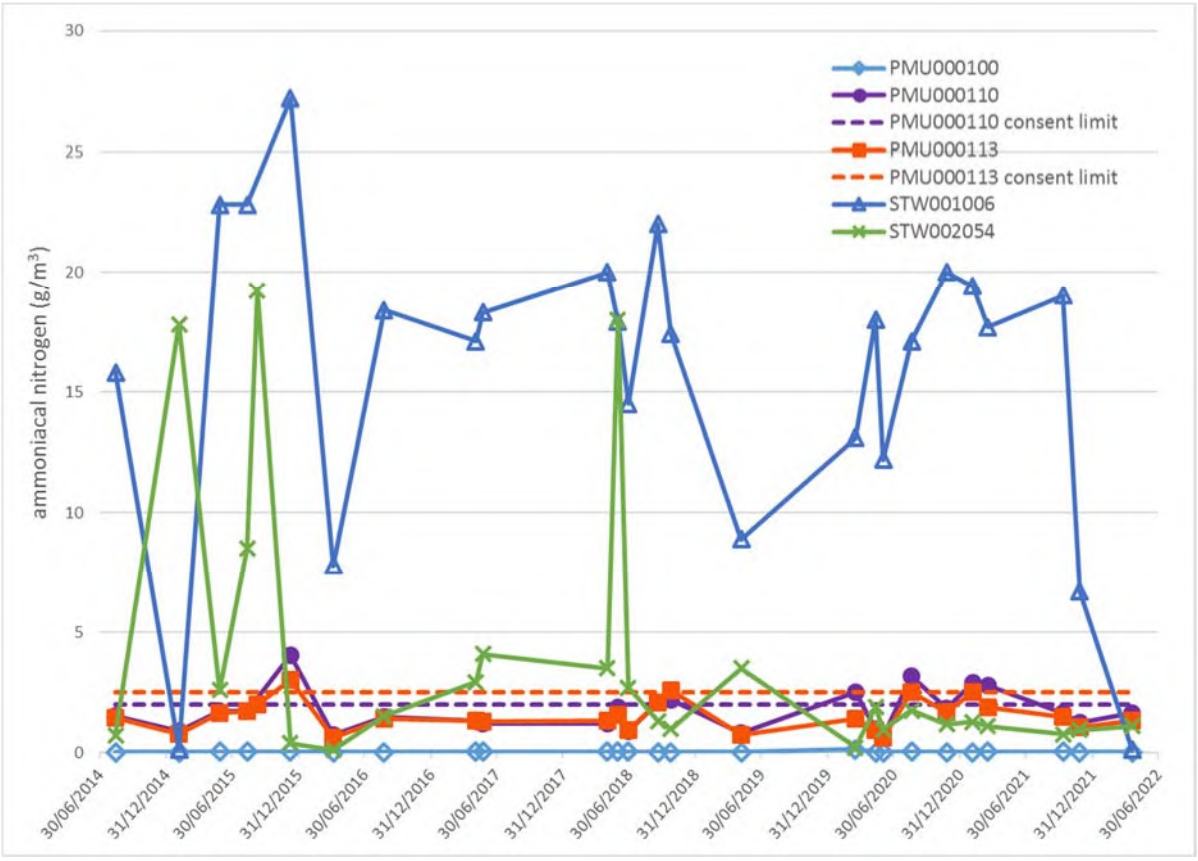

Figure 16 Ammoniacal nitrogen concentration in the Puremu Stream and stormwater discharge samples, June 2014 to date (includes wet weather samples)

Table 11 Chemical analysis of the Puremu Stream and discharges, sampled on 26 November 2021

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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	0.026	0.034	6.7	1.26	***2.5***	0.96	0.49	1.05	***2.0 [at pH<7.75; limit is pH dependant]***
Free Ammonia	g/m^3 N	0.00006	0.00009	0.0093	0.0057		0.0062	0.00194	0.005	
Turbidity	NTU	-	-	290	-		38	-	-	
pH	g/m^3	6.8	6.9	6.7	7.2	***[within ± 0.5]***	7.3	7.1	7.2	***≥ 6.5 & ≤ 8.5***
Total Alkalinity	g/m^3 $CaCO_3$	27	27	156	47		98	88	52	
Electrical Conductivity (EC)	mS/m@25°C	13.8	14.5	52.1	20.5		37.5	33.5	22.3	
Total Suspended Solids	g/m^3	3	4	45	5		10	5	< 3	***13 [+10]***
Sample Temperature	°C	18.1	17.9	16.0	16.8	***≤ 20.1 [+2]***	18.7	16.7	17.5	
Dissolved Aluminium	g/m^3	0.007	0.006	< 0.003	0.004		< 0.003	< 0.003	0.003	***0.107 [+0.1]***
Total Aluminium	g/m^3	0.062	0.062	0.0131	0.107	***5.0***	0.116	0.043	0.053	***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	0.017	0.017	0.039	0.027		0.021	0.021	0.025	
Total Boron	g/m^3	0.0184	0.021	0.042	0.028	***0.5***	0.025	0.024	0.028	***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]***

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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 Cadmium	g/m³	< 0.000053	< 0.000053	< 0.000053	< 0.000053	***0.01***	< 0.000053	< 0.000053	< 0.000053	***0.05***
Dissolved Chromium	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005		< 0.0005	< 0.0005	< 0.0005	***0.02 [+0.02]***
Total Chromium	g/m³	< 0.00053	< 0.00053	< 0.00053	< 0.00053	***0.1***	< 0.00053	< 0.00053	< 0.00053	***1.0***
Dissolved Cobalt	g/m³	0.0002	0.0004	0.0024	0.0006		0.0048	0.0026	0.0008	
Total Cobalt	g/m³	0.00046	0.00055	0.0026	0.00081	***0.05***	0.0048	0.0027	0.00091	***1***
Dissolved Copper	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005		0.0005	< 0.0005	< 0.0005	***0.007 [+0.002]***
Total Copper	g/m³	< 0.00053	< 0.00053	< 0.00053	0.0007	***0.2***	0.00108	0.00059	0.00055	***0.5***
Dissolved Iron	g/m³	0.55	0.49	18.4	0.65		0.03	0.06	0.6	***0.85 [+0.3]***
Total Iron	g/m³	1.22	1.17	26	2.3	***5.0***	4.0	1.94	1.57	***10***
Dissolved Lead	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010		< 0.00010	< 0.00010	< 0.00010	***0.002 [+0.002]***
Total Lead	g/m³	< 0.00011	< 0.00011	< 0.00011	< 0.00011	***0.1***	< 0.00011	< 0.00011	< 0.00011	***0.1***
Dissolved Manganese	g/m³	0.078	0.096	3.7[a]	0.41		9.1[a]	6.1[a]	1.14[a]	
Total Manganese	g/m³	0.122	0.109	3.3[a]	0.45	***1.0***	7.6[a]	5.3[a]	1.11[a]	***5.0***
Dissolved Zinc	g/m³	< 0.0010	0.0011	< 0.0010	< 0.0010		< 0.0010	< 0.0010	0.0011	***0.030 [+0.03]***
Total Zinc	g/m³	0.0011	0.0016	< 0.0011	0.0018	***2.0***	< 0.0011	< 0.0011	0.0017	***2.4***
Chloride	g/m³	21	21	61	27		52	46	30	
Nitrite-N	g/m³	0.002	0.002	0.019	0.005		0.017			***0.06***
Nitrate-N + Nitrite-N	g/m³	0.145	0.33	0.081	0.8	***100***	0.32	0.42	0.75	***10***

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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*
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004	< 0.004	< 0.004		< 0.004	< 0.004	< 0.004	
Sulphate	g/m^3	5.5	7.2	6.7	6.9	***500***	6.8	5.8	6.8	***1,000***
Dissolved Oxygen	g/m^3 O_2	8.25	8.79	-	8.73	***≥ 5.0***	-	5.88	8.51	***≥ 7.25 [-1]***
Total Biochemical Oxygen Demand	g/m^3 O_2	< 2	< 2	< 2	< 2		< 2	< 2	< 2	
Faecal Coliforms	cfu/100 ml	200[b]	2,000[b]	<10	1,000[b]		<10	430[b]	1,200	***≤ 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 20 April 2022

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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	1.66	0.026	0.143	0.043	***2.5***	1.11	0.4	1.33	***2.0 [at pH<7.75; limit is pH dependant]***
Free Ammonia	g/m^3 N	0.0091	0.00006	0.00047	0.00013		0.0089	0.0027	0.0097	
Turbidity	NTU	-	-	1.92	-		18.4	-	-	
pH	g/m^3	7.3	6.9	7.1	7.0	***[within ± 0.5]***	7.4	7.3	7.4	***≥ 6.5 & ≤ 8.5***

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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 Alkalinity	g/m^3 $CaCO_3$	58	28	50	29		124	107	67	
Electrical Conductivity (EC)	mS/m@25°C	24.4	14.2	25.8	14.9		46.4	41.3	27.4	
Total Suspended Solids	g/m^3	4	4	< 6	< 3		< 3	< 3	< 3	***14 [+10]***
Sample Temperature	°C	16.4	16.1	14.8	16.3	***≤ 18.4 [+2]***	18.4	17.4	16.4	
Dissolved Aluminium	g/m^3	< 0.003	0.005	< 0.003	0.004		< 0.003	< 0.003	< 0.003	***0.100 [+0.1]***
Total Aluminium	g/m^3	0.0094	0.0169	0.0035	0.024	***5.0***	0.079	0.043	0.025	***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	0.036[a]	0.019[a]	0.031[a]	0.020[a]		0.027	0.028	0.03	
Total Boron	g/m^3	0.033[a]	0.0177[a]	0.029[a]	0.0195[a]	***0.5***	0.027	0.028	0.032	***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	0.0006	0.0003	0.0004[a]	0.0005		0.0055	0.0030[a]	0.0009	
Total Cobalt	g/m^3	0.00065	0.00044	0.00034[a]	0.00064	***0.05***	0.0058	0.0028[a]	0.00102	***1.0***
Dissolved Copper	g/m^3	0.0005[a]	< 0.0005	0.0008[a]	< 0.0005		< 0.0005	0.0006	< 0.0005	***0.007 [+0.002]***
Total Copper	g/m^3	< 0.00053[a]	< 0.00053	0.00067[a]	< 0.00053	***0.2***	0.00065	0.00057	< 0.00053	***0.5***

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000106 500 m u/s of landfill	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*
Dissolved Iron	g/m^3	0.87	0.58	0.03	0.66		0.02	0.11	0.60	***1.17 [+0.3]***
Total Iron	g/m^3	1.97	1.36	0.41	1.42	***5.0***	2.9	2.1	1.94	***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	0.64[a]	0.103	0.14	0.189[a]		10.2	8.0[a]	2.0	
Total Manganese	g/m^3	0.62[a]	0.124	0.142	0.178[a]	***1.0***	10.8	7.6[a]	2.0	***5.0***
Dissolved Zinc	g/m^3	< 0.0010	< 0.0010	< 0.0010	0.0019[a]		< 0.0010	< 0.0010	< 0.0010	***0.030 [+0.03]***
Total Zinc	g/m^3	0.0012	< 0.0011	< 0.0011	0.0018[a]	***2.0***	< 0.0011	< 0.0011	0.0013	***2.4***
Chloride	g/m^3	33	21	39	22		66	60	38	
Nitrite-N	g/m^3	<0.002	0.002	0.005	0.011		0.036	0.038	0.016	***0.06***
Nitrate-N + Nitrite-N	g/m^3	0.86	0.078	0.33	0.23	***100***	0.63	0.77	0.88	***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	6.2	4.9	13.8	6.4	***500***	5.7	4.9	5.9	***1,000***
Dissolved Oxygen	$g\ O_2/m^3$	7.63	7.18	-	7.74	***≥ 5.0***	-	4.78	7.90	***≥ 6.63 [-1]***
Total Biochemical Oxygen Demand	$g\ O_2/m^3$	< 2	< 2	< 2	< 2		< 2	< 2	< 2	
Faecal Coliforms	cfu/100 ml	780	270[b]	800	1,100		190	620	1,500	***≤ 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

A reduction in the total alkalinity (Figure 17) and conductivity (Figure 18) of the discharge from the small eastern silt ponds is also evident. Historically the influence of both the small western and large silt ponds is notable at PMU000113.

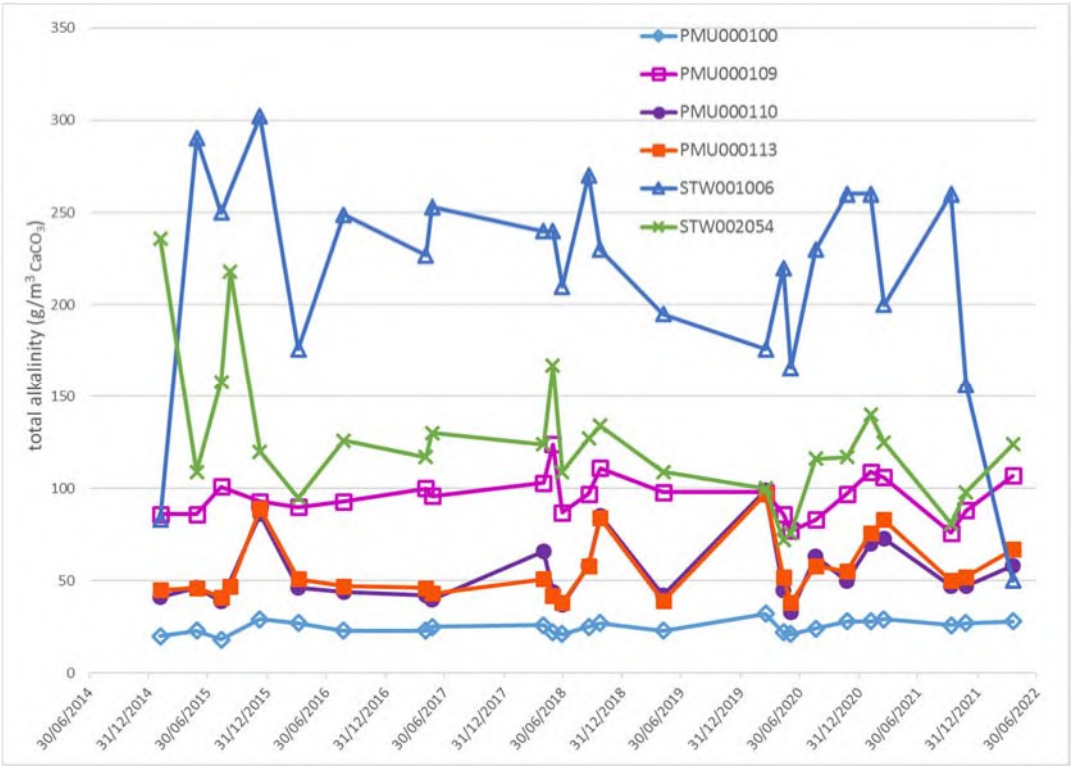

Figure 17 Total alkalinity in the Puremu Stream and stormwater discharge samples, June 2014 to date (includes wet weather samples)

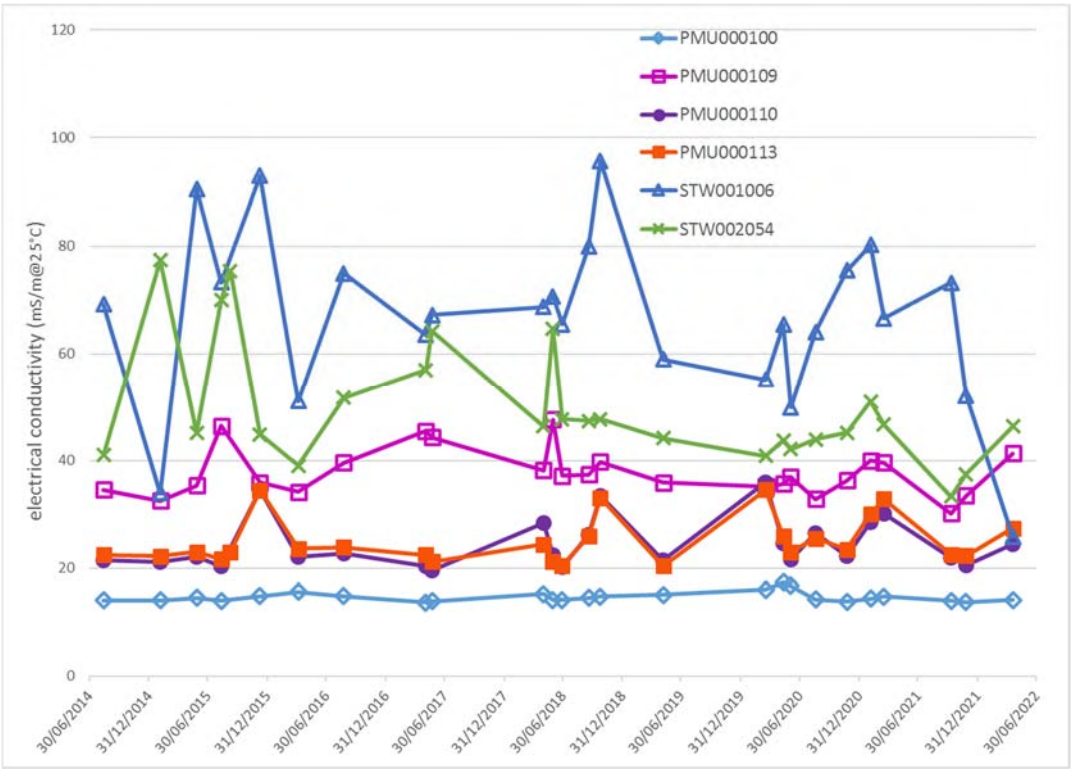

Figure 18 Conductivity in the Puremu Stream and stormwater discharge samples, June 2014 to date (includes wet weather samples)

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	
		26 Nov 2021	20 Apr 2022	26 Nov 2021	20 Apr 2022
Sum of Anions	meq/L	5.0	2.4	3.6	4.5
Sum of Cations	meq/L	5.0	2.6	3.7	4.4
Bicarbonate	g/m^3 at 25°C	190	60	120	151
Total Hardness	g/m^3 $CaCO_3$	89	65	89	109
Total Dissolved Solids (TDS)	g/m^3	240	210	240	300
Dissolved Calcium	g/m^3	13.8	13.3	15.2	18.4
Dissolved Magnesium	g/m^3	13.4	7.8	12.4	15.3
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Dissolved Potassium	g/m^3	9.5	5.0	5.7	4.5
Dissolved Sodium	g/m^3	40	26	31	37
Fluoride	g/m^3	0.07	0.06	0.06	0.12
Total Kjeldahl Nitrogen (TKN)	g/m^3	7.1	0.2	1.1	1.19
Phosphate	g/m^3	< 0.013	< 0.013	< 0.013	< 0.013
Total Phosphorus	g/m^3	0.006	0.003	0.012	0.009
Total Ammoniacal-N	g/m^3	6.7	0.143	0.96	1.11
Nitrite-N	g/m^3	0.019	0.005	0.017	0.036
Nitrate-N	g/m^3	0.062	0.31	0.32	0.59
Reactive Silica	g/m^3 as SiO_2	15.3	21	23	31
Dissolved carbonaceous biochemical oxygen demand	g O_2/m^3	< 2	< 2	< 2	< 2
Carbonaceous biochemical oxygen demand	g O_2/m^3	< 6	< 2	< 6	< 2
Chemical oxygen demand	g O_2/m^3	14	< 6	8	8
Total organic carbon	g/m^3	2.2	< 0.5	3.3	2.2
Escherichia coli	cfu/100 mL	<10	800[a]	<10	150[a]

Parameter	Unit	STW001006 Small western silt pond		STW002054 Large silt pond	
		26 Nov 2021	20 Apr 2022	26 Nov 2021	20 Apr 2022
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	0.00029	0.00007	< 0.00002	0.00002
Terbuthylazine	g/m^3	0.00009	0.00006	0.00004	0.00002
Semi volatile organic compounds		ND	ND	ND	ND
Volatile organic compounds[b]					
Chlorobenzene (monochlorobenzene)	g/m^3	0.0008	< 0.0003	< 0.0003	< 0.0003
1,4-Dichlorobenzene	g/m^3	0.0004	< 0.0003	< 0.0003	< 0.0003

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

There are 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 and the sample collected in April. It is noted that the work to divert the contaminated discharge from the pipework under the Stage 1B area commenced in October, and therefore at this point in time it is unclear if these differences are 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 showed significant improvement between the samples collected before the diversion and following the diversion. Examples of the improvement in some of the parameters determined can be seen in Figure 16 to Figure 18. The potential seasonal variation in the samples collected from the large silt pond were much less pronounced than in the western pond during the year under review. Monitoring will need to continue to establish any baseline seasonal variation in the quality of these discharges.

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.

The only compounds under the organo-nitrogen & phosphorus pesticide classification that were detected were hexazinone and terbuthyazine.

Hexazinone is a non-selective contact herbicide that has a low reliability trigger level of 0.075 g/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.

Tebuthylazine 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 0.008 g/m^3. The concentrations detected in the stormwater discharges were well below this value during the year under review

In the case of monochlorobenzene, the ANZECC trigger value for a slight to moderately disturbed eco system is 0.055 g/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 0.0013 g/m^3 for long term exposure.

The concentration detected in the discharge from the small western silt pond in November 2021 was below the acute and chronic levels, and the contaminant was not detected at the time of the April 2022 survey.

In the case of 1,4-dichlorobenzene there is a moderately reliable ANZECC trigger value of 0.060 g/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 0.0026 g/m^3 for long term exposure. The concentration detected in the discharge from the small western silt pond in November 2021 was below the acute and chronic levels, and again, the contaminant was not detected at the time of the April 2022 survey.

2.3.4 Biological monitoring

2.3.4.1 Macroinvertebrate surveys

Two macroinvertebrate surveys were conducted during the year under review. Summaries of the surveys' findings are given below and a full copy of the reports can obtained from the Council upon request.

Biological surveys have been undertaken on the Puremu Stream since 1986, to assess potential adverse effects of leachate from the landfill on the macroinvertebrate communities of the stream. Further to this, biological monitoring has been undertaken on the Manganaha Stream since 1994 to assess the effects of seepage from the landfill site on the macroinvertebrate communities in the stream.

Results of freshwater biological surveys performed in relation to the Colson Road landfill since the 2000-2001 monitoring year are discussed in numerous biomonitoring reports listed in the biomonitoring report reference lists.

The Council's 'kick-sampling' technique and a combination of the 'kick-sampling' and 'vegetation-sweep' sampling techniques, along with a combination of the two techniques, were used at seven sites 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. Samples were processed to provide number of taxa (richness), MCI, and SQMCI scores for each site.

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.

The sites sampled are described in Table 14 and their locations are shown in Figure 19. During the year under review, the surveys were undertaken on 9 November 2021 and 1 March 2022.

Overall, both 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. In the unnamed tributary, no significant detrimental effects were found at the time of the November survey. At the time of the March survey the results suggested poor preceding water quality that may be indicative of adverse effects associated with the landfill leachate.

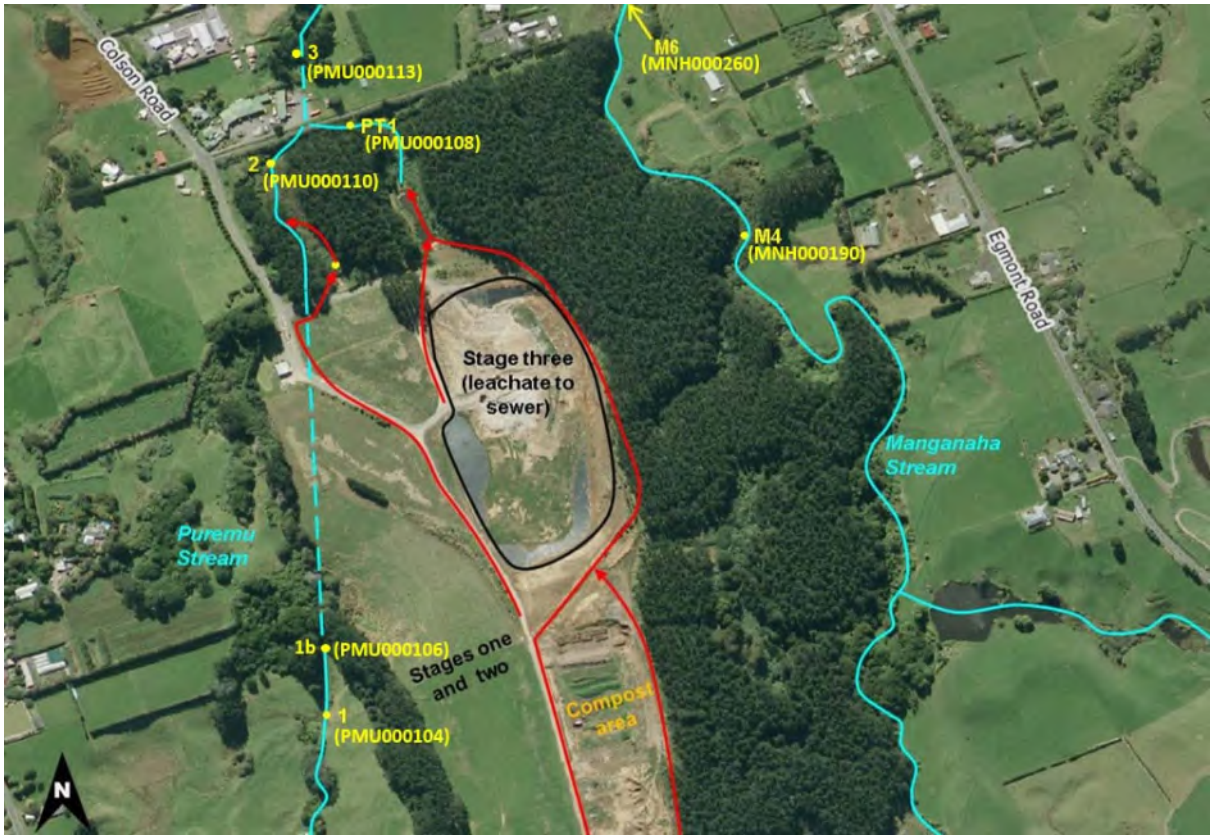

Figure 19 Biomonitoring sites related to the Colson Road landfill, New Plymouth. The red lines on the aerial photograph indicate the direction of stormwater runoff from the landfill site

Table 14 Biomonitoring sites in the Puremu and Manganaha Streams related to the Colson Road Landfill

Stream	Site number	Site Code	Grid reference (NZTM)	Location
Puremu Stream	1	PMU000104	E1697003 N5675699	Upstream of the landfill
	1b	PMU000106	E1697019 N5675802	Immediately downstream of farm bridge
	2	PMU000110	E1696974 N5676405	400 m downstream landfill
	3	PMU000113	E1696986 N5676534	Downstream of the SPCA driveway
Unnamed tributary of Puremu Stream	PT1	PMU000108	E1697046 N5676450	60 m upstream of the confluence with Puremu Stream
Manganaha Stream	M4	MNH000190	E1697483 N5676284	10 m downstream of an unnamed tributary of the Manganaha Stream
	M6	MNH000260	E1697371 N5676665	500 downstream of site M4

9 November 2021

Taxa richness was low in the current survey, ranging between nine and 15 taxa. All sites, excluding site 3 recorded lower numbers of taxa than their respective site medians. In comparison to the previous survey results, sites 2 and M4 recorded slightly higher numbers of taxa, whilst the remaining sites recorded lower numbers of taxa. All taxa numbers were within the ranges of those recorded previously.

MCI scores were reflective of 'poor' macroinvertebrate community health at sites 1, 3 and PT1, and 'fair' health at sites 1b, 2, M4 and M6. MCI scores were above site medians at sites 2, 3 and M6, with site 2 recording a significantly higher score. Sites 1, PT1 and M4 recorded MCI scores lower than respective site medians, although not significantly. Site 2 recorded an MCI score slightly higher than the previous survey score, while the remaining sites recorded lower scores, with sites 3 and PT1 both recording significantly lower scores. There were no significant differences recorded between the MCI score recorded at 'control' site 1 and those recorded downstream at sites 3 and PT1, while the MCI score recorded at site 2 was significantly higher than that recorded at site 1. The MCI score recorded at the newly established site 1b was similar to that recorded at site 2 and also significantly higher than that recorded at site 1. This site has habitat features more similar to that recorded at site 2 and will likely be a more suitable 'control' site for future surveys. The MCI scores recorded at sites 2 and 3 were not significantly different to that recorded at site 1b, while the MCI score at site PT1 was significantly lower. There was a substantial increase in MCI score between sites M4 and M6, however this is thought to be related to habitat differences between the two sites. Similarly to the previous sampling occasion, the sample for site M6 was taken slightly downstream of where it has previously been taken, due to poor accessibility to the site, which may explain some of the improvement in MCI recorded.

SQMCI scores ranged between 2.9 and 6.5 units across the seven sites surveyed, and were reflective of 'very poor' to 'very good' health. Site PT1 recorded the lowest SQMCI score, reflective of 'very poor' health. Sites 1 and 3 both recorded SQMCI scores reflective of 'poor' health, while sites 1b, 2 and M4 recorded 'fair' health. Site M6 recorded the highest SQMCI score, reflective of 'very good' health. There were no significant differences in SQMCI score recorded between sites 1, 1b, 2 and 3, while the SQMCI score recorded at site PT1 was lower than that recorded at site 3, and significantly lower than that recorded at the remaining three upstream Puremu Stream sites. The SQMCI recorded at site M6 was significantly higher than that recorded at site M4, however the score recorded for site M4 was typical for the site, while the score at score at M6 was significantly higher than the median.

Overall, the results of this survey indicated that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site had not had any significant detrimental effects on the macroinvertebrate communities of the Puremu and Manganaha Streams, or the unnamed tributary of the Puremu Stream. No undesirable biological growths were detected at any of these sites during this November 2021 survey. It is recommended that 'control' site 1 and site 1b, 100 m downstream of site 1 be sampled concurrently in the next monitoring summer 2022 survey to further determine whether the aforementioned site would be a more representative 'control' site.

1 March 2022

Taxa richness was low to moderately low in the current survey, ranging between seven and 16 taxa. All sites recorded lower numbers of taxa than their respective site medians. In comparison to the previous survey results, sites 1b and M4 recorded slightly higher numbers of taxa, whilst the remaining sites recorded lower numbers of taxa. All taxa numbers were within the range of those recorded previously, although site M4 recorded 10 taxa, which was equal to the lowest number recorded for the site to date.

In the Puremu Stream and tributary, MCI scores were reflective of 'very poor' macroinvertebrate community health at site PT1, 'poor' health at sites 1, 1b and 3, and 'fair' health at site 2. 'Fair' macroinvertebrate community health was recorded at both sites in the Manganaha Stream, and results were not significantly

different to one another. In comparison to site medians, sites 1 and PT1 recorded significantly lower scores, while sites 3 and M6 recorded significantly higher scores. The remaining sites recorded MCI scores that were not significantly different to historic site medians. MCI scores in the current survey were not significantly different to those recorded in the previous survey, with the exception of site PT1, which recorded a significantly lower score (by 16 MCI units). In addition, the 'very poor' MCI score recorded at site PT1 was the lowest recorded for the site to date. There were no significant differences in MCI scores recorded between sites 1b, 2 and 3, while the MCI score recorded at site 1 was significantly lower than those recorded at sites 2 and 3. The MCI score recorded at site PT1 was significantly lower than all other MCI scores recorded in the current survey.

SQMCI scores ranged between 1.5 and 5.2 units across the seven sites surveyed, and were reflective of 'very poor' to 'good' health. Site PT1 recorded the lowest SQMCI score of 1.5 units, reflective of 'very poor' health. Sites 1, 1b and 2 all recorded SQMCI scores reflective of 'poor' health, while sites 3 and M4 recorded 'fair' health. Site M6 recorded the highest SQMCI score, reflective of 'good' health. There were no significant differences in SQMCI score recorded between sites 1, 1b, 2 and 3, while the SQMCI score recorded at site PT1 was significantly lower than the remaining sites scores. The SQMCI scores recorded at the two sites in the Manganaha Stream were not significantly different to one another.

Overall, the results of this survey 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. However, results for the unnamed tributary of the Puremu Stream suggested poor preceding water quality and may be indicative of adverse effects associated with the landfill leachate. No undesirable biological growths were detected at any of these sites during this March 2022 survey. It is recommended that future biomonitoring surveys utilise site 1b, rather than site 1 as the 'control' site, due to the comparable habitat at this site with the downstream site habitat.

2.4 Groundwater

As outlined in Section 1.4.5, the monitoring programme for the 2021-2022 year was altered from that undertaken up to June 2021. The bores that have been sampled under this monitoring programme are described in Table 15. The monitoring 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 2019-2020 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 2020-2021 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 year under review. 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 and GND0574 (highlighted in orange) were added to the list of bores scheduled for monitoring, however during the first survey carried out during the year under review it was identified that bore GND0572 had been compromised and would need to be repaired or replaced. NPDC and the Council are working towards agreeing a suitable location and depth for the replacement bore. It is expected that this bore will be replaced prior to the 2022-2023 sampling surveys.

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)	Relative level (masl)	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 IB	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

Key: a Bore collapsed as at 18/6/19 depth to base 19.52 m, replaced by GND3134

b Bore added to the 2021-2022 programme, but found to be compromised at the time of sampling

c Bore collapsed as at 18/6/19 depth to base 17.4 m, new control bore GND3135 in different location

d monitoring of this bore recommenced in the 2021-2022 year.

e Bore collapsed as at 18/6/19 depth to base 19.71 m, replaced by GND3133

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

Parameter name	Units	GND0573		GND0574		GND0575		GND0598		GND1301		GND3133		GND3134		GND3135	
		03 Mar 2022	03 May 2022	03 Mar 2022	03 May 2022	03 Mar 2022	03 May 2022	25 Feb 2022	04 May 2022	03 Mar 2022	03 May 2022	24 Feb 2022	03 May 2022	25 Feb 2022	04 May 2022	24 Feb 2022	05 May 2022
Water Level	m	4.81	5.79	9.08	9.21	7.54	8.31	9.75	10.61	8.23	8.27	12.30	13.42	12.67	13.27	8.85	10.78
Bicarbonate	g/m^3 at 25°C	33	28	53	68	58	106	187	185	111	113	33	34	54	55	29	28
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	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloride	g/m^3	81	99	30	28	75	59	21	22	27	28	25	24	19.5	19.9	121	62
Dissolved oxygen	g/m^3	2.76	3.85	2.69	1.73	3.75	3.01	6.69	0.42	1.06	1.44	8.41	8.33	4.76	4.68	7.7	5.73
Dissolved Oxygen Saturation %	%	28.0	38.3	27.9	17.8	37.2	29.0	68.5	4.2	10.6	14.3	86.8	83.5	50.0	47.4	80.1	58.1
Electrical Conductivity (EC)	mS/m at 25°C	34.9	39.1	19.7	20.8	38.1	37.4	36	34.2	27.4	28	16.4	15.5	15.8	16.2	47.7	26.9
pH	pH units	5.9	5.8	6.3	6.3	6	6.3	7.8	7.5	7.2	7.1	6	6	6	6.1	6	5.8
Sulphate	g/m^3	6.7	7.4	5	5.3	2.3	2.3	<0.5	1.1	4.8	5	4.9	4.2	3.6	4.1	4.4	3.6
Total Alkalinity	g/m^3 $CaCO_3$	27	23	43	56	48	87	154	152	91	93	27	28	45	45	23	23
Total Dissolved Solids (TDS)	g/m^3	250	210	149	189	250	250	320	220	200	210	109	122	116	116	260	155
Total Hardness	g/m^3 $CaCO_3$	77	89	54	64	76	124	105	108	83	90	28	30	25	24	34	37
Temperature	°C	16.3	16.0	17.5	17.3	15.4	15.4	16.5	15.4	15.8	15.9	16.9	15.7	17.3	16.4	17.3	16.3
Dissolved COD, trace level	g O_2/m^3	<6	<6	6	<6	<6	<6	10	11	<6	<6	<6	<6	<6	<6	<6	<6
Dissolved Total Biochemical Oxygen Demand (TBOD5)	g O_2/m^3	<0.4	-	0.5	-	<0.4	-	3.6	-	<0.4	-	<0.4	-	<0.4	-	<0.4	-
Nitrate-N	g/m^3	0.210	0.073	0.350	0.048	3.20	2.00	0.003	0.037	1.34	1.33	1.62	1.06	0.096	0.106	0.220	0.450
Nitrate-N + Nitrite-N	g/m^3	0.210	0.073	0.350	0.048	3.20	2.00	0.003	0.039	1.34	1.33	1.62	1.06	0.096	0.107	0.220	0.450
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	<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	1.09	1.13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Total Kjeldahl Nitrogen (TKN)	g/m^3	0.12	<0.010	<0.010	<0.010	<0.010	<0.010	1.30	1.07	<0.010	<0.010	<0.010	<0.010	<0.010	0.15	<0.010	0.15
Total Nitrogen	g/m^3	0.33	0.11	0.45	0.14	3.30	2.10	1.30	1.11	1.41	1.35	1.70	1.06	0.14	0.25	0.30	0.60
Dissolved Aluminium	g/m^3	0.005	-	0.009	-	<0.003	-	0.003	-	<0.003	-	0.005	-	0.018	-	0.007	-
Dissolved Arsenic	g/m^3	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-	<0.0010	-
Dissolved Boron	g/m^3	0.022	0.023	0.025	0.028	0.015	0.021	0.051	0.054	0.021	0.025	0.016	0.020	0.015	0.017	0.016	0.018
Dissolved Cadmium	g/m^3	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	<0.00005	-	0.00005	-	0.00008	-

Parameter name	Units	GND0573		GND0574		GND0575		GND0598		GND1301		GND3133		GND3134		GND3135	
		03 Mar 2022	03 May 2022	03 Mar 2022	03 May 2022	03 Mar 2022	03 May 2022	25 Feb 2022	04 May 2022	03 Mar 2022	03 May 2022	24 Feb 2022	03 May 2022	25 Feb 2022	04 May 2022	24 Feb 2022	05 May 2022
Dissolved Calcium	g/m^3	12.2	14.1	9.2	11.3	14.8	25	21	23	17.2	18.5	5.6	5.8	4.9	4.6	6.8	7.4
Dissolved Chromium	g/m^3	<0.0005	<0.0005	0.0007	<0.0005	0.0007	0.0013	<0.0005	<0.0005	0.0005	0.0007	<0.0005	<0.0005	<0.0005	0.0013	<0.0005	<0.0005
Dissolved Cobalt	g/m^3	0.0003	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	<0.0002	-	0.0004	-	<0.0002	-
Dissolved Copper	g/m^3	0.0006	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
Dissolved Iron	g/m^3	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.21	0.41	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Dissolved Lead	g/m^3	<0.00010	-	<0.00010	-	<0.00010	-	0.00024	-	<0.00010	-	<0.00010	-	<0.00010	-	<0.00010	-
Dissolved Magnesium	g/m^3	11.2	13.0	7.5	8.8	9.4	14.9	12.4	12.4	9.8	10.7	3.5	3.6	3.0	3.1	4.2	4.4
Dissolved Manganese	g/m^3	0.0154	0.0057	0.005	0.0111	0.0034	0.0005	0.066	0.080	0.0008	0.0049	0.0082	0.0041	0.028	0.0062	0.0184	0.0079
Dissolved Nickel	g/m^3	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	0.0014	-
Dissolved Potassium	g/m^3	1.61	1.70	0.90	1.01	3.00	2.40	4.50	4.40	2.10	2.10	1.63	1.59	1.11	1.20	2.80	2.20
Dissolved Sodium	g/m^3	36	41	19.5	20	43	30	37	33	26	26	19.2	18.4	24	25	72	37
Dissolved Zinc	g/m^3	0.0083	0.0034	0.0157	0.0198	0.0093	<0.0010	0.0076	<0.0010	0.0062	0.0114	0.0129	0.0086	0.0110	0.0260	0.0095	0.0029
Semi volatile organic compounds		ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Volatile organic compounds[a]																ND	
Toluene	g/m^3	<0.0003	-	0.0018	-	<0.0003	-	<0.0003	-	<0.0003	-	0.0015	-	<0.0003	-	<0.0003	-
m&p-Xylene	g/m^3	<0.0005	-	0.0006	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-	<0.0005	-
o-Xylene	g/m^3	<0.0003	-	0.0003	-	<0.0003	-	<0.0003	-	<0.0003	-	<0.0003	-	<0.0003	-	<0.0003	-

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

ND None detected

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.

The February/March samples were also analysed for SVOCs (semi-volatile organic compounds) and VOC's (volatile organic compounds). There were no SVOC's found to be above detection levels. Low concentrations of toluene, m&p-Xylene and o-Xylene were found in GND0574 (in the forest on the north of eastern side of Stage 3). Toluene alone was found in GND3133 (in the forest east of landfill). These compounds are highly volatile and have relatively low water solubility. This means that should they enter a surface water body, they would be lost to the atmosphere rapidly. 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 year under review. The new control bore is in a different location up gradient of Stages 1 & 2. Following the elevated conductivity and chloride found in the February 2022 sample from the new control bore, the historical information on file at the Council was reviewed. During this review a site plan was found, which 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 & 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 Stages1 and 2) and GND0575 (down gradient of Stage 3) there is an emerging trend of increasing chloride concentrations in the groundwater at these locations. This may be indicative of some minor leachate contamination. These trends are also apparent in the conductivity of the groundwater samples from these bores.

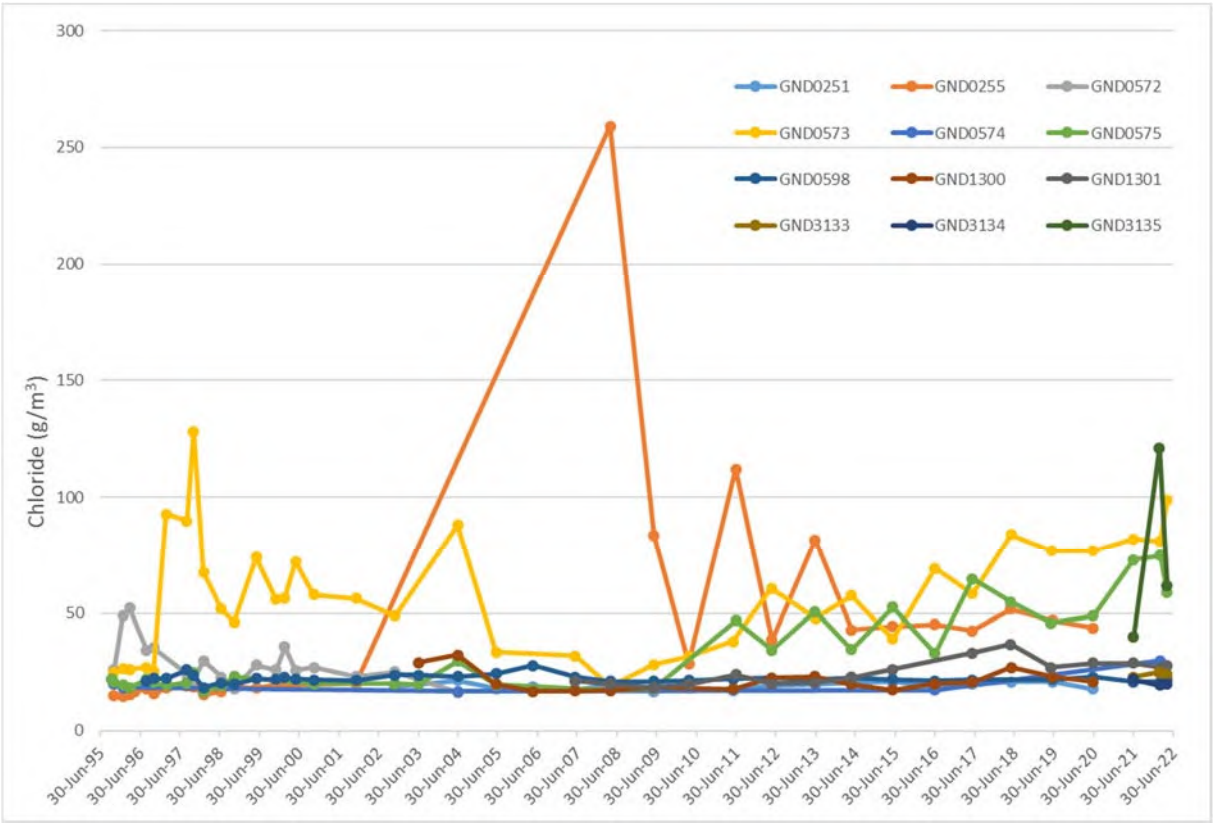

Figure 20 Chloride concentrations in the Colson Road groundwater bores

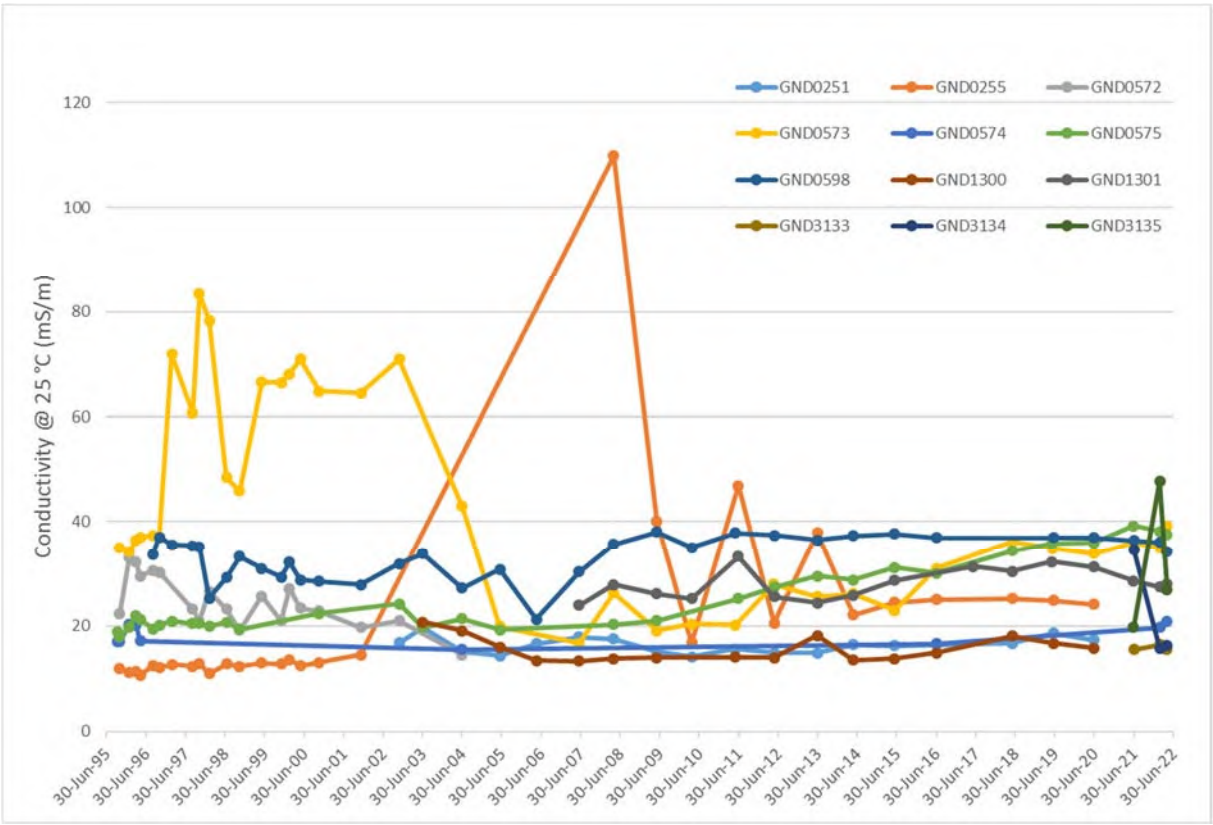

Figure 21 Conductivity in the Colson Road groundwater bores

Figure 22 shows that there may also be an emerging trend of increasing nitrate/nitrite nitrogen concentrations in GND0575 (north of Stage 3). This finding is consistent with the elevated ammoniacal

nitrogen in the under liner groundwater drainage results provided by NPDC (2.3.1.2, Figure 11). Nitrate/nitrite nitrogen had not previously been determined in the routine under liner groundwater drainage monitoring undertaken by NPDC, however has been included in the additional parameters determined in the twice yearly, more comprehensive, monitoring that commenced during the year under review (Table 7). 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 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.

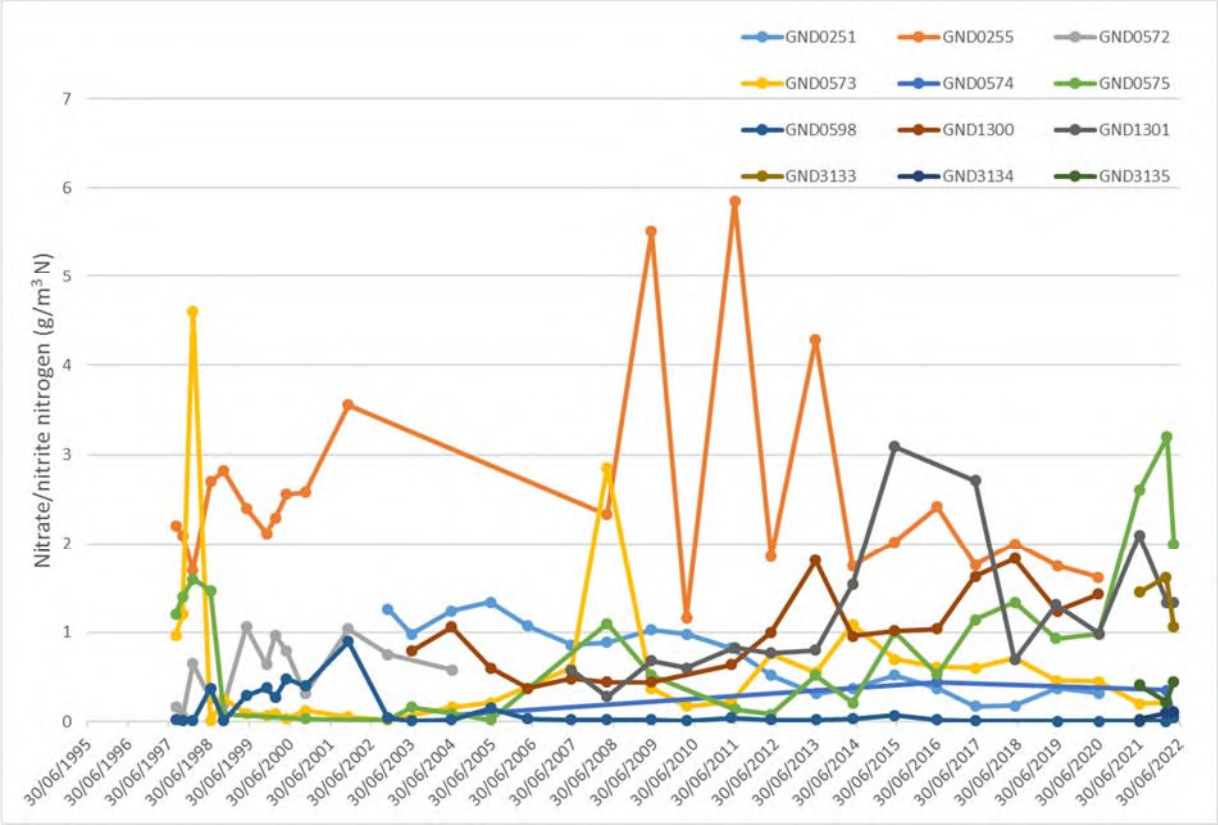

Figure 22 Nitrate/nitrite nitrogen concentrations in the Colson Road groundwater bores, June 2006 to date

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

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).

As discussed in Section 1.2, 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.

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 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 remaining trace constituents 1%, which is a typical composition for landfill gas.

Typically, LFG contains a small amount (0.4%) of non-methane organic compounds (NMOC), which can contain organic hazardous 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 conditions included in the varied consent were to ensure that the potential adverse effects from the flare, as a point source of emissions, are controlled and are consistent with the assessment of environmental effects provided with the application.

Conditions on the varied consent 4779-1.1 require that:

1. Within three 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.

3 The first revision of the landfill management 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.

Condition 1

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 special condition 1 was received within the three months stipulated by consent conditions, on 16 April 2018 and has been presented in the 2017-2018 Annual Report.

Condition 1 also requires that NPDC provide updated annual information on the feed gas and temperature.

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 in the form of daily average temperature, gas flow, and methane concentration in the feed gas collected by the monitoring system that is integrated into the flare system (Figure 23 and Figure 24).

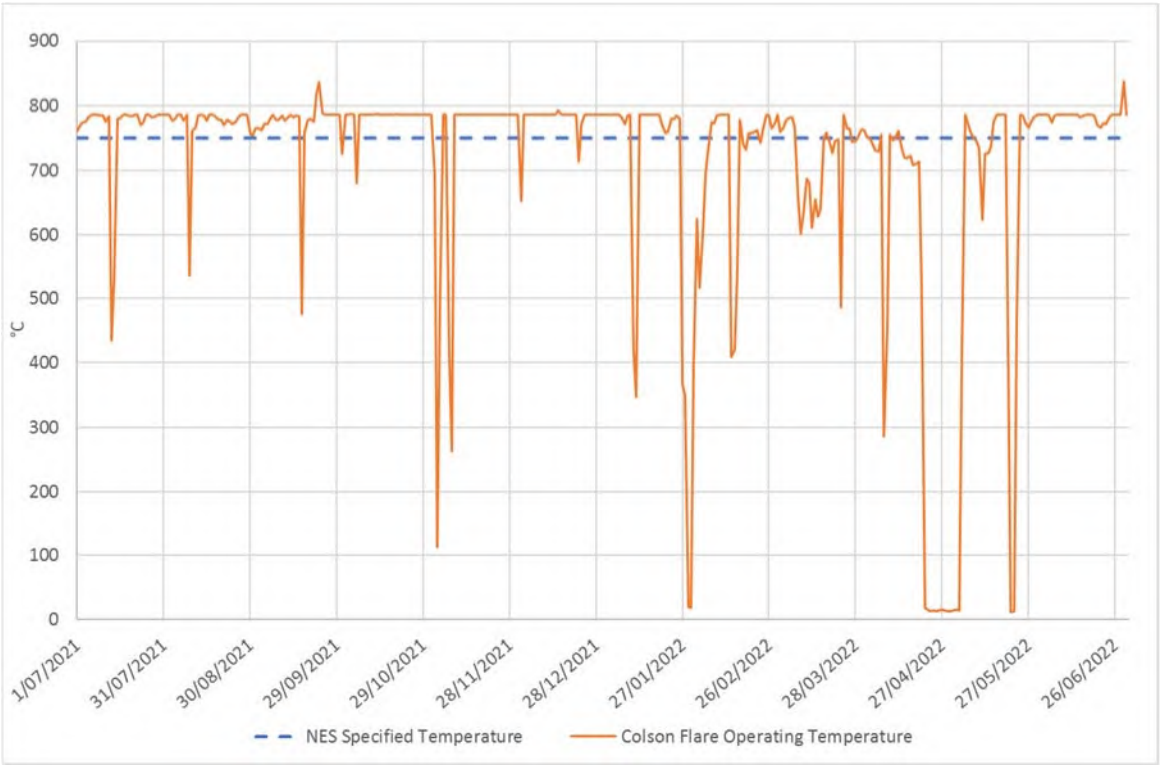

Figure 23 Colson Road landfill flare temperature for the year under review

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 had 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;
- During times of operation the flare temperature was maintained at or above 750°C.
- 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.

In a telephone conversation prior to the end of the 2021-2022 year, the Council was informed that there had been periods during the year under review when it had been difficult to maintain the gas flare temperature at above 750 °C whilst the flare was operating. This was subsequently confirmed, and the non-compliance was recorded on the Council's incident register, with the details of the incident discussed in Section 2.6.

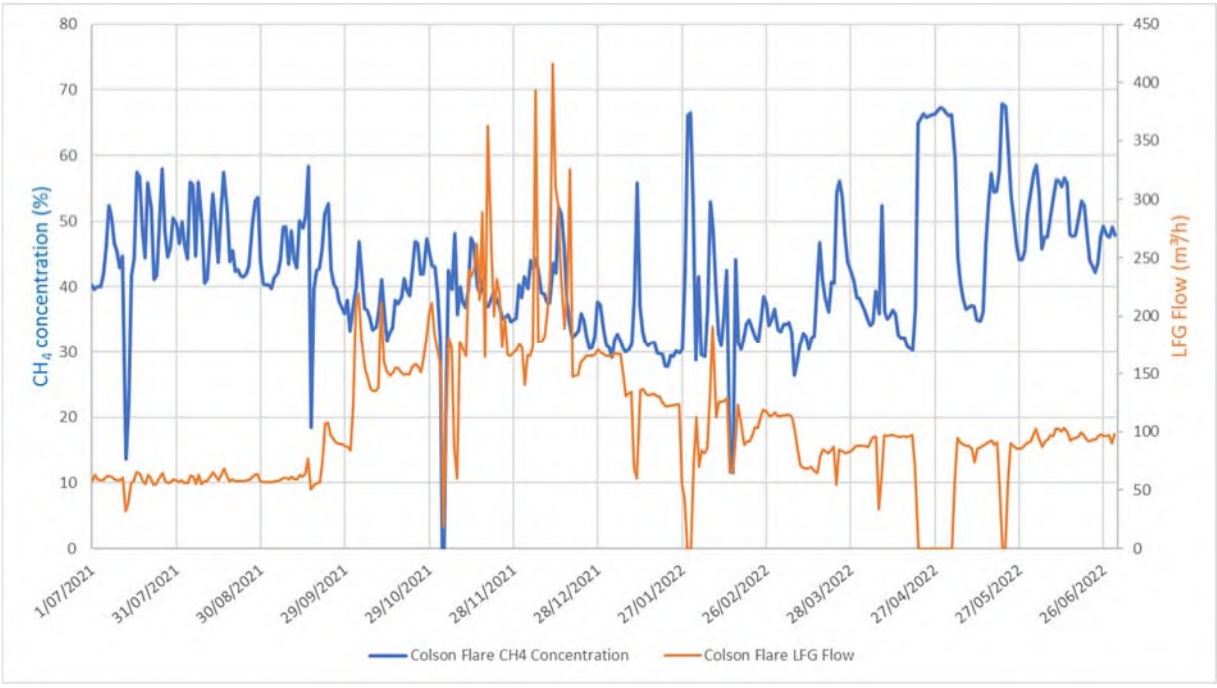

Figure 24 Flare feed gas flow rate and methane concentration during the year under review

It is noted that in the 2021-2022 year, the percentage methane concentration of the landfill gas and the landfill gas flow volumes had changed significantly from the previous year's data (Figure 25 and Figure 26).

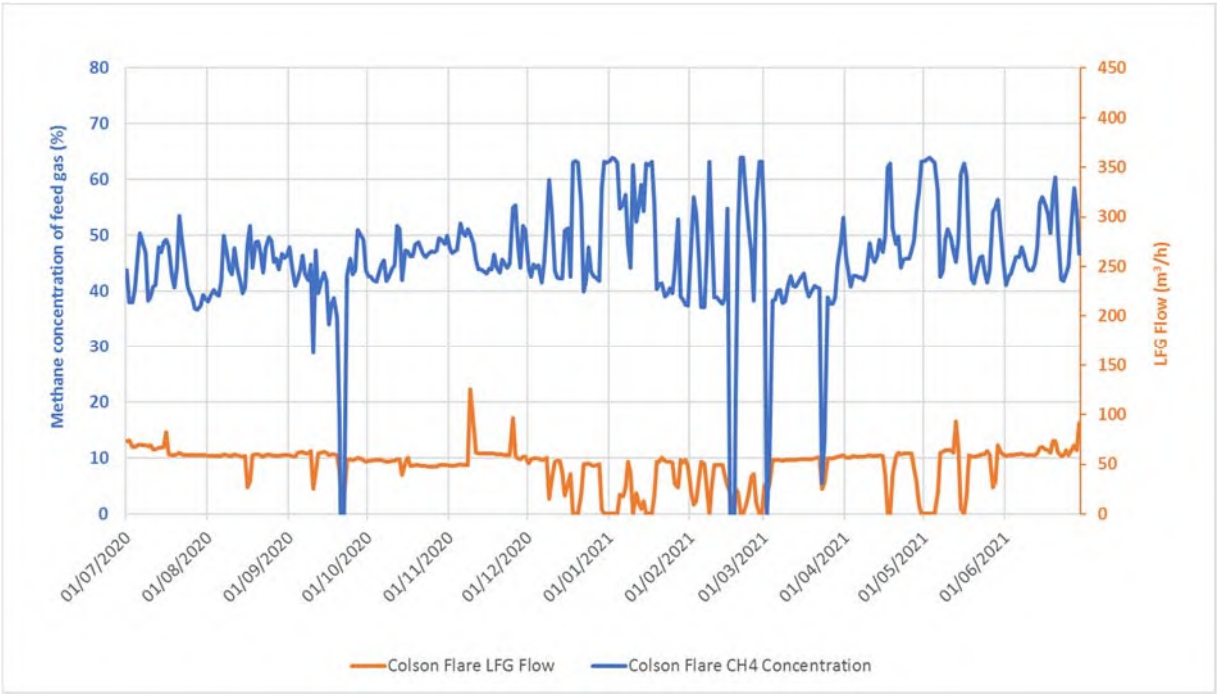

Figure 25 Flare feed gas flow rate and methane concentration, 2020-2021

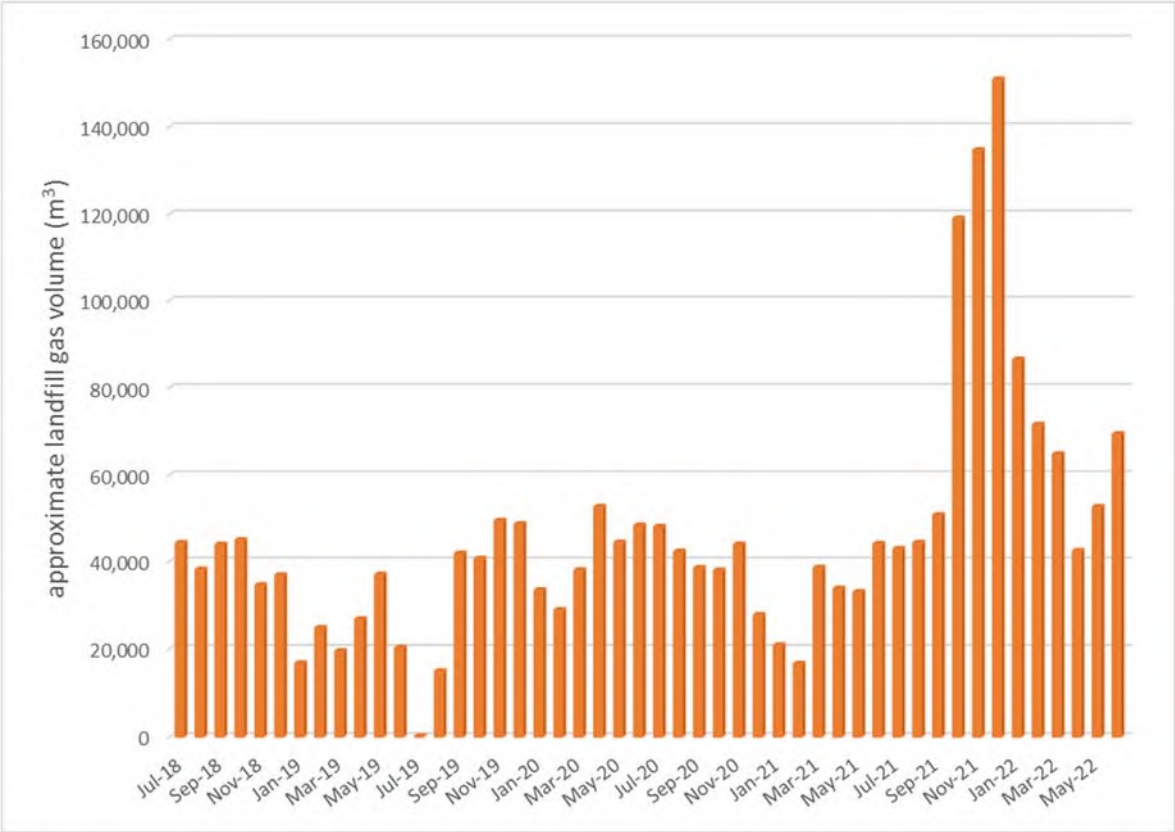

Figure 26 Monthly landfill gas flow volumes flared, July 2018 to date

The data provided by NPDC shows that percentage methane concentration of the landfill gas had reduced and gas flow volumes had increased. In the 2020-2021 year the annual average daily methane concentration was 46%, with 58 days of the year when the average daily concentration was less than 40%. In the year under review, this had reduced to an annual average daily methane concentration of 42 %, with 168 days of the year when the average daily methane concentration was less than 40%.

It is also noted that during the 2021-2022 year, the total gas volume fed through the flare during the year under review was 929,606 m^3 calculated from daily average landfill gas flow in m^3/h. This is comparison to the 425,383 m^3 and 440,758 m^3 for the 2020-2021 and 2019-2020 years respectively.

The approximate average daily methane concentration can be calculated from the average hourly landfill gas flow volume and the average daily methane concentrations. Given the significant increase in landfill gas volume and decrease in average daily methane concentration, the approximate daily methane concentrations for the 2020-2021 and 2021-2022 years have been calculated to enable a comparison of the amount of methane being directed through the landfill flare (Figure 27). The calculated total approximate volume of methane directed through the flare in the 2021-2022 year was in the order of 372,600 m^3. This is in comparison to a total annual volume in the order of 190,200 m^3 in the 2020-2021 year.

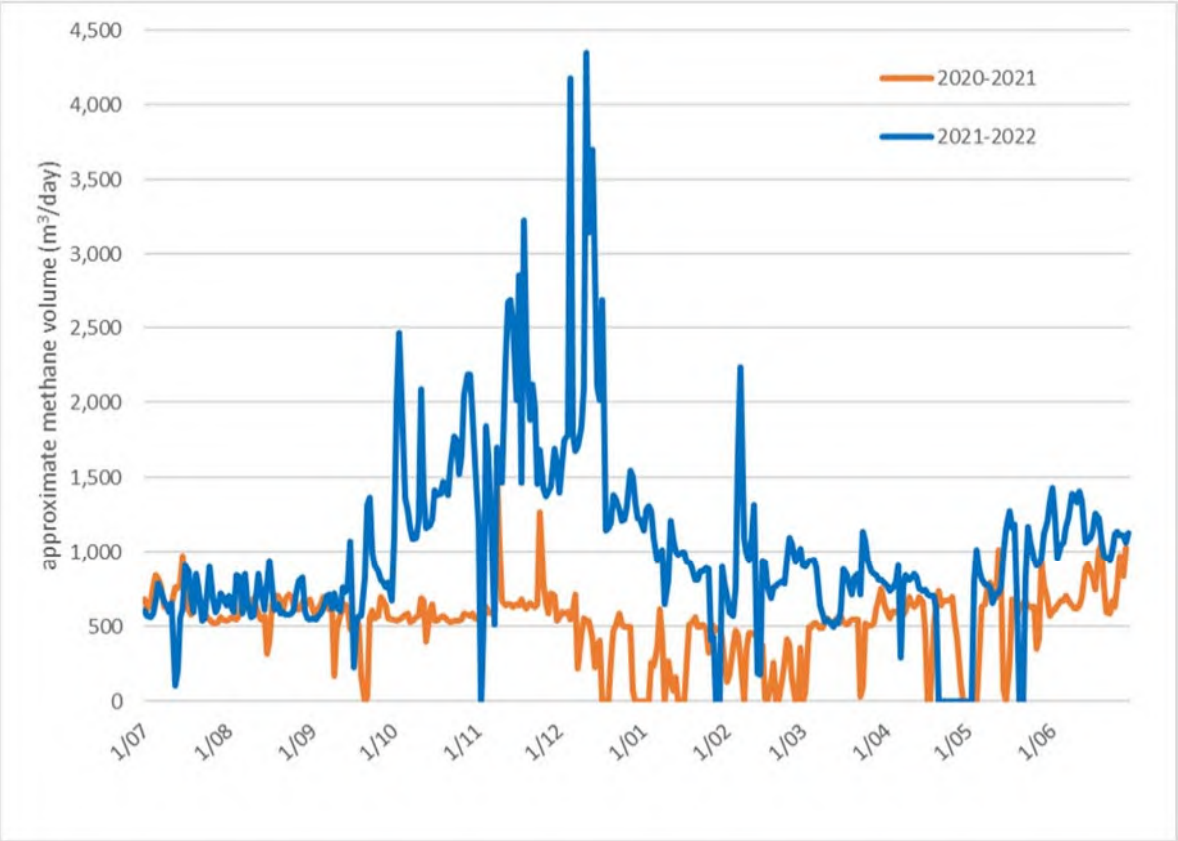

Figure 27 Approximate daily methane volumes flared in the 2020-2021 and 2021-2022 years

The hydrogen sulphide concentration of the feedstock gas was measured on four occasions during the year under review with the results given in Table 17, along with previous year's results for comparison

Table 17 Feedstock gas hydrogen sulphide concentration test results

Date	Hydrogen sulphide concentration (ppm)
31 October 2019	25.0
12 December 2019	11.0
21 January 2020	2.0
10 August 2020	10
8 September 2020	10
30 June 2021	0
21 July 2021	0 (waiting on detection limit)
11 November 2021	0
1 February 2021	0
5 April 2021	0

Condition 3

The Colson Road Regional Landfill Management Plan 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 plan references a separate

specific NPDC procedure for the management and operation of the flare that must be adhered to, which has also been received. It has previously been confirmed that the plan covers the required procedures, schedules and records keeping information. The latest iteration of the Colson Road Regional Landfill Management Plan retains this information.

A flare fault log was provided for the year under review. This showed that there was a total of 27 non-operational days due to faults (32 in total), which is 7.4% of the year (compared to 16% in the 2020-2021 year). Issues with low methane concentration of the feed gas resulted in 14 of the shutdowns, 11 were due to power outages, five were due to planned maintenance and one was for an unknown reason but thought to be a burner lock out and one was due to an instrument fault. In all but one of the unplanned shutdowns, no specific maintenance was required to bring the flare back on line as restarting the system was effective. In the case of one of the power outage shutdowns, the ignition rod needed to be replaced to enable the flare to be restarted. The length of the outages varied and were affected by the response being possible only during normal working hours. The shortest outage was approximately half an hour. The longest outage was just over 14 days from Wednesday 20 April to Tuesday 4 May 2022. This was the instance that was caused by a power outage, but the ignition rod needed to be replaced to enable the flare to be restarted. A summary of the monthly non-operational hours is given in Table 18 and Figure 28.

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

Month	No. shutdowns	Average non-operational time (hours)	Maximum non-operational time (hours)	Minimum non-operational time (hours)	Monthly total non- operational time
Jul-19	2	9.5	16.6	2.4	19 hrs
Aug-19	1	-	-	-	8.8 hrs
Sep-19	2	4.9	9.2	0.6	9.8 hrs
Oct-19	2	2.8	3.5	2.2	5.7 hrs
Nov-19	3	17.6	20.8	13.2	2.2 days
Dec-19	3	2.4	4.3	0.5	7.3 hours
Jan-20	6	187	64.9	2.6	4.7 days
Feb-20	5	11.4	21.8	1.5	2.4 days
Mar-20	4	3.6	8.4	1.4	14.3 hours
Apr-20	1.5[a]	134.4	253	15.8	11.2 days
May-20	2.5[a]	83.8	30.4	1.8	3.8 days
Jun-20	0	-	-	-	0
Totals	32	-	-	-	26.9

Key: a One shut down occurred over these two months with a total shutdown time of 14.1 days

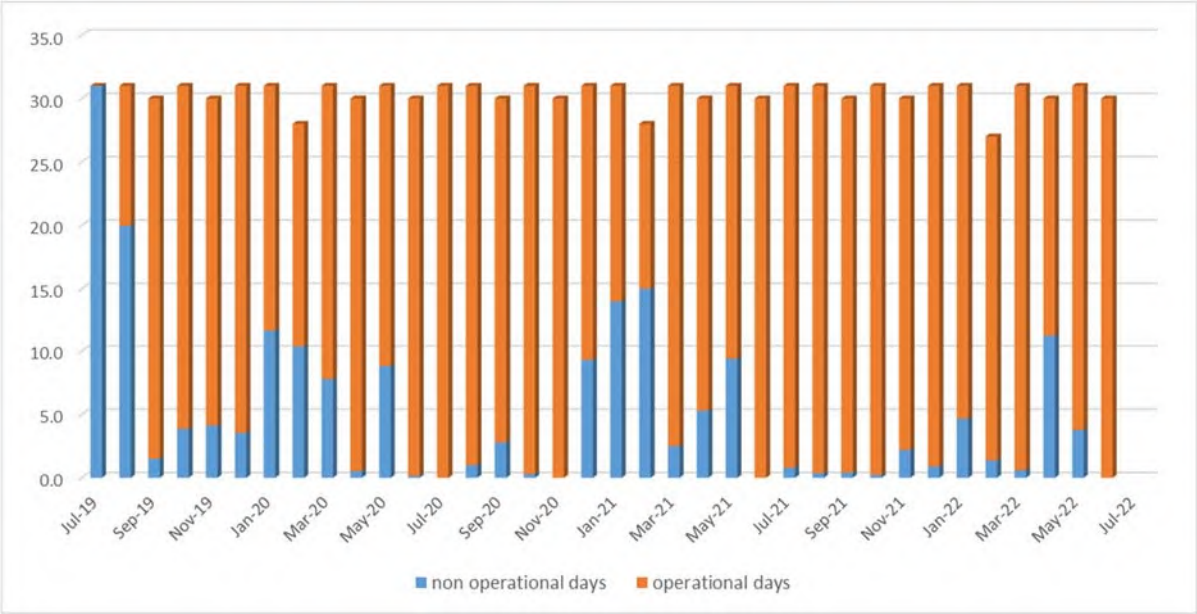

Figure 28 Monthly operational/non-operational days for the Colson Road landfill gas flare for the 2019 to date

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 1.6 m. 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 a period of two weeks to a month, on two separate occasions.

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

Guideline values used by the Council for dust deposition are 4 $g/m^2/30$ days or 0.13 $g/m^2/day$ 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 2020

Site code	Site description	Particulate $g/m^2/day$	
		6 Jan 2022 to 27 Jan 2022 (21 days)	27 Jan 2022 to 17 Feb 2022 (21 days)
AIR001603	At entrance to landfill	0.04	0.01
AIR001604	Adjacent to Manganaha Stream, behind rose nursery	0.10	0.10

Site code	Site description	Particulate g/m²/day	
		6 Jan 2022 to 27 Jan 2022 (21 days)	27 Jan 2022 to 17 Feb 2022 (21 days)
AIR001608	124 Egmont Road, paddock boundary, west of house	0.03	0.02
AIR001613	Grass lawn, behind work shed	0.05	0.06
AIR001622	At rear of RSPCA building	0.09	0.04
AIR001623	Behind 194 Egmont Road	0.09	0.03

* Gauge empty

All results of both surveys were below guideline deposition values of 0.13 g/m^2/day.

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 two occasions during the year under review at seven monitoring locations on, and in the neighbourhood of, the landfill. The particulate (dust) monitoring was undertaken using a DustTrak, and the methane and H_2S monitoring was undertaken using a MultiRae. The results are shown in Table 20 and Table 21.

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 µm 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 24 hr period) is 50 µg/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 PM10 guideline. This is despite it being noted that at the time of the survey undertaken on 13 April 2022 that there was a very strong south easterly wind and capping activities were being undertaken. There were no landfill gas components detected at the time of either of the surveys when this monitoring was carried out.

Table 20 Ambient PM_{10} and methane survey results, 9 March 2022

Site	On or off site	Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
AIR001603	on-site	0	0	26
By old compost ponds	on-site	0	0	13
AIR001610	on-site	0	0	14
AIR001613	on-site	0	0	18

Site	On or off site	Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
By flare	on-site	0	0	25
AIR001612	off-site	0	0	18
AIR001615	off-site	0	0	17
Average		**0**	**0**	**19**

Table 21 Ambient PM_{10} and methane survey results, 13 April 2022

Site		Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
AIR001603	on-site	0	0	39
By old compost ponds	on-site	0	0	54
AIR001610	on-site	0	0	46
Beside flare	on-site	0	0	42
AIR001612	off-site	0	0	44
AIR001615	off-site	0	0	39
Average		**0**	**0**	**46**

2.5.3 Composting

In the past concerns have been raised about whether the material in each windrow had a plant derived matter content of at least 95% as required by consent conditions. These concerns were mostly directed at the acceptance of stock bedding which is a mixture of hay (or wood chips) and manure. To address this the Council clarified plant derived matter as being any plant derived material that has only been exposed to external degradation processes (and has not been partially or wholly ingested by any type of animal). This definition includes green waste, shredded green waste, humate, untreated woodchip/shavings, the plant derived component of animal litter (such as hay and wood shavings), and old existing compost stored on the site. This definition does not include paunch grass, or animal manure. It is however Council's position, that poultry, goat and horse manure are acceptable constituents of the 5% non-plant derived proportion of the windrows.

Changes occurred to the composting operations during the 2014-2015 year, due to a change in the contractor employed by EnviroWaste, who is the operator of the transfer station.

The main compost operator on site changed from Return2Earth to Revital.

During the 2019-2020 year, work was completed on preparing the southern end of the composting area to be used as a borrow area for landfill cover material, as discussed in Section 1.2. This work began by excavating the treatment ponds for the remaining composting area, which would then allow the extraction of cover material from this composting pad area. Plans were submitted to Council outlining the drainage that would be constructed to accommodate the relocated activity prior to any work being undertaken and this was installed. Revital relocated to the more southern end of the composting area during the 2020-2021 year.

During the 2021-2022 year, Revital moved to an off-site location. At the time of the February 2022 inspection it was found that the Company had removed all their material from the site. In summary, during the year under review, there were no issues raised with regards to the consent condition relating to the acceptable percentage of non-plant derived material. It was also considered, in general, the stormwater

from the composting areas was being managed such that compliance with the conditions of the stormwater discharge consents for the landfill was not being compromised by the composting activities, with no issues noted. No objectionable odours were found as a result of the composting activities, with only mild localised compost odours detected at two of the inspections. There were also no concerns raised relating to dust in this area.

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).

Table 22 and Table 25 give outlines of any incidents recorded, additional investigations, or interventions required by the Council in relation to NPDC's activities during the 2021-2022 period. The tables present a summary of all events that required further investigation or intervention regardless of whether these were found to be compliant or not. Table 22 summarises the matters first recorded in the 2021-2022 monitoring year, and Table 25 summarises any on-going matters from previous years. Where additional investigations were undertaken, they are reported in more detail following the tables.

Table 22 Summary table for incidents, investigations, and interventions commencing in the year under review

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
30-Jul-2021	During routine monitoring it was found that it was likely that sediment had discharged into stormwater from the Stage 3 landfill area at the Colson Road Landfill, New Plymouth.	N	N	A meeting was held with NPDC and the contractor. It was agreed that further works would be undertaken to ensure compliance with resource consent conditions. The works to be undertaken are outlined below. The site was considered to be compliant at the inspection undertaken on 8 October 2021. Improvements also made to the Erosion and Sediment Control Plan for the site.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
15-Dec-2021	Self-notification was received concerning an overflow from the Leachate Pond at Colson Road Landfill in New Plymouth. The overflow had started at 10.32pm and was still ongoing.	Y	N	An investigation found that following days of heavy rain, the leachate pond at Colson Road Landfill filled to a point where it overflowed into the Puremu Stream. Samples were collected for analysis. Resource consents 2370-3 and 4619-1 permit the discharge of minor amounts of leachate from the site. Sample results found that constituents in the discharge were compliant with resource consent conditions. A report was received from NPDC explaining the circumstances surrounding the discharge and mitigation actions undertaken This is summarised below.
14-Jan-2022	A complaint was received regarding dust on Colson Road in New Plymouth.	Y	N	At the time of investigation there was no activity occurring at the landfill and no dust was being discharged from the site.
17-Jun-2022	During routine monitoring it was found that the flare temperature had not been maintained above 750°C as required by resource consent conditions and the management plan for the operation of the flare, at the Colson Road Landfill, New Plymouth.	N	Letter of explanation	Investigation found that the flare had not consistently been maintained above 750°C for periods of time between 20 January 2022 and 29 May 2022. A letter of explanation was received and more information has been requested. Further information was received and the explanation was accepted, as suitable mitigation measures have been put in place. The Council is continuing to review the NPDC monitoring data from the flare to ensure that the mitigation measures implemented remain effective.
15-Jun-2022	During routine monitoring it was found that resource consent conditions were being contravened at the Colson Road Landfill in New Plymouth.	N	N	The site was not adequately stabilised for the winter period and some ponding was occurring in the Stage 3 area. The site was found to be compliant with consent conditions at the time of the inspection on 5 August 2022.

30 July 2021

During routine monitoring it was found that it was likely that sediment had discharged into stormwater from the Stage 3 landfill area at the Colson Road Landfill, New Plymouth. There was ponding and riling on the top part of the Stage 3 landfill area and there were some quite extensive areas where grass had either failed to establish or had been washed off. Further erosions and sediment control works were required to achieve compliance with conditions 9 and 11 of consent 6177-1.

Condition 9: 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.

Condition 11: requires the consent holder to 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.

A meeting was held with NPDC and the contractor. It was agreed that further works would be undertaken to ensure compliance with resource consent conditions. These further works included:

1. Re-stabilise the area at the top of the landfill where 90% cover has not been achieved. Stabilise other areas or a place silt fence at the base of those areas if access with vehicles is not practicable.
2. Cover areas where rilling has occurred to prevent further scour and erosion, or re-direct water to an area where rilling and erosion will not occur.
3. Install a series of weirs into the original eastern drain as per Waikato Erosion and Sediment Control Guidelines. Direct stormwater from the landfill to this drain at the earliest possible point and use a geotextile material at these discharge points to prevent scour of the bank. It was noted that the current drain was scouring and the sediment pit and silt fence had not been maintained. The use of the original wider channel will aid in reducing scouring within the drain itself (once the weirs are installed). The use of weirs in the original channel on the eastern side will aid in slowing the flow of water from site. This is key and fundamental to ensuring stormwater containing sediment is treated by "slowing the flow" and is a very useful tool on sites with steep gradients such as this one to stop further erosion. Please note that this is a recommendation only and other suitable sediment controls are also applicable if NPDC desires to use other methods.
4. All existing sediment and erosion controls onsite require maintenance and also on-going maintenance. Those pits within the perimeter of the landfill footprint need to be lined due to ponding/leaching concerns. It is important these remain functioning as they are still capturing sediment. It was evident that some controls have not been maintained for a significant period of time.
5. The use of silt fences within a stormwater drain that has concentrated flow is inappropriate and should be replaced with check dams/weirs that won't cause scour and erosion during heavy rainfall events.
6. The area at the top of the metalled access road (where it flattens out) receives stormwater from a number of different areas including unstabilised parts of the site. It would be good to see stockpiles controlled with silt fences or similar, or removed, and sediment controls installed prior to stormwater flowing into the roadside drain. The contractors' representative mentioned that there was a sediment pit, however this was not sighted by the inspecting officer. It was noted that the roadside drain had scoured significantly and would continue to. As discussed onsite, the use of gravel of various sizes placed within the drain would help to stabilise this issue, reduce the flow (speed) of stormwater and help to settle out sediment within these stones.
7. The pre-treatment pond may need modifications to improve sediment retention efficiency – for example, a stabilised weir type outlet.

The works were undertaken and the site was considered to be compliant with consent conditions at the time of the inspection on 8 October 2021. NPDC were instructed to continue to continue to undertake maintenance, stabilisation and address any areas of ponding as required to ensure continued compliance.

15 December 2021

Self-notification was received concerning an overflow from the Leachate Pond at Colson Road Landfill in New Plymouth. Sampling was carried out by both the Council and NPDC (Table 23 and Table 24). The NPDC investigation report was received on 24 December 2021.

In summary, mitigation measures undertaken by NPDC included closing the leachate valve from the Stage 3 landfill area the day before the overflow event to retain the leachate from this source within the landfill footprint to reduce the risk of an overflow. Closing this valve reduced the flow through the system to being only the leachate and contaminated groundwater from Stages 1 & 2. The overflow from the leachate pond to the small silt pond and Puremu Stream commenced as per the system design at 08:30 on 15 December

and continued until 18:20 on 18 December 2021. The retained leachate was not allowed to drain to the leachate pond until after the leachate flows from the Stage 1 & 2 areas had receded. The pump station operation was monitored to ensure the pumps continued to operate and divert as much leachate as possible to the sewer network throughout the event. The results of the samples collected on 15 December confirmed that the overflow contained only minor amounts of leachate and that the conditions of the consent were complied with.

It was concluded that, on this occasion, the leachate collection system operated as per the design and as permitted in resource consents during this event, and there were no significant effects noted in the receiving environment. However, the Council informed NPDC that going forward, changes may need to be made in terms of the on-going management of the site, bearing in mind the goal of minimising the number and duration of overflows from the system, and the impacts of climate change on the site. NPDC subsequently advised the Council that NPDC were planning to consider the effects associated with overflows as part of the consent renewal.

It was considered that this event complied with the conditions of the consent and no enforcement action was necessary.

Table 23 Results of samples collected by NPDC on 15 December 2021, during the leachate overflow

Analysis	Units	Leachate overflow pond	Outlet from silt pond into the Puremu Stream	Puremu Stream PMU000110	Consent limits 2370-3	Consent limits 4619-1
pH	pH units	6.5	6.5	7.1	6.5 – 8.5	6.5 – 8.5
Alkalinity	g/m^3	65	66	27	-	
Ammonia as 'N'	g/m^3	4.1	2.1	0.64	2.5	2
Suspended solids	g/m^3	<5	5	<5	-	-
BOD5	gO_2/m^3 $CBOD^5$	<3	<3	<3	-	-
Conductivity	mS/m	31.9	27.3	15.8	-	-
Chloride	g/m^3	39	36	21	-	-
Nitrite as 'N'	g/m^3	0.05	<0.20	<0.20	5	0.06
Nitrate as 'N'	g/m^3	2.9	0.3	0.06	10	
Cadmium	ppm soluble	<0.005	<0.005	<0.005	0.01 total	0.05 total
Chromium	ppm soluble	<0.005	<0.005	<0.005	0.1 total	1.0 total
Copper	ppm soluble	<0.005	<0.005	<0.005	0.2 total	0.5 total
Iron	ppm soluble	0.66	8.39	0.86	5.0 total	10 total
Lead	ppm soluble	<0.05	<0.05	<0.05	0.1 total	0.1 total
Manganese	ppm soluble	0.1	1.31	0.22	1.0 total	5.0 total
Nickel	ppm soluble	<0.005	<0.005	<0.005	-	
Zinc	ppm soluble	<0.05	<0.05	<0.05	2.0 total	2.4 total

Table 24 Results of samples collected by the Council on 15 December 2021, during the leachate overflow

Analysis	Units	Discharge	Puremu Stream - Upstream of discharge	Puremu Stream - Downstream of discharge
Free Ammonia	g/m^3	-	0.0042	0.0092
Turbidity	NTU	5.6	5.3	5.9
pH	pH units	7.1	7.2	7.1
Electrical Conductivity (EC)	mS/m	28.5	15.5	18.1
Total Suspended Solid	g/m^3	< 10 #1	-	-
Sample Temperature	°C	22	18.5	18.6
Total Ammoniacal-N	g/m^3	3.5	0.55	1.51
Carbonaceous Biochemical Oxygen	$g\ O_2/m^3$	< 2		
Total Biochemical Oxygen Demand	$g\ O_2/m^3$	-	< 2	< 2
Escherichia coli	cfu / 100mL	110	1,100	1,500
Total hydrocarbons	g/m^3	-	< 0.7	< 0.7

Table 25 Summary table for on-going incidents, investigations, and interventions

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
23-May-2018	During routine monitoring it was found that capping, compaction and vegetative cover in the Stage 2 area was insufficient to comply with resource consent conditions.	N	Abatement notice issued	Cap depth investigations by NPDC during the year under review found that the cap depth was insufficient in some areas. A remediation plan was developed and presented to the Council. An abatement notice, EAC-22506, was issued requiring that works be undertaken to ensure compliance by 15 March 2020. Extension of due date to 14 March 2021 approved to allow prioritisation of Stage 3 capping. Further extension to 14 March 2022 approved in 2020-2021 year. Further extension to 1 May 2023 granted due to delays caused by the wet weather in December and February and the impacts of COVID on the contracts staff availability, combined with the additional 0.76 ha outside the landfill footprint that was found to be in need of remedial works.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
21-Jul-2020	During analysis of data it was found that three groundwater monitoring bores were compromised and also 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 sites monitoring plan had not been identified and documented.	N	Abatement notices issued	NPDC have undertaken further investigation and have confirmed that non-compliant discharges are occurring. Compromised groundwater bores were replaced. Change to consent granted with respect to the bores that are required to be maintained. Abatement notice EAC-23543 was complied with. Investigations continued during the year under review. Management plan updated. Draft plan to be finalised. Early consent renewals to be sought to ensure compliance with abatement notice EAC-23544 by 30 April 2023

30 May 2018

During the 2021-2022 year, the earthworks consent was granted and required silt controls installed so that progress could be made on the mitigation works on the Stage 2 cap. During the preparatory work in this area it was found that refuse had previously been disposed of outside the known footprint of Stage 2, under the access road. This was added to the area for planned mitigation works which is identified as Access Road area C in Figure 29. During the year under review, Stage 2: Area A was completed.

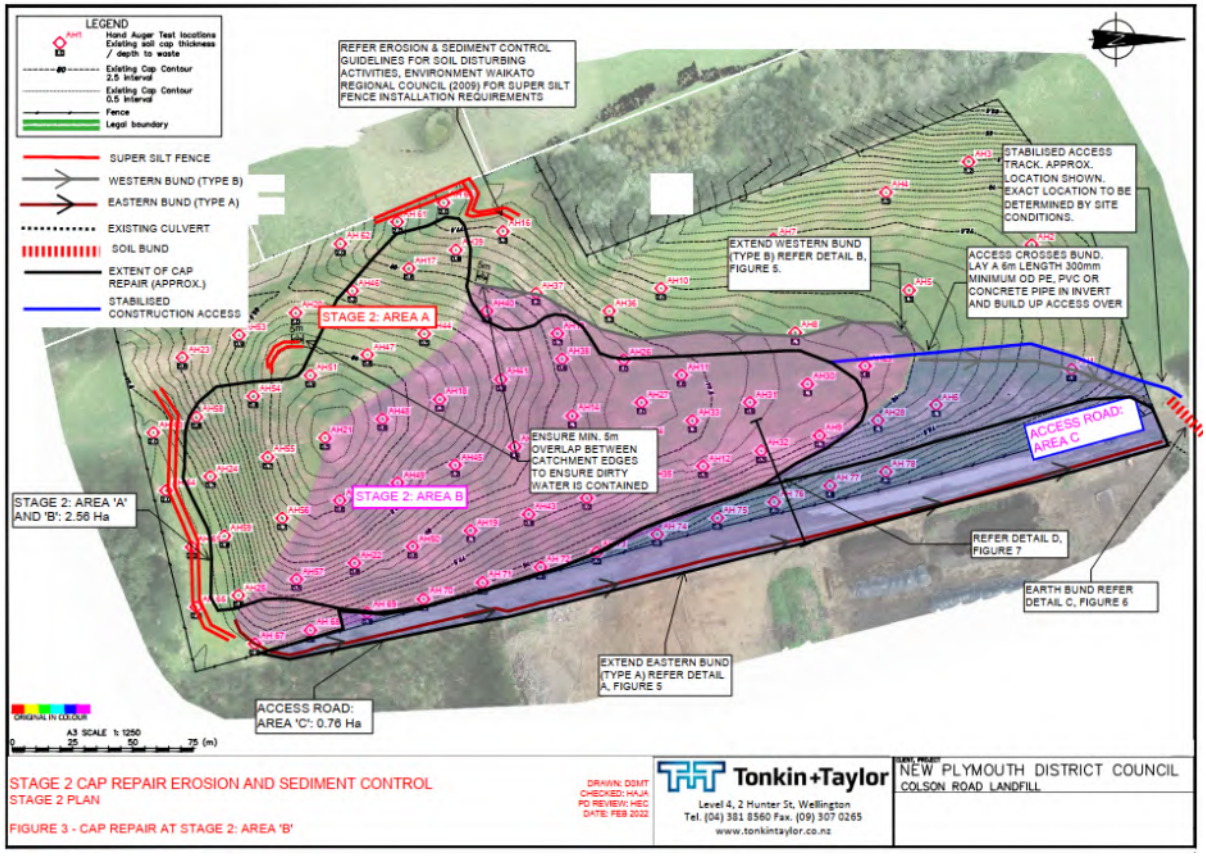

Figure 29 Phasing of Stage 2 cap repair

21 July 2020

During the 2019-2020 year NPDC commissioned a consultant to conduct a two part desk top study to:

- assess the Stage 3 under liner drainage, and if contamination is confirmed, identify possible sources of that groundwater contamination; and
- consider the effect of any contamination and options to address it.

The consultant's report covering the first part of this investigation was provided to Council following a meeting on 21 July 2020. This report identified that there were a significant number of parameters that either exceeded the calculated natural maximum values and/or showed increasing trends over time, suggesting that contamination of the groundwater collected by the under liner drain had occurred between 2008 and 2019. It was identified that the contamination appeared to originate from the landfill and that this was most likely to be as a result of leakage of leachate to the under liner drain. Further investigation was recommended to determine:

- The direction of groundwater flow by carrying out a hydrogeological assessment to determine if groundwater may be flowing offsite or whether it is being captured in the under liner drain;
- Whether the contamination noted in the groundwater discharged through the under liner drainage system or potentially migrating offsite in groundwater may be affecting the downstream/down gradient groundwater and surface water quality (including trend analysis on groundwater and surface water quality data); and
- Options to address groundwater and surface water quality impacts if necessary.

Special conditions 5 and 6 of consent 4621-1 states

8. *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.*
9. *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.*

It was found that the maximum natural variations had not been provided to Council. It was also noted that a similar requirement to set out guidelines for the determination of whether contamination is occurring in the surface waters that is contained in condition 5 of consent 4619-1 had also not been complied with.

A letter of explanation was requested and received in the 2021-2022 year.

The response was accompanied by a preliminary summary of the Part 2 investigation. The preliminary summary indicated that there may be some limited impact on groundwater quality beyond the underliner drain, however while some parameters have demonstrated increasing trends, these are only small increases and the contaminant levels remain below relevant water quality standards. The preliminary summary also indicated that where surface water samples have exceeded the water quality guidelines these were not considered to be the result of contaminants in the discharge from the underliner drain. Maximum limits for calculated natural variation had also been determined. NPDC proposed that, considering the change in landfill activity following closure in October 2020, it is logical to review monitoring requirements and align groundwater bore locations with proposed monitoring to ensure the programme is fit for purpose. As NPDC is committed to ensuring compliance with resource consent requirements, the following timeline was proposed to the identified matters and any further recommendations from Part 2 and 3 of the investigation:

Table 26 Proposed timeline for resolution of consent 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
Lodge renewal applications for the landfill consents that are due to expire in June 2025	2022	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 30 April 2023

Following receipt of the Part 2 report two abatement notices were issued.

Initially, abatement notice EAC-23543 was issued requiring that works be undertaken to comply with condition 1 of consent 4621-1 by 30 April 2021. This consent condition lists specific bores that are required to be maintained including several bores that were within the landfill footprint that have been appropriately retired. It was agreed that the three compromised bores would be replaced either at the same location or, in the case of the control bore, at a suitable alternative location. A change to consent was granted and the bores were installed. This abatement notice was complied with during the year under review.

Initially, abatement notice EAC-23544 was issued requiring that works be undertaken to comply with conditions 5 and 6 of consent 4621-1 and condition 5 of consent 4619-1 by 30 April 2021.

In summary, the Part 2 investigation found that groundwater and surface water analytical results indicated a likely release of contaminants associated with the landfill beneath the Stage 3 liner, and although the under liner drain provides a preferential pathway, some groundwater may bypass the drain and travel north-northwest with the natural flow of groundwater. Analysis of the groundwater data suggested that the impact on groundwater quality down gradient of Stage 3 is relatively minor and unlikely to present a human health risk. Parameters that do exhibit an increasing trend are generally at low levels and do not indicate imminent or near-future exceedances of the drinking water standards. It was concluded that discharges from Stage 3 were not significantly degrading water quality in either down gradient groundwater or the downstream Puremu Stream. On this basis, immediate remedial action was not considered necessary. The consultant recommended ongoing monitoring and assessment to determine any future need for remedial action.

The Part 3 investigation focused on developing a site-wide monitoring programme that considers the site conditions characterised in Part 1 and is protective of the receptors identified in Part 2. Additionally, NPDC requested an assessment of suitable locations for monitoring wells to replace the three damaged wells. The scope of work was as follows:

Developing a recommended site-wide monitoring programme comprising:

- Appropriate monitoring locations for surface water and groundwater that provide suitable coverage.
- A targeted list of analytes based on historical concentrations and typical leachate constituents;
- Appropriate response procedures in the event of an exceedance of a trigger value and/or consent limit; and
- A stepped reduction in monitoring frequency, in accordance with Ministry for the Environment (MfE) guidance.
- Identifying appropriate consent limits for surface water and groundwater, that are protective of likely receptors and based on published guidelines, and suitable "point of compliance" monitoring locations;
- Developing trigger values (TV) for surface water and groundwater to provide advance warning of contamination that may lead to a consent limit being exceeded in the future at the point of compliance;
- Recommending suitable locations for replacement monitoring wells.

It was determined that compliance with the abatement notice could not be achieved until there was a change to condition 5, as this condition contains a specific definition of "significantly affected" as being a change greater than the maximum natural variation. It is noted that this differs from the definition of a "significant effect" in the RMA. So, whilst this condition was deemed appropriate and agreed to by both NPDC and the submitters at the time the discharge application was processed, this may not be appropriate for the re-issued consents. This would be determined during the processing of the application for the replacement consents.

During the review of the Part 3 report by Council officers, there were a number of discussions focusing on ensuring that any monitoring programme addressed the necessary matters to ensure sufficient information was available to support an assessment of environmental effects to support a consent application, as previously outlined in Section 1.4.1.

Council agreed that the timing of the early application to renew the landfill consents could be revised to ensure that there is sufficient information available to inform the assessment of environmental effects and to allow pre-application consultation. A schedule was provided by NPDC that outlined the timeframes for the various activities that would need to be undertaken during the preparation to lodge the consent replacement application. Based on this schedule a request was made to extend the deadline on the abatement notice to 30 April 2023. This was approved by Council. NPDC continued to progress the work outlined in the schedule during the year under review.

3 Discussion

3.1 Discussion of site performance

At inspection there were aspects of the site operations that continued to be well managed. These included:

- Maintenance of the sediment retention pond to treat stormwater from the "borrow" area. The catchment area of this pond was also modified to treat the stormwater from the earthworks required to remediate the Stage 2 cap.
- Maintenance of the pre-treatment pond and large silt pond;
- Maintenance of the grate on the inlet to the SPCA driveway;
- Odour control; and
- Dust control.

During the year under review progress was made on:

- the capping of Stage 2 in order to comply with the abatement notice issued in February 2019;
- the capping on Stage 3; and
- the works required in order to comply with the abatement notice issued in September 2020.

In relation to matters arising during the year under review, non-compliances related to erosion and sediment control were found at the time of inspections undertaken at both the start and end of the monitoring year. The matters identified were addressed, however at a number of inspections issues relating to the maintenance of erosions and sediment control were identified. Following these inspections NPDC was instructed to undertake works, as required, to ensure on-going compliance.

The diversion of the pipework under Stage 1B that allowed the discharge of leachate, contaminated stormwater and groundwater to the small silt ponds resulted in a marked improvement in the quality of the stormwater discharged from these ponds (STW001006). During the year under review samples collected from this monitoring location contained an elevated concentration of ammoniacal nitrogen only at the time of the wet weather sample collected on 11 October 2021 (prior to the diversion). The concentration of this parameter and also manganese were well below their respective historical medians at the time of the November and April surveys. There did however, continue to be elevated levels of manganese in the stormwater pond discharges, and receiving waters of the Puremu Stream, as discussed in Sections 2.3.3.2 and 3.2.

The activities in the composting area were managed effectively during the year under review.

NPDC experienced issues in maintaining the flare temperature above the required temperature during the year under review. The report provided to the Council indicated that this was due to a reduction in the volume of methane being generated in the landfill during dry periods. Analysis of the data provided by NPDC showed that when evaluated in terms of methane volumes per year, there has been an increase in the volume of methane being directed through the flare.

3.2 Environmental effects of exercise of consents

In the 2020-2021 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 that 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 data for the under liner drain analysis

performed by NPDC in the 2019-2022 years indicated that, for the most part, these trends have continued. The results show that the groundwater beneath the landfill has been "significantly affected" as defined by the conditions of the consent. However, these 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 are increasing in some of the bores, this would not currently be considered a significant adverse effect. As a result, in the short term, the groundwater and surface water monitoring related to this site has been expanded 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.

The faecal coliform concentrations exceeded the limit on consent 4619-1 on two occasions, however, the concentrations were also elevated upstream of the site, and therefore these were not considered to be substantiated non-compliances.

There was also one occasion on which the total manganese concentration was elevated, but could not be deemed a substantiated exceedance of the consent limit at the compliance point for discharges authorised by consent 2370 (PMU000110). This is the fourth time in the last three years that the total manganese concentration has been at, or above, consent limit. It is noted that total manganese has been monitored at this point only since the 2013-2014 year. The historical results for the more bioavailable dissolved manganese are shown in Figure 30. Due to the data gaps, it is too early to confidently comment on whether this is part of an emerging trend of increasing concentrations at this site. The trend of increasing manganese concentration at site PMU000109 is continuing. However, this monitoring site is inside the mixing zone and therefore not a compliance issue. This suggest that NPDC may want to investigate this further to ensure continued consent compliance at site PMU000113. In order to assist data interpretation monitoring of the manganese concentration in the discharges from the stormwater ponds commenced in the 2020-2021 year.

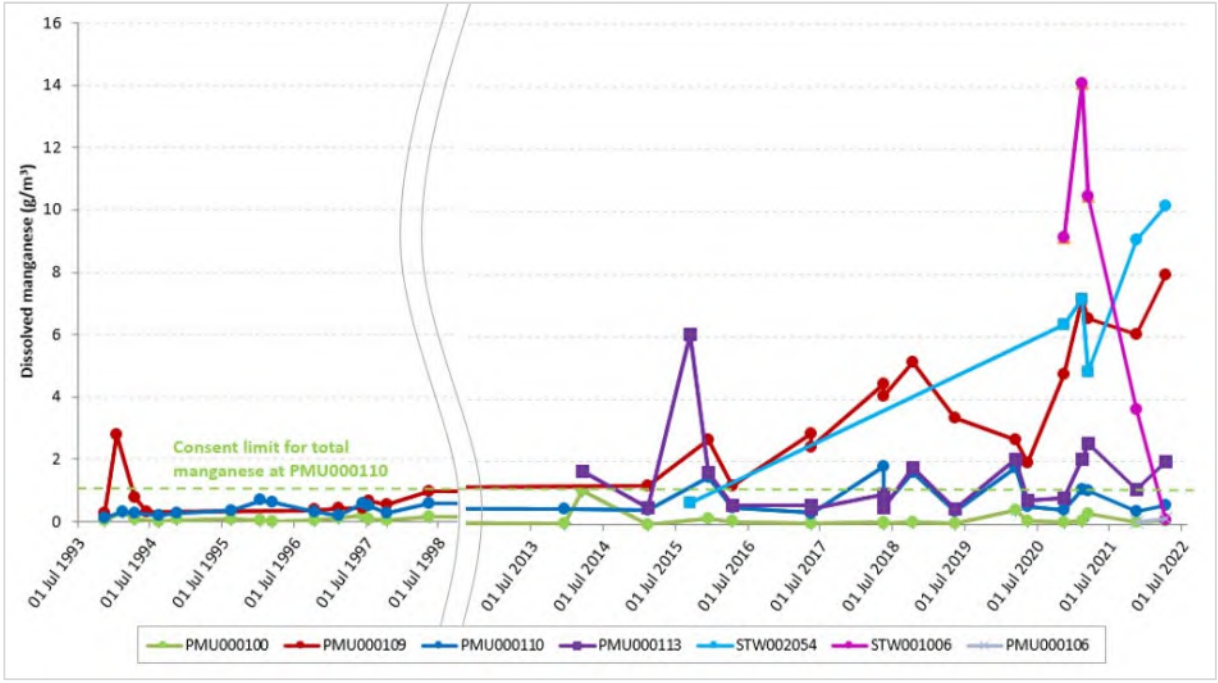

Figure 30 Dissolved manganese concentrations in the wetland polishing area and Puremu Stream

There was one leachate overflow to the Puremu Stream during the year under review. Sample results showed that there were only minor amounts of leachate in the discharge and that the consent parameter

limits were complied with. Therefore, although this was investigated, it was not considered to be an unauthorised discharge.

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 and some other parameters 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.

All ambient deposited particulate levels obtained were below the Council guideline level for dust deposition in residential areas (0.13 g/m^2/day). Therefore, based on the results of the deposition gauge surveys undertaken during the period under review, it is unlikely that landfill is causing off site dust deposition levels that exceed the guideline. Suspended particulate readings also indicate that the landfill is complying with off-site National Environmental Standard for PM_{10}. There was one dust complaint received by Council during the year under review in relation to the landfill site. This was not substantiated at the time of investigation.

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. There were no odour complaints received during the year under review. However, there was one non-compliance relating to the operation of the flare. It was found that there were periods during which the flare was not continually operated at above the required 750°C. This requirement, along with the residence time of the gasses in the flare, is in place to ensure that there is in the order of 90% destruction of the components that may be present in the LFG. No significant adverse effects were found as a result of this non-compliance and NPDC have put measures in place aimed at preventing a reoccurrence.

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 27 to Table 34.

Table 27 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 28 Summary of performance for contaminated stormwater and leachate consent 2370-3

Purpose: *To discharge up to 1,000 m³/day [5 L/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	No. Following attempted remediation, cap still needs to be re-contoured and cap thickness addressed. Abatement notice extended to May 2023
2. Consent undertaken in accordance with information supplied in the application	Site inspection and review of documentation on file	No. As per condition 1
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	No. As per condition 1
8. Maintain a landfill capping barrier and vegetative cover	Site inspection (Stages 1 & 2)	No. As per condition 1
9. Area is closed and managed in accordance with the management plan	Site inspection and review of documentation on file	No. As per condition 1
10. Maintain drains, ponds and contours on site to minimise unwanted water movement and ponding on site	Site inspections	No. As per condition 1
11. No cleaning or hosing out of refuse vehicles on site	Site inspections	Yes
12. The mixing zone extends downstream from the culvert outlet to 2 m above the confluence between the Puremu Stream and its tributary	N/A	N/A

Purpose: *To discharge up to 1,000 m³/day [5 L/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?**
13. 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 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
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 Overall assessment of administrative performance in respect of this consent		**Improvement required** **Improvement required**

Table 29 Summary of performance for Consent 4619-1 treated stormwater and leachate discharge

Purpose: *To discharge up to 675 L/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

Purpose: *To discharge up to 675 L/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?**
3. 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 inspection and water sampling	Yes
4. Operate according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan July 1994', or subsequent versions with no less environmental protection. Plan to be updated at not greater than yearly intervals	Site inspection and review of documentation on file. Draft plan on file dated August 2021	Further update to plan required following work to identify criteria (see condition 5). Draft plan still to be finalised
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. Draft plan on file dated August 2021	Further update to plan required following work to identify criteria (see condition 5). Draft plan still to be finalised
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 Overall assessment of administrative performance in respect of this consent		**Good** **Improvement required**

N/A = not applicable

Table 30 Summary of performance for uncontaminated stormwater consent 4620-1

Purpose: *To discharge up to 675 L/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

Purpose: *To discharge up to 675 L/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?**
2. Discharge to have pH 6.5-8.5, maximum suspended solids 100 g/m^3, and maximum ammoniacal nitrogen 0.5 g/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
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 July 1994', or subsequent versions with no less environmental protection. Plan to be updated at not greater than yearly intervals	Site inspection and review of documentation on file. Draft plan on file dated August 2021	Draft plan still to be finalised
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. Draft plan on file dated August 2021	Further update to plan required following work to identify criteria. Draft plan still to be finalised
12. Consent will lapse after six years if not exercised	N/A, consent has been exercised	N/A

Purpose: *To discharge up to 675 L/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?**
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		**Good**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = not applicable

Table 31 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 to determine changes in groundwater quality. New bores to be installed to NZS 4411:2001 at locations and depths approved by Council	Sampling and liaison with consent holder	NPDC and TRC agreeing location and depth for a replacement bore for GND0572
2. Prevent surface runoff into the Manganaha Stream from any area used or previously 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
5. Mitigate if spring and/or groundwater "significantly affected". Defined as increase above natural variation. Criteria to be set out in plan produced under condition 6	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.	Early consent renewals to be sought to ensure compliance with abatement notice EAC-23544 by 30 April 2023

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?**
6. Maintain and comply with a monitoring programme	Review of documentation on file. Monitoring programme is provided in Landfill Management Plan	Guidelines for determining if contamination is occurring were not identified. Work has commenced to rectify this. To be provided in next plan update. Draft plan still to be finalised
7. Operate according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan July 1994', or subsequent versions with no less environmental protection. Plan to be updated at not greater than yearly intervals	Site inspection and review of documentation on file. Plan on file dated August 2019	Further update to plan required following work to identify criteria (see conditions 5 and 6). To be provided in next plan update. Draft plan still to be finalised
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	N/A, 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		**Improvement required**

N/A = not applicable

Table 32 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	Site inspection and liaison with consent holder	Yes
2. No offensive odours	Air surveys	Yes

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?**
3. No adverse ecological effects on any ecosystem	Site inspection, sampling, and neighbourhood surveys	Yes
4. Materials accepted for composting comply with the 'Assessment of Discharges to Air' July 1994 and the New Plymouth District Council Colson Road Landfill Management Plan July 1994	Site inspection	Yes
5. All composting to occur at least 300 m from any dwelling existing as of 21 March 1999	Site inspections	Yes
6. Composting piles must consist of no less than 95% plant-derived material	Site inspections and visual assessment	Yes
7. Composting to occur on a trial basis until the consent is approved or reviewed on receipt of a full report	N/A	N/A
8. Consent will lapse after six years if not exercised	N/A, consent has been exercised	N/A
9. 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		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 33 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 within three months of landfill gas flare operation commencing and annually thereafter	Data provided	Yes
2. Provision of as built plans and suppliers operating instructions within three months of operation of the flare	Data provided	Yes

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?**
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	Management plan revised, and is supported by a separate flare specific document (SW-G-20)	Yes
4. Best practicable option (BPO) to prevent or minimise adverse effects on the environment	Site inspection, air surveys, complaint response	No. See condition 9
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 200 m of any boundary	Site inspection	Yes
9. Comply with 'Air Discharge Consent Application Supporting Documentation' and according to the 'New Plymouth District Council Colson Road Landfill: Landfill Management Plan July 1994, or subsequent versions with no less environmental protection. Plan to be updated at not greater than yearly intervals	Site inspection and review of documentation on file. Plan on file dated June 2018. Plan review in progress to accommodate special waste only considerations	No. Flare not consistently maintained above 750°C for periods of time between 20 January 2022 and 29 May 2022
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	Review of documentation on file. Compliance previously achieved, as report had been received	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

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?**
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = Not applicable

Table 34 Summary of performance for earthworks stormwater consent 6177-1, to 12 October 2021

Purpose*: 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*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge quality within specified parameters	Site inspection and sampling	Not able to assess as discharge is mixed with that of consent 4619
2. No leachate discharged	Site inspection	Yes
3. Maintenance of drains to prevent erosion and sedimentation	Site inspections	Yes
4. No conspicuous effect on clarity or colour of receiving waters	Site inspection and sampling	Yes
5. No significant effect on aquatic life	Site inspection, sampling and biomonitoring	Yes
6. Monitoring to satisfaction of the Council	Site inspection, sampling and data review	Yes
7. Preparation and maintenance of management and site contingency plans	Review of Council records and liaison with consent holder	Yes
8. Sediment and erosion management plan	Erosion and sediment control analysis provided.	Yes
9. Adopt best practice	Site inspection and liaison with content holder	No. There was ponding and riling on the top part of the Stage 3 landfill area. There were some quite extensive areas where grass had either failed to establish or had been washed off

Purpose: *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*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. Rehabilitation of disturbed areas	Site inspection	Yes
11. Maintain stormwater system to prevent ponding and overland flow	Site inspection	No. As per condition 9
12. Receiving waters not adversely affected	Site inspection, sampling and biomonitoring	Yes
13. Provision for review	Consent expired. Renewal application received	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **Improvement required**

N/A = Not applicable

Table 35 Summary of performance for earthworks stormwater consent 6177-2.0, from 13 October 2021

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	No. As per conditions 2, 11, 12 and 14
2. Site to be managed in accordance with a certified Soil Erosion and Sediment Control Plan (ESCP)	Site inspection	No Ponding in several areas, insufficient stabilisation, silt build-up in NE drain, silt fence above north face needed maintenance at June inspection. ESCP also needed to be updated to include contingency
3. Principal to be appointed and contact details to be provided to Council	Check of Council records	Yes
4. Pre-construction site meeting to be held	Site inspections	Yes

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?**
5. Up to date copy of certified ESCP to be kept available on site	Site inspection	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 (pond 1) not to exceed 100 gm^{-3}	Visual assessment at site inspection, sampling by Council and NPDC	Yes
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	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 possible and within a period not exceeding five days after completion of any phase authorised by this resource consent	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	No. Insufficient stabilisation at June 2022 inspection
12. Stabilisation must be undertaken by providing adequate measures to achieve immediate stabilisation. Requirement to maintain this until vegetation is sufficiently established to prevents erosion and prevents sediment from entering any water body	Site inspection	No. Insufficient stabilisation at June 2022 inspection
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. A copy of the forum collaboration agreement shall be provided to the Council	Liaison with the consent holder and review of Council records.	Yes
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	Extension to 31 May 2022 granted. Site inspection and liaison with consent holder	No. Insufficient stabilisation at June 2022 inspection

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?**
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	Review at June 2022 opportunity not required. No further opportunities prior to June 2025 expiry	N/A
17. Additional opportunity for review within 3 months of any ESCP update if it is determined that the 100 gm^{-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 Overall assessment of administrative performance in respect of this consent		**Good** **Improvement required**

Table 36 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	No. Area not stabilised as per plan
2. Adopt best practice	Site inspection	No. Best practice would be having borrow area stabilised for winter. It is noted that NPDC plan to do this using a polymer but that there have been supply issues followed by inability to apply due to wet weather
3. Notification of commencement required	Review of Council records	Yes

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?**
4. Site and stormwater to be managed as per NPDC Soil Erosion and Sediment Control Plan	Site inspection	No. Area not stabilised as per plan
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	Previously complied with	N/A
7. Sediment control measures to be installed prior to works other than construction of sediment control pond	Site inspection	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 100 g/m^3 from "large silt pond"	Visual assessment at inspection and sampling	Yes
10. Provision for review	Next opportunity to review June 2022	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		**Improvement required**

N/A = Not applicable

Table 37 Summary of performance for earthworks stormwater consent 10912-1.0, from 13 October 2021

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 2.6 ha	Site inspection and liaison with content holder	Yes
2. Adopt best practice	Site inspection and liaison with content holder	Yes
3. Site to be managed in accordance with a certified Soil Erosion and Sediment Control Plan (ESCP)	Site inspection	Yes

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?**
4. Principal to be appointed and contact details to be provided to Council	Check of Council records	Yes
5. Pre-construction site meeting to be held	Site inspections	Yes
6. Up to date copy of certified ESCP to be kept available on site	Site inspection	Yes
7. As built certification statements to be provided before commencement of bulk earthworks	Site inspection and check of Council records	Yes
8. Discharge of untreated stormwater from unstabilised areas prohibited	Site inspection	Yes
9. Suspended solids concentration in combined discharges from the site not to exceed 100 gm^{-3}. Assessed at point of discharge to neighbouring properties or at discharge point from SRP (pond 1)	Visual assessment at site inspection, sampling by Council and NPDC	Yes
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	Review and certification of ESCP, as built certification statements and site inspection	Yes
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)	Site inspection	Yes
12. Progressive stabilisation to a specified standard to be completed as soon as practically possible and within a period not exceeding five days after completion of any phase authorised by this resource consent	Site inspection and liaison with consent holder	Yes
13. Further to condition 12, 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

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?**
14. Stabilisation must be undertaken by providing adequate measures to achieve immediate stabilisation. Requirement to maintain this until vegetation is sufficiently established to prevents erosion and prevents sediment from entering any water body	Site inspection	Yes
15. 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. A copy of the forum collaboration agreement shall be provided to the Council	Liaison with the consent holder and review of Council records.	Yes
16. Except as provided for in condition 15 no earthworks shall occur, and all exposed areas shall be stabilised between 1 May and 1 October	Site inspection and liaison with consent holder	Extension to 31 May 2022 requested on 28 April. This was granted
17. Provision for review	Review at June 2022 opportunity not required. No further opportunities prior to June 2025 expiry	N/A
18. Additional opportunity for review within 3 months of any ESCP update if it is determined that the 100 gm^{-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		**High**
Overall assessment of administrative performance in respect of this consent		**Good**

Overall, NPDC demonstrated a good level of environmental performance, however an improvement is required in their administrative performance and compliance with the resource consents as defined in Appendix II. During the year under review there were on-going, and still unresolved, issues with the compliance of the cap on Stage 2, with an abatement notice in place requiring the works to be undertaken by 1 May 2022. The abatement notices issued during the 2020-2021 year in relation to water quality changes in the groundwater in the under liner drain, and monitoring plan requirements are still in effect with works required to be undertaken by 30 April 2023. 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. Monitoring requirements have been revised and evaluation is on-going. Additional investigations are also being undertaken by NPDC, when required, to ensure that any appropriate interventions are implemented where improvements are required. There were two non-compliances during the year under review in relation to inadequate localised erosion and sediment controls. There was one non-compliance in relation to the landfill gas flare not being

continuously operated above the required temperature. There were no significant adverse effects found as a result of these non-compliances.

Table 38 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement required	Poor	N/A
2012-13	0226-1, 2370-3, 4622-1, 4779-1	4	-	-	-	
	6177-1	-	1	-	-	
	4619-1, 4620-1, 4621-1	-	-	3	-	
2013-14	0226-1, 4779-1, 4620-1, 4619-1, 2370-3, 4622-1, 4621-1, 6177-1	8	-	-	-	
2014-15	0226-1, 2370-3, 4619-1, 4622-1	4	-	-	-	
	4620-1, 4621-1, 6177-1	-	3	-	-	
	4779-1	-	-	1	-	
2015-16	0226-1, 4622-1, 6177-1	3	-	-	-	
	2370-3	-	1	-	-	
	4619-1, 4620-1, 4621-1	-	-	3	-	
	4779-1	-	-	-	1	
2016-17	0226-1, 4620-1, 4621-1, 4622-1, 6177-1	5	-	-	-	
	2370-3, 4619-1, 4779-1 (4779-1.1)	-	3	-	-	
2017-18	0226-1, 4622-1, 4779-1, 6177-1	4	-	-	-	
	4619-1, 4620-1, 4621-1	-	3	-	-	
	2370-3	-	-	1	-	
2018-19	0226-1, 4620-1, 4622-1, 4779-1.1, 6177-1, 10804-1.0	6	-	-	-	
	4619-1, 4621-1	-	2	-	-	
	2370-3	-	-	1	-	
2019-20	0226-1, 4622-1, 4779-1.1, 6177-1, 10804-1.0	5	-	-	-	
	4619-1, 4621-1	-	2	-	-	
	2370-3	-	-	1	-	
	4620-1	-	-	-	-	1
2020-21	0226-1, 4622-1, 4779-1.1, 6177-1, 10804-1.0	6	-	-	-	-
	4620-1, 4621-1	-	2	-	-	-
	2370-3, 4619-1	-	-	2	-	-

Year	Consent no	High	Good	Improvement required	Poor	N/A
Totals		45	17	12	1	1

3.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. That in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2021-2022 year be amended from that of 2020-2021 by the inclusion of two additional groundwater sites and one surface water site with a more comprehensive range of parameters determined.
2. That a second groundwater survey be undertaken analysing for a range of indicator parameters to ascertain the extent of any seasonal variation that may be occurring.
3. That should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
4. That the NPDC complete the investigations and review of the Landfill Management Plan to ensure that the criteria for determining whether any contamination is occurring that is greater than the natural variation be included along with measures 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.
5. That on two of the regular sampling occasions per year NPDC undertake comprehensive monitoring of the Stage 1 & 2 leachate, the Stage 3 leachate and the under liner drain.

Recommendations two and five were fully implemented by Council. Recommendation one was partially implemented. Bore GND0572 was found to be compromised and NPDC and the Council are in the process of agreeing the alternative location and depths for the replacement bore. NPDC is continuing towards implementation of recommendation 4. With regards to recommendation 3, additional investigations were undertaken as required during the year under review.

3.5 Alterations to monitoring programmes for 2022-2023

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.

Planned changes for the 2022-2023 monitoring programme include the replacement of biomonitoring site PMU000104 with site PMU000106, as outlined in Section 2.3.4.1 and in the recommendations of the biomonitoring reports.

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 2022-2023.

4 Recommendations

1. That in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2022-2023 year be amended from that of 2021-2022 by the replacement of biomonitoring site PMU000104 with site PMU000106.
2. That should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. That the NPDC continue with the review of the Landfill Management Plan 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.
4. NPDC replace bore GND0572.
5. That NPDC establish and confirm 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 consent renewal applications.

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 mS/m.
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.
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.
fresh	Elevated flow in a stream, such as after heavy rainfall.
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.
L/s	Litres per second.
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.
LFG	Landfill gas, a complex mixture of gaseous components produced as the refuse decomposes.
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.
mS/m	Millisiemens per metre.
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 7 times the width of the stream at the discharge point.
Moxie	A large earthmoving truck.
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).
NLG	Neighbourhood liaison group.
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}	Relatively fine airborne particles (less than 10 micrometre diameter).
ppm	Parts per million on a volume/volume basis.
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 subsequent amendments.
SS	Suspended solids.
SVOC	Semi-volatile organic compounds
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
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 Environmental 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

Consent 2370-3

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 Private Bag 2025 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 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 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
	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 1.3 gm^{-3} for pH between 7.75-8.00 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	
[dry weather conditions]	10 gm^{-3}
[wet weather conditions]	10% of upstream concentration

	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 Private Bag 2025 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

TRK994622

TARANAKI REGIONAL COUNCIL
PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

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 PRIVATE BAG 2025 NEW PLYMOUTH
Consent Granted Date:	21 March 1999

CONDITIONS OF CONSENT

Consent Granted:	TO DISCHARGE EMISSIONS INTO THE AIR FROM COMPOSTING AND ANCILLARY ACTIVITIES AT THE COLSON ROAD LANDFILL AT OR ABOUT GR: P19:074-372
Expiry Date:	1 June 2025
Review Date[s]:	June 2006, June 2012 and June 2018
Site Location:	COLSON ROAD LANDFILL, COLSON ROAD, NEW PLYMOUTH
Legal Description:	SEC 223 HUA DIST BLK VI PARITUTU SD

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

TRK994622

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 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 composting 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 condition 9 of this consent.

2. THAT the discharge of contaminants into the air from the composting operation shall not result in offensive or objectionable odours or dust or dangerous or noxious ambient concentrations of any airborne contaminant in the opinion of an enforcement officer of the Taranaki Regional Council, at or beyond the boundary of the site.

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

4. THAT the nature of materials accepted for composting and the operation of the composting activities shall give effect to the 'Assessment of Discharges to Air' July 1994, prepared for the New Plymouth District Council by Woodward-Clyde [in particular, but not exclusively, section 2.2.2] and the New Plymouth District Council Colson Road Landfill Management Plan July 1994 [in particular, but not exclusively, section 5.9.6 and Figure 1 of Appendix A] 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 any composting pile or windrow shall be located at least 300 metres from any dwellinghouse existing as of 21 March 1999.

6. THAT the maximum proportion of a composting windrow or pile comprising other than plant-derived material shall not exceed 5% by weight.

7. THAT the composting operation shall initially be undertaken on a trial basis. After at least six, but not more than nine, months of operation, the consent holder shall report to the Taranaki Regional Council on trial, noting particularly the results of operation and effects-based monitoring, and recording any complaints received about odour from composting. Upon receipt of that report, the Taranaki Regional Council may either approve the continuation of composting, or require a review of this consent pursuant to section 128(1)(a) of the Resource Management Act 1991.

8. 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.

9. 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, 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.

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 Private Bag 2025 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) 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

_____

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 Private Bag 2025 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 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 100gm^{-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) 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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www.facebook.com/TaranakiRegionalCouncil twitter.com/TaranakiRC
Please quote our document number in your reply

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

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 Private Bag 2025 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

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) 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.