NPDC Colson Road Landfill
Monitoring Programme
Annual Report
2018-2019

Technical Report 2019-45

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Taranaki Regional Council
Private Bag 713
STRATFORD

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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. During the year under review, the landfill was continuing to fill Stage 3 of the site which has a design capacity of approximately 800,000 cubic metres. Stages 1 and 2 have been closed and are fully reinstated. This report for the period July 2018 to June 2019 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 eight resource consents, which include a total of 105 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 leachate and contaminated stormwater into the Puremu Stream, two consents to discharge emissions into the air, one consent to discharge solids onto and into land and one consent to discharge stormwater from earthworks. NPDC also holds one consent to divert water.

The Council's monitoring programme for the year under review included 12 inspections, eight stormwater/discharge samples, 18 surface water samples, six groundwater samples, two biomonitoring surveys of receiving waters, and three ambient air quality surveys. NPDC also collected five leachate samples and four under-liner drainage samples for physicochemical analysis.

At inspection issues were found in regards to site management, although most of them were attended to and none resulted in significant off site effects. The issue of cap management and maintenance on Stage 2 remained unresolved at the end of the monitoring period, however, extensive investigations into the cap depth and compaction were carried out 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.

Groundwater and under liner drainage sampling indicated that there is no significant contamination occurring in the local aquifer as a result of the landfill's presence, although there may be emerging trends of increasing, but still low level, concentrations of chloride and nitrate/nitrite nitrogen in some bores and ammoniacal nitrogen in the under liner drainage.

Chemical and bacteriological monitoring of the Puremu and Manganaha Streams found that the receiving water quality criteria on the consents were met at the time of the three sampling surveys with the exception of one manganese result, one ammoniacal nitrogen result and two faecal coliform counts in the Puremu Stream. The manganese and ammoniacal nitrogen results were below the levels expected to result in significant adverse effects due to the conditions prevailing at the time of the surveys, and it was concluded that there were other off site influences resulting in the elevated faecal coliform counts.

The results of biological monitoring indicated that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site had not had any detrimental effect on the macroinvertebrate communities of the Manganaha Stream. However, the results in the Puremu Stream and tributary indicate there may be impacts in this stream. The effects found inside the mixing zone were attributed to the discharge of sediment from the landfill, however the effects occurring beyond the mixing zone could not be solely and completely attributed to the landfill discharges. Due to the fact that the compliance point given in the consent is on the site boundary, at which point the Stream is piped, the downstream monitoring point is also downstream of other site discharges and further investigation is required.

Air quality monitoring showed that off-site 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 was only one unsubstantiated odour complaint received during the 2018-2019 period that was potentially associated with the Colson Road landfill. At the time of investigation only noticeable and intermittent odours were found, and these were dissipating.

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 Section 1.1.4. 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 15 March 2020. Although there may be some changes occurring in the receiving water quality below this area with regard to the manganese concentration, with one consent non-compliance recorded, it is not considered to be a significant adverse effect at this point in time. Biomonitoring found that there were effects on the macroinvertebrate communities inside the mixing zone as a result of the discharge of sediment from the site. There were also effects found at the compliance point, however there are other potential contributing sources at this location, so this could not be attributed to the landfill discharges.

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% 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 continued to improve in the year under review, however there is still an improvement required with their administrative performance and compliance with some consent conditions.

This report includes recommendations for the 2019-2020 year, including a recommendation relating to an optional review of consent 2370-3.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2018 to June 2019 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by New Plymouth District Council (NPDC). NPDC operates a regional landfill situated on Colson Road, New Plymouth, in the Waiwhakaiho catchment.

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 19th 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;
- 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 2019-2020 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 Company, this report also assigns them a rating for their environmental and administrative performance during the period under review.

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.

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.[1]

1.2 Process description

Wastes originating from municipal refuse kerbside collection, the Colson Road transfer station, other municipal transfer stations and commercial operators are discharged to the landfill. As of December 2007 Colson Road became the sole operating landfill in the Taranaki region. Once the waste is discharged it is compacted and, according to the management plan, covered daily with clay or a suitable alternative. During the year under review, waste was discharged to Stage 3 of the operation, which was expected to operate as a municipal landfill until approximately August 2019. Once full, the area will be covered with clay and topsoil to a predetermined specification before being grassed. Leachate from Stages 2 and 3 is collected and directed to the New Plymouth wastewater treatment plant, along with contaminated stormwater from Stage 3. An aerial plan of the site is shown in Figure 1.

[1] The Council has used these compliance grading criteria for 15 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

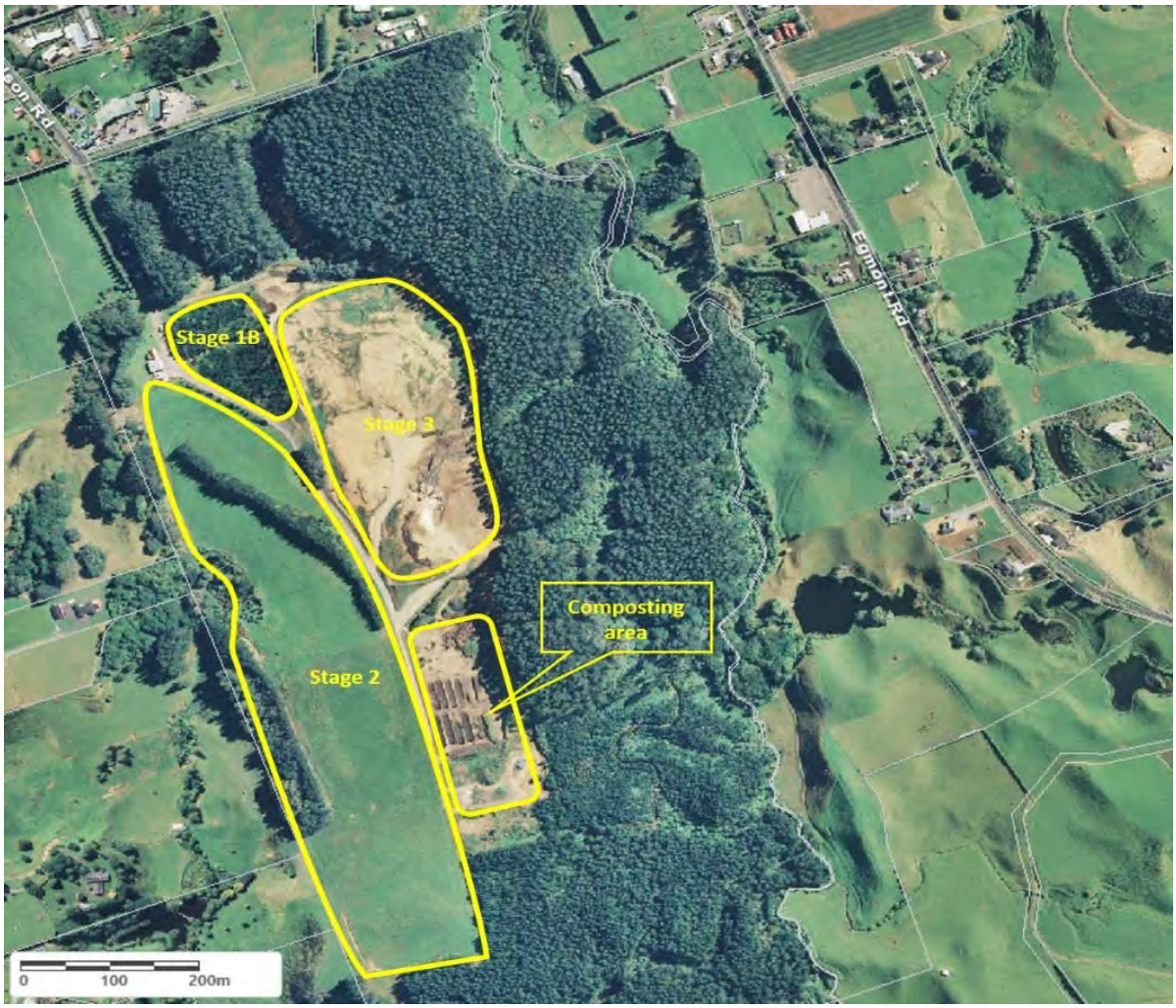

Figure 1 Aerial view of the Colson Road landfill

The current stage in use (Stage 3) has a fully engineered liner consisting of high density polyethylene (HPDE) laid over compacted clay. Leachate is collected in porous pipes that have been put down in herring bone configuration over the polyethylene liner. During the 2013-2014 year, the lining of Stage 3 was completed so that the liner covered Stage 3's entire footprint (Photo 1). 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. As the volumes of leachate/contaminated stormwater generated exceeded the instantaneous capacity of the pipe to the waste water treatment plant, the landfill was used as storage to prevent overflows to the Puremu Stream tributaries.

Daily operations at the site are governed by the requirements contained in the Colson Road Regional Landfill Management Plan.

Photo 1 Stage 3 extension works, February 2011

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. Mitigation measures undertaken by NPDC during the 2014-2015 year included the installation of fixed deodorant sprayers and an automated spray system, and capping of the lateral leachate lines. There was also on-going monitoring of ponding in the landfill foot print to ensure this remained minimal.

The report produced by the consultant in June 2015 identified a number of actions that could be undertaken at the site to improve odour management including:

1. Operational improvements
    a. Upgrade odour spray system
    b. Regular visual inspections to identify point sources of landfill gas or odour
    c. Modifications to leachate collection pipes as a point source of landfill gas
    d. Improve methodology for sludge disposal
2. Cap remediation particularly with intermediate cover and targeting any gas hotspots
3. Install a gas collection and disposal system

NPDC worked towards implementing the recommendations from the consultant report, with the first two stages involving operational improvements and cap remediation undertaken during the 2015-2016 and early 2016-2017 periods.

Specifically:

- Reticulation was improved to capture leachate breakouts and mitigate associated landfill gas venting.
- Regular visual walkover inspections were implemented by the operator.
- NPDC engaged a consultant to carry out outstanding work such as updating the site management plan, project managing further work to mitigate the point source discharges from the protruding leachate lines, following up on final cover being applied to areas that were at final level, and reviewing operational issues to feed into future versions of the management plan.
- Improvements were made to the fence mounted odour mitigating sprayers and the system was upgraded so that it could be automated.
- Trials of alternative spray on daily cover materials were carried out.
- A trial biofilter was installed on one of the protruding leachate lines.
- The volume and pressure of the landfill gas present in the leachate system was investigated.
- A preliminary design report was completed for the collection and treatment of landfill gas that could be extracted from the leachate lines and directed to either a biofilter or flare.
- Data was gathered to allow the special waste disposal practices to be reviewed, with wastes with less than 20% solids no longer being accepted after 31 July 2015 as per the site management plan.
- NPDC recognised that optimal operational performance could not be achieved under the current tender cost and in April 2016 the landfill operator contract was tendered with the intention of lifting operational performance.
- Daily cover practices were improved, with the new contractor opting to trial large metal covers that could be lifted onto compacted refuse at the end of one working day and lifted off at the start of the next.
- Intermediate cover was applied to all but a relatively small area that was to be completed as and when weather permitted.
- Clay was used to try to prevent fugitive emissions around leachate line protrusions.
- The large special waste 'lagoon' was remediated.

During 2017-2018 a fully enclosed gas flare was installed at the site as a mitigation measure for reducing odours at the landfill site. The landfill is approaching capacity and is due to close in 2019 but could continue to produce potentially odorous gas for up to 30 years.

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 2 Leachate pipes feeding into the gas collection system

Figure 2 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. This has resulted in no substantiated odour complaints being received in relation to the site since October 2017. There was only one unsubstantiated complaint that was received in September 2017, before the flare was installed and another unsubstantiated complaint post installation that was received on 18 August 2018.

Photo 3 The fully enclosed flare

Filling continued during the during the 2018-2019 year with the closure of the site to domestic refuse set to occur in early August 2019. Contouring and preparation work for the application of the final cap commenced. This included installing drainage around the composting area at the southern end of the site previously occupied by Return2Earth, to allowing Revital to relocate to that area so that additional cover

material could be safely accessed. The Council was informed 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 around how this could be managed in such a way as to continue to comply with the conditions of the existing consents.

Photo 4 Northern toe, April 2019

Photo 5 Northern toe, May 2019

Photo 6 Eastern side of filling area, May 2019

Photo 7 Temporary access road to tipping area and intermediate cover, May 2019

1.3 Resource consents

NPDC holds eight 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.

During the year, extensive consultation began regarding the NPDC proposal of operating the site for the disposal of special waste only after the disposal of general refuse was to cease on 2 August 2019. The consultation was required as the original application was for co-disposal of special waste alongside domestic refuse. Both NPDC and the Council sought the advice of technical experts to support the shaping of the proposal, and the decision making process. It was considered that this activity could be accommodated by the existing consents, provided the Management Plan was updated to include this practice, along with details of how the activity would be managed to ensure that this did not *"lessen the environmental protection standards"* (condition 7 consent 4621-1).

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 2020	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	-	June 2025
4620-1	To discharge uncontaminated stormwater from areas B1, B2, C1 and C2 into the Puremu Stream	March 1999	-	June 2025
6177-1	To discharge stormwater from earthworks	June 2003	-	June 2020
Air discharge permit				
4622-1	To discharge emissions to air from composting	March 1999	-	June 2025
4779-1	To discharge emissions to air from landfilling	Jan 2017	-	June 2026
Discharges of waste to land				
4621-1	To discharge contaminants onto and into land in areas B1, C1 and C2	Jan 2010	-	June 2025
Land use permits				
0226-1	To divert the Puremu Stream by placing a culvert to provide road access	Oct 1986	-	Oct 2026

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 Colson Road landfill site consisted of five primary components, as described in Sections 1.4.2 to 1.4.6. A summary is also provided in Table 2.

Table 2 Summary of monitoring activity for 2018-2019

Activity	Number
Inspections	12
Discharge samples	2
Stormwater samples	6
Receiving water samples	18
Groundwater samples	6
Air deposition samples	11
Ambient methane readings	14
Ambient PM_{10} readings	21
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.

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 plant 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 Company 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 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 3.

The Puremu Stream, Manganaha Stream, and stormwater were all sampled on three occasions during the period under review. The discharge from the composting area treatment system was sampled twice. The samples were analysed for a range of parameters including ammoniacal nitrogen, unionised ammonia, suspended solids, conductivity, and metals.

Groundwater in the vicinity of the landfill was sampled on one occasion. The groundwater sampling sites are shown in Figure 4. These bores were analysed for a range of physicochemical parameters including semi volatile organic compounds (SVOC) and metals.

1.4.5 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.

Three ambient suspended particulate and two methane surveys were also undertaken. The air monitoring sites are shown in Figure 5.

1.4.6 Biomonitoring surveys

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

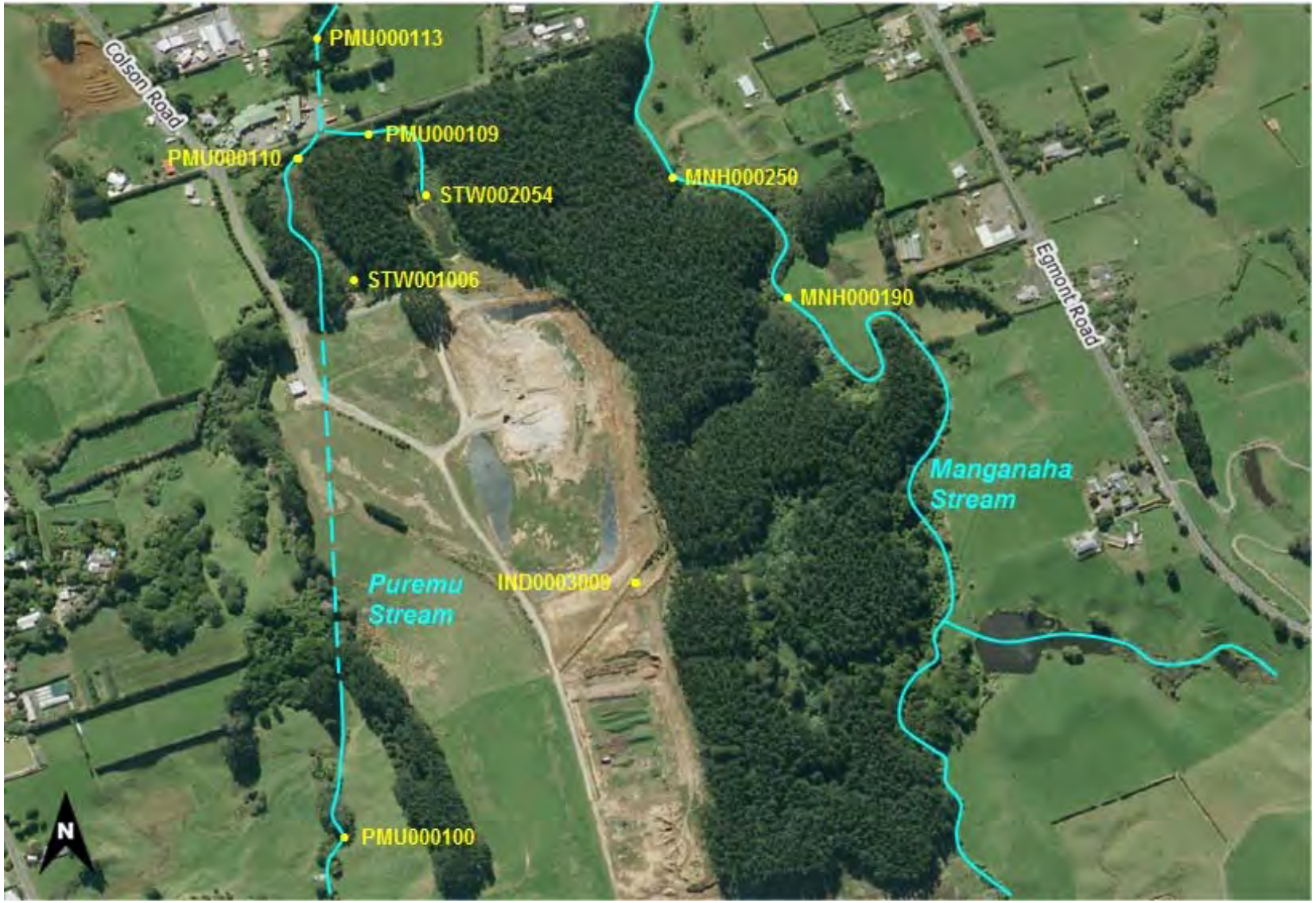

Figure 3 Aerial photo showing the stormwater and receiving water sampling sites at Colson Road landfill

Figure 4 Aerial view showing the groundwater sampling sites at Colson Road landfill

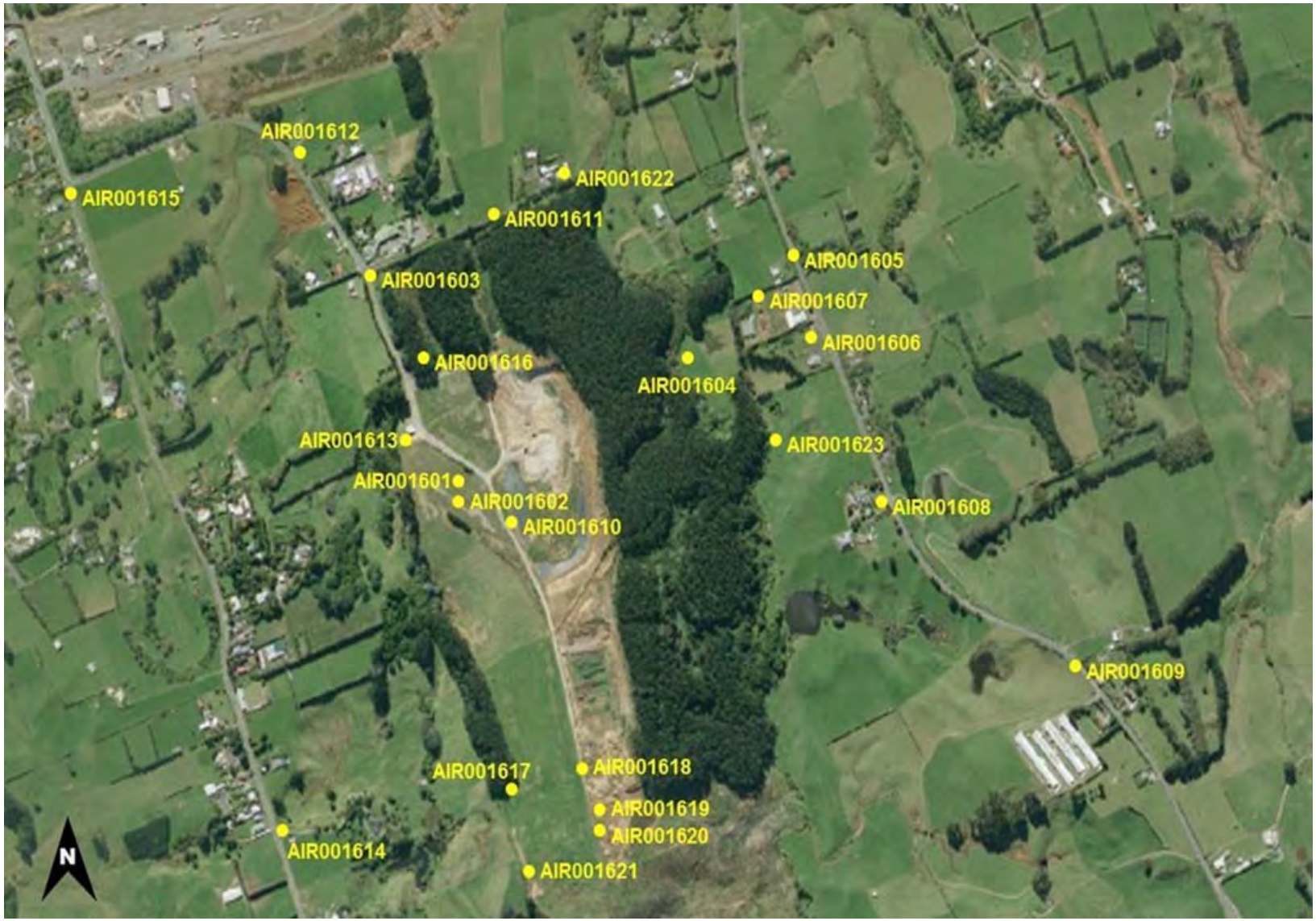

Figure 5 Aerial view showing the positions of air quality monitoring sites at and around Colson Road landfill

2 Results

2.1 Inspections

Twelve routine inspections were undertaken during the 2018-2019 monitoring period. The site was inspected on: 27 July, 29 August, 26 September, 14 November, 28 November and 17 December 2018, and 16 January, 22 February, 21 March, 9 April, 23 May, and 26 June 2019. Photos were taken on each inspection and were shared with relevant NPDC staff and the contractor, via an online service provider, following each inspection.

27 July 2018

It was fine at the start of the inspection, with a couple of showers near the end of the visit. There was a moderate south-westerly wind. It rained every day in the week preceding the inspection, with 52 mm of rainfall recorded at the Hillsborough monitoring station.

There were no off-site odours or dust issues observed prior to going on site. No refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were slightly cloudy. No heterotrophic growths were observed.

The odour mitigating sprays were operating on arrival. No odours were noted around the weighbridge. Silt socks were observed to be in place at the stormwater grates by the weighbridge. The drain on the left hand side on the way up the hill from the weigh bridge had been dug out and filled with gravel/small rocks.

The ground on Stage 2 was much firmer than in the previous couple of inspections. Where the grass seed had taken the grass growth was good and these areas were looking very green. However there were still some quite large areas where it was very patchy and still quite bare. The worst of these areas was about 150-200 m long and approximately 20 m wide. The ground was very firm and virtually grass-free. Ponding was very minimal at the time of inspection, with only two areas of less than 1x1 m still present and there was no overland flow.

The composting area was relatively full; the majority of this was aged product with a small amount of fresher vegetation observed. A tractor was working in the area. It was noted that gravel had been put in place around the entrance to the composting area, however the rest of the ground was quite cut up due to heavy traffic on the wet ground. There were no odours around the composting area. There was very little litter present in and around the compost area, and none on the netting drain covers. There was very little stormwater flow around the area with all drains directed to the stormwater ponds. The ponds were turbid brown/black and fairly full but they were not discharging to the drain.

There were very mild refuse odours present at the southern end of the landfill and along the northern side. No dust was noted at any stage during the inspection.

Grass was continuing to establish along the contour/bund present around most of the north-eastern side of the tip face. There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above.

Approximately halfway down this track there was rilling on the side of the bund, rubbish was littered down the face and it was unclear if this had washed down or been uncovered by the rilling. Leachate, some very black, was running from the cracks down the side of the slope. It was unclear whether this was perched leachate or leachate breakout caused by excess stormwater. The leachate was directed to the bund and down to the bottom holding pond. The silt trap on the outlet from this pond was submerged due to the water level of stormwater/leachate and the consent holder confirmed that this had been blocked off temporarily in order to replace some of the gravel that links the silt trap back to the leachate system.

Filling continued to occur from the highest level. The tipping pit was being accessed from the track between the southern litter fence and the compost ponds. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Metal covers were in place around the active face.

There were mild landfill gas odours present at the white stand pipe at the edge of the tip access track. An underground pipe had been damaged below the white stand pipe. It was noted that this pipe was part of the leachate collection system that transfers potentially contaminated stormwater from one side of the road to the other.

Photo 8 Broken leachate pipe, July 2018

Refuse had just been tipped into the special waste pit at the time of inspection. It was noted that, apart from this new material, the rest of the contents of the pit had been covered in soil.

No odours were observed around the flare.

No odours or litter were observed around the stormwater and silt ponds. The small silt ponds were a very bright orange/brown colour, although water flowing into the small western pond at the time of inspection was clear. The small eastern pond contained a lot of silt. It was noted that this has been recently de-silted, but that it had already filled with silt again (Photo 9). The inspecting officer noted that a contractor had been engaged to replace the silt fence and hay bales at the front of the pond. The Puremu Stream outlet grate was clear of obstructions.

The vehicle wash was not in use at the time of inspection. The contents of the wheel wash pit appeared to be in an acceptable condition.

Photo 9 Small eastern slit pond, July 2018

The following action was to be undertaken:

- Ongoing - address the cap on Stage 2 to ensure that the contour is adequate to prevent ponding, run off and/or rilling, and monitor the area to ensure that satisfactory grass establishment is occurring;
- Ongoing – please confirm cap depth is adequate on Stage 2 and address if required;
- Continue to ensure that contaminated stormwater/leachate from the active filling areas is captured and directed to the appropriate disposal routes;
- Control silt accumulating in the small eastern silt pond.

29 August 2018

It was overcast at the beginning of the inspection, with drizzle every now and again throughout the visit. There had been rain during the night and earlier in the morning with 19 mm of rainfall recorded at the Hillsborough monitoring station in the week prior to the inspection. A moderate to strong north-westerly wind was blowing.

There were no off-site odours or dust issues observed prior to going on site. No refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were running at a moderate flow and were slightly cloudy. No heterotrophic growths were observed.

The odour mitigating sprays were not observed to be operating at any time during the inspection. No odours were noted around the weighbridge. Silt socks were beside the stormwater grates by the weighbridge, however they were not in use.

The ground on Stage 2 was firm underfoot. Where the grass seed had taken the grass growth was very good and these areas were looking very green. As noted in the previous inspections, there were still some quite large areas where it was very patchy and still quite bare. The worst of these areas was about 150-200 m long and approximately 20 m wide. The ground was very firm, lacking top soil, and virtually grass-free. There was no ponding but there were a couple of areas of mud where this had previously occurred. There was no overland flow.

The composting area was relatively full. The majority of this was aged product with a small amount of fresher vegetation observed. There was no activity in the composting area (a digger was working on an access road over on the northern side of the area). As noted in the previous inspection, the ground was quite cut up due to heavy traffic on the wet ground. There were no odours around the composting area. There was very little litter present in and around the compost area, and none on the netting drain covers. There was very little stormwater flow around the area and all drains were directed to the stormwater ponds. The ponds were turbid brown/black and fairly full but they were not discharging to the drain.

There were very mild refuse odours present at the southern end of the landfill and along the northern side. No dust was noted at any stage during the inspection.

Grass was continuing to establish along the contour/bund present around most of the north-eastern side of the tip face. There was minimal stormwater flowing down from the top of the north-eastern side, both in the covered drain or on the track above.

The rilling observed in the previous inspection about halfway down the side of the north-eastern bund was still present. There was less rubbish littered down the face than the previous inspection and less leachate flowing down than noted in the previous inspection.

All leachate and stormwater from the north-eastern side was directed to the pond/silt trap area at the bottom. The small amount of flow was directed to the concrete pipe. Silt fencing had been installed around this. There was a significant amount of litter/debris in this area.

The north-eastern face of the landfill was covered in a mixture of litter and soil. This appeared to be reclaimed cover and it is important that any contaminated stormwater or leachate from this area is directed to the leachate system until clean cover is in place.

Filling continued to occur from the highest level. The tipping pit was being accessed from the track between the southern litter fence and the compost ponds. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Metal covers were in place around the active face. Very mild odours were noted.

There were mild odours present around the white stand pipe at the edge of the tip access track. The damaged underground pipe below the white stand pipe (part of the leachate collection system that transfers potentially contaminated stormwater from one side of the road to the other) had not been fixed. Refuse in the special waste pit was covered with sawdust. This was almost full and a second pit had been dug ready to use.

No odours were observed around the flare.

No odours or litter were observed around the leachate or silt ponds. There was a small amount of flow out the grate of the leachate pond. The small silt ponds were a very bright orange/brown colour, although water flowing into the small western pond at the time of inspection was clear. Silt fencing had been installed along the road drain above the ponds. The Puremu Stream outlet grate was clear of obstructions.

There were two diggers beside the vehicle wash. It appeared that one was digging out the vehicle wash while the other was using it.

The following action was to be undertaken:

- Ongoing - address the cap on Stage 2 to ensure that the contour is adequate to prevent ponding, run off and/or rilling, and monitor the area to ensure that satisfactory grass establishment is occurring;
- Ongoing – please confirm that the cap depth is adequate on Stage 2 and address if required;
- Continue to ensure that contaminated stormwater/leachate from the active filling areas is captured and directed to the appropriate disposal routes;
- Control silt accumulation in the small eastern silt pond;
- Ensure contaminated stormwater from all areas without clean cover is directed to the leachate system until these are covered with intermediate grade or higher cover;
- Ensure silt socks are positioned correctly over drains.

26 September 2018

There had been rain during the previous few days, with some light showers overnight and during the morning. Most of the 25 mm of rainfall recorded at the Hillsborough monitoring station in the week prior to the inspection had fallen in the two days prior. A moderate to strong south-westerly wind was blowing.

There were no off-site odours or dust issues observed prior to going on site. No refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a moderate flow. No heterotrophic growths were observed.

The odour mitigating sprays were operating on arrival. No odours or litter were noted around the weighbridge. There was no stormwater in the drains, however silt socks were in place around the stormwater grates by the weighbridge.

The ground on Stage 2 was firm underfoot. Grass growth was very lush in places. As noted in the previous inspections, there were still some quite large areas where it was very patchy and still quite bare. No ponding or rilling were observed.

The composting area contained less product than the previous few inspections, the majority of this was aged product with a small amount of fresher vegetation observed. Staff were operating a machine in the area that appeared to be sifting/sorting finished product. There was very little litter present in and around the compost area, and none on the netting drain covers. No odours were noted. All drains were directed to the stormwater ponds, however there was no stormwater flow around the area at the time of the inspection. The ponds were turbid brown/black and fairly full, but they were not discharging to the drain.

There were very mild refuse odours present at the southern end of the landfill and along the northern side. No dust was noted at any stage during the inspection.

Grass was continuing to establish along the contour/bund present around most of the north-eastern side of the tip face. There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was a significant amount of litter all along the northern boundary that was most likely due to the strong winds over the previous couple of days. A staff member was in the process of collecting this.

The rilling observed in the previous inspection about halfway down the side of the north-eastern bund was no longer present. There was still evidence of leachate breakout in this area, however it had the appearance of stains on the soil near the top of the bund as opposed to fresh flow.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however there was no flow at the time of inspection.

The area of north-eastern face that had been covered in a mixture of litter and soil during the previous inspection had since been covered with clean soil.

Filling continued to occur from the highest level. The tipping pit was being accessed from the track between the southern litter fence and the compost ponds. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Metal covers were in place around the active face. Very mild odours were noted.

There were mild odours present around the white stand pipe at the edge of the tip access track. The damaged underground pipe below the white stand pipe (part of the leachate collection system which transfers potentially contaminated stormwater from one side of the road to the other) had not been fixed. Refuse in the special waste pit was covered with soil.

No odours were observed around the flare.

No odours or litter were observed around the leachate or silt ponds. The leachate pond contained a moderate amount of water, however there was no flow out of the grate. The small silt ponds were a very bright orange/brown colour, although water flowing into the small western pond at the time of inspection was clear. The level in the small eastern pond was very low with no signs of excess silt. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The vehicle wash was not in use, although it appeared to have been used recently. No problems were noted in this area.

The following action is to be undertaken:

- Ongoing - address the cap on Stage 2 to ensure that the contour is adequate to prevent ponding, run off and/or rilling, and monitor the area to ensure that satisfactory grass establishment is occurring;
- Ongoing – please confirm that the cap depth is adequate on Stage 2 and address if required.

14 November 2018

Note: This was the inspection due in October that had been delayed due to discussions with NPDC's contractor over health & safety requirements that were impacting on the Council staff's ability to enter the site to undertake the inspections.

The inspection was undertaken on a very dry, hot, sunny day. There had been no significant rain during the previous few days, with most of the 30 mm of rainfall recorded at the Hillsborough monitoring station in the week prior recorded five days before the inspection. Wind was a very light northerly.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a low-moderate flow. No heterotrophic growths were observed.

The odour mitigating sprays were not operating on arrival. No odours or litter were noted around the weighbridge. There was no stormwater in the drains, however silt socks were in place around the stormwater grates by the weighbridge.

The ground on Stage 2 was dry and firm underfoot. Grass growth was very lush and reached above knee height in places. There were a couple of bare areas remaining along the ridge to the east (refer to photos online). No ponding or rilling were observed.

The composting area contained mainly aged product, with a small amount of fresher vegetation observed. There was a significant amount of litter mixed into some of the piles of fresh vegetation that needs to be removed prior to processing. Staff were operating a machine in the area which appeared to be

sifting/sorting finished product. No odours were noted. The ground in and around the area was firm and dry (in comparison with the inspections over the previous months where it has been wet and boggy). All drains were directed to the stormwater ponds, however these drains were all completely dry. The ponds were turbid brown/black and there was no discharge to the outgoing drain.

There were very mild refuse odours present at the southern end of the landfill and along the northern side. No airborne dust was noted at any stage during the inspection.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was a small amount of litter along the northern boundary although the netting covering the drain was generally clear and in good condition.

There were some damp areas indicating potential leachate breakout mid-way down the north-eastern side. The liquid appeared to be clear and there were no odours noted.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however the whole area was completely dry.

Filling continued to occur from the highest level. The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face had moved over to the north-west. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Metal covers were in place around the active face. Very mild odours were noted.

There were mild odours present around the white stand pipe at the edge of the tip access track. Refuse in the special waste pit was not covered with soil, but there was a digger parked next to the pit. NPDC were asked to continue to ensure that the special waste pit is covered as per management plan requirements. Across the road from the white stand pipe there was a large pile of soil and rubbish that had been dug out leaving a large pond of leachate (Photo 10). This is an area on the up gradient side of a leachate pipe that crosses beneath the road before passing into the gravel around the leachate cleaning line (white pipe) and ultimately into the leachate collection system. Given the ponded leachate it is likely this pipe is not conveying the leachate across under the road. Due to the contour of the ground around this location it was likely that any overflow during rain would run back towards the access road and stormwater drains.

Photo 10 Ponded leachate, 14 November 2018

A slight haze above the flare was evidence in was in operation, no odours were noted around the area.

No odours or litter were observed around the leachate or silt ponds. The leachate pond contained a very small amount of ponded water, the grate was clear and there was no out flow. There was very little flow into the large silt pond and this was a turbid brown/grey. The level in both small silt ponds was fairly low and both were a very bright orange/brown colour. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The vehicle wash was not in use and no problems were noted in this area.

The following action was to be undertaken:

- Please continue to update TRC with the progress towards remediating the Stage 2 cap prior to the autumn/winter rains; confirming that the work is progressing as per the timeline outlined in the NPDC email dated 9 November 2018;
- Ensure that leachate breakouts and the ponded leachate in the area near the white stand pipe are contained and/or directed to the leachate system;
- Ensure that there is no more than 5% non-plant derived material in any composting windrow or pile as per condition 6 of consent 4622.

28 November 2018

The inspection was undertaken in fine conditions with a fairly strong south-easterly wind. There had been 31 mm of rainfall recorded at the Hillsborough monitoring station in the week prior to the inspection, with no significant rain during the previous couple of days.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a low-moderate flow. No heterotrophic growths were observed.

The odour mitigating sprays were operating on arrival. No odours or litter were noted around the weighbridge. There was no stormwater in the drains, however silt socks were in place around the stormwater grates by the weighbridge. A water cart was operating on the gravel areas of the tip access road around the entrance to the composting area.

The ground on Stage 2 was dry and firm underfoot. Grass growth was very lush and reached above knee height in places. There were a couple of bare areas remaining along the ridge to the east although these were not as noticeable anymore. No ponding or rilling were observed.

The composting area contained mainly aged product, with a small amount of fresher vegetation observed. There was quite a bit of activity on site with a bulldozer moving product and another machine sorting it. Mild composting odours were noted. The ground in and around the area was firm and dry. All drains were directed to the stormwater ponds, however these drains were all completely dry. The ponds were turbid brown/black and there was no discharge to the outgoing drain.

There were very mild refuse odours present at the southern end of the landfill and along the northern side. No airborne dust was noted at any stage during the inspection.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was very little litter along the northern boundary considering the strong wind during the previous day.

As noted in the previous inspection, there were some damp areas indicating potential leachate breakout mid-way down the north-eastern side. The liquid appeared to be clear and there no associated odours.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however the whole area was completely dry. There was quite a bit of litter in this bottom area. A litter-picker was noted in the vicinity.

Filling continued to occur from the highest level. The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face had moved over to the north-west. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Very mild refuse odours were noted.

There were mild odours present around the white stand pipe at the edge of the tip access track. Refuse in the special waste pit was not mostly covered with sawdust. The large pile of soil and rubbish that had been dug out leaving a large pond of leachate noted in the previous inspection was still present. Due to the contour of the ground around this location it was likely that any overflow during rain would run back towards the access road and stormwater drains.

No odours were noted around the flare.

No odours or litter were observed around the leachate or silt ponds. The leachate pond contained a very small amount of clear ponded water, the grate was clear and there was no out flow. There was very little flow into the large silt pond and this was a turbid brown/grey. The level in both small silt ponds was low and both were a very bright orange/brown colour. The small eastern pond appeared to be stagnant, although a trickle of inflow could be heard. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The vehicle wash was not in use and no problems were noted in this area.

The following action was to be undertaken:

- Please continue to update TRC with the progress towards remediating the Stage 2 cap prior to the autumn/winter rains; confirming that the work is progressing as per the timeline outlined in the NPDC email dated 9 November 2018;
- Ensure that leachate breakouts and the ponded leachate opposite the white stand pipe are contained and/or directed to the leachate system.

17 December 2018

The inspection was undertaken in fine conditions with a light north-easterly wind. Conditions were very dry with less than 1 mm of rainfall recorded at the Hillsborough monitoring station in the week prior to the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a low-moderate flow. No heterotrophic growths were observed.

The odour mitigating sprays were operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however stormwater drains were completely dry.

A water cart was operating on the gravel areas of the tip access road around the entrance to the composting area and along the access up to the active tip face. A litter picker was noted in the area around the entrance to the composting area.

The ground on Stage 2 was dry and firm underfoot. Grass growth was very lush and reached above knee height in places. No ponding or rilling were observed and grass cover had established on areas that were previously bare.

The composting area contained mainly aged product, with a small amount of fresher vegetation observed. There appeared to be less product than in the previous few inspections. There was no activity on site at the time of the inspection. Mild composting odours were noted. The ground in and around the area was firm and dry. All drains were directed to the stormwater ponds, however these drains were all completely dry. The ponds were turbid brown and contained a low level of water, there was no discharge to the outgoing drain.

No refuse odours were noted at the southern end of the landfill or anywhere along the northern side. The ground was very dry along this side, however no airborne dust was noted at any stage during the inspection.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was very little litter along the northern boundary.

There was one damp area indicating potential leachate breakout mid-way down the north-eastern side. The liquid appeared to be clear and there were no associated odours.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however the whole area was completely dry.

The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face had moved over to the north-west. The working area was compact and estimated to be within the 900 m^2 required by the management plan.

There were mild odours present around the white stand pipe at the edge of the tip access track. The large pile of soil and rubbish that had been dug out leaving a large pond of leachate noted in the previous two

inspections was still present. Due to the contour of the ground around this location it was likely that any overflow during rain would run back towards the access road and stormwater drains.

No odours were noted around the flare.

No odours or litter were observed around the leachate or silt ponds. The leachate pond contained a small amount of clear water, the grate was clear and there was a small amount of flow out. The large silt pond was green-brown in colour and there was very little flow into or out of the pond. The level in both small silt ponds was low and both were a very bright orange/brown colour. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The level in the vehicle wash was very low, this was not in use.

The following action was to be undertaken:

- Please continue to update TRC with the progress towards remediating the Stage 2 cap prior to the autumn/winter rains; confirming that the work is progressing as per the timeline outlined in the NPDC email dated 9 November 2018;
- Ensure that leachate breakouts and the ponded leachate opposite the white stand pipe are contained and/or directed to the leachate system.

16 January 2019

The inspection was undertaken in fine conditions with a strong south-easterly wind. Conditions were fairly dry. However, 42 mm of rainfall was recorded at the Hillsborough monitoring station in the week prior to the inspection, with the majority of this falling two days prior to the inspection (35 mm).

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a low flow. No heterotrophic growths were observed.

The odour mitigating sprays were operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however stormwater drains were completely dry.

The ground on Stage 2 was dry and firm underfoot. Grass growth was very lush and reached above knee height in places. No ponding or rilling were observed and grass cover was well established across the entire area.

The composting area contained mainly aged product. There appeared to be more product than in the previous few inspections. There was no activity on site at the time of the inspection and it appeared that compost heaps and machinery had been placed in such a way as to prevent access to the site. Mild composting odours were noted. The ground in and around the area was firm and dry. All drains were directed to the stormwater ponds, however these drains were all completely dry. The ponds were turbid brown and contained a low level of water, there was no discharge to the outgoing drain.

No refuse odours were noted at the southern end of the landfill, this increased to faint refuse odours down the lower northern side.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was more litter than usual (although not an excessive amount) along the northern boundary and down below the landfill and this was probably due to the strong wind that was also blowing during the previous day.

Grass was continuing to establish along the northern batter. No areas of leachate breakout were noted along the northern side.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however the whole area was completely dry.

The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face was over to the north-west. The working area was compact and estimated to be within the 900 m^2 required by the management plan. Metal covers were being used.

Both the white stand pipe and the large pile of soil and rubbish that had been dug out leaving a large pond of leachate noted in the previous two inspections were gone as filling had moved into this area.

No odours were noted around the flare. As noted above there was some wind-blown litter present around the bottom of the site.

No odours were observed around the leachate or silt ponds. The leachate pond contained a small amount of clear water, the grate was clear and there was a small amount of flow out. The large silt pond was brown-green in colour and there was very little flow into or out of the pond. The level in both small silt ponds was very low and both were a very bright orange/brown colour. Hay bales were in place in the small eastern pond. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The level in the vehicle wash was very low, this was not in use.

The following action was to be undertaken:

- Please continue to update TRC with the progress towards remediating the Stage 2 cap prior to the autumn/winter rains; confirming that the work is progressing as per the timeline outlined in the NPDC email dated 9 November 2018.

22 February 2019

The inspection was undertaken in overcast conditions with a light north-westerly wind. It had been raining overnight and during the morning after a long hot, dry spell. 14 mm of rainfall was recorded at the Hillsborough monitoring station in the week prior to the inspection, with 2 mm of this overnight the day prior to the inspection, and the other 12 mm on the morning of the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The streams below the site were clear and running at a low flow. No heterotrophic growths were observed.

The odour mitigating sprays were not operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge. By the end of the inspection it was raining again and stormwater was running in the drains.

The ground on Stage 2 was firm underfoot. No ponding or rilling were observed and grass cover was well established across the entire area.

Work was being carried out at the southern end of the compost area and further south. It looked like a large bund or drain was being created and lined with plastic.

The composting area contained mainly aged product. Some of the piles appeared to have been sitting for quite some time with fully mature pumpkins on one row. The area was fairly full, with a similar amount of product to the previous inspection. A truck was dumping a load of fresh product at the time of inspection. Mild composting odours were noted, but they were not unpleasant and no dust was being generated. The ground in and around the area was damp with the recent rain, but was otherwise firm. The first pond was mostly dry, the second was dry, while the third one contained a small amount of water. There was no discharge to the outgoing drain.

A litter-picker was at work around the southern end of the tip entrance at the tie of inspection. Mild refuse odours were noted at the southern end of the landfill and along the lower northern side.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was very little litter along the northern boundary and down below the landfill. No dust was noted.

Grass was continuing to establish along the northern batter. No areas of leachate breakout were noted along the northern side and the hand-held air meter did not locate any fugitive gases.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however there was no water in any drains/bunds.

The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face was over to the south-west and was gradually moving down the gravel access track off the main sealed access way. Due to the health and safety restrictions put in place by the contractor, the inspecting officer could not get an estimate on the working area or get access to the special waste pit. Metal covers were being used. There were strong refuse odours in this area.

No odours or dust were noted around the flare. No flow was noted in the roadside drain.

No odours were observed around the leachate pond. The leachate pond contained a small amount of clear water. The outlet grate was clear and there was a small amount of out flow. The pond area appeared stagnant while the out flow was originating from subsurface seepage on the western edge of the pond. There was a small but constant flow from this (area of iron oxide).

The large silt pond was brown-green in colour. The level was fairly low and there was very little flow into or out of the pond. The level in both small silt ponds was very low and both were a brownish colour. Haybales were in place in the small eastern pond. The Puremu Stream was running clear and the outlet grate was clear of obstructions.

The level in the vehicle wash was very low, this was not in use.

The following action was to be undertaken:

- Please continue to work towards complying with abatement notice EAC-22506 (due by 15 March 2020).

21 March 2019

The inspection was undertaken in overcast conditions with a light east north-easterly wind. It had been hot and dry for the proceeding week, with all of the 25 mm of rainfall recorded at the Hillsborough monitoring station falling on one day, seven days prior to the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The main branch of the Puremu Stream appeared almost stagnant as the culvert was blocked with debris, however, water was still just able to pass through the debris into the culvert. No heterotrophic growths were observed.

The odour mitigating sprays were not operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however all drains and surfaces were dry.

The ground on Stage 2 was firm underfoot. No ponding or rilling were observed and grass cover was well established across the entire area.

Work on the bund for the relocation of the composting area appeared to be complete. The entire area had been levelled. It was not confirmed that bunds and drains direct the mixed stormwater/leachate flow from the new area to the composting treatment ponds. This was to be checked at the next inspection.

The current composting area contained mainly aged product, along with some piles of fresher material. The area was almost full to capacity. Mild composting odours were noted, though nothing unpleasant and there was no airborne dust. The ground was completely dry and no water was going into or out of the compost are treatment ponds. The first two ponds were dry, while the third and fourth contained small amounts of water.

There was a lot of activity occurring in behind the composting area where a lot of diggers and trucks were excavating soil and moving it to create the final cap on the western side of the northern face and the northern end of the western face of Stage 3. A water cart was operating around the area where the trucks were active.

A litter-picker was at work along the north-eastern boundary, near the southern end of the tip entrance. No odours were noted at the southern end of the landfill or along the lower northern side.

There was no stormwater flowing down from the top of the north-eastern side, either in the covered drain or on the track above. There was very little litter along the northern boundary and down below the landfill. The ground was very dry, however no airborne dust was noted.

Grass/weeds were well established along most of the northern batter, other than areas where recent re-contouring had been carried out. There were a few patches of leachate breakout noted on the top of the northern batter and in one area landfill gas was observed to be bubbling out of the ground. The patches of leachate were outside the area targeted by Stage 1 of the gas collection system. As the leachate was being contained, and there were no objectionable odours present, these were not of immediate concern, however should be monitored by NPDC.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom, however there was no water in any drains/bunds and the whole area was overgrown with various weeds and grasses.

The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face was over to the west. There was no longer a gravel access track off the main sealed access way as this area had all been filled. Due to this and the health and safety restrictions put in place by the contractor, the inspecting officer could not get an estimate on the working area or get access to the special waste pit. Mild refuse odours were noted in this area.

There was a lot of activity occurring on the north-western face, with the final cap being put in place.

No odours or dust were noted around the flare. No flow was noted in the roadside drain.

No odours were observed around the leachate pond. The leachate pond contained a small amount of water, the grate was clear and there was a very small trickle of flow out.

The large silt pond was brown-green in colour, the level was fairly low and there was very little flow into or out of the pond. There were some white films near the outlet end. The cracked appearance of the films and almost stagnant nature of the pond indicated they were more likely to be bacterial rather than hydrocarbon films.

There was a trickle inflow to both small silt ponds and both contained very low levels of bright orange-brown water with bacterial surface films. The tributary below the eastern small silt pond contained banks of silt (Photo 11). Although this is in the head of the wetland polishing area and well within the mixing zone, it indicates that additional silt controls would be beneficial below any areas of earthworks on site to reduce

the potential for impoundment occurring within the tributary. The Puremu Stream was running clear above the confluence with the small silt pond discharges and the outlet grate was clear of obstructions.

Photo 11 Silt bank in the tributary below the eastern small silt pond, March 2019

The level in the vehicle wash was very low, this was not in use.

The following action was to be undertaken:

- Please continue to work towards complying with abatement notice EAC-22506 (due by 15 March 2020);
- Please clear the culvert inlet grate above the SPCA driveway.

9 April 2019

The inspection was undertaken in fine conditions with a light easterly wind. It had been dry during the preceding week, with no rainfall recorded at the Hillsborough monitoring station in the seven days prior to the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The main branch of the Puremu Stream was very orange and appeared almost stagnant with films and scums on the stream surface as the culvert grate was still blocked with debris despite the request for it to be cleared following the previous inspection (Photo 12). Only a small amount of water was running out from underneath and into the culvert. No heterotrophic growths were observed. As the NPDC had not addressed this issue in the preceding month, the inspecting officer attempted to kick away some of the debris and clear the bottom of the grate. There was still some debris at the top of the grate, however normal flow was mostly resumed and the scums/films washed downstream.

Photo 12 Obstructed SPCA driveway culvert inlet, April 2019

The odour mitigating sprays were not operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however all drains and surfaces were dry.

The ground on Stage 2 was firm underfoot. No ponding or rilling were observed and grass cover was well established across the entire area.

Compost had not yet been relocated to the new composting area. It was confirmed that bunds/drains were in place to direct stormwater/leachate flow from the new area to the existing composting treatment ponds.

The current composting area contained mainly aged product, along with some piles of fresher material. The area was almost full to capacity. A digger was active in the area moving piles. Mild composting odours were noted, though nothing unpleasant and there was no airborne dust. The ground was completely dry and no water was going into or out of the ponds. The first two ponds were dry, while the third and fourth contained a small volume of water.

Mild refuse odours were noted at the southern end of the landfill and along the lower northern side. There was no stormwater flowing in the covered drain or down the roadway. The area was dry but no airborne dust was noted and a water cart was operating between the composting area and the entrance to the tip face. Very little litter was noted.

Grass/weeds were well established along most of the northern batter, other than areas where recent re-contouring had been carried out. The patches of leachate breakout noted on the top of the northern batter in the previous inspection were still present. As noted at the previous inspection these patches of leachate were outside the area targeted by Stage 1 of the gas collection system. No leachate was observed to be escaping to the stormwater system and no offensive or objectionable odours were noted.

Bunds were in place to direct leachate and stormwater from the north-eastern side to the pond/silt trap area at the bottom (north eastern corner), however there was no water in any drains/bunds and the whole area was overgrown with various weeds and grasses.

The tipping pit was still being accessed from the track between the southern litter fence and the compost ponds, however the working face was over to the west. There was no longer a gravel access track off the main sealed access way as this area had all been filled. Due to this and the health and safety restrictions put in place by the contractor, the inspecting officer could not get an estimate on the working area or get access to the special waste pit. Mild refuse odours were noted in this area.

There was a lot of activity occurring on the north-western face with the final cap being put in place.

No odours or dust were noted around the flare. Silt traps were in place, however no flow was noted in the roadside drain.

No odours were observed around the leachate pond. The leachate pond contained a small amount of water, the grate was clear and there was at most a very small trickle of flow out.

The large silt pond was brown-green in colour, the level was fairly low and there was very little flow into or out of the pond.

There was a trickle inflow to both small silt ponds and both contained very low levels of bright orange-brown water with bacterial surface films. Work had been undertaken on the small eastern pond with fresh haybales installed across the outlet. The tributary below the eastern small silt pond contained banks of silt. Although this is in the head of the wetland treatment area and well within the mixing zone, it indicates that additional silt controls would be beneficial below any areas of earthworks on site. The Puremu Stream was running clear above the confluence with the small silt pond discharges and the outlet grate was clear of obstructions.

The level in the vehicle wash was very low, this was not in use.

The following action was to be undertaken:

- Please continue to work towards complying with abatement notice EAC-22506 (due by 15 March 2020).
- Please clear the culvert inlet grate above the SPCA driveway.

23 May 2019

The inspection was undertaken following very light early morning drizzle, the wind was light easterly. There had been some brief light showers during the preceding week, with 5 mm of rainfall recorded at the Hillsborough monitoring station in the seven days prior to the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The culvert grate had been unblocked and was clear with a moderate amount of mostly clear flow in the main branch of the stream. The side branch of the stream was very orange in colour with iron oxide. There were some ‘fluffy’ patches which may have been heterotrophic growths, however these were within the permitted mixing zone and it was hard to tell with the amount of iron oxide in the stream. The NPDC was informed that these would be checked more closely at the next inspection.

The odour mitigating sprays were not operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however there was no flow in any of the drains.

The ground on Stage 2 was firm underfoot. No ponding or rilling were observed and grass cover was well established across the entire area.

Compost had not yet been relocated to the new composting area. Further earthworks had been undertaken on the pad and a digger was placing metal around the entrance at the time of the inspection.

The current composting area contained mainly aged product, along with some piles of fresher material. The area was almost full to capacity. A digger was active in the area loading trucks with finished product. Mild composting odours were noted, nothing unpleasant and no airborne dust. The ground was a bit muddy and there was a small amount of ponded water around the entrance to the area. Some fresh material had been placed on top of the drains to the ponds (Photo 13). This was not causing an issue at the time of the inspection due to the lack of flow, however the material would block the discharge of any runoff from the pad if not moved before the next rain. The ponds all contained some water, which was a dark black/brown colour. The ponds were not discharging to the eastern drain.

Photo 13 Green waste placed in compost area stormwater drain to treatment ponds, May 2019

There was no stormwater flowing in the covered drain or down the roadway along the north-eastern side. The ground was slightly damp and no airborne dust was noted. Very little litter was noted along the north-eastern boundary and there were no odours.

Grass/weeds were well established along most of the northern batter. One area of leachate breakout was noted on the top of the northern batter. As noted at the previous inspection these patches of leachate were outside the area targeted by Stage 1 of the gas collection system. There were no issues found at inspection with no leachate escaping to the stormwater system and no offensive or objectionable odours noted.

Earthworks were being undertaken along the lower north-eastern side. A channel had been dug and piped and was in the process of being filled with plastic lining and gravel.

There was evidence of recent discharge to the pond/silt trap area at the bottom, however there was no water in any drains/bunds at the time of the inspection.

The tipping pit was being accessed from the track between the southern litter fence and the compost ponds. No activity was occurring at the time of the inspection.

No dust was noted around the flare. There were mild landfill odours in the vicinity. Silt traps, including hay bales, were in place in the roadside drain, however there was no flow at the time of the inspection.

No odours were observed around the leachate pond. The leachate pond contained more liquid than noted on the previous several inspections and was orange/brown in colour. Flow was also entering the pond from a pipe on the western edge of the pond (previously thought to be originating from subsurface seepage), iron oxide lined this inflow. The leachate in the pond covered the grate, so it could not be visually confirmed as being clear, but there was obvious out flow through a newly established ring.

The large silt pond was at a moderate level and brown-orange in colour. There was an area of surface sheens down the northern/outflow end. At the time of inspection it was not determined whether this was due to hydrocarbons or bacteria. The photos shared with NPDC also showed a silt bank below the weir in the large silt pond.

Photo 14 Silt bank below weir of large silt pond, May 2019

There was inflow to both small silt ponds and both contained moderate levels of bright orange-brown water with bacterial surface films. The film on the western pond was very deep orange/red in places. The tributary below the eastern small silt pond was also bright orange and contained banks of silt. Although this is in the head of the wetland treatment area and well within the mixing zone, it indicates that additional silt controls would be beneficial below any areas of earthworks on site. The Puremu Stream was running clear above the confluence with the small silt pond discharges and the outlet grate was clear of obstructions.

The level in the vehicle wash was low, this was not in use.

The following action was to be undertaken:

- Please continue to work towards complying with abatement notice EAC-22506 (due by 15 March 2020).
- Please ensure drains/bunds in the composting area are clear of debris and directed to the ponds.

26 June 2019

The inspection was undertaken in cold but fine weather with a light south-easterly wind. Rainfall of 22 mm had been recorded at the Hillsborough monitoring station in the seven days prior to the inspection.

There were no off-site odours or dust issues observed prior to going on site. Very little refuse was noted on Colson Road between the transfer station and the landfill gates.

The culvert grate was clear with a moderate, clear flow in the main branch of the stream. The 'fluffy' patches noted in the side stream in the previous inspection (which may have been heterotrophic growths) were no longer present.

The odour mitigating sprays were operating on arrival. No odours or litter were noted around the weighbridge. Silt socks were in place around the stormwater grates by the weighbridge, however there was no flow in any of the drains.

The ground on Stage 2 was firm underfoot. No ponding or rilling were observed and grass cover was well established across the entire area. No odours were noted.

There was a lot of activity occurring in the composting area, with a tractor in the process of relocating compost to the new composting area. Mild composting odours were noted around the existing compost area, though nothing unpleasant and there was no airborne dust. The ground was a bit muddy and there was some ponded water around the entrance to the area. As in the previous inspection, it was noted that drains near the entrance were not directed to the compost area treatment ponds, although the green waste material previously blocking the drains had been removed. There was no discharge at the time of the inspection and was a lot of activity around the entrance to the area with the loader moving compost and the tractor coming and going. The ponds all contained moderate levels of water, this was a dark black/brown colour. The ponds were not discharging to the eastern drain.

The tipping pit was being accessed from the track between the southern litter fence and the compost ponds. Activity was focused on the very top in the centre of the landfill.

There was no stormwater flowing in the covered drain along the north-eastern side. The ground on the roadway was damp, muddy in places, with a bit of flow here and there. No airborne dust was noted. Very little litter was noted along the top part of the north-eastern boundary and there were no odours.

Earthworks were still in the process of being undertaken along the lower north-eastern side. A channel had been dug and piped and was in the process of being filled with plastic lining and gravel. This channel was being directed to a new pond/silt trap area at the bottom (on the north eastern corner).

No dust was noted around the flare, but there were mild landfill odours in this vicinity. Silt traps, including hay bales, were in place in the roadside drain. There was some ponded water along the drain but no flow at the time of the inspection.

There was good grass cover on the north-western side of the landfill and a bund was directing run-off to a pond/silt trap area at the bottom.

The large silt pond was at a low to moderate level and was an orange/brown colour. No odours were noted in the area. The outlet was clear.

No odours were observed around the leachate pond. A trickle of flow was entering the pond from the pipe on the western edge. The pond was orange/brown coloured with a small but constant discharge.

Both small silt ponds contained moderate levels of bright orange-brown water with surface bacterial films. There was inflow into the western pond, while there was neither inflow nor outflow from the small eastern pond. The tributary below the eastern small silt pond was also bright orange and contained banks of silt.

Although this is in the head of the wetland treatment area and well within the mixing zone, it indicates that additional silt controls would be beneficial below any areas of earthworks on site.

The Puremu Stream was running clear above the confluence with the small silt pond discharges and the outlet grate was clear of obstructions.

The level in the vehicle wash was low, this was not in use.

The following action was to be undertaken:

- Please continue to work towards complying with abatement notice EAC-22506 (due by 15 March 2020).
- Please ensure drains/bunds in the composting area are directed to the ponds.

2.2 Water

2.2.1 NPDC monitoring results

2.2.1.1 Leachate

NPDC collected five samples of leachate during the 2018-2019 monitoring period. Analyses were carried out for a range of parameters. The leachate is pumped to, and treated at the New Plymouth wastewater treatment plant. Whilst the leachate is not discharged directly to the environment, the results are used by the Council to compare with groundwater and surface water quality. The results are also of interest to the Council because the leachate can reveal information about the landfill processes taking place. The results of the analyses from the samples collected by the NPDC are presented in Table 3.

Table 3 Chemical analysis of Colson Road landfill leachate

Parameter	Unit	Date				
		20-Jul-18	26-Sep-18	19-Oct-18	28-Feb-19	15-May-19
pH	pH	7.3	7.6	7.6	7.8	7.3
BOD	g/m^3	42	40	58	140	50
Suspended solids	g/m^3	34	20	18	7	22
Conductivity	mS/m	527	618	649	1254	594
Alkalinity	g/m^3	-	2,480	-	-	-
Aluminium	g/m^3	-	-	< 2	-	-
Ammoniacal N	g/m^3	410	483	540	1,080	434
Chromium	g/m^3	< 0.1	< 0.1	< 0.1	0.2	< 0.1
Iron	g/m^3	14.9	9.5	10.5	5.3	-
Lead	g/m^3	< 0.1	< 0.1	< 0.1	0.1	< 0.1
Manganese	g/m^3	1.7	-	1.6	0.64	-
Nickel	g/m^3	< 0.05	< 0.05	< 0.05	-	< 0.05
Zinc	g/m^3	0.1	< 0.05	< 0.05	< 0.05	< 0.05

The results gathered by NPDC during the year under review reflect typical leachate quality. There are no obvious trends in the indicator leachate constituents measured emerging at this stage (for example, the

concentration variations within each parameter are likely to reflect seasonal variations in leachate quality and the dilution afforded by the contaminated stormwater that is diverted through this system.

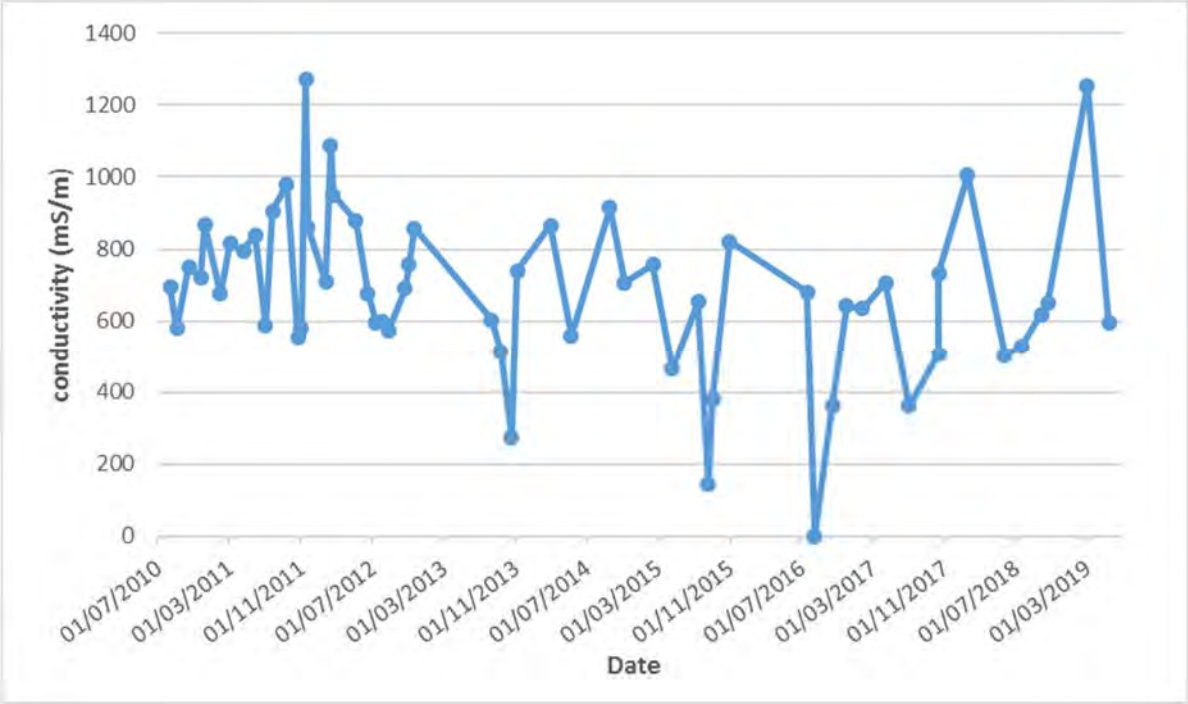

Figure 6 Leachate conductivity July 2010 to date

2.2.1.2 Under liner drainage

NPDC collected four samples of the groundwater that drains from a network of pipes under the liner. The results of the analyses are given in Table 4. The quality of this water is a useful indicator of whether leachate is passing through the liner. This is especially important in view of the slip that occurred in 2005 that ripped the liner in several places on the western side of Stage 3. The exposed rips were repaired but it was not known if the liner had ripped underneath the slipped refuse. There were also rips in the liner at the edge of the landfill footprint 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.

Table 4 Results of analysis of under liner drainage

Parameter	Unit	Date			
		23-Aug-18	14-Nov-18	28-Feb-19	22-May-19
pH	pH	6.4	6.6	6.6	6.6
BOD	g/m^3	< 2	< 2	< 3	< 3
CBOD	g/m^3	< 10	13	14	24
Suspended solids	g/m^3	8	< 5	22	13
Faecal coliforms	/100ml	30	< 10	24	2
Conductivity	mS/m	39.2	45.4	49.7	48.7
Turbidity	N.T.U.	59	56	118	-
Alkalinity	g/m^3	101	132	156	147

Parameter	Unit	Date			
		23-Aug-18	14-Nov-18	28-Feb-19	22-May-19
Ammoniacal nitrogen	g/m^3-N	2.0	2.9	3.5	3.2
Cadmium	g/m^3	< 0.02	< 0.02	< 0.02	< 0.02
Chromium	g/m^3	< 0.1	< 0.1	< 0.1	< 0.1
Chloride	g/m^3	53	59	61	59
Copper	g/m^3	< 0.05	< 0.05	< 0.05	< 0.05
Iron	g/m^3	6.0	11.2	9.0	7.6
Lead	g/m^3	< 0.1	< 0.1	< 0.2	< 0.1
Manganese	g/m^3	1.6	1.9	1.4	1.6
Nickel	g/m^3	< 0.05	< 0.05	< 0.05	< 0.05
Zinc	g/m^3	< 0.05	< 0.05	< 0.05	0.05

Historically, drainage analysis has shown that little, if any, contamination has been occurring in the groundwater immediately below the liner. Although the level of key indicator species such as zinc and chloride (Figure 7) are relatively stable over the last several years there may be an emerging trend of very slight increasing contaminants. In particular, the results for the 2017-2019 years indicate that some contaminant concentrations such as ammoniacal nitrogen have increased more noticeably (Figure 8).

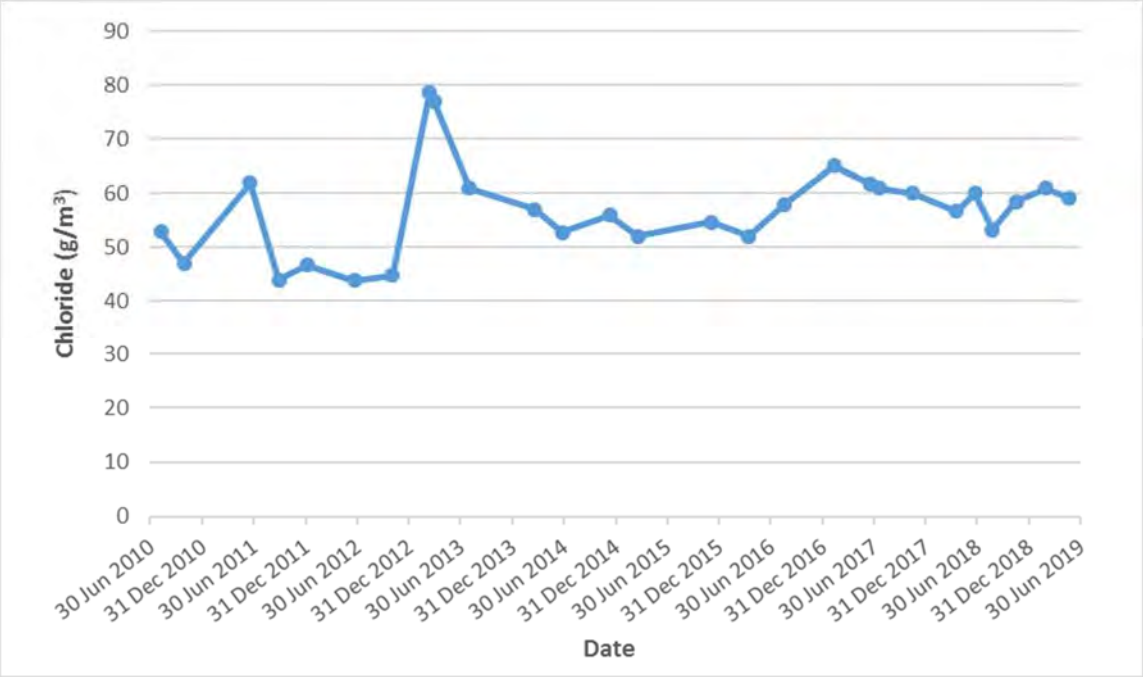

Figure 7 Chloride concentration in the under liner drainage

Although these indicator constituents show very slight 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. They are however comparatively higher than any of the monitoring bores surrounding the landfill. At this stage it is difficult to assess whether the increase in the ammoniacal nitrogen concentration in the under liner drainage is as a result of changes in the leachate strength or an increasing amount of leachate getting through the liner. It is noted that during the 2017-2019 years, the ammoniacal concentration of the under liner drainage has followed a similar pattern to the

leachate. Monitoring of the contaminant concentrations in the under liner drainage will continue. Given the changes in this indicator, a recommendation will be included in this report that NPDC widen the range of parameters be increased to those given in Table 8-1 of the Technical Guidelines for Disposal to Land (WasteMINZ, 2018) on at least one occasion annually. An additional recommendation is that the NPDC review 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.

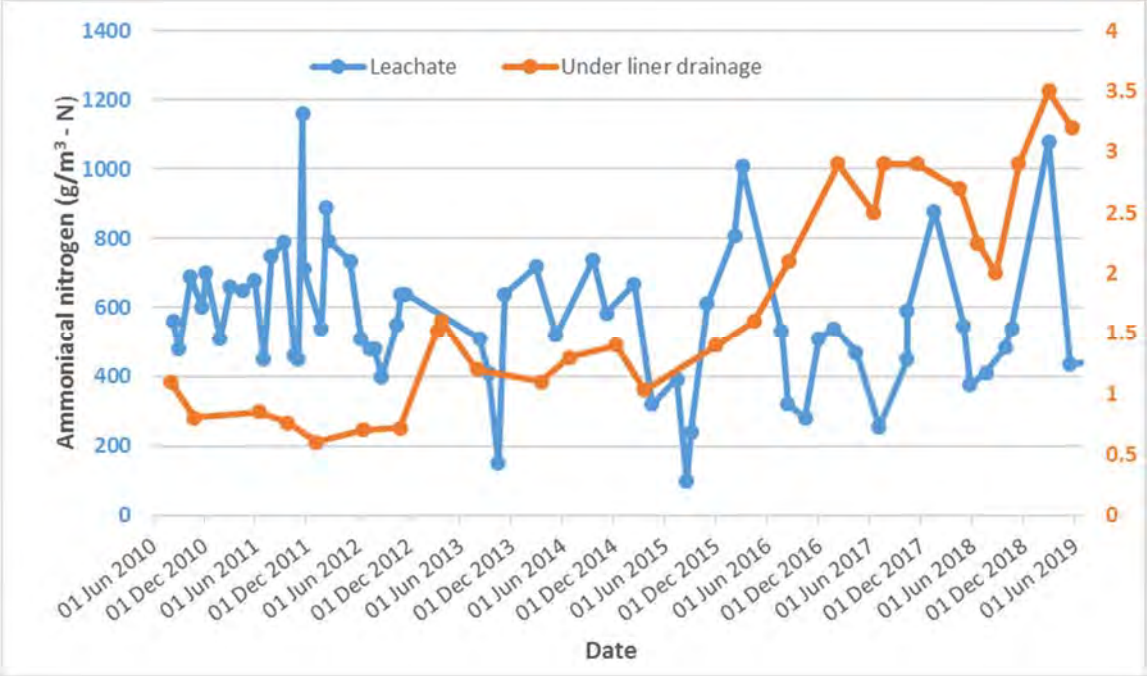

Figure 8 Ammoniacal nitrogen concentration in the under liner drainage

Results obtained during the 2018-2019 year continue to indicate that there does not currently appear to be any potential issues in regards to faecal coliform levels, and that the unusually high faecal coliform result obtained on 18 March 2014 (3,460 cfu/ 100 ml) has not been repeated to date. It is therefore considered likely to have been as a result of sample contamination, rather the start of an on-going issue.

2.2.2 Results of dry weather stormwater and receiving environment monitoring

2.2.2.1 Dry weather stormwater monitoring

Samples of the discharge from the compositing area (IND0003009), stormwater from below the large silt pond (STW002054), and discharge from the small eastern silt pond (STW001006) were collected if they were discharging during dry weather runs. The sites are shown in Figure 9. The compost pond discharge and the under liner drainage discharge via the large silt pond. The catchment areas within the landfill footprint that drain through each of the stormwater ponds can change as the active filling areas and those areas with intermediate cover change. The results of the sampling are presented in Table 5 below.

Table 5 Chemical analysis of site discharges during dry weather

Parameter	units	IND003009		STW001006		STW002054	
		24-Oct-18	6-May-19*	24-Oct-18	6-May-19	24-Oct-18	6-May-19
Alkalinity	g/m³ $CaCO_3$	-	-	230	195	134	109

Parameter	units	IND003009		STW001006		STW002054	
		24-Oct-18	6-May-19*	24-Oct-18	6-May-19	24-Oct-18	6-May-19
Ammoniacal nitrogen	g/m^3-N	0.128	-	17.4	8.9	1.0	3.5
Unionised ammonia	g/m^3	0.0069	-	0.058 (±0.025)	0.0102	0.021	0.021
Conductivity	mS/m@25°C	123	-	96	59	48	44
Faecal coliforms	cfu/100ml	140	-	90	< 10	1,400	1,000
pH	pH	8.1	-	7.0	6.6	7.7	7.3
Suspended solids	g/m^3	17	-	60	19	13	5
Temperature	Deg.C	19.0	-	15.4	14.1	17.8	14.0
Acid soluble iron	g/m^3	-	-	15.1	22	3.4	2.4
Dissolved zinc	g/m^3	0.0027	-	0.0168	0.0032	< 0.001	0.0011
Nitrate+Nitrite-N	g/m^3	0.036	-	1.92	0.62	0.55	1.29
Sulphate	g/m^3	-	-	-	-	3.5	16.0
BOD (total)	g O_2/m^3	5.2	-	3.7	14	5	1.8

* Sample not collected as no discharge occurring

(±0.025) – uncertainty of measurement for this result

Although the compost pond discharge is usually found to be the major source of faecal coliforms at the time of sampling surveys, this was not the case during the year under review. At the times the surveys were undertaken the highest faecal coliforms results were obtained in the discharge from the large stormwater pond through which the non-landfill leachate contaminated stormwater drains. The receiving water results are presented in Table 7 and Table 8 and discussed in Section 2.2.2.2.2.

Other contaminants of note in the pond discharges are alkalinity, ammoniacal nitrogen and iron, which as per previous years, tended to be higher in the discharge from the small eastern silt pond, during the year under review. Although the biochemical oxygen demand of the discharge from the small silt pond was elevated on 6 May 2019, the value obtained was lower than the previous maximum and was found to have been assimilated and was compliant in the receiving water downstream at site PMU000110 (Table 8).

2.2.2.2 Dry weather receiving environment monitoring

The Colson Road landfill site has two streams associated with it. 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, flows into the main stream stem. The smaller silt pond discharges directly into the main stream stem just upstream of the confluence (see Figure 9).

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.

Tables 6-8 give the results of the dry weather freshwater sampling undertaken during the period under review.

2.2.2.2.1 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 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 six years.

Table 6 Chemical analysis of the Manganaha Stream

Parameter	Units	24-Oct-18		6-May-19	
		MNH000190 u/s of landfill	MNH000250 d/s of landfill	MNH000190 u/s of landfill	MNH000250 d/s of landfill
Alkalinity	g/m^3 – $CaCO_3$	30	31	25	25
Conductivity	mS/m@25°C	16.3	16.5	15.5	15.5
Acid soluble iron	g/m^3	0.67	0.86	0.46	0.53
Ammonia (unionised)	g/m^3	0.00022	0.00037	0.00011	0.00012
Ammoniacal nitrogen	g/m^3-N	0.031	0.047	0.022	0.024
pH	pH	7.4	7.4	7.2	7.3
Suspended solids	g/m^3	< 3	4	< 3	< 3
Temperature	Deg C	14.0	14.1	13.3	13.3
Dissolved zinc	g/m^3	< 0.0010	< 0.0010	0.0022	0.0020

There are no specific consent conditions in regards to the Manganaha Stream water quality other than the requirements that 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.

2.2.2.2.2 Puremu Stream

In stream limits are given for a range of parameters for Stage 2 (2370-3) where the compliance point is 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 also sampled on two occasions in dry weather under low to moderate flow conditions.

The downstream sampling sites are shown in Figure 9. The results for the general parameters are given in Tables 7 and 8, with the dry weather metals analysis covered in Section 2.2.2.3.

Table 7 Chemical analysis of the Puremu Stream, sampled on 24 October 2018

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000109 Trib d/s large silt	PMU000110 d/s landfill culvert	PMU000113 d/s SPCA drive culvert	*Consent limits at PMU000113* (PMU000110**)*
Alkalinity	g/m^3 $CaCO_3$	27	111	85	84	*NA*
BOD	g/m^3	1.1	1.9	6.5	4.5	*NA*
Conductivity	mS/m@25°C	14.8	39.8	33.5	33.1	*NA*
Dissolved oxygen	g/m^3	7.53	5.01	7.94	8.11	*≥ 6.53 [-1] (≥ 5.0)*
DRP	g/m^3	<0.004	< 0.004	< 0.004	< 0.004	*NA*
Faecal coliforms	cfu/100 ml	600	220	1,400	**1,800**	*≤ 1,000*
Unionised ammonia	g/m^3 N	0.00013	0.0025	0.0168	0.021	*NA*
Ammoniacal-N	g/m^3 N	0.023	0.31	2.2	**2.6**	*2 [limit is pH dependant] (2.5)*
Nitrate/nitrite N	g/m^3 N	0.140	0.50	0.80	0.89	*10 (100)*
Oxygen saturation	%	76	49	77	79	*NA*
pH	pH	7.2	7.4	7.4	7.4	*≥ 6.5 & ≤ 8.5 ([within ± 0.5])*
Sulphates	g/m^3	5.4	4.0	5.5	5.8	*1,000 (500)*
Suspended solids	g/m^3	< 3	4	20	8	*13 [+10]*
Temperature	Deg C	16.3	15.1	14.5	14.5	*(≤ 18.3 [+2])*

Key: * Consent limits with no brackets are for consent 4619 at site PMU000113

** Consent limits shown in rounded brackets are for consent 2370-3 at site PMU000110

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

The faecal coliform count exceeded the limit on consent 4619 on 24 October 2018. It is noted on this occasion that the count was elevated upstream of the site and that although the count in the small silt pond discharge was low, both the western tributary and the large silt pond contributed to an increase observed at PMU000113. However the count obtained at this site (1,800 cfu/100ml)) was higher than would be expected given the values obtained for the western and eastern tributaries, indicating an additional contribution from outside the landfill.

In terms of ammoniacal nitrogen concentration, although the concentration in the discharge from the eastern small stormwater pond was high (17.4 g/m^3), this had reduced to 2.2 g/m^3 in the western tributary and was compliant with conditions on consent 2370 at the compliance point (PMU000110). The ammoniacal nitrogen exceeded the limit on consent 4619 at PMU000113 however. The ammoniacal nitrogen concentration in the compost pond and large stormwater pond discharges were relatively low, indicating an additional contributing source. At the pH and temperature conditions prevailing at the time of the survey,

the unionised ammonia concentration was less than the 0.025 g/m^3 considered to be toxic to aquatic ecosystems, therefore this was not logged as a consent non-compliance. As at the time of the wet weather survey, it appears that the dilution potential of the eastern tributary is not apparent in the results obtained for PMU000113 indicating the possibility of impoundment and flow reduction in this tributary.

It is also noted that there was an increase in the biological oxygen demand in the western tributary resulting in an elevated demand in the Puremu Stream downstream of the landfill (PMU000113). The value obtained beyond the mixing zone is however lower than the 5 g/m^3 guideline given in the Council's Regional Freshwater Plan for Taranaki (2001).

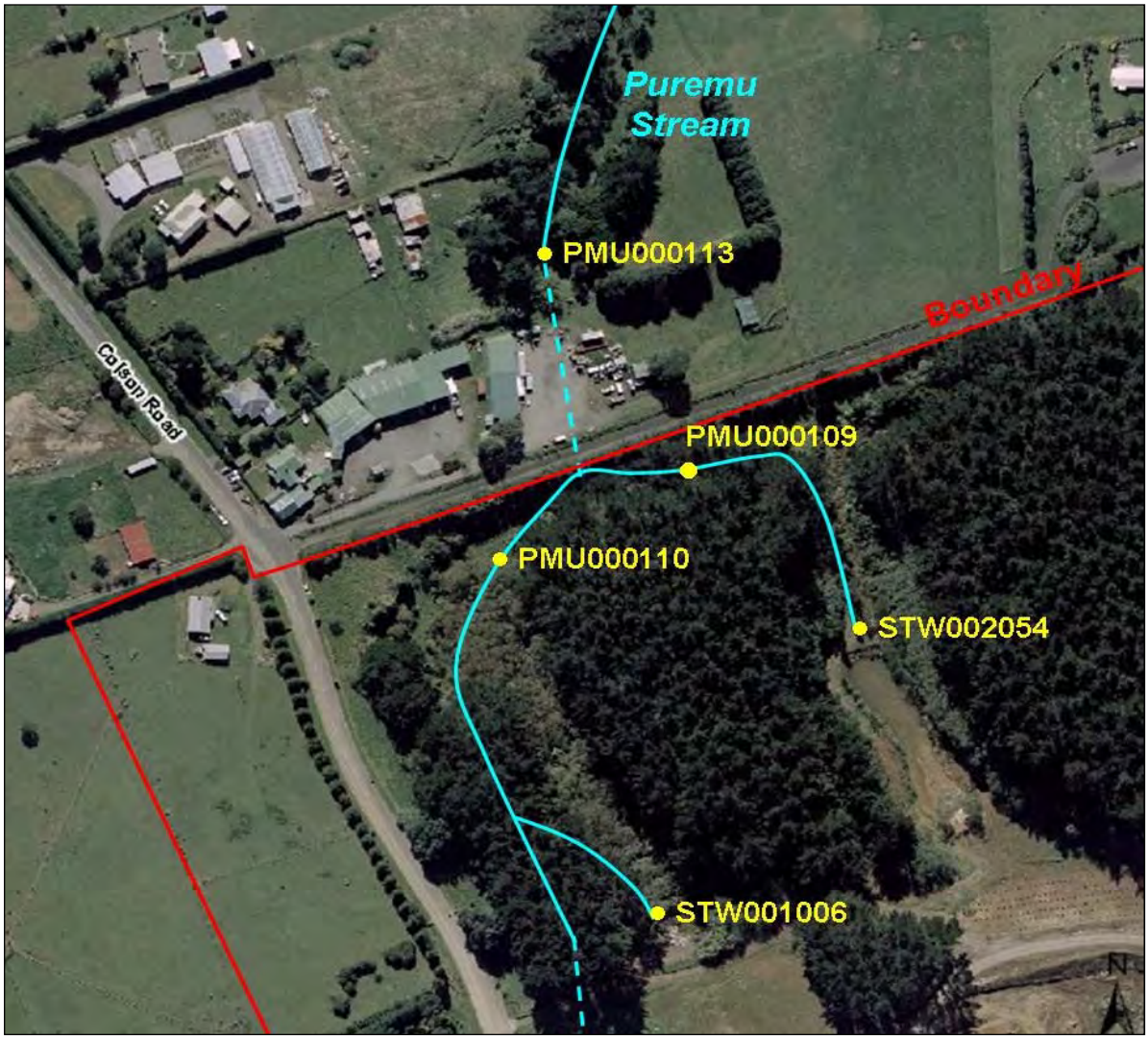

Figure 9 Sampling sites on the Puremu Stream downstream of the landfill

Table 8 Chemical analysis of the Puremu Stream, sampled on 6 May 2019

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000109 Trib d/s large silt pond	PMU000110 d/s landfill culvert	PMU000113 d/s SPCA drive culvert	*Consent limits at PMU000113* (PMU000110**)*
Alkalinity	g/m^3 $CaCO_3$	23	98	42	39	*NA*
BOD	g/m^3	0.6	1.0	1.0	0.9	*NA*
Conductivity	mS/m@25° C	15.1	35.9	21.4	20.4	*NA*

Parameter	Unit	PMU000100 500 m u/s of landfill	PMU000109 Trib d/s large silt pond	PMU000110 d/s landfill culvert	PMU000113 d/s SPCA drive culvert	*Consent limits at PMU000113* (PMU000110**)*
Dissolved oxygen	g/m^3	9.14	4.91	9.47	9.73	*≥ 8.14 [-1] (≥5.0)*
DRP	g/m^3	< 0.004	< 0.004	< 0.004	< 0.004	*NA*
Faecal coliforms	cfu/100 ml	430	450	220	**12,000**	*≤ 1,000*
Unionised ammonia	g/m^3 N	0.00004	0.0055	0.0033	0.0032	*NA*
Ammoniacal-N	g/m^3 N	0.020	1.84	0.83	0.76	*2.0 [limit is pH dependant] (2.5)*
Nitrate/nitrite N	g/m^3 N	0.23	0.59	0.83	0.86	*10 (100)*
Oxygen saturation	%	88	46	90	93	*NA*
pH	pH	6.8	7.0	7.1	7.1	*≥ 6.5 & ≤ 8.5 ([within ±0.5])*
Sulphates	g/m^3	13.2	9.9	13.0	13.6	*1,000 (500)*
Suspended solids	g/m^3	< 3	7	< 3	< 3	*13 [+10]*
Temperature	Deg C	14.0	13.2	13.4	13.8	*(≤ 16.0 [+2])*

Key: * Consent limits with no brackets are for consent 4619 at site PMU000113

** Consent limits shown in rounded brackets are for consent 2370-3 at site PMU000110

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

With the exception of faecal coliforms, the samples taken during the year under review complied with the consent conditions of both 2370 and 4619 for the parameters listed in the above table. The biochemical oxygen demand and ammoniacal nitrogen concentrations had returned to lower, more typical, levels. In terms of the faecal coliforms, the ponds (Table 5) and tributaries had much lower counts, indicating that the elevated count at PMU000113 was not as a result of the landfill discharges.

2.2.2.3 Dry weather metals analysis

Consents 2370 and 4619 have some differing limits on the concentrations of various metals at sites PMU000100 and PMU000113 respectively, with PMU000110 being the compliance point for consent 2370, and with PMU000113 being the compliance point for consent 4619.

In the consents, total recoverable metal limits are given as absolute concentrations that must not be exceeded, whereas the dissolved metal limits are given in terms of a maximum permitted increase relative to the upstream site as indicated within the square brackets in the following tables.

In previous monitoring periods, as the limits for each are similar, and PMU000110 is only a short way upstream of PMU000113, a metals screen was undertaken on site PMU000113 only, with site PMU000100 (upstream of the landfill) acting as a control.

During the 2013-2014 year, metals monitoring at sites PMU000110 and PMU000109 was introduced. The results of the dry weather metals monitoring for the year under review are given in Tables 9 and 10.

Table 9 Results of metal analysis undertaken on 24 October 2018

Parameter	Unit	PMU000100	PMU000109	PMU000110	PMU000113	Consent limit at PMU000113 (PMU000110)
Dissolved aluminium	g/m^3	0.004	< 0.003	< 0.003	< 0.003	0.104 [+0.1]
Total aluminium	g/m^3	0.040	0.023	0.040	0.165	5.0 (5.0)
Dissolved arsenic	g/m^3	< 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	0.2 (0.1)
Dissolved beryllium	g/m^3	< 0.00010	< 0.00010	< 0.00010	< 0.00010	NA
Total beryllium	g/m^3	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.1 (0.1)
Dissolved boron	g/m^3	0.018	0.027*	0.036*	0.035*	NA
Total boron	g/m^3	0.018	0.026	0.034	0.034	5.0 (0.5)
Dissolved cadmium	g/m^3	< 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	0.05 (0.01)
Dissolved cobalt	g/m^3	0.0002	0.0017	0.0011	0.0011	NA
Total cobalt	g/m^3	0.00037	0.00166	0.00099	0.00127	1.0 (0.05)
Dissolved chromium	g/m^3	< 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	1.0 (0.1)
Dissolved copper	g/m^3	0.0006	< 0.0005	< 0.0005	0.0007	0.008 [+0.002]
Total copper	g/m^3	0.00077	< 0.00053	0.00059	0.00097	0.5 (0.2)
Dissolved iron	g/m^3	0.25	0.20	0.40	0.37	0.55 [+0.3]
Total iron	g/m^3	0.61	1.85	1.94	2.3	10.0 (5.0)
Dissolved manganese	g/m^3	0.079	5.2^+	1.68^+	1.81	NA

Parameter	Unit	PMU000100	PMU000109	PMU000110	PMU000113	Consent limit at PMU000113 (PMU000110)
Total manganese	g/m^3	0.097	5.0	**1.64**	1.85	5.0 (1.0)
Dissolved lead	g/m^3	< 0.00010	< 0.00010	< 0.00010	< 0.00010	0.002 [+0.002]
Total lead	g/m^3	< 0.00011	< 0.00011	< 0.00011	0.00021	0.1 (0.1)
Dissolved selenium	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.001 [+0.001]
Total selenium	g/m^3	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.05 (0.02)
Dissolved vanadium	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	NA
Total vanadium	g/m^3	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.1 (0.1)
Dissolved zinc	g/m^3	0.0056	< 0.0010	0.0012	0.0027	0.0356 [+0.03]
Total zinc	g/m^3	0.0063	0.0012	0.0020	0.0047	2.4 (2.0)

Key: * Consent limits with no brackets are for consent 4619 at site PMU000113

** Consent limits shown in rounded brackets are for consent 2370-3 at site PMU000110

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

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

With the exception of total manganese, the metals limits on both consent 2370 and 4619 were complied with on this occasion. The total manganese concentration obtained (1.64 g/m^3) is less than the ANZECC default guideline for freshwater offering protection to 95 % of species (1.9 mg/m^3). When resampled in May, the manganese concentration was found to be compliant with consent conditions. It is also noted that there is currently an abatement notice in place to address the depth and contouring of the cap on Stage 2 that has a completion date of 15 March 2020. As the condition of the cap results in the potential for a slight increase in the amount of leachate entering the western tributary, the minor non-compliance that is not resulting in significant adverse effects is considered to be implicitly allowed for under the abatement notice.

Table 10 Results of metal analysis undertaken on 6 May 2019

Parameter	Unit	PMU000100	PMU000109	PMU000110	PMU000113	Consent limit at PMU000113 (PMU000110)
Dissolved aluminium	g/m^3	0.008	< 0.003	0.004	0.004	0.109 [+0.1]
Total aluminium	g/m^3	0.022	0.0172	0.025	0.027	5.0 (5.0)
Dissolved arsenic	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.05 [+0.05]

Parameter	Unit	PMU000100	PMU000109	PMU000110	PMU000113	Consent limit at PMU000113 (PMU000110)
Total arsenic	g/m³	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.2 (0.1)
Dissolved beryllium	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	NA
Total beryllium	g/m³	< 0.00011	< 0.00011	< 0.00011	< 0.00011	0.1 (0.1)
Dissolved boron	g/m³	0.020	0.031	0.025	0.026	n/a
Total boron	g/m³	0.0186	0.031	0.024	0.027	5.0 (0.5)
Dissolved cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	< 0.00005	0.001 [+0.001]
Total cadmium	g/m³	< 0.000053	< 0.000053	< 0.000053	< 0.000053	0.001 (0.01)
Dissolved cobalt	g/m³	0.0003	0.0013	0.0004	0.0004	NA
Total cobalt	g/m³	0.00024	0.00127	0.00042	0.00040	1.0 (0.05)
Dissolved chromium	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.02 [+0.02]
Total chromium	g/m³	< 0.00053	< 0.00053	< 0.00053	< 0.00053	1.0 (0.1)
Dissolved copper	g/m³	0.0005	0.0005	< 0.0005	< 0.0005	0.007 [+0.002]
Total copper	g/m³	0.00061	0.00083	0.00055	0.00070	0.5 (0.2)
Dissolved iron	g/m³	0.32	0.27	0.50	0.53	0.62 [+0.3]
Total iron	g/m³	0.74	2.9	1.07	1.07	10.0 (5.0)
Dissolved manganese	g/m³	0.052	3.4	0.43	0.49	NA
Total manganese	g/m³	0.057	3.6	0.44	0.49	5.0 (1.0)
Dissolved lead	g/m³	< 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 (0.1)
Dissolved selenium	g/m³	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.001 [+0.001]

Parameter	Unit	PMU000100	PMU000109	PMU000110	PMU000113	Consent limit at PMU000113 (PMU000110)
Total selenium	g/m^3	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.05 (0.02)
Dissolved vanadium	g/m^3	< 0.0010	< 0.0010	< 0.0010	< 0.0010	NA
Total vanadium	g/m^3	< 0.0011	< 0.0011	< 0.0011	< 0.0011	0.1 (0.1)
Dissolved zinc	g/m^3	0.0024	0.0013	0.0018	0.0025	0.0324 (+0.03)
Total zinc	g/m^3	0.0027	0.0018	0.0019	0.0030	2.4 (2.0)

Key: * Consent limits with no brackets are for consent 4619 at site PMU000113

** Consent limits shown in rounded brackets are for consent 2370-3 at site PMU000110

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

The results for the May survey show that all parameters were in compliance with the conditions on consents 2370 and 4619 and that there were only very slight increases in some of the metals determined. 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.

2.2.3 Results of wet weather stormwater and receiving environment monitoring

A survey was conducted during a rainfall event and the results are given in the tables below. Table 11 shows the results for discharges and receiving water into which the discharges from within the landfill catchment flow (Puremu Stream). Table 12 shows the results for the Manganaha Stream, which lies adjacent 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 leachate from Stages 1 and 2, and STW002054 discharges stormwater from the eastern forest of the site and the composting pad. STW002054 also receives leachate from Stage 3 in the event that the leachate pumping system is overloaded, or fails. It is noted that consent 4619 provides only for minor amounts of leachate to be present in this discharge.

The results show that during stormwater discharges, the site was complying with consent conditions in regards to all the water quality parameters in both the Puremu and Manganaha Streams. The small eastern silt pond was again found to be the main contributor of ammoniacal nitrogen, however, at all the freshwater sites monitored the levels of unionised ammonia, suspended solids and conductivity were within environmentally acceptable ranges, and indicated reasonable water quality during these surveys.

Table 11 Results of rain event monitoring – discharge and Puremu Stream samples, 18 September 2018

Site	Alkalinity g/m3 CaCO3	Conductivity mS/m @25°C	Faecal Coliforms cfu/100ml	Unionised ammonia g/m^3-N	Ammoniacal nitrogen g/m^3-N	pH	Suspended solids g/m^3	Temp. Deg.C	Turbidity NTU
Limits PMU000110	**NA**	**NA**	**NA**	**NA**	**2.5**	***[within ±0.5]***		***≤ 17.5 [+2]***	**NA (visual)**
Limits PMU000113	**NA**	**NA**	**≤ 1000**	**NA**	**2.0 at pH < 7.75**	***≥ 6.5 & ≤ 8.5***	***13 [+10]***		**NA (visual)**
IND003009	-	116.8	1,200	0.0020	0.065	8.0	16	15.8	14.1
STW001006	270	79.9	<10	0.033	22	6.6	51	15.8	260
STW002054	127	47.4	3,100	0.0115	1.32	7.4	8	14.7	27
PMU000100	25	14.6	110	0.00010	0.024	7.1	< 3	15.5	1.9
PMU000109	97	37.4	-	0.00198	0.34	7.2	39	16.0	39
PMU000110	58	26.2	-	0.0114	2.1	7.2	6	15.7	9.5
PMU000113	58	25.9	280	0.0110	**2.1**	7.2	4	15.8	8.6

Key: * Consent limits with no brackets are for consent 4619 at site PMU000113

** Consent limits shown in rounded brackets are for consent 2370-3 at site PMU000110

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

In line with the findings of the dry weather survey, the compost ponds were again the major contributor of faecal coliforms. Although the levels had increased more than two fold between the compost pond and the discharge point from the relevant stormwater pond (STW002054), the level was within consent conditions at the compliance point (PMU000113). It is also noted that there was a significant decrease in the faecal coliform count in the compost pond sample when compared to that obtained in the 2017-2018 year (140,000 cfu).

There apparent minor exceedance in the ammoniacal nitrogen concentration at the compliance point for consent 4619 was found to be within the uncertainty of measurement of the test method, and was therefore not pursued as a non-compliance. It is also noted that the main contributing source on this occasion was the small silt ponds that feeds into the western tributary, and this was compliant with consent 2370 at PMU000110.

Table 12 Results of rain event monitoring - Manganaha Stream, 18 September 2018

Parameter	Unit	Site	
		MNH000190	MNH000250
Conductivity	mS/m@25 °C	15.4	15.4
Unionised ammonia	g/m^3	<0.00005	0.00011
Ammoniacal nitrogen	g/m^3-N	< 0.010	0.020
pH	-	7.2	7.2
Suspended solids	g/m^3	< 3	< 3
Temperature	Deg C	14.3	14.5

Parameter	Unit	Site	
		MNH000190	MNH000250
Turbidity	NTU	1.5	1.6

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

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.

2.2.4 Biological monitoring

2.2.4.1 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 sites sampled are described in Table 13 along with the standard Council sampling technique used at each site, and their locations are shown in Figure 10.

Table 13 Biomonitoring sites in the Puremu and Manganaha Streams related to the Colson Road landfill

Stream	Site No.	Site Code	Location	Sampling method	
				24-Oct-2018	18-Apr-2019
Puremu Stream	1	PMU000104	Upstream of the landfill	Kick-sweep	Streambed kick
	2	PMU000110	400 m downstream landfill	Streambed kick	Streambed kick
	3	PMU000113	Downstream of the RSPCA driveway	Streambed kick	Streambed kick
Unnamed tributary of Puremu Stream	PT1	PMU000108	60 m upstream of the confluence with Puremu Stream	Streambed kick	Streambed kick
Manganaha Stream	M4	MNH000190	10 m downstream of an unnamed tributary of the Manganaha Stream	Streambed kick	Streambed kick
	M6	MNH000260	500 m downstream of site M4	Streambed kick	Streambed kick

Samples were sorted and identified to provide number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

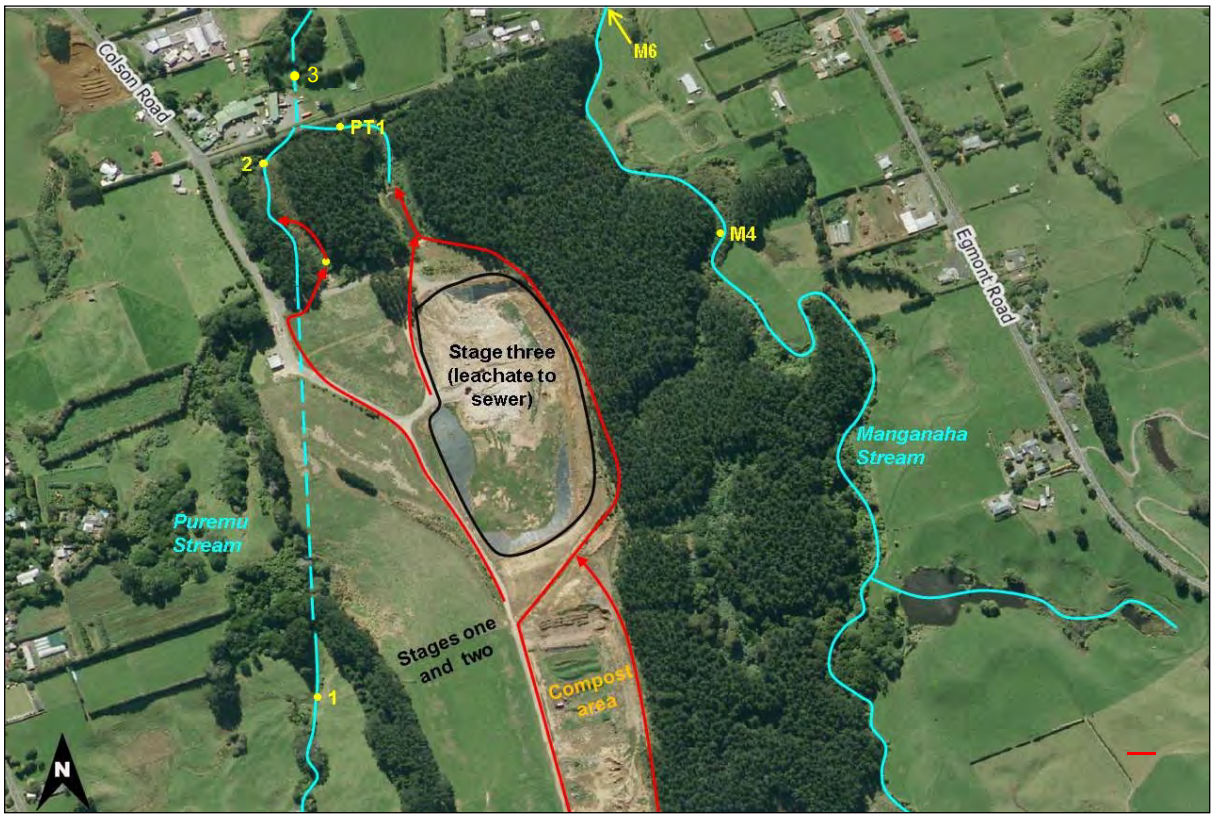

Figure 10 Biomonitoring sites related to the Colson Road landfill, New Plymouth

24 October 2018

In this survey, the MCI score recorded at the upstream 'control' site 1 on the Puremu Stream was slightly lower than the score recorded in the preceding survey and slightly lower than the median score for this site. The $SQMCI_S$ score was also lower than the historical median score for the site. Taxa richness was similar to the long-term median for the site. These results were indicative of 'poor' biological health.

Site 2 in the Puremu Stream recorded a slightly lower MCI score and significantly lower $SQMCI_S$ score compared with site 1. The MCI result was similar to the historical median for the site and to the preceding survey score. The $SQMCI_S$ score however was significantly lower than both the median for the site and the previous survey score. These results were indicative of 'poor' biological health. Taxa richness was low and was equal to the lowest taxa richness recorded at this site to date. The iron oxide sediment and high proportion of silt substrate recorded at the time of the survey is likely to have reduced the quality of the habitat at this site. It is difficult to ascertain whether or not stormwater discharges from the Colson Road Landfill have contributed to the poor habitat at this site.

Site 3 was monitored in the previous survey in response to the poor results recorded at site PT1 in the Puremu Stream tributary during the spring (October 2017) survey. In the current survey, site 3 recorded similar MCI scores and taxa richnesses to the two upstream sites in main stem of the Puremu Stream. The $SQMCI_S$ scores recorded at sites 1 and 3 in the Puremu Stream were not significantly different to one another, however the $SQMCI_S$ score recorded at site 3 was significantly higher than that recorded at site 2.

These results show improvement from the previous survey result where site 3 recorded the lowest taxa richness and MCI and SQMCIS scores of the three Puremu Stream sites. In the preceding survey, it was thought that this may have been due to impacts from the landfill, but, due to slight habitat differences between the sites, definitive conclusions could not be drawn. There was a slower flow at this site compared to the upstream sites affecting habitat, and increasing sediment deposition. It was also noted during the February 2018 sampling that the streambed sediment had a slight anaerobic odour. Furthermore, it was noted that the culvert upstream of this site also had the potential to influence conditions at this site. It was suggested that physicochemical water quality sampling be carried out in conjunction with the biological monitoring to assist with interpretation of the results. It is again recommended that physicochemical water quality sampling be carried out in conjunction with the next biomonitoring survey, should a return to less desirable conditions occur.

Site PT1 in the unnamed tributary of the Puremu Stream recorded a MCI score of 71; a significant recovery from the October 2017 survey, which recorded a MCI score of 48 units, which was the lowest MCI score recorded at this site to date. The MCI score of 71 units was one unit lower than the historical median, and was slightly higher than the scores recorded at sites 1 and 2 (by 3 and 5 MCI units respectively). This MCI score was also similar to that recorded by the previous February 2018 survey. The $SQMCI_S$ score was similar to that recorded by site 1 and 3 and was significantly higher than that recorded at site 2 (by 1.4 units). This $SQMCI_S$ score was slightly higher than the historical median and higher than the preceding survey score. This site recorded a moderate taxa richness, equal to the historical median, which was a significant improvement from the previous two survey results, which recorded the two lowest results to date. The results at this site were indicative of 'poor' physicochemical water quality and/or habitat quality.

The sites in the Manganaha Stream (site M4 and site M6) recorded MCI scores that were not significantly different to one another and were similar to historical medians. The $SQMCI_S$ score recorded at site M4 was significantly higher than that recorded at site M6 (by 2.1 units). The $SQMCI_S$ score recorded at site M4 was also significantly higher than the previous survey score and the median for the site, while the $SQMCI_S$ score for site M6 was significantly higher than the previous survey score but similar to the median score for the site. Taxa richness was moderate and had increased from the previous survey at both sites. The results at these two sites were indicative of reasonable preceding water quality. There was some evidence of a decline in health between sites M4 and M6 but the differences may also be attributed to subtle habitat differences between the two sites.

No undesirable biological growths were detected at any of these sites during this October 2018 survey.

Overall, the results of this survey indicate 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, or the unnamed tributary of the Puremu Stream. Site PT1 showed a significant recovery from the poor results recorded in the October 2017 survey. There were no significant differences in MCI scores between the three Puremu Stream sites and the unnamed tributary site PT1. It is still recommended that, where possible, future biological monitoring be carried out in conjunction with physicochemical water quality monitoring, in order to assist with determination of the causes of any poor results. Given the anaerobic nature of the streambed sediment and the historical results indicating low dissolved oxygen levels in the Puremu Stream and tributary, consideration should be given to more intensive dissolved oxygen monitoring in this Stream.

18 April 2019

In this survey, the MCI score recorded at the upstream 'control' site 1 on the Puremu Stream was slightly lower than the score recorded in the preceding survey, and significantly lower than the median score for this site. The SQMCI score was also significantly lower than the historical median score for the site. Taxa richness was substantially lower than the long-term median for the site. These results were indicative of 'poor' biological health. These results are reflective of the habitat available at this site. This site is essentially a

wetland area, dominated by wetland vegetation. Water depths are usually very low and on this sampling occasion, flow conditions were also low. It is suggested, that if possible, the 'control' site be moved slightly upstream of its current location, to a portion of the stream with greater flow, where the habitat is more representative of that found downstream at sites 2 and 3.

Site 2 in the Puremu Stream recorded significantly higher MCI and SQMCI scores in comparison to site 1. The MCI result was similar to the historical median for the site, but slightly higher than the preceding survey score. The SQMCI score however, was significantly higher than both the median for the site and the previous survey score, and was the highest equal SQMCI score recorded for the site to date. These results were still indicative of 'poor' biological health. Taxa richness was low and was equal to the lowest taxa richness recorded at this site to date. The iron oxide bacteria and high proportion of silt substrate recorded at the time of the survey is likely to have reduced the quality of the habitat at this site. It is thought that stormwater discharges carrying suspended sediment from the Colson Road Landfill has possibly contributed to the poor habitat at this site.

Site 3 was monitored in the previous two surveys in response to the poor results recorded at site PT1 in the Puremu Stream tributary during the spring (October 2017) survey. In the current survey, site 3 recorded a similar taxa richness, but much lower MCI score compared with the two upstream sites, in main stem of the Puremu Stream. The MCI score recorded at site 3, (55 units), was significantly lower than that recorded upstream, at site 2, (by 19 units), and was substantially lower than that recorded at 'control' site 1, (by 8 units). This MCI score was reflective of 'very poor' macroinvertebrate health. When comparing the macroinvertebrate community composition between site 2 and site 3 there were two significant differences in taxon abundance between the two sites. These included the significant increase of two 'tolerant' taxa, worms (oligochaetes) and fingernail clam (Sphaeriidae). Other variances between site 2 and site 3 included slight changes to the composition of numerous rare 'taxa', which were insignificant. At the time of sampling the flow was recorded as 'grey' in colour which could indicate increased turbidity and suspended sediment loading at this site. Is it important to note, a concrete products site is situated directly upstream of site 3 and may be contributing stormwater discharges immediately upstream of site 3.

The SQMCI scores recorded at sites 1 and 3 in the Puremu Stream were not significantly different to one another, however the SQMCI score recorded at site 3 was significantly lower than that recorded at site 2 (by 2.3 units). This contrasted to the previous spring survey where the SQMCI recorded at site 3 was significantly higher than that recorded at site 2. These results show deterioration from the previous survey results and a return to the poor results that were recorded by the summer 2018 survey. It is possible that these poor results may be explained by an increase in suspended sediments entering the Puremu Stream, downstream of the Colson Landfill site, particularly during high flow events. Further investigation is needed to determine the levels of suspended sediment entering the Puremu Stream from the Colson Road Landfill site, as there may also be input coming from the concrete products site immediately upstream of site 3.

The dissolved oxygen concentrations recorded in the month prior to the survey at site 3 ranged from 5.28 mg/L to 7.67 mg/L, and were above the consented bottom line limit of 5 mg/L. These dissolved oxygen levels, although somewhat low, are not thought to be the cause of any significant decline in macroinvertebrate populations at site 3. Turbidity levels ranged from 7.6 FNU to 3145.6 FNU, with an average of 117.7 FNU, which is considered to be elevated.

Site PT1 in the unnamed tributary of the Puremu Stream recorded an MCI score of 55 units; a significant decrease from the previous survey (by 16 MCI units), and significantly lower than the median for the site. The MCI score of 55 units was lower than the scores recorded at sites 1 and 2 (by 8 and 19 MCI units respectively). This MCI score was only slightly higher than the extremely low score of 48 units recorded by the October 2017 survey. The low MCI scores recorded by the current and October 2017 surveys can predominantly be attributed to a high abundance of both oligochaete and *Chironomus* bloodworms

recorded. High numbers of both of these taxa can be attributed to organic enrichment and an increase in fine and soft sediments.

The SQMCI score recorded at site PT1, was however, similar to that recorded by site 1 and 3, but was significantly lower than that recorded at site 2 (by 2.4 units). This SQMCI score was significantly lower than the historical median for the site (by 0.9 unit), and was lower than the preceding survey score (by 1.3 units). This site recorded a low taxa richness, (half the number of the historical median), and the third lowest taxa score recorded for this site to date. The results at this site were indicative of 'very poor' physicochemical water quality and/or habitat quality. Site PT1 also recorded 'abundant' *Chironomus* blood worms, indicative of low oxygen sediment levels and organic enrichment. These results indicate that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site has had a detrimental effect on the macroinvertebrate communities of the unnamed tributary of the Puremu Stream at site PT1.

The MCI and SQMCI scores recorded at site M4 in the Manganaha Stream was significantly higher than that recorded at site M6 (by 20 MCI and 0.9 SQMCI units). In comparison to the previous survey results and the site medians, the MCI scores recorded in the current survey, were not significantly different at either site M4 or M6. Taxa richness was moderate and had increased from the previous survey at site M4, but decreased at site M6. The results were reflective of 'fair' macroinvertebrate health at site M4 and 'poor' macroinvertebrate health at site M6. These results were indicative of average preceding water quality. There was some evidence of a decline in health between sites M4 and M6, but the differences may also be attributed to subtle habitat differences between the two sites. There were five significant differences in taxon abundance between the two sites, which can be partially be explained by the increase in gravel and cobble substrate and a slight increase in periphyton, at site M4. This increase in stony substrate is more suitable for 'sensitive' taxa such as the mayflies (*Austroclima*) and (*Coloburiscus*), and caddisfly, (Hydropsyche-*Orthopsyche*). The increase in periphyton at site M4 is likely to have supported the higher numbers of snail (*Potamopyrgus*), at site M4.

No undesirable biological growths were detected at any of these sites during this April 2019 survey.

Overall, the results of this survey indicate that the discharge of treated stormwater and leachate discharges from the Colson Road landfill site, have had a detrimental effect on the macroinvertebrate communities of the unnamed tributary of the Puremu Stream, at site PT1. Site PT1 recorded an MCI score reflective of 'very poor' macroinvertebrate health. The presence of 'abundant' *Chironomus* blood worms at site PT1 and 'very abundant' oligochaete worms suggests low oxygen sediment levels and/or organic enrichment at this site. Given that the Colson Road Landfill site is situated in the head of the catchment of the unnamed tributary of the Puremu Stream, it can be confirmed that the Colson Road landfill stormwater and leachate discharges have directly contributed to the 'very poor' macroinvertebrate results recorded. It is possible that accumulations of fine sediments have also contributed to the 'very poor' and 'poor' results recorded at sites PT1, 2 and 3. It is recommended that consideration be given to investigating the levels of suspended sediment entering the Puremu Stream and Unnamed tributary, in relation to the Colson Road Landfill site and the possible contribution of the concrete products site immediately upstream of site 3. There were no significant dissolved oxygen results from the physicochemical monitoring that was undertaken in the month prior to the survey. An average of 6.59 mg/L of dissolved oxygen was recorded over the monitored period, which, given the habitat was not unusual. Turbidity levels were elevated and ranged from 7.6 FNU to 3145.6 FNU, with an average of 117.7 FNU. It is recommended that macroinvertebrate sampling continue for the 2019-2020 period, similar in format to the 2018-2019, to include sampling at site 3. However, it is not recommended that intensive dissolved oxygen monitoring continue, as the concentrations recorded prior to this survey were deemed acceptable for this habitat. Lastly, the results from site M4 and M6 in the Manganaha Stream suggested there were no detrimental impacts from the Colson Road Landfill on the macroinvertebrate communities of this stream.

2.3 Groundwater

Groundwater was sampled from six bores on over three separate days in June 2019 due to the difficulty in finding and/or accessing the bores in the forest undergrowth. The results of the analyses are given in Table 14.

Although the NPDC subsurface drainage samples (Table 4, Section 2.2.2) may be starting to show the early signs of slight leachate impact, on the whole, the groundwater results show little evidence of leachate contamination. Although all parameters measured for all the bores, were well within the ranges expected in Taranaki groundwater, there are some small changes in recent years, particularly in the chloride and nitrate/nitrite nitrogen concentrations, that may be indicative of newly emerging trends (Figure 11 and Figure 12).

Table 14 Chemical analysis of Colson Road landfill groundwater sampled June 2019

Parameter	Unit	GND0573	GND0255	GND0575	GND0251	GND0598	GND1300	GND1301
Date		11 Jun 2019	18 Jun 2019	04 Jun 2019	18 Jun 2019	18 Jun 2019	18 Jun 2019	04 Jun 2019
Alkalinity	g/m^3 $CaCO_3$	27	39	98	62	160	33	113
Chloride	g/m^3	77	47	46	21	22	23	27
COD	g/m^3	< 6	< 6	< 6	20	8	14	< 6
Conductivity	mS/m @ 25 °C	34.8	24.8	35.7	18.6	36.9	16.7	32.2
Water level	m	4.88	11.21	8.61	13.49	11.00	13.33	8.65
Unionised ammonia	g/m^3 N	<0.00001	<0.00001	<0.00001	<0.00001	0.025	<0.00001	0.00053
Ammoniacal N	g/m^3 N	0.022	<0.010	<0.010	<0.010	1.25	<0.010	0.095
Nitrate/nitrite N	g/m^3 N	0.46	1.75	0.93	0.37	<0.002	1.24	1.31
Nitrite N	g/m^3 N	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
pH	pH	5.7	5.8	6.4	6.3	7.8	6.2	7.2
Sulphate	g/m^3	7.0	2.4	1.5	5.3	< 0.5	7.4	2.6
Temperature	Deg C	15.4	15.7	14.9	15.5	14.3	13.1	15.0
Dissolved aluminium	g/m^3	<0.003	0.012	<0.003	0.037	0.004	0.027	<0.003
Dissolved arsenic	g/m^3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Dissolved beryllium	g/m^3	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved boron	g/m^3	0.023	0.021	0.020	0.016	0.057	0.022	0.029
Dissolved cadmium	g/m^3	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dissolved cobalt	g/m^3	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005
Dissolved chromium	g/m^3	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved copper	g/m^3	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005
Dissolved Iron	g/m^3	<0.02	<0.02	<0.02	0.03	0.30	<0.02	0.58
Dissolved lead	g/m^3	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Dissolved manganese	g/m^3	0.0046	0.0053	<0.0005	0.0005	0.077	0.0037	0.125
Dissolved selenium	g/m^3	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010

Parameter	Unit	GND0573	GND0255	GND0575	GND0251	GND0598	GND1300	GND1301
Dissolved vanadium	g/m^3	<0.0010	<0.0010	0.0105	0.0019	<0.0010	0.0013	0.0044
Dissolved zinc	g/m^3	0.0038	0.0018	0.0022	< 0.0010	0.0058	0.0040	0.0022

Historically, GND0598 shows some elevation in alkalinity, ammoniacal nitrogen, pH and dissolved iron when compared to the other bores. However, this bore is up gradient of the landfill in terms of groundwater flow, and the results are consistent with those obtained from the bore since 1996. The elevated levels of these parameters in this bore are therefore unlikely to be a result of leachate contamination.

The samples were also analysed for SVOC's (semi-volatile organic compounds) and none were found to be above detection levels. A copy of the SVOC results is available on request.

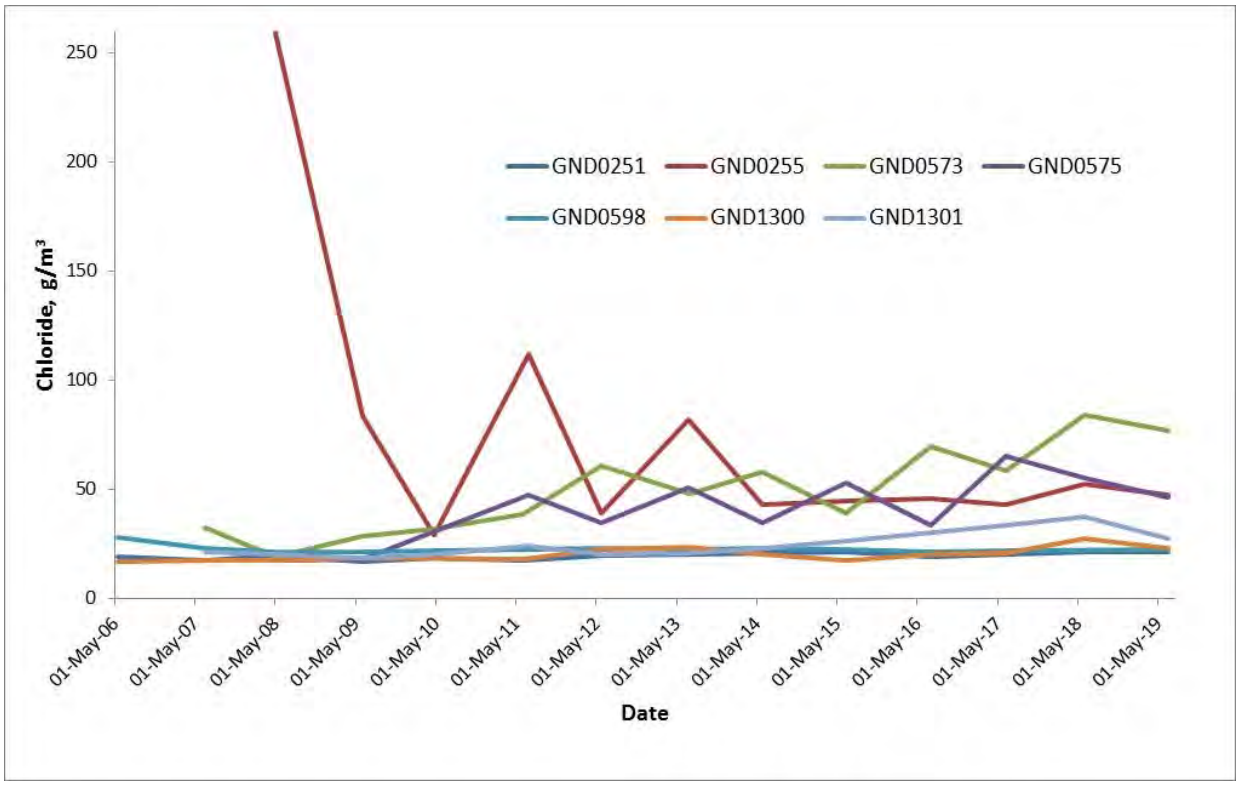

Figure 11 Chloride concentrations in the Colson Road groundwater bores, June 2006 to date

It can be seen that the chloride concentration in bore GND0255 (up gradient of the landfill) have been stabilising at a decreased level since the spike found in April 2008. Conversely, in bores GND0573, GND0575 (and to a lesser extent GND1301), although the changes are relatively small, it does appear that there may be an emerging trend of increasing chloride concentrations. These bores are down gradient of landfill Stages 2 and 3, and may be indicative of some minor leachate contamination.

Figure 12 shows that there may also be an emerging trend of increasing nitrate/nitrite nitrogen concentrations in some of these bores, that is, GND0575 (north east of the landfill) and GND1300 (north east of the composting area and east of the southern end of the landfill). This finding is consistent with the potential emerging trend of increasing nitrate/nitrite nitrogen in the under liner drainage results provided by NPDC (2.2.1.2, Figure 8). In contrast, it is noted that the nitrate/nitrite nitrogen results obtained at GND1301 (further east of the landfill than GND0575) during the year under review was still relatively low, following the higher results obtained in the 2014-2015, 2015-2016 and 2016-2017 years.

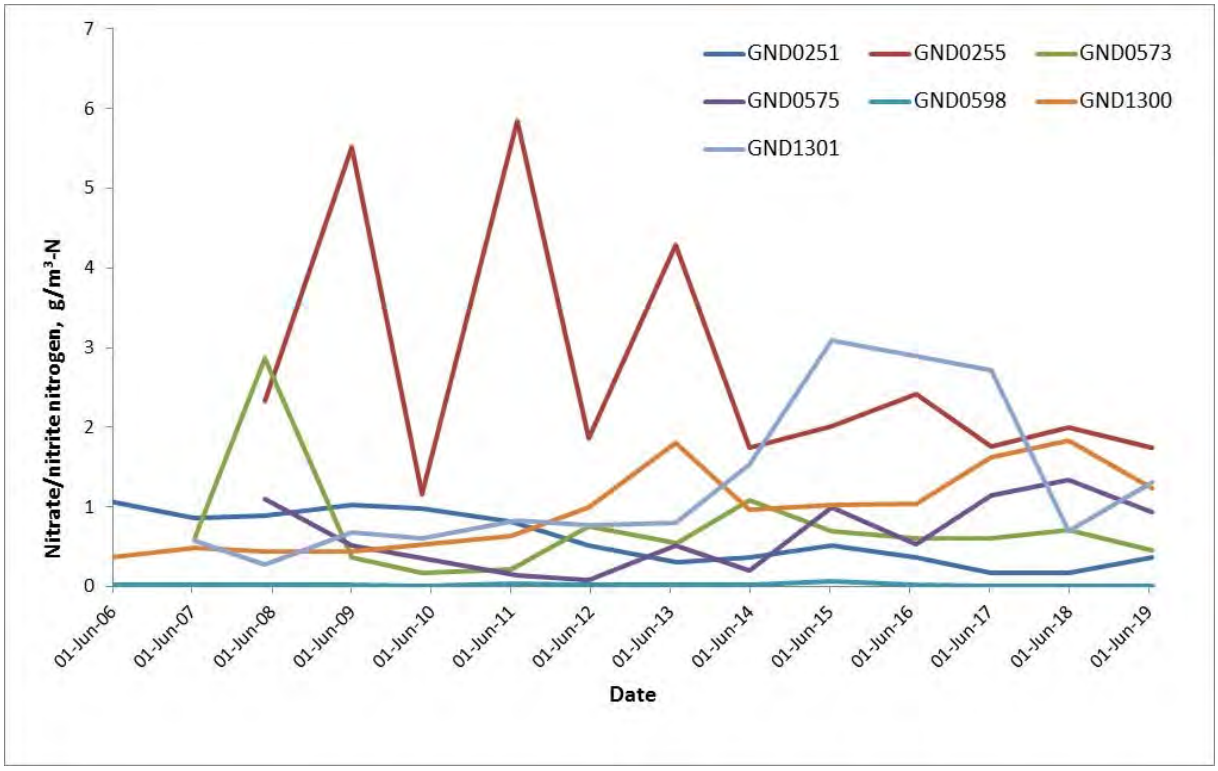

Figure 12 Nitrate/nitrite nitrogen concentrations in the Colson Road groundwater bores, June 2006 to date

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 Colson Road landfill is not having a significant adverse effect on groundwater quality.

2.4 Air

2.4.1 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 the Colson Road landfill, Regulations 26 and 27 do not apply as 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.

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.

Updated annual information on the feed gas and temperature was provided upon request in the form of graphed methane and temperature data from the continuous (1 minute) data collected by the monitoring system integrated into the flare system (Figure 13).

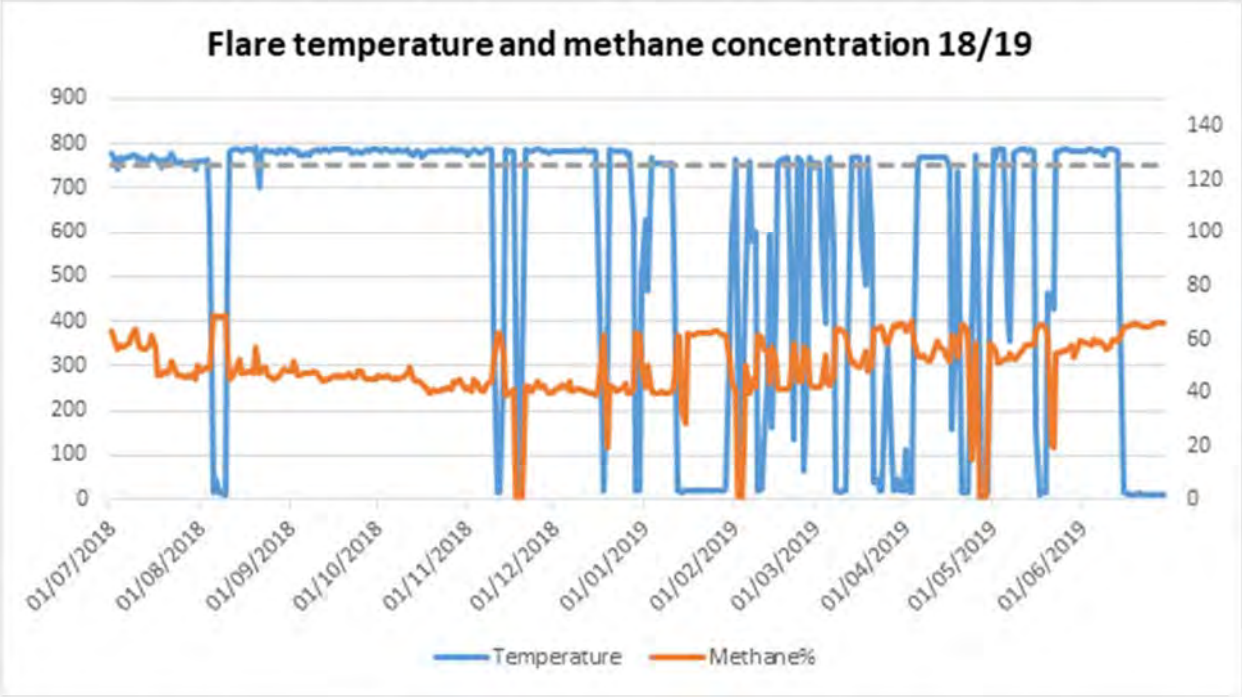

Figure 13 Methane and temperature recorded by the landfill gas flare for the year under review

Due to an oversight, the hydrogen sulphide concentration of the feedstock gas was not measured during the year under review. As soon as this oversight was recognised, NPDC undertook monitoring of the feedstock gas and provided the results to Council. The results will be presented in the 2019-2020 Annual Report.

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 confirmed that:

- The system incorporates automatic isolation vales 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.

- The 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.

The total landfill gas volume treated by the flare during the year under review was 386,959 m^3 calculated from daily average landfill gas flow in m^3/h. The monthly averaged landfill gas flows are shown in Figure 14.

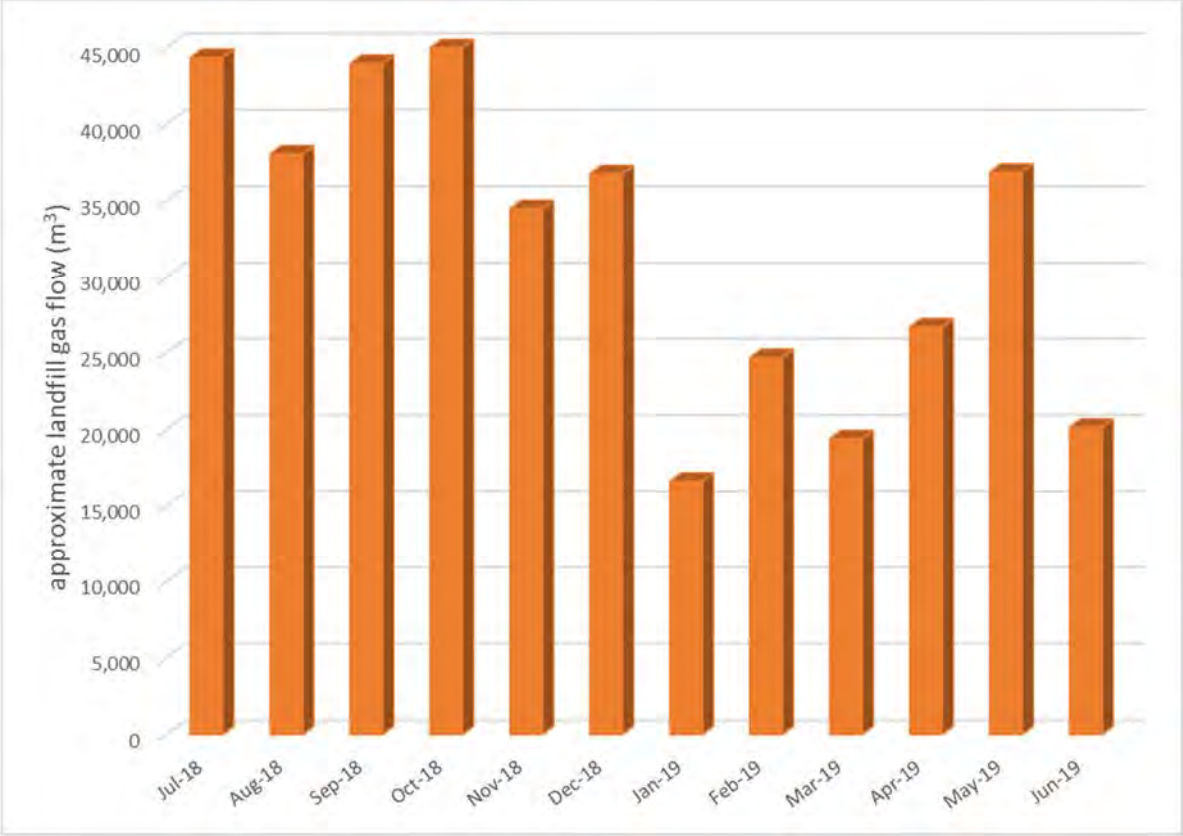

Figure 14 Monthly landfill gas flow volumes flared

Condition 3

The Colson Road Regional Landfill Management Plan was updated in June 2018, to include a general description of the flare, 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 can be confirmed that the plan covers the required procedures, schedules and records keeping information.

A flare fault log was provided for the year under review. This showed that there was a total of 99.5 non-operational days due to faults, which is 27 % of the year. The longest non-operational period was just under 19 days from 11 to 30 January 2019. The reason given for the shutdown was a fault on the extraction fan control system. This is a fault that was logged as the cause of 41.5 of the total 99.5 non-operational days. At the time of writing the report Council was informed that this fault has occurred only once to date in the 2019-2020 year. The other common causes of shutdown was the burner being over temperature. The shutdowns due to the burner temperature appeared to have been resolved by the replacement of temperature control probe. A summary of the monthly non-operational hours is given in Table 15 and Figure 15. It is noted that there were no odour complaints received by the Council during any of the non-operational periods.

Table 15 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 (days)l
Jul-18	2	<0.1	<0.1	<0.1	0.1
Aug-18	2	2.9	5.5	0.2	5.8
Sep-18	0	0.0	0.0	0.0	0.0
Oct-18	1	0.1	0.1	0.1	0.1
Nov-18	2	2.8	3.2	2.4	5.6
Dec-18	3	1.7	2.6	0.8	5.2
Jan-19	3	6.6	18.9	0.3	19.9
Feb-19	11	1.1	2.7	0.0	11.9
Mar-19	8	2.3	5.0	0.6	18.7
Apr-19	5	1.9	3.7	0.4	9.3
May-19	3	2.1	4.3	1.0	6.4
Jun-19	1	16.6	16.6	16.6	16.6
Totals	41	-	-	-	99.5

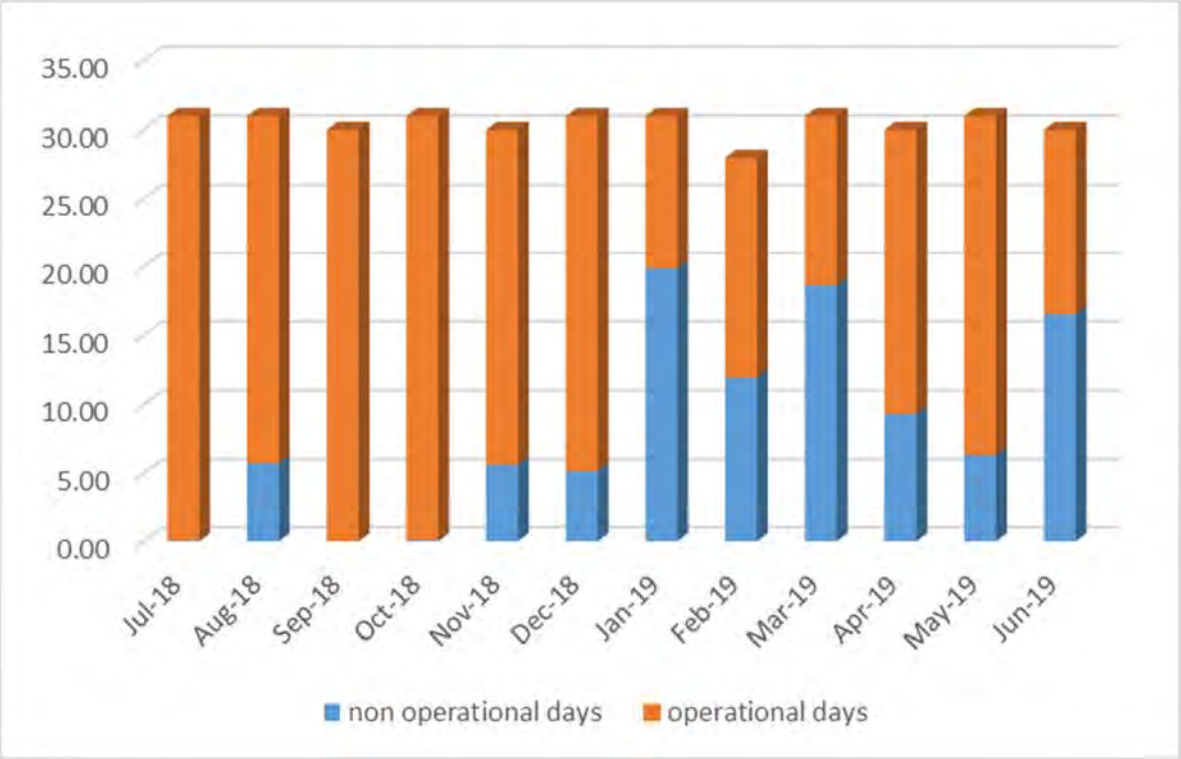

Figure 15 Monthly operational/non-operational hours for the Colson Road landfill gas flare for the year under review

2.4.2 Results of receiving environment monitoring

2.4.2.1 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 16.

Table 16 Air deposition monitoring results for January and February 2019

Site code	Site description	Particulate $g/m^2/day$	
		8-29 Jan 2019 (21 days)	5-27 Feb 2019 (22 days)
AIR001604	Adjacent to Manganaha Stream, behind rose nursery	0.03	0.05
AIR001608	124 Egmont Road, paddock boundary, west of house	0.04	0.03
AIR001622	At rear of RSPCA building	0.07	*
AIR001603	At entrance to landfill	0.04	0.07
AIR001613	Grass lawn, behind work shed	0.01	0.04
AIR001623	Behind 194 Egmont Road	0.04	0.04

* sample discarded, gauge full of vegetation.

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

2.4.2.2 Ambient suspended particulate and landfill gas component monitoring

Ambient monitoring of suspended particulates (dust) and/or landfill gas components was undertaken under dry weather conditions on three occasions during the year under review at 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 17, Table 18 and Table 19.

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}.

Suspended particulate (dust) monitoring was carried out under dry weather conditions on three occasions at several monitoring locations on, and in the neighbourhood of, the landfill.

Landfill gas components

The landfill gas components monitored during the ambient surveys in the year under review were methane and H_2S. These were not able to be measured during one of the surveys due to equipment failure.

The monitoring showed that there were several instantaneous exceedances of the PM10 guideline, however this give only an indication of the preferred off-site maximums as the guideline is based on a 24 hour average rather than an instantaneous reading. The exceedances recorded were all at on-site locations with the exception of site AIR001612, which was up wind of the landfill site based on the reported wind direction at the time of the survey. At the time of both of these surveys, it was reported that there were no off site dust or odour issues. There were no landfill gas components detected at the time of either of the surveys when this monitoring was carried out.

Table 17 Ambient PM_{10} and methane survey results 22 February 2019

Site	Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
AIR001603 (on-site)	0	0	**55**
AIR001619(on-site)	0	0	44
Top SE corner of track (on-site)	0	0	**60**
AIR001610 (on-site)	0	0	35
Beside flare (on-site)	0	0	40
AIR001609 (off-site) – down wind	0	0	40
Averages	**0**	**0**	**46**

Table 18 Ambient PM_{10} and methane survey results 21 March 2019

Site	Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
AIR001603 (on-site)	-	-	*36*
AIR001619 (on-site)	-	-	*38*
AIR001610 (on-site)	-	-	*40*
AIR001613 (on-site)	-	-	***72***
AIR001616 (on-site)	-	-	***192***
AIR001612 (off-site) - upwind	-	-	***90***
AIR001615 (off site)	-	-	*47*
Averages	**-**	**-**	***74***

Table 19 Ambient PM10 and methane survey results 23 May 2019

Site	Methane (%LEL)	H_2S (ppm)	PM_{10} µg/m^3
AIR001603 (on-site)	0	0	6
AIR001616 (on-site)	0	0	8
AIR001619 (on-site)	0	0	5
Top SE corner of track (on-site)	0	0	6
AIR001610 (on-site)	0	0	17
AIR001613 (on-site)	0	0	19
AIR001612 (off site)	0	0	19
AIR001615 (off site)	0	0	26
Averages	**0**	**0**	**13**

2.5 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 20 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to NPDC's activities during the 2018-2019 period. This table presents a summary of all events that required further investigation or intervention regardless of whether these were found to be compliant or not and includes any on-going matters from previous years.

Table 20 Incidents, investigations, and interventions summary table

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 was issued requiring that works be undertaken to ensure compliance by 15 March 2020.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
18-Aug-2018	A complaint was received concerning an objectionable landfill odour.	Y	Investigations	An odour survey detected a landfill odour at the entrance to the landfill and at the complaints property, however it was deemed as noticeable, intermittent and dissipating and was not in breeching consent conditions.
11-Apr-2019	Self-notification was received that a bund had been breached in two areas and contaminated stormwater was entering the stormwater drains that are directed to the stormwater ponds (which then discharge to the Puremu Stream).	Y	14 day letter (explanation) requested.	A letter of explanation was received and accepted. There was no evidence of any discharge of leachate to surface water.
23 April 2019	Notification was received from NPDC that an overflow was occurring from the leachate pond due water damage to the pump control panel and a blocked outlet grate. Subsequent investigation by NPDC found that the discharge commenced on 21 April and ceased on 24 April.	Y	Investigation including sampling	NPDC responded immediately to investigate and undertake works. Water was pumped from the leachate pond to the wet well (which then pumps to the WWTP) to draw the level of the leachate pond below the overflow point. Samples were collected by both NPDC and the Council, which are reported below. This event occurred during prolonged heavy rainfall (170mm in two days). A number of modifications to the stormwater systems were made to prevent reoccurrence.

23 April 2019

Investigation and sampling found that although the ammoniacal nitrogen and faecal coliforms (Table 21 and Table 22) were above the limits prescribed on consent 4619, these were likely to be as a result of or partly due to the surrounding agricultural land uses as the results show that the levels in the downstream samples were much higher than in the leachate sample. The appearance of the leachate pond (Photo 15) also supported the conclusion that the leachate was substantially diluted with stormwater and the discharge contained only minor amounts of leachate as permitted by the consent.

Table 21 Results of samples collected by Council, leachate pond overflow 23 April 2019

Parameter	Units	Leachate	Upstream	Downstream
time	NZST	17:15	17:24	17:48
Free Ammonia	g/m^3	0.00122	0.0013	0.0112
pH	pH Units	6.6	6.8	7.2
Total Alkalinity	g/m^3 as $CaCO_3$	28	24	37

Parameter	Units	Leachate	Upstream	Downstream
Electrical Conductivity	mS/m	15.3	21.8	25.6
Sample Temperature	°C	14.1	15.8	15.7
Total Ammoniacal Nitrogen	g/m^3	0.98	0.63	**2.1**
Total Biochemical Oxygen Demand	g O_2/m^3	10	< 2	< 2

Table 22 Results of samples collected by NPDC, leachate pond overflow 23 April 2019

Parameter	Units	Leachate pond	Downstream boundary Puremu Stream Culvert
pH	pH Units	7.1	7.1
Alkalinity to pH 4.8	g/m^3	<20	38
Ammonia as ' N '	g/m^3	0.8	2.8
Suspended Solids	g/m^3	11	8
BOD_5(Carbonaceous)	g/m^3 $CBOD_5$	15	<4
Conductivity	mS/m	14.7	26.7
Copper	g/m^3	<0.05	<0.05
Nickel	g/m^3	<0.05	<0.05
Zinc	g/m^3	<0.05	<0.05
Chromium	g/m^3	<0.1	<0.1
Iron	g/m^3	0.8	1.6
Lead	g/m^3	<0.1	<0.1
Manganese	g/m^3	0.24	0.45
Chloride	g/m^3	-	27

Photo 15 Leachate pond 23 April 2019, from NPDC investigation report

2.6 Management and reporting

2.6.1 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.

The management plan in effect during the year under review was the version updated by NPDC in June 2018. The Update scheduled for June 2019 was deferred to include the additional special waste only considerations and those required by the upcoming potential change in operational contractor. The revised plan was updated in August 2019. The contingency plan was last updated in November 2017.

2.6.2 Colson Road Landfill Liaison Committee

A liaison committee comprising representatives of NPDC, Taranaki Regional 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 10 July and 14 November 2018, and 13 March 2019. This periodicity of meetings was agreed by all parties. The meetings covered site development progresses, 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 useful feedback to NPDC.

The Colson Road landfill liaison committee has been very successful to date and will continue in its present format for the 2019-2020 monitoring period.

2.6.3 Independent consultant's reports

Site inspections were undertaken by WAI Environmental (independent consultants) on 21 September 2018 and 15 February 2019.

21 September 2018

It was reported that the first impression was of a neat and tidy operation by an operator who is paying attention to detail. There was little free litter on the site and a significant area of the site was now covered by soil.

In particular, the report of the 21 September 2018 visit noted that:

- A copy of the cap depth investigation was provided, which found that an area of Stage Two had less than the required 800mm depth of final cover. The consultant was advised that this was to be rectified by remedial works.
- The gas collection system and flare seemed to be working well and the records held at NPDC offices show a thorough monitoring control is taking place. There were no LFG odours noted around the site, although localised odours were noted downwind of the open refuse pit and leachate pumping station. It did not seem likely that this odour could be detected off site.
- Litter was not observed being collected at the time of the visit, however, it was considered obvious that it was continuing and the reduction of litter on the site was significant.
- The compost operation continued to be run by a company called "Revital". Generally, it appeared to be a well-run facility.
- Whilst on this occasion the Consultant was not able to get close enough to pace out the approximate area of uncovered refuse, it was estimated the area of exposed refuse to be no more than 400m^2.
- A survey carried out by BTW suggested there may be as much as 3.2 years remaining capacity. It was stated that the capacity would remain available should there be a sudden need for additional emergency disposal such as an earthquake, tornado or eruption.
- The contractor had probably excavated up to a metre below the original ground level in the southern stockpile area, but it was considered unlikely to cause any major issues for closure. The major issue is the lack of cover material for final cover. This is exacerbated by the need for cover to remediate Stage 2 where it has been identified that there is a shortfall.
- On inspection it was found that the contractor had removed more material from the base of the leachate pond than should have been removed. It was recommended that the over-excavated material be replaced with fill to bring the base of the pond up to the correct level and ensure that leachate does not remain in the pond but can all be disposed of via the pumping station.
- A number of historical leachate breakouts have occurred on the sloping sides of the landfill. Whilst these appear to be considerably reduced since the gas flare has been commissioned, a few remain.
- The standard of the access road continued to deteriorate. Bearing in mind the remaining life of the landfill this was not necessarily considered significant. However, the Consultant was informed that

there was a programme of maintenance planned as soon as weather conditions permitted. It was noted that there had been the addition of an open drain filled with large diameter course gravel.

- The Consultant was provided with a copy of the work proposed for completion to closure by June 2019 which allowed for space for emergency disposal.

On this occasion the condition of the landfill was of high quality. This was the eighth consecutive occasion that the Consultant had been able to report a high quality of workmanship. In summary, the main matters for continued vigilance were:

- Maintenance of working face under 900 m^2;
- Continued attention to compaction;
- Ongoing litter collection.

15 February 2019

The report of the 15 February 2019 inspection noted that:

- The planned remedial works to rectify the thickness of the final cover had yet to start
- All previously planned capital works associated with the foundation of Stage 3 had been completed and it was not expected that further lining or major leachate collection pipework would need to be installed.
- The gas collection system and flare had been installed and appeared to be working as no landfill gas odours were detected around the site. It was noted that NPDC had experienced a series of outages of the system recently. It was considered possible that this was associated with the heat of summer in some way, but that was yet to be confirmed. Certainly, it was considered possible that for whatever reason, the amount of methane being produced had reduced and caused the flare to be extinguished from time to time. There is no automatic start, so the flare must be ignited manually each time this happens. It was suggested that it may be appropriate to add a programmable logic controller (PLC) that turns the flare off for several days per week to allow the level of methane to build to a sustainable volume.
- On this occasion the Consultant observed litter being collected during the visit and it was obvious that it was done regularly. Both fences and drainage ditches were generally devoid of litter.
- The landfill working face was approximately 400 m^2, well within that allowed by the management plan.
- The survey carried out by BTW suggested there may be as much as 2.2 years remaining after closure that will remain available should there be a sudden need for additional emergency disposal such as an earthquake, tornado or eruption.
- The contractor was constructing a drain around the southern stockpile area, which, appeared to be satisfactory. Once this was completed the composting activity would be moved onto this flat area leaving the current composting area available for further excavation.
- A further survey had apparently been carried out revising the final cover soil volumes that would be required, however the figures for this were not available at the time of the Consultant's visit.
- Generally, the composting area appeared to be a well-run facility.
- The over-excavated material had been replaced with fill to bring the base of the leachate pond up to the correct level and ensure that leachate did not remain in the pond but can all be disposed of via the pumping station.
- A number of historical leachate breakouts had occurred on the sloping sides of the landfill in the past. None were noticed during this visit, which may be due to the lack of rainfall in recent weeks.

- A significant amount of dust was being produced by vehicles on the site although it did not appear to travel away from the site.
- It should be noted that the standard of the access road continued to deteriorate. Bearing in mind the remaining life of the landfill, this was not necessarily considered significant. During the previous visit the Consultant was informed that there was a programme of maintenance planned as soon as weather conditions permitted. This obviously never eventuated.

On this occasion the condition of the landfill was of a high quality. This was the ninth time in a row that the consultant had been able to report a high quality of workmanship. In summary the main matters for continued vigilance were:

- Maintenance of working face under 900 m^2;
- Continued attention to compaction;
- Ongoing litter collection, again satisfactory during this visit.

2.6.4 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 to Revital, with the previous operator moving to a hard stand area to the south of the main composting area.

The volumes of green waste composted at the site remained high during the period under review. There was an acceptable volume of non-plant derived matter contained in the green waste received at the site. During a couple of the inspections it was noted that heavy traffic movements occurring on the compost area pad during wet weather had caused damage with rutting and some large areas of ponded compost leachate present.

In summary, findings during the year under review were that, based on estimates at inspection, it appeared that the condition relating to the acceptable percentage of non-plant derived material was being complied with throughout the monitoring period. 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 were not being compromised by the composting activities. However, at the May inspection it was found that green waste had been placed in the drain that leads from the area to the composting treatment ponds. Although this was not impounding flow at the time of inspection due to the weather conditions, the potential for this to impact on the quality of the site discharges during rainfall was raised. There were also times when it was noted that areas of the composting pad were not being directed to the treatment ponds. The green waste in the drain was found to have been removed at the subsequent inspection, however a further request had to be made for NPDC to ensure that the bunds and drains from the composting are were directed to the composting treatment ponds.

During the year under review, work started on preparing the old Return2Earth composting area further south so that the current composting activities could be moved to allow the extraction of cover material from the current active 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, with the compost relocation having begun at the time of the final inspection of the year, on 26 June 2019.

3 Discussion

3.1 Discussion of site performance

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

- The continued use of the odour mitigating sprays and operation of the gas extraction system and flare, which resulted in only occasional mild odours being noted on site;
- The use of the water cart on an as required basis;
- A compact working area;
- Litter control;
- Improvements in intermediate cover over most of the site as filling progressed towards completion of acceptance of general refuse; and
- Appropriate control of the leachate breakouts on the eastern batter;

However, there were also some on-going issues that included:

- Large areas of exposed uncompacted soil, with re-work occurring on previously stabilised areas requires as the contour and/or compaction was not adequate for the final cap;
- Obstructions at the grate on the inlet to the SPCA driveway culvert;
- Silt accumulations in the tributaries in the wetland polishing area; and
- Although the Stage 2 cap was not repaired, extensive investigations were undertaken by NPDC to confirm adequate compaction and the area was re-vegetated to stabilise the area to minimise effects whilst the remediation plan was developed that was to be implemented in the next dry construction period. An abatement notice was issued requiring that the remediation works be undertaken by 15 March 2020.

There was a damaged leachate pipe on the south east side of the temporary access road that was left unaddressed for over 5 months that was not remedied until filling moved into that area. Ponded leachate was observed in this vicinity and it was noted this area was likely to drain to the stormwater catchment in the event of rain. Council had asked NPDC to ensure that the leachate and contaminated stormwater from this area was contained and/or directed to the leachate system. At the time of writing this report Council was informed that the pipe in question carried contaminated stormwater under the special waste road to the gravel area near the cleaning line. As contaminated stormwater had not been draining as effectively as NPDC would have liked in this area, the contractor excavated this area exposing the pipe to improve drainage into the gravel. During excavation the end of the pipe was damaged. It wasn't repaired because the pipe was still fulfilling its purpose of directing contaminated stormwater under the road and to the gravel surrounding the cleaning line (within the landfill footprint and leachate collection system) and therefore didn't need to be repaired.

Although the sediment issues were on site and within the mixing zone they appear to have resulted in some impoundment within the tributaries (Photo 16, Photo 17, Photo 18, and Photo 19), so there is, never the less, potential for adverse effects if the sedimentation is not brought under control. This is discussed further in Section 3.2.

Sampling of the stormwater and compost area discharges found that the constituent concentrations were within historical ranges at the times the surveys were undertaken.

Two self-notifications were received regarding situations that resulted in increased discharges of leachate to the Puremu Stream. However, at the time of investigation it was found that due to the very wet weather there was sufficient stormwater dilution to prevent significant adverse effects.

Photo 16 Silt in the western tributary below the small eastern silt pond, February 2019

Photo 17 Widening of eastern tributary above wetland polishing area, Jan 2019

Photo 18 Flow in eastern tributary below wetland polishing area, Jan 2019

Photo 19 Silt on access road, 5 July 2017

Council inspections found that the compositing areas were generally well managed with no dust or odour issues reported relating to these activities. Dust control at the landfill was also adequate to ensure that there were no resultant off site effects. There were two occasions when obstruction was found in the drainage ditches that are designed to direct stormwater flow to the compost treatment ponds, however no stormwater flows were observed at the times these inspections were undertaken.

3.2 Environmental effects of exercise of consents

Chemical sampling found that there were no significant adverse effects found in the Puremu Stream during the period under review. There were a total of four non-compliant results found in relation to discharges authorised by consent 4619, two were exceedances of the faecal coliform count and two were exceedances of the ammoniacal nitrogen concentration. On one occasion the ammoniacal nitrogen concentration was within the uncertainty of measurement of the test method, and in the case of the other three exceedances there were likely unsourced contributions from outside the landfill. There was also one exceedance of the total manganese limit at the compliance point for discharges authorised by consent 2370 (PMU000110). However, the result obtained was less than the ANZECC guideline for the protection of 95% of species. This is the second time in the last two years that the consent limit has been exceeded however, manganese has been monitored at this point only since the 2013-2014 year, and in both cases the following sampling result was compliant (Figure 16). It is therefore too early to confidently comment on whether this is part of an emerging trend of increasing concentrations at this site. There does appear to be a trend of increasing manganese concentration at site PMU000109, which is inside the mixing zone and therefore not a compliance issue. It may however suggest that NPDC may want to investigate this further to ensure continued consent compliance at site PMU000113.

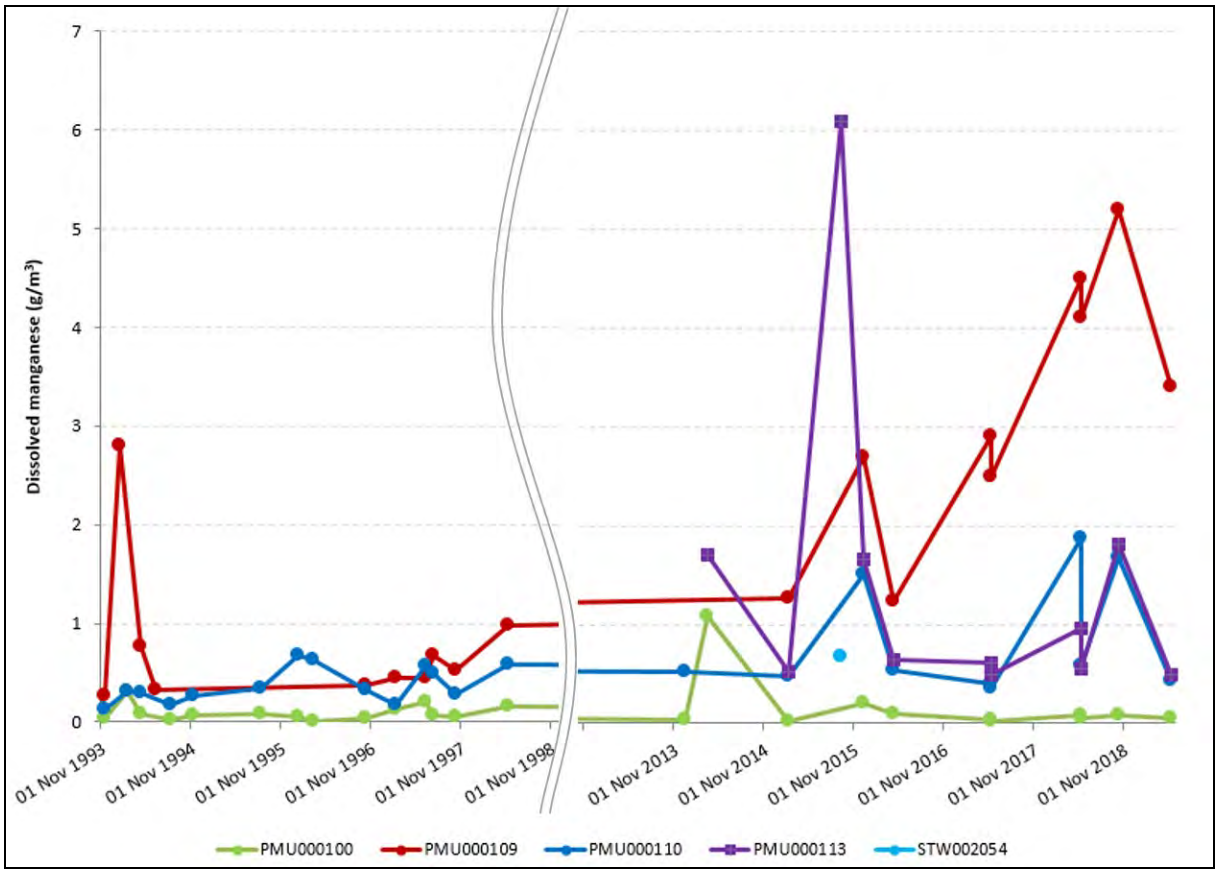

Figure 16 Dissolved manganese concentrations in the wetland polishing area and Puremu Stream

The Manganaha Stream was found not to be affected by discharges from the landfill, and no direct discharges were found to this waterbody during the year under review. Biomonitoring also found that there were no indications of any significant adverse effects on the Manganaha Stream from the discharges from the Colson Road landfill at the time of either survey.

However, results from the Puremu Stream tributary and Puremu Stream at site PMU000113 indicated there are impacts occurring in this stream. It was concluded that the impacts in the Puremu Stream tributary, inside the mixing zone are as a result of discharges from the landfill, however as there are other discharges that occur between the landfill site and the earliest macroinvertebrate sampling site available downstream of the site boundary and SPCA culvert, it cannot be confirmed that the impacts are as a result solely of discharges from the landfill. Additional investigations will be undertaken in an attempt to identify the cause(s).

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. Groundwater quality remains satisfactory and there is no evidence of significant contamination either in the groundwater or in the under-liner drainage system, however there may be emerging trends of increasing chloride and/or nitrate/nitrite nitrogen in some of the bores and in the ammoniacal nitrogen concentration of the under liner drainage (ground water and springs from under the landfill). It is therefore recommended that NPDC undertake monitoring of additional parameters for at least one sample of the under liner drainage per year, and develop the trigger levels for identifying the levels at which contamination is considered to be occurring and at which remedial actions are to be undertaken 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 were no dust related complaints received by Council during the year under review.

Only one, unsubstantiated odour complaint was received, this was following the installation of the flare. The fault log supplied by NPDC indicate that there we no flare faults on the day the complaint was received, however, short periods (less than 20 minutes for maintenance/calibrations etcetera) were not contained within the report. The odours were found by Council investigation to be noticeable and intermittent only, and were dissipating at the time of investigation. There were no offensive or objectionable odours found off site at the time of investigation or at the time the compliance monitoring inspections were undertaken.

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 23 to Table 30.

Table 23 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 24 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 for works by 15 Mar 2020.
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

Purpose: *To discharge up to 1,000 m^3/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?**
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
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	No. One manganese result above limits
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	Next opportunity for review June 2020	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?**
Overall assessment of environmental performance and compliance in respect of this consent		**Improvement required**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = not applicable

Table 25 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	No. Faecal coliforms was above limits on both sampling occasions, while ammoniacal nitrogen was above the limit on one occasion
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	Biomonitoring recorded effects, however landfill cannot be confirmed as the cause beyond the mixing zone
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. Plan on file dated June 2018. Plan review in progress to accommodate special waste only considerations	Yes
5. Maintain and comply with a monitoring programme	Not assessed during period under review	N/A
6. Consent will lapse after six years if not exercised	Consent exercised	N/A

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?**
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		**Good**
Overall assessment of administrative performance in respect of this consent		**Improvement required**

N/A = not applicable

Table 26 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
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

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?**
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. Plan on file dated June 2018. Plan review in progress to accommodate special waste only considerations	Yes
11. Maintain and comply with a monitoring programme	Not assessed during period under review	N/A
12. Consent will lapse after six years if not exercised	N/A, consent has been exercised	N/A
13. Optional review provision re environmental effects	No further opportunity for review prior to consent expiry	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 27 Summary of performance for discharge to land consent 4621-1

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 groundwater monitoring piezometers	Site inspection and liaison with consent holder	Yes
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

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?**
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 adverse effects on spring and/or groundwater	Sampling, review of consent holder data. Changes observed in spring water - No mitigation required at this stage	N/A
6. Maintain and comply with a monitoring programme	Not assessed during period under review	N/A
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 June 2018. Plan review in progress to accommodate special waste only considerations	Yes
8. Disposal of waste shall comply with the 'criteria for calculating landfill potentials' and the 'Draft Health and Environment Guidelines for selected Timber Treatment Chemicals'	Not assessed during period under review	N/A
9. Consent will lapse after six years if not exercised	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		**Good**

N/A = not applicable

Table 28 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. As best as could be estimated
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 29 Summary of performance for air discharge consent 4779-1

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	Yes
5. No offensive odours or dust or noxious concentrations	Site inspection, air surveys, complaint response	Yes
6. No burning on site with the exception of the flare	Site inspection, complaint response	Yes
7. No adverse ecological effects on any ecosystem	Inspections of site and neighbouring areas	Yes
8. No venting untreated landfill gases within 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	Yes
10. Council approval to be sought in the event of alterations at the site or to site operations	Site inspections and liaison with consent holder and site operator	Yes
11. Meet once a year to discuss any matter relating to the consent	Landfill liaison committee meetings	Yes
12. Provide a report within a year on the collection, extraction, venting and combustion of landfill gas	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		**High**

N/A = Not applicable

Table 30 Summary of performance for earthworks stormwater consent 6177-1

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	Not assessed during year under review	Plans previously provided
9. Adopt best practice	Site inspection and liaison with content holder	Yes
10. Rehabilitation of disturbed areas	Site inspection	Yes
11. Maintain stormwater system to prevent ponding and overland flow	Site inspection	Yes
12. Receiving waters not adversely affected	Site inspection, sampling and biomonitoring	Yes

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?**
13. Provision for review	No further review opportunities 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

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 Section 1.1.4. 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 15 March 2020. Although there may be some changes occurring in the receiving water quality below this area with regard to the manganese concentration, with one consent non-compliance recorded, it is not considered to be a significant adverse effect at this point in time. Biomonitoring found that there were effects on the macroinvertebrate communities inside the mixing zone as a result of the discharge of sediment from the site. There were also effects found at the compliance point, however there are other potential contributing sources at this location, so this could not be attributed to the landfill discharges.

Table 31 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement required	Poor
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	-	-

Year	Consent no	High	Good	Improvement required	Poor
	2370-3	-	-	1	-
Totals		28	11	8	1

3.4 Recommendations from the 2017-2018 Annual Report

In the 2017-2018 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2018-2019 year continue at the same level as in 2017-2018, but that that future biological monitoring is carried out in conjunction with physicochemical water quality monitoring.
2. THAT consideration should be given to more intensive dissolved oxygen monitoring in the Puremu Stream in the weeks leading up to the biomonitoring surveys.
3. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendations two and three were undertaken. Recommendation one was undertaken on 24 October 2019, however due to the different weather condition sampling protocols, this did not occur at the time of the second biological survey. Although a chemical sampling survey was not undertaken at this time, the dissolved oxygen monitor deployed for the weeks preceding the survey also recorded conductivity, pH and turbidity in addition to the dissolved oxygen giving an indication of the preceding water quality.

3.5 Alterations to monitoring programmes for 2019-2020

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.

It is proposed that for 2019-2020 the Council's monitoring of discharges from the Colson Road regional landfill remains unchanged from that of 2018-2019.

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 2019-2020.

3.6 Exercise of optional review of consent

Resource consent 2370-3 provides for an optional review of the consent in June 2020. Condition 18 allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the Colson Road regional landfill in the 2019-2020 year continue at the same level as in 2018-2019.
2. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consent 2370-3 in June 2020, as set out in condition 18 of the consent, not be exercised, on the grounds that the conditions are adequate to deal with any adverse effects on the environment.
4. THAT, given the changes in the ammoniacal nitrogen concentration of the under liner drainage, NPDC widen the range of parameters determined to those given in Table 8-1 of the Technical Guidelines for Disposal to Land (WasteMINZ, 2018) on at least one occasion annually.
5. THAT the NPDC review 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.

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 Science Services Manager.

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Thomas, B and Clements, K (2019): Biomonitoring of the Puremu and Manganaha streams in relation to the New Plymouth District Council Colson Road landfill, October 2018 (BT091). June 2019.

Thomas, B (2019): Biomonitoring of the Puremu and Manganaha streams in relation to the New Plymouth District Council Colson Road landfill, April 2019 (BT105). August 2019.

Waste Management Institute of New Zealand (WasteMINZ)(2018): Technical Guidelines for Disposal to Land,. August 2018.

Appendix I

Resource consents held by NPDC

(For a copy of the signed resource consent
please contact the TRC Consents department)

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 2020	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	-	June 2025
4620-1	To discharge uncontaminated stormwater from areas B1, B2, C1 and C2 into the Puremu Stream	March 1999	-	June 2025
6177-1	To discharge stormwater from earthworks	June 2003	-	June 2020
Air discharge permit				
4622-1	To discharge emissions to air from composting	March 1999	-	June 2025
4779-1	To discharge emissions to air from landfilling	Jan 2017	-	June 2026
Discharges of waste to land				
4621-1	To discharge contaminants onto and into land in areas B1, C1 and C2	Jan 2010	-	June 2025
Land use permits				
0226-1	To divert the Puremu Stream by placing a culvert to provide road access	Oct 1986	-	Oct 2026

Water abstraction permits

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

Water discharge permits

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

Air discharge permits

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

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national

regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

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

Coastal permits

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

TRK750226

WATER PERMIT

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

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

Change to
Conditions Date: 8 October 1986

CONDITIONS OF CONSENT

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

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

Site Location: COLSON ROAD NEW PLYMOUTH

Legal Description: SEC 223 HUA DIST BK VI PARITUTU SD

Catchment: WAIWHAKAIHO 392.000

Tributary: MANGAONE 392.010
PUREMU 392.012

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

TRK750226

Conditions of right

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TRK750226

VARIATION OF 14 MAY 1986:

Additional General Conditions

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

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

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

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

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

Additional Special Conditions

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

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

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

VARIATION OF 8 OCTOBER 1986:

Deletion of special condition 2.

Signed at Stratford on 8 October 1986

For and on behalf of
TARANAKI REGIONAL COUNCIL

_____
OPERATIONS MANAGER

Discharge Permit

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

Name of Consent Holder:	New Plymouth District Council Private Bag 2025 NEW PLYMOUTH
Review Completed Date:	20 July 2004 [Granted: 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 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 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 adverse effects on the environment from the exercise of this consent.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of applications 87/228, 92/205 and 1664. In the case of any contradiction between the documentation submitted in support of applications 87/228, 92/205 and 1664 and the conditions of this consent, the conditions of this consent shall prevail.

3. 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.

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

5. 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.

6. The consent holder shall satisfy all relevant requirements, obligations and duties of the Proposed District Plan of the New Plymouth District Council.

7. The consent holder shall prepare, maintain and comply with a site management plan to the approval of the Chief Executive, Taranaki Regional Council.

8. 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.

9. The consent holder shall ensure that the area to which this consent is attributed is closed and subsequently managed in accordance with the Colson Road Regional Landfill Management Plan provided June 2004 or as subsequently amended provided that subsequent amendments do not reduce the level of environmental protection set out in the June 2004 plan.

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

11. The consent holder shall ensure that there shall be no cleaning or hosing out of refuse-containing vehicles at the site.

12. 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 site's legal boundary.

13. 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

14. 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	**maximum 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

15. 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.

16. The discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, contain substances or constituents other than those listed in condition 14, nor pathogenic organisms, which would render the water of the Puremu Stream, beyond the mixing zone specified in condition 12 above, unpalatable or unfit for stock consumption purposes.

17. 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 consent can be met.

18. 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 20 July 2004

For and on behalf of
Taranaki Regional Council

_____

Director-Resource Management

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

TRK994620

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 675 LITRES/SECOND 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 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.

TRK994620

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 water quality of uncontaminated stormwater discharged to the Puremu Stream shall meet the following criteria:

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

3. THAT no leachate discharge shall be permitted by the exercise of this consent.

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

5. THAT the earthworks and construction associated with the landfill and the composting site and the stormwater diversion and containment channels shall be designed, constructed and maintained so as to minimise instability of the surrounding land.

6. THAT 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 or landfilling operations or composting site associated with the exercise of this consent.

7. THAT the consent holder shall notify the General Manager, Taranaki Regional Council, of any proposal which may alter or affect the areas contributing runoff insofar as may affect the exercise of this consent, other than as advised to the Taranaki Regional Council in the application for this consent, at least two months prior to commencing any such works. The consent holder shall obtain any necessary approvals under the Resource Management Act 1991 prior to commencing any such works.

8. 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, including but not limited to, freshwater fish, eels and watercress.

9. THAT there shall be no excavation or earthworks or other landfilling-related activities or composting activities in any area if any runoff of water containing suspended solids or any other contaminant arising from such activities might by reason of land topography or engineered works enter the Manganaha Stream, and in the event of any runoff water entering the Manganaha Stream contrary to this consent the consent holder shall immediately undertake such works as may be necessary to cease the discharge and to prevent a recurrence.

10. 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 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 General Manager, Taranaki Regional Council.

11. 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.

12. 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.

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.

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
Change To Conditions Date:	19 January 2010 [Granted: 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 at or about (NZTM) 1697313E-5675450N
Expiry Date:	1 June 2025
Review Date(s):	June 2012, June 2018
Site Location:	Colson Road Landfill, Colson Road, New Plymouth
Legal Description:	Sec 223 Hua Dist Blk VI Paritutu SD
Catchment:	Waiwhakaiho
Tributary:	Puremu

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

General conditions

a) That on receipt of a requirement from the Chief Executive, Taranaki Regional Council 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 install and maintain to the satisfaction of the Chief Executive, Taranaki Regional Council, a further groundwater monitoring piezometer approximately equidistant between the bores designated as AH9 and L2, and shall maintain to the satisfaction of the Chief Executive, Taranaki Regional Council, groundwater monitoring piezometers and bores at the sites designated as WQA, WQB and WQC, as AH1, AH2, AH3, AH5, AH6, AH7, and as L1, L2, L5, L7 and L8. [Bore designations are those in Appendix A2, Figure 1, in the Assessment of Effects on the Environment prepared by Woodward-Clyde for New Plymouth District Council, July 1994].

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 19 January 2010

For and on behalf of
Taranaki Regional Council

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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.

TRK994622

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

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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
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

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Chief Executive