

Lower Waiwhakaiho Catchment
Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-98

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Executive summary

The Lower Waiwhakaiho River catchment monitoring programme addresses discharges by several consent holders in the Fitzroy area of New Plymouth. The report covers the period July 2015 to June 2016, and is the 23rd report for this combined monitoring programme.

The Waiwhakaiho River catchment is significant for the Taranaki region. It is used for domestic, agricultural and industrial water supply, hydroelectric power generation, recreational purposes, and waste assimilation. It is also important to the local hapu. Because of the pressure on the river, the Taranaki Regional Council (the Council) adopted a water management plan for the river in September 1991.

At the end of the 2015-2016 monitoring period a total of 22 consents were held by the 14 industries monitored under this programme that discharge wastewater, stormwater and/or leachate from the industrial area at Fitzroy, New Plymouth to the lower Waiwhakaiho River and Mangaone Stream, or to land in the lower Waiwhakaiho and Mangaone Stream catchments. The activities and impacts of the consent holders upon water quality are discussed, as is the extent of their compliance with their permits, and their overall environmental performance. There is a separate report covering emissions to air within the catchment.

During the year under review, the companies generally demonstrated a good level of environmental performance and a high level of administrative performance.

The monitoring programme has included 51 site inspections, 102 samples of discharges, groundwater and receiving waters, and 4 biomonitoring surveys of the Waiwhakaiho River and Mangaone Stream.

In the lower Waiwhakaiho River and Mangaone Stream, the biomonitoring surveys generally reported results that were similar to or better than long term historical medians. In the period under review it was found that all Waiwhakaiho River sampling sites generally recorded community richnesses similar to or slightly above long term medians for their respective sites. There was a typical downstream decrease in MCI scores between the sites, but these results did not indicate any significant effects of stormwater or wastewater discharges from the Fitzroy industrial area on the macroinvertebrate communities of the Waiwhakaiho River. The results from the Mangaone Stream exhibited the expected and typical downstream decrease in MCI scores, however in this instance noticeable deterioration of SQMCI scores were noted in the lower reaches of the Mangaone Stream during the summer survey. Also noted are successively decreasing MCI scores at site MGO000150 in the middle reaches of the Mangaone Stream.

There continued to be evidence of nutrient enrichment occurring in the lower Mangaone Stream. Chemical monitoring shows that stormwater from the fertiliser distribution depot (and old fertiliser works) presently owned and operated by Ravensdown Fertiliser Co-operative Ltd, is still a source of nutrients.

Elevated levels of the light organic preservative chemicals Tebuconazole and Propiconazole were found in the Mangaone Stream downstream of Taranaki Sawmills Ltd during one wet weather survey. The levels found, whilst exceeding national environmental exposure limits (EELS), they were found to be well within the empirical NOEC's (no observable effect

concentrations) for aquatic life developed by the European Chemical Agency and the Cawthron Institute.

Monitoring of groundwater and leachate in relation to the old landfill area off Bewley Road showed that with exception of one ammoniacal nitrogen result, all of the samples collected from the three monitoring bores complied with consent limits.

There were six unauthorised incidents recorded that were associated with the consents covered by this report, one of which resulted in an abatement notice being issued. There were a further four incidents associated with actual or potential discharges to water within the lower Waiwhakaiho industrial area, of which one was found to be breaching regional rules and resulted in an abatement notice being issued.

During the period under review, AML Ltd demonstrated a good level of administrative performance and a high environmental performance and compliance, with their resource consent.

During the period under review, Downer EDI Works Ltd demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent in relation to its site at Rifle Range Road.

During the period under review, Envirowaste Services Ltd demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent.

During the period under review, Firth Industries Ltd demonstrated a good level of environmental performance and a good level of administrative performance and compliance with their resource consent.

During the period under review, Fitzroy Engineering Group Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consent.

During the period under review, Freight and Bulk Transport Holdings Ltd demonstrated a high level of administrative performance and a good level of environmental performance and compliance with their resource consents.

During the period under review, Katere Stores Ltd demonstrated a high level of environmental performance and good level of administrative performance and compliance with their resource consent.

During the period under review, the Nankervis Family Trust demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent.

During the period under review, New Plymouth District Council demonstrated a high level of environmental performance and high level of administrative performance and compliance with its resource consents.

During the period under review, New Zealand Railways Corporation Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consents.

During the period under review, Ravensdown Fertiliser Co-operative Ltd demonstrated a high level of administrative performance, however an improvement was required in the level of Ravensdown's environmental performance. An abatement notice was issued after two instances of significant offsite product tracking.

During the period under review, Taranaki Sawmills Ltd demonstrated a good level of environmental performance and high level of administrative performance and compliance with the resource consents in relation to its site on Katere Road.

During the period under review, Technix Group Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consents.

For reference, in the 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

When compared to previous monitoring periods, overall, a good level of environmental performance is being maintained in the Lower Waiwhakaiho Catchment.

This report includes recommendations for the 2016-2017 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is the Annual Report for the period July 2015 to June 2016 by the Council describing the monitoring programme associated with resource consents held by twelve industries in the Lower Waiwhakaiho catchment. The monitoring covers discharges to water and land in the Fitzroy and Katere Road industrial areas of New Plymouth.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by these industries that relate to discharges of stormwater, wastewater and leachate to the Lower Waiwhakaiho River and Mangaone Stream, and to land in the Mangaone Stream catchment.

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 the companies' use of water and land, and is the 23rd report by the Council for these Companies.

A separate report covers the results of the Council's monitoring programmes associated with the air discharge permits held by some of these industries.

The lower Waiwhakaiho River has been identified by the Council as a resource of regional significance that has demonstrated evidence of adverse impact from catchment-wide point and diffuse source pollution and other river usage. This is apparent particularly during periods of low flow accentuated by abstraction related to operation of the hydroelectric power station at Mangamahoe. The Mangaone Stream has also been identified in Appendix IA of the Regional Freshwater Plan for Taranaki as a stream of high ecological value. This tributary of the Waiwhakaiho River has particularly high native fish diversity, including the presence of threatened species. It is therefore important that monitoring of the Waiwhakaiho River and Mangaone Stream is continued, particularly in relation to any major wastewater or stormwater discharges, in order that these water bodies are safeguarded as resources for the area.

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 through annual programmes;
- the resource consents held by the companies in the Lower Waiwhakaiho catchment;

- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in each consent holder's site.

Section 2-14 discusses the results from each individual company covered by this report. Each section has details on process description, resource consents, results of inspections and sampling, an evaluation of performance and recommendations for the 2016-2017 period.

Section 16 presents a summary of the information on file about incidents in the Waiwhakaiho and Mangaone catchments that have been logged on the Council's database.

Section 17 discusses the results, their interpretation, and their significance for the environment in the Waiwhakaiho River or Mangaone Stream as a whole.

Section 18 presents a summary of recommendations made in relation to the monitoring of each company's activities.

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 *Resource Management Act 1991* (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 socio-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 continuously 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 Investigations, interventions, and incidents

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 the consent holder. 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.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The incident register includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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 company is indeed the source of the incident (or that the allegation cannot be proven).

1.1.5 Evaluation of environmental performance

Besides discussing the various details of the performance and extent of compliance by the consent holders during the period under review, this report also assigns a rating as to each Company's 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 significant 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 in response to unauthorised incident reports, 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 in response to unauthorised incident reports. 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 in response to unauthorised incident reports. 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 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Resource consents

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.

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.

Each of the consents that pertain to the Lower Waiwhakaiho Catchment Programme is listed in Table 1 and Table 2. The locations of the consent holders monitored under this programme and the chemical sampling sites are shown in Figure 1. The locations of the discharges are shown in Figure 2, whilst the biomonitoring sites that pertain to the monitoring programme are shown in Figure 3.

A total of 21 consents were held to discharge wastewater, stormwater and leachate from the industrial area at Fitzroy, New Plymouth to the lower Waiwhakaiho River and Mangaone Stream during the period under review. Each of these permits was issued by the Council as a resource consent under Section 87(e) of the Resource Management Act. These consents are set out in Table 1.

Outlines of the companies' activities and the special conditions on their consents are presented in later sections, and copies of the full consents are given in alphabetical order in Appendix I.

Stormwater discharge consents have standardised special conditions that:

- Requires the consent holder to adopt best practice.
- Limits the area from which stormwater can be discharged.
- Requires the use of a stormwater discharge system.
- Limits constituents of the discharge, with specific regard to pH, suspended solids and oil and grease.
- Requires that the discharge does not cause certain effects in the receiving waters.
- Requires that the consent holder maintains a spill contingency plan to ensure that in the event of an unforeseen situation, the chances of a spillage resulting in an unauthorised discharge leaving the site are minimised.

- Requires that the consent holder maintain and adhere to a management plan to ensure that the consent holder examines the activities taking place on site, and puts appropriate controls in place to minimise the potential for stormwater contamination to occur due to routine activities.
- Requires the consent holder to notify Council prior to making any changes to the site or site processes; and
- Provide for lapse (were applicable) and review of the consent.

Table 1 Resource consents for discharges to the lower Waiwhakaiho River from New Plymouth industrial area

Consent holder	Consent number	Type of discharge	Catchment area/Volume	Review date	Expiry date
Fitzroy Engineering Group Ltd	0021-4	Stormwater from an industrial site into the Waiwhakaiho River	3.3 ha	June 2020	1 June 2032
	9853-2	Stormwater from an industrial site into the Waiwhakaiho River	3.3 ha	June 2020	1 June 2032
Firth Industries Ltd	0392-3 0392-4	Treated wastewater and stormwater (consent 0392-4 granted 21 July 2015)	1.618 ha	June 2020	1 June 2032
NPDC	4984-1 4894-2	Leachate from former Bewley Road Landfill (consent 4984-2 granted 16 March 2016)	-	June 2020	1 June 2032
	5163-2	Stormwater from Waiwhakaiho industrial area, multiple outlets	-	June 2020	1 June 2026
NZ Railways Corporation	3528-2	Treated wastewater and stormwater from rail yard [renewal application lodged, Section 124 protection]	13 m ³ /day	-	1 June 2014
Ravensdown Fertiliser Co-operative Ltd	3140-2	Stormwater from fertiliser storage depot [renewal application lodged, Section 124 protection]	700 L/s	-	1 June 2014
Technix Group Ltd	9982-1	Stormwater from an industrial site into the Mangaone Stream	1.3 ha	June 2020	1 June 2032
	0291-3	Stormwater from an industrial site into the Waiwhakaiho River	2.2 ha	June 2020	1 June 2032
	9981-1	To discharge stormwater from an industrial site into the Waiwhakaiho River	1.8 ha	June 2020	1 June 2032

Table 2 Resource consents for discharges to the Mangaone Stream from the New Plymouth industrial area

Consent holder	Consent number	Type of discharge	Catchment area/Volume	Review date	Expiry date
AML Ltd [Trading as Allied Concrete]	4539-2	Stormwater and treated waste water from truck washing	5880 m2	June 2020	1 June 2026
Downer EDI Works Ltd	3917-3	Treated washwater and stormwater from asphalt plant	6.5 ha	June 2020	1 June 2032
Envirowaste Services Ltd	10109-1	Stormwater to the Puremu Stream and an unnamed tributary of the Mangaone Stream	4.93 ha	June 2020	1 June 2032
Freight & Bulk Transport Ltd	2041-3	Treated truck wash water and stormwater onto and into land	-	-	1 June 2018
	10008-1	Stormwater onto and into land and into the Mangaone Stream	1.77 ha	June 2020	1 June 2032
Katere Stores Ltd	4548-2	Treated wastewater and stormwater from feed mill	128 L/s	-	1 June 2020
Nankervis Family Trust	6965-1	Truckwash water via interceptor	Approx 1 m3/day	-	1 June 2020
NPDC	1275-3	Stormwater from Katere industrial area, multiple outlets	-	June 2020	1 June 2026
NZ Decorative Concrete Ltd	7450-1	Stormwater from a decorative concrete products manufacturing site	0.26 ha	June 2020	1 June 2026
NZ Railways Corporation	1735-3	Stormwater from Smart Road rail terminal	11.28 ha	June 2020	1 June 2026
Ravensdown Fertiliser Co-operative Ltd	3865-3	Stormwater from fertiliser storage depot [renewal application lodged, Section 124 protection]	700 L/s	-	1 June 2014
Taranaki Sawmills Ltd	3491-2	Treated cooling water, wastewater and stormwater	5.3 ha + 12 m3/day	-	1 June 2020

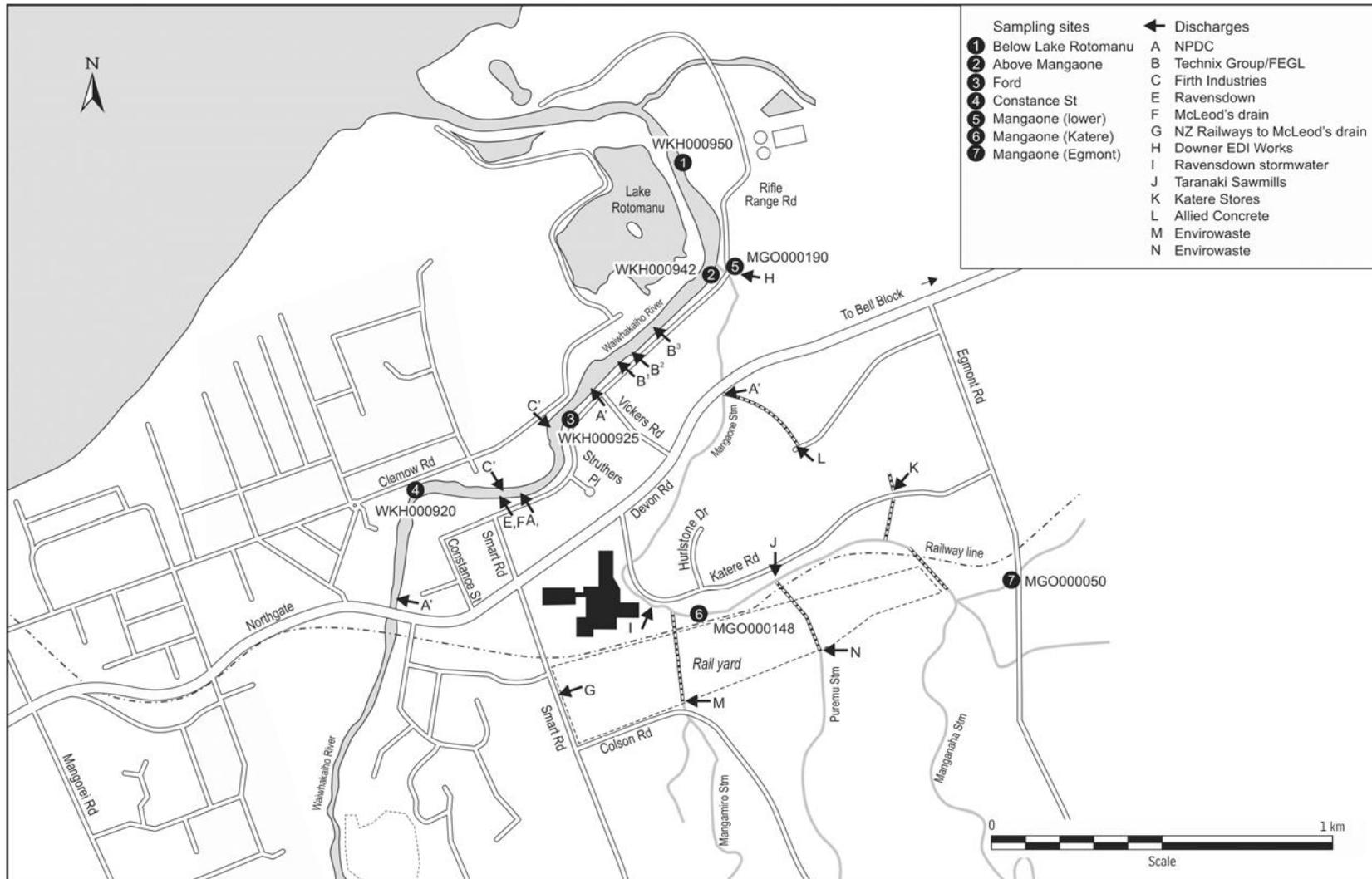


Figure 2 Lower Waiwhakaihō River and Mangaone Stream discharges

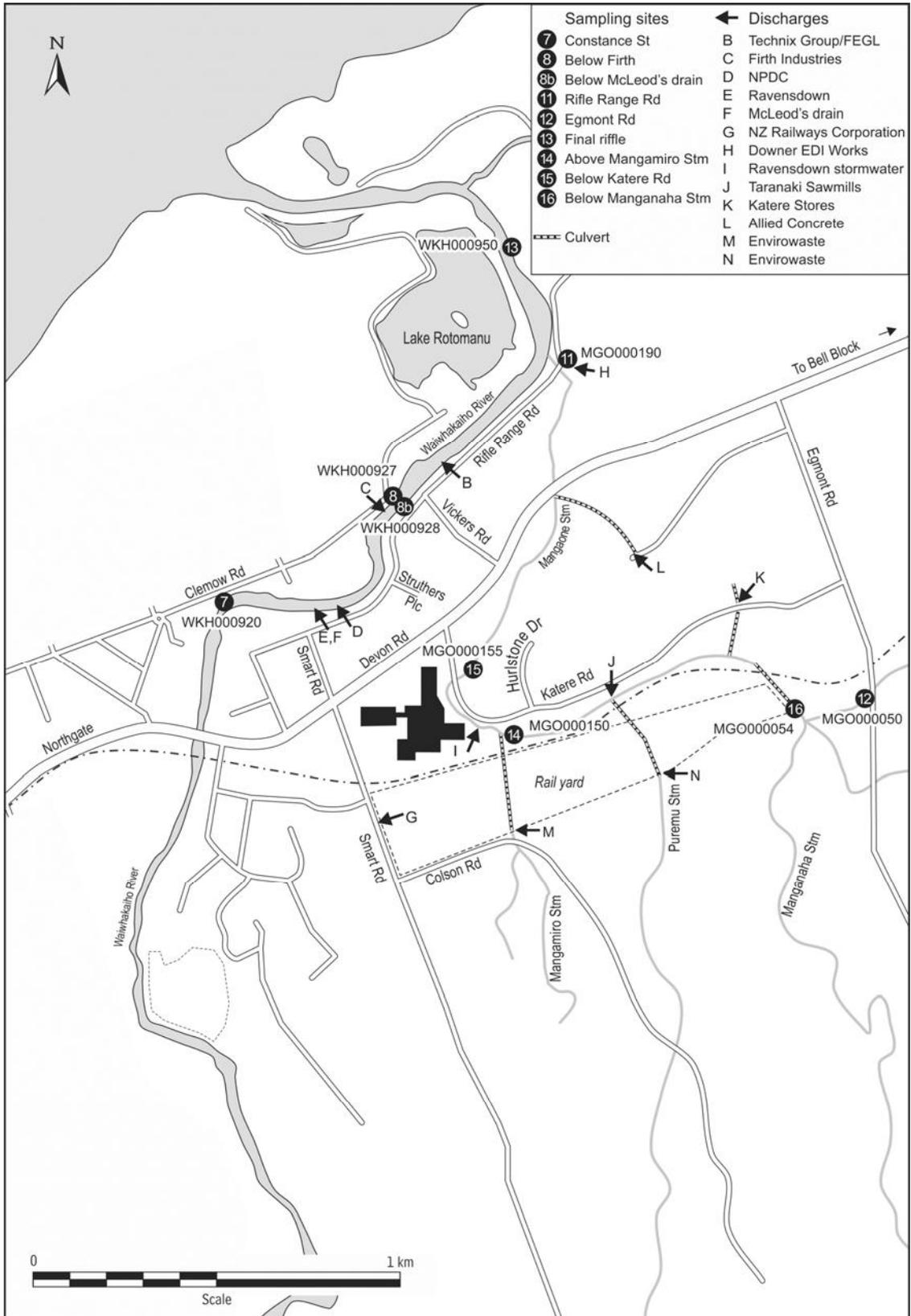


Figure 3 Lower Waiwhakaiho River and Mangaone Stream biological monitoring sites

1.3 Monitoring programme

1.3.1 Introduction

Section 35 of the RMA sets out 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 in the catchment consisted of five primary components. During the 2015-2016 monitoring period inspections of industrial sites, wet weather sampling and analysis of discharge and receiving waters, dry weather sampling and analysis of ground waters and receiving waters, sediment sampling and macroinvertebrate surveys were undertaken (as outlined in the monitoring programme).

1.3.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;
- preparation for any reviews;
- renewals;
- new consents;
- advice on the Council's environmental management strategies and content of regional plans and;
- consultation on associated matters.

1.3.3 Site inspections

Each of the consent holders' properties was scheduled for inspection four times per year during the period under review to assess compliance with any relevant consent conditions, and the potential for unauthorised discharge. With regard to consents for 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.

Activities on the site are discussed with respect to general housekeeping, effects on stormwater quality and wastewater disposal. Water and waste treatment systems and areas where chemicals or products are stored or transferred are given particular attention. Sources of data being collected by the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was also surveyed for environmental effects.

The frequency of inspection varied depending on the type of activity at the site, the outcome of previous inspections, and the stage of any investigation of unlicensed discharges of contaminants. Inspection frequency is approximately quarterly, however additional inspections may be carried out where necessary. In the period under review the Council undertook 51 site inspections.

1.3.4 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and mixing zone.

The number and location of sites sampled, the frequency and conditions of sampling, and the range of water quality parameters determined have changed since this combined monitoring programme commenced in 1988. This evolution has occurred as knowledge of the characteristics of the discharges and waters that receive them has been gained, and as the number and composition of licensed discharges has varied.

Routine chemical sampling is now conducted on a biannual basis under wet weather conditions and groundwater monitoring is conducted on a biannual basis in dry weather. Not all parameter results from sampling are published herein, only those relevant to assessing compliance and effects. All results are available upon request.

1.3.4.1 Surface water surveys

The discharge and receiving water chemical sampling sites are shown in Figure 1. As there are no samples taken downstream of the confluence of the Mangaone Stream and Waiwhakaiho River, the surface water surveys of these two water bodies, and their discharges, may sometimes be carried out separately.

Wet weather sampling was carried out on 15 July 2015 and 8 January 2016 for the Waiwhakaiho River and on 15 July 2015 and 18 May 2016 for the Mangaone Stream resulting 34 surface water samples and 42 discharge samples being taken.

The results of the discharge monitoring are discussed in the relevant section based on the consent holder responsible for that discharge, and the receiving water results are discussed in Section 17.

1.3.4.2 Groundwater surveys

Groundwater sampling in the vicinity of the old Bewley Road landfill on 24 February and 9 May 2016 and the Ravensdown Fertiliser Co-operative Ltd site took place on 7 March and 9 May 2016. Groundwater sampling is conducted independently of the wet weather surface water sampling. A discharge drain and three receiving water sites are sampled in conjunction with the Bewley Road groundwater monitoring, and two receiving water sites are sampled in conjunction with the Ravensdown groundwater monitoring. The location of the sites sampled during the groundwater surveys are shown in Figure 4.

Where possible, a summary of previous monitoring data for a particular site is provided for comparative purposes. Unless specifically stated all metals results are from acid soluble analysis

1.3.4.3 Streambed sediment sampling

Dry weather sampling of the Mangaone Stream sediments is scheduled to be carried out every other year and will next be undertaken in the 2016-2017 monitoring period. This focuses on the contaminants that may be present in the past and present discharges from the Taranaki Sawmills site.

1.3.5 Biomonitoring surveys

Biological surveys are used to determine the impacts that discharges may cause over a period of time, as distinct from chemical surveys which give detailed information upon the constituents of a discharge at the time of sampling but cannot give information upon previous discharge characteristics. Biological surveys also directly indicate any significant adverse effects of discharges upon in-stream flora and fauna, so that cause-effect relationships do not have to be established as for critical levels of individual chemical parameters, although variation in habitat must also be taken into consideration.

1.3.5.1 Macroinvertebrate surveys

Samples of streambed macroinvertebrates and algae are collected from three sampling sites in the lower Waiwhakaiho River and five sites in the Mangaone Stream on a biannual basis. During the 2015-2016 period, these surveys were conducted on 21 December 2015 and 16 March 2016. The locations of the biomonitoring sites are shown in Figure 3. A summary of the findings is discussed in section 17.2 and copies of the full reports are included in Appendix III.

1.3.5.2 Fish survey

Fish surveys in the Waiwhakaiho catchment historically surveyed only two sites in the Mangaone Stream. In the 2004-2005 fish survey report it was proposed that future surveys incorporate more sites in an attempt to compare sites with similar habitats, and to ensure that discharges to the Mangaone Stream are not presenting a barrier to upstream migration. Fish surveys are scheduled on a triennial basis with next due in the 2017-2018 period.

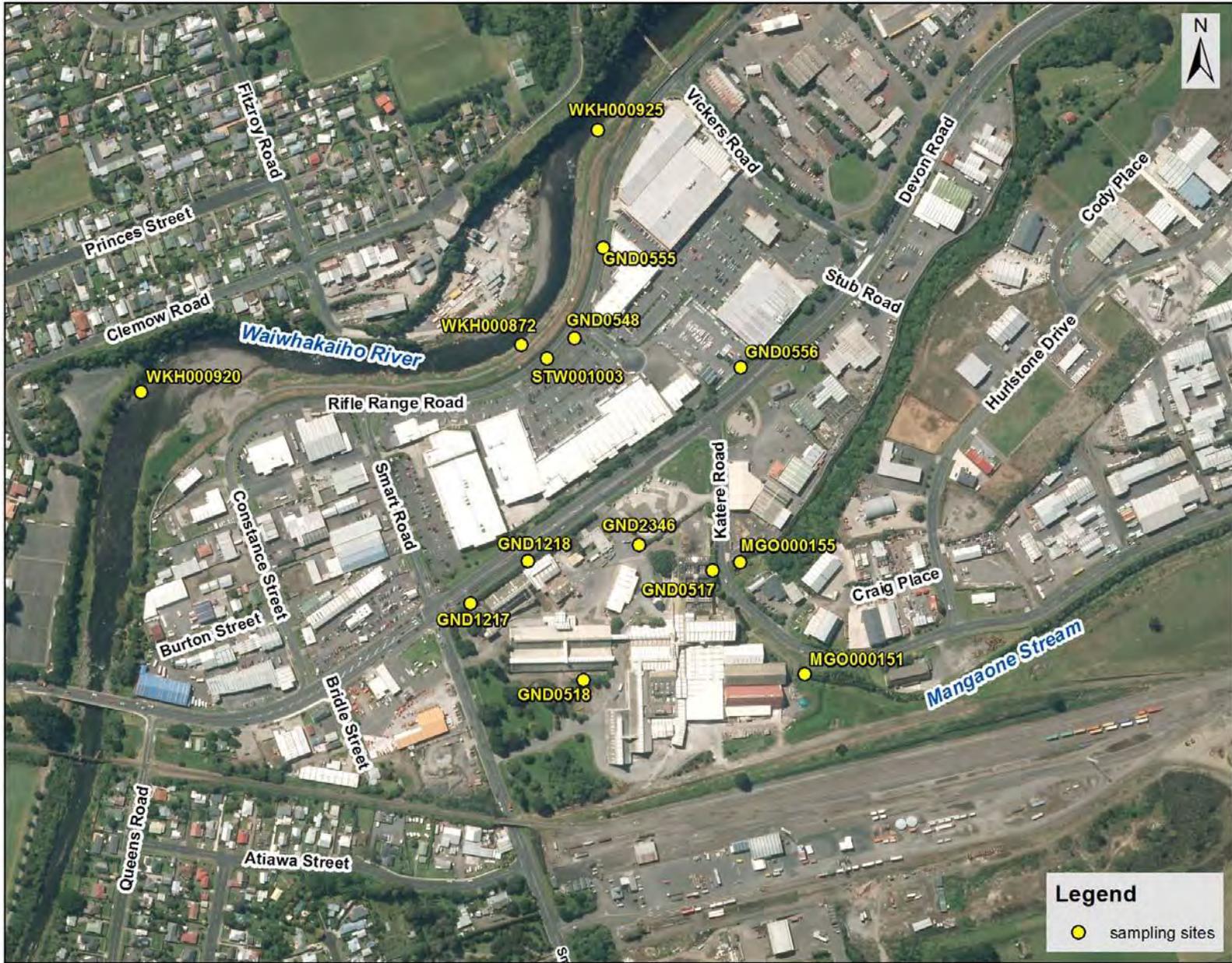


Figure 4 Location of groundwater monitoring bores and associated sampling sites

2. AML Ltd (trading as Allied Concrete)

2.1 Process description

AML Ltd's (AML) concrete batching plant at 67 Hurlstone Drive is one of four such plants it operates in the Taranaki region. The main activities are loading of ready-mixed concrete into trucks, and the unloading of concrete raw materials including cement and aggregate into silos and bins.

Stormwater from the majority of the site drains directly to the New Plymouth District Council (NPDC) stormwater system and then to the Mangaone Stream.



Figure 5 AML Ltd (trading as Allied Concrete) site location and stormwater drainage

The wastewater treatment system consists of a series of settlement ponds and pumps for the recycling of process water. The emptied mixing bowls of up to seven concrete trucks are washed out each day using water and a small amount of detergent. This bowl wash water is discharged into two 36 m³ bins and allowed to settle for at least 18 hours before treatment through an additional series of six settlement ponds totalling approximately 360 m³ in volume. Solids from the settlement process are removed from the bins and ponds as required.

Water from the settlement ponds is recycled into the concrete manufacturing process and is also used for bowl washing. The recycled water is supplemented on most days by reticulated supply and no discharge of wastewater occurs to the stormwater drain. However, because the uncovered settlement ponds receive stormwater both

directly and as run off from certain areas of the site, an excess of water may enter the system during heavy or sustained rainfall, or if rainfall occurs when the plant is not operating. This excess is discharged via a sand filter prior to entering the NPDC stormwater system, which discharges to the Mangaone Stream immediately upstream of State Highway 3.

Contaminants that may enter the wastewater treatment system include solids and detergents from bowl washing, and cement products and additives used in AML's manufacturing process.

The use of settling bins and six settling ponds in series significantly reduces the suspended solids concentration of the discharge. The small amounts of additives in the bowl wash water are likely to bind to suspended sediment in the ponds, the majority of which will settle out during the treatment process. Concentrations of any additives remaining in the discharge will be further reduced by dilution with stormwater from the surrounding area prior to entering the Mangaone Stream.

Storage areas for the concrete additives are bunded with drainage to the wastewater treatment system.

During the 2000-2001 monitoring period, it was found that untreated stormwater was exiting the site via a piped drain in the concreted car park area. This flow was channelled to the road where it entered the NPDC stormwater system discharging to the Mangaone Stream. This discharge was not covered by the wastewater discharge consent and so a cattle grid type arrangement was installed on site during the 2002-2003 year that drains to a soak hole to prevent this discharge from occurring.

2.2 Water discharge permit

AML holds water discharge permit **4539-2** to cover the discharge stormwater and treated wastewater from truck washing at a concrete batching plant into the Mangaone Stream in the Waiwhakaiho catchment. This permit was issued by the Council on 30 July 2008 under Section 87(e) of the RMA. It is due to expire on 1 June 2026.

It contains the standardised special conditions as set out in Section 1.2.

The permit is attached to this report in Appendix I.

2.3 Results

2.3.1 Inspections

AML's site was inspected on 24 August 2015, 18 November 2015, 22 February 2016 and 23 May 2016.

Inspections focussed on the cleanliness of the site, the driveway collection sump, soakage pits, treatment ponds, sand filters and fuel storage.

During the routine inspections no significant issues were noted and the site was found to be compliant with consent conditions. However, the 22 February 2016 inspection noted that the sand filter needed to be cleaned out.

2.3.2 Results of discharge monitoring

Since 1996, the discharge from the concrete plant has been monitored at a manhole outside the plant, before it enters the stormwater drain along Hurlstone Drive. It is also monitored at a second point, together with contributions from the surrounding industrial area, at the point where the combined NPDC reticulated stormwater drain discharges into the Mangaone Stream (site STW001035).

Results for the 2015-2016 monitoring of the stormwater/wastewater, where it leaves the concrete plant at site STW002033 are presented in Table 3. A summary of all monitoring results from site STW002033 is also included for comparative purposes.

The results for the stormwater drain at the Mangaone Stream (site STW001035) are given in Section 10.3.1.2, Table 30, whilst the results of the receiving water (i.e. for the purposes of monitoring compliance with consent conditions) are given in Section 17.1.2.

Table 3 Chemical monitoring results for AML's discharge-site STW002033

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	6.4	0.5	8.2	2	8	0.68
Maximum	2740	38	12.8	1000	21.8	520
Median	152	0.2	11.9	82	13.7	71
Number	37	28	38	36	37	20
15 Jul 2015	21.6	b	9.5	77	10.4	84
18 May 2016	23.3	b	9.2	130*	16.6	200
Consent limits	-	15	-	100	-	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded

b no visible hydrocarbon sheen and no odour

* sampled from sump- not discharging

The concentration of suspended solids was found to be in compliance with the consent conditions at site STW002033 on 15 July 2015, the sample collected on 18 May 2016 was an indicative sample as the no discharge from the sump was occurring.

All pH results for the year, whilst elevated (as expected) were below the median value for the site.

However, no significant changes in pH were observed in the receiving water between site MGO000153 (upstream) and MGO000190 (downstream) during the period under review. The consent condition limiting the effect the discharge is permitted to have on the receiving water pH was therefore complied with.

The oil and grease limit of 15 g/m³ imposed by the AML's consent was complied with on all monitoring occasions.

2.3.3 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with AML's conditions in resource consents or provisions in Regional Plans.

2.4 Discussion

2.4.1 Evaluation of plant performance

At inspection the fuel and chemical storage at the AML Ltd site was well managed during the period under review.

In relation to the consented stormwater/wastewater discharge via the NPDC reticulated stormwater network, the treatment systems appeared to be effective during this period.

A stormwater management plan and contingency plan is in place, however an update is due for the stormwater management plan.

2.4.2 Environmental effects of exercise of consent

Alkaline discharges from this site have the potential to influence not only the pH of the NPDC stormwater discharge at the State Highway 3 bridge and downstream receiving water, but also the unionised ammonia concentration. Unionised ammonia is potentially in the receiving environment at relatively low concentrations (less than 0.025 g/m³) and the equilibrium that exists between ammoniacal nitrogen and unionised ammonia is affected by pH. In alkaline conditions the equilibrium is shifted towards the more toxic unionised ammonia.

Imposing a pH control limit on the receiving water as opposed to the discharge still appears to be an appropriate control mechanism. Monitoring results during the period under review continued to show that, whilst the pH of the discharge is quite alkaline, this 'effect' appears to be assimilated within the NPDC reticulated stormwater network and/or the receiving water.

2.4.3 Evaluation of performance

A tabular summary of the AML's compliance record for the period under review is set out in Table 4.

Table 4 Summary of performance for AML's consent 4539-2

Purpose: To discharge of stormwater and treated concrete truck washings		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option to minimise effects	Observation and discussion at inspection	Yes

Purpose: To discharge of stormwater and treated concrete truck washings		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
2. Limit on stormwater catchment area	Observation and discussion at inspection	Yes
3. Bunding of above ground hazardous substance storage	Observation at inspection	Yes
4. Discharge cannot cause specified general adverse effects beyond mixing zone	Sampling and discharge point inspections	Yes
5. Concentration limits upon potential contaminants in discharge	Chemical sampling	Yes
6. pH limits on receiving water as a result of discharge	Chemical sampling	Yes
7. Maintenance of and adherence to contingency plan	Review of documentation received	Yes
8. Preparation and maintenance of operation and management plan. Initially due January 2009	Review of documentation received.	Update due
9. Written notification of changes	Observation and discussion at inspection found no changes requiring notification	N/A
10. Optional review provision re environmental effects	Next opportunity for review June 2014, unless Council notified of changes	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		Good

N/A = not applicable

During the period under review, AML Ltd demonstrated a good level of administrative performance and a high environmental performance and compliance, with their resource consent as defined in Section 1.1.5.

2.4.4 Recommendation from the 2015-2016 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from AML Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was carried out in full.

2.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made

available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in 2015-2016. A recommendation to this effect is attached to this report.

2.5 Recommendation

THAT monitoring of discharges from AML Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

3. Downer EDI Works Ltd

3.1 Process description

Downer EDI Works Ltd (Downer) operates an asphalt manufacturing plant at a site off Rifle Range Road. A depot for maintenance, parking and storage of equipment and materials used in road-making is also on the site.

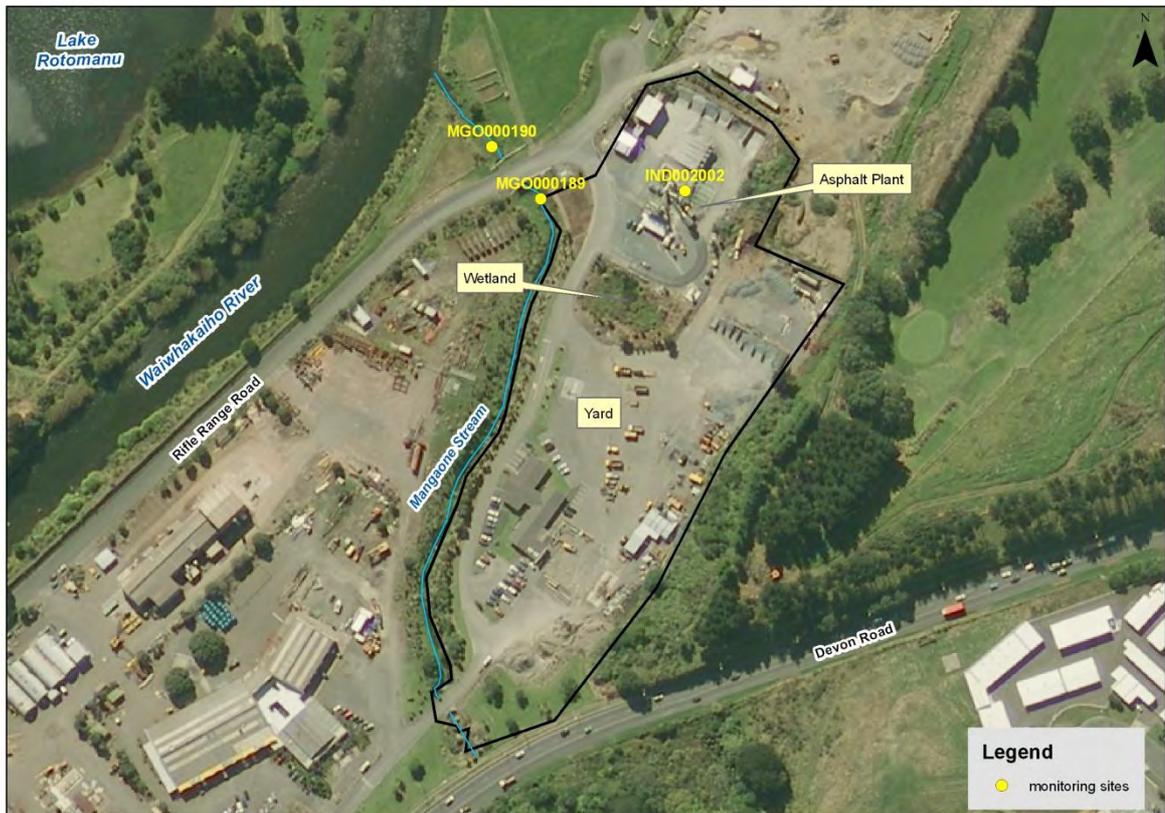


Figure 6 Downer's site and sampling point locations

In the manufacturing process, aggregate metal is dried by gas heating and is mixed with heated bitumen to form hot-mix bitumen. Diesel oil and/or kerosene may be added to adjust the consistency of the mix. The product is loaded onto trucks for transport. Dust and gases generated from the process are treated in a wet scrubber. Scrubber effluent is treated in four settling ponds then reused.

The asphalt plant stormwater catchment contains raw materials, comprising various grades of aggregate, static bitumen tanks, banded emulsion tanks, and stores housing bitumen additives and plant maintenance materials, such as chain oil.

The depot includes an administration building, vehicle and equipment maintenance workshops, aggregate stores, and an area for parking motor vehicles and equipment. Stormwater from this area drains via a three-stage oil separator to a small constructed wetland that also receives piped water from springs. Stormwater from the eastern side of the site which contain aggregate storage and the asphalt plant is treated by three-stage interceptors and prior to discharge to the network. There is also a truck wash facility in the depot area, the drainage from which is currently diverted to sewer at all times by means of a locked diversion valve.

Drainage from the asphalt plant settling ponds (which have a baffled outlet to contain floatables) and the depot both discharge via the small wetland, to the Mangaone Stream immediately above the Rifle Range Road bridge.

3.2 Water discharge permit

Downer operates an asphalt drum plant that is situated on the right bank of the Mangaone Stream near its confluence with the Waiwhakaiho River, on Rifle Range Road. Ownership of the plant has changed several times, with Works Civil Construction previously taking over the site from Technic Industries Ltd in November 1997.

Downer holds consent **3917-3** to discharge treated stormwater from an asphalt manufacturing plant onto land and into the Mangaone Stream. This was granted by the Council under Section 88 of the RMA on 20 June 2015. It is due to expire on 1 June 2032.

It contains all of the eight of the standardised special conditions as set out in Section 1.2.

The permit is attached to this report in Appendix I.

3.3 Results

3.3.1 Inspections

During the period under review Downer's Rifle Range Road site was inspected on four occasions. These were on 26 August 2015, 31 November 2015, 31 March 2016 and 24 May 2016.

Site inspections focussed on treatment systems, site housekeeping, visual quality of discharges, dust and odour, and the receiving waters.

During the period under review it was generally found that the site was well managed. It was also noted that treatment and mitigation measures at the site were being maintained and/or improved. However, the 24 May 2016 inspection found silt and sediment discharging from the unsealed yard to the stormwater treatment system. There was also a hydrocarbon spill flowing into the stormwater drain, which was dealt with at the time of inspection. Inspection of the stream found that there was no visual impact below the mixing zone.

No dust or odour issues were noted during the period under review.

3.3.2 Results of discharge monitoring

Chemical monitoring of discharges from the site of Downer EDI Works Ltd takes place at two points. The effluent to the wetland from the settling ponds at the asphalt plant is sampled at the ponds' outlet (site code IND002002). The combined flow of stormwater from the depot, which is treated in the oil separator and constructed wetland, and the pond effluent is sampled at the outlet to the Mangaone Stream (site MGO000189).

The discharge from the settling ponds is often highly turbid, however further “treatment” occurs in the constructed wetland. The discharge to the wetland is usually a grey colour, and contains a high concentration of fine suspended solids.

The results of chemical monitoring of the pond effluent and combined flows for the period under review are given in Table 5 and Table 6. A summary of all results for each site is also given in the tables.

Table 5 Chemical monitoring results for Downer’s air scrubber settling ponds-site IND002002

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	5.2	0.5	5.9	3	10.5	3.7
Maximum	89.5	29	9.6	600	37.4	290
Median	39.8	0.2	7.6	82	20.2	19.5
Number	30	25	30	30	29	16
15 Jul 2015	34.8	b	7.6	3	12.3	4.0
18 May 2016	48.5	0.5	8.1	43	15.4	60

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded
b parameter not determined, no visible hydrocarbon sheen and no odour

The suspended solids and oil/grease concentrations were found to be well below the median for the site. Conductivity, whilst above the median for the site on one occasion, was below the maximum value recorded.

The pH result obtained for the samples collected during the period under review were acceptable, and similar to the median calculated from previous results.

Table 6 Chemical monitoring results for from Downer’ final discharge-site MGO000189

Parameter	Conductivity @ 20°C	HCVIS	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	Pass/fail	pH	g/m ³	Deg.C	NTU
Minimum	6.2	-	6.5	0.5	10.6	2.6
Maximum	32.2	-	8.4	370	19.2	380
Median	19.3	-	6.8	18	15.5	42
Number	49	-	49	49	45	22
15 Jul 2015	21.3	Pass	6.7	23	14.4	33
08 Jan 2016	18.5	Pass	6.8	30	18.0	33
18 May 2016	20.9	Pass	6.8	23	16.6	27
<i>Consent Limits</i>	-	-	6-9	100	-	-

Key: HCVIS Visual/odour assessment of a sample for the presence of hydrocarbons or greases

During the period under review the pH and suspended solids levels were in compliance with the consented limits. Oil and grease was not detected by odour or visual inspection of the samples.

Receiving water results indicate no adverse effects were occurring in the Mangaone Stream during discharges (see section 17.1.2).

3.3.3 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with conditions in resource consents or provisions in Regional Plans at Downer's Rifle Range Road site.

3.4 Discussion

3.4.1 Discussion of site performance

Housekeeping at the site was found to be good over the monitoring period.

The site was well managed during the period under review and the discharge from the site complied with the conditions of consent on all monitoring occasions. Some minor issues were noted in regard to a spill and some sediment accumulation in the yard.

Stormwater management and contingency plans are up to date for this site.

3.4.2 Environmental effects of exercise of consent

No adverse effects were noted on the water quality in the Mangaone Stream as a result of the exercise of Downer's water permit.

3.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 7.

Table 7 Summary of performance for Downer EDI's consent 3917-3

Purpose: To discharge up to 175 litres/second of stormwater and wash down water from an asphalt manufacturing plant into the Mangaone Stream in the Waiwhakaiho Catchment		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Inspection	Yes
2. Limit on catchment size	Inspection	Yes
3. Limits on contaminants in discharge	Not assessed during the period this consent was active	Yes
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
5. Maintain and adhere to a stormwater management plan	Inspection and programme supervision	Yes
6. Maintain and adhere to a spill contingency plan	Inspection and programme supervision	Yes
7. Notify the Council of changes at site	No notification received	N/A
8. Provision for review of consent	No review option this period	N/A

Purpose: To discharge up to 175 litres/second of stormwater and wash down water from an asphalt manufacturing plant into the Mangaone Stream in the Waiwhakaiho Catchment		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

During the period under review, Downer EDI Works Ltd demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent in relation to its site at Rifle Range Road, as defined in Section 1.1.5.

3.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Downer EDI Works Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented during the year under review.

3.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remain similar to that undertaken in 2015-2016. A recommendation to this effect is attached to this report.

3.5 Recommendation

THAT monitoring of discharges from Downer EDI Works Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

4. Envirowaste Services Ltd

4.1 Process description

Envirowaste Services Ltd (Envirowaste) operates a material recovery facility (MRF) on Colson Road. The site receives and separates recyclable material sourced from district council kerbside collections and transfer stations for the entire Taranaki region.

Stormwater from the site discharges via retention ponds to the Puremu and Mangamiro Streams. Prior to discharge the stormwater is treated in long sediment ponds that discharge via grates to prevent litter being carried with it.



Figure 7 Envirowaste's site and sampling locations

4.2 Water discharge permit

Envirowaste holds consent 10109-1 to discharge stormwater from an industrial site into the Puremu Stream and an unnamed tributary of the Mangaone Stream. This was granted by the Council under Section 88 of the RMA on 6 May 2015. It is due to expire on 1 June 2032.

It has nine of the standardised special conditions as set out in Section 1.2.

The permit is attached to this report in Appendix I.

4.3 Results

4.3.1 Inspections

During the period under review Envirowaste's site was inspected on four occasions. These were on 14 July 2015, 3 August 2015, 8 April 2016 and 27 June 2016.

Site inspections focussed on treatment systems, site housekeeping, visual quality of discharges, dust and odour, and the receiving waters.

The inspections raised the issue of litter at the site and noted that it was accumulating in the stormwater drains. This was discussed with the consent holder who now has litter control and retrieval measures in place. No other issues were noted and the discharges were found to be clear upon visual inspection. No dust or odour issues were noted during the period under review.

4.3.2 Results of discharge monitoring

Chemical monitoring of discharges from the Envirowaste site takes place at two points. Stormwater discharging to the Puremu Stream is sampled at STW0002091 whilst stormwater discharging to the Mangamiro Stream is sampled at STW002092. During the period under review, only one of the sites was found to be discharging during sampling visits. The results of the discharge sampling are given in Table 8.

Table 8 Chemical monitoring results for Envirowaste's stormwater to the Mangamiro Stream–site STW002092

Parameter	Ammoniacal nitrogen	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temp.	Un-ionised ammonia
Unit	g/m ³ N	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	g/m ³
Minimum	-	-	-	-	-	-	-
Maximum	-	-	-	-	-	-	-
Median	-	-	-	-	-	-	-
Number	2	2	2	2	2	2	2
18 May 2016	0.380	14.8	b	7.5	10	14.9	0.00391
<i>Consent limits</i>	-	-	15	6-9	100	-	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded
 b parameter not determined, no visible hydrocarbon sheen and no odour

All results were found to be compliant with consent conditions.

Receiving water results indicate no adverse effects were occurring in the Mangamiro Stream during discharges (see section 17.1.2).

4.3.3 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with conditions in resource consents or provisions in Regional Plans at Envirowaste's Colson Road site.

4.4 Discussion

4.4.1 Discussion of site performance

Housekeeping at the site was found to be good over the monitoring period.

The site was well managed during the period under review and the discharge from the site complied with the conditions of consent. Some issues were noted in regard to litter control at the site, however this has been addressed by the consent holder.

Stormwater management and contingency plans are up to date for this site.

4.4.2 Environmental effects of exercise of consent

No adverse effects were noted on the water quality in the Puremu, Mangamiro or Mangaone Streams as a result of the exercise of Envirowaste's water permit.

4.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 9.

Table 9 Summary of performance for Envirowaste's consent 10109-1

Purpose: To discharge stormwater from an industrial site into the Puremu Stream and an unnamed tributary of the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Inspection	No- improved litter control required
2. Limit on catchment size	Inspection	Yes
3. Limits on contaminants in discharge	Sampling	Yes
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
5. Maintain and adhere to a stormwater management plan	Plan provided April 2015	Yes
6. Maintain and adhere to a spill contingency plan	Plan provided April 2015	Yes
7. Notify the Council of changes at site	No notification received	N/A
8. Lapse condition	Consent exercised	N/A
9. Provision for review of consent	No review option until June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

During the period under review, Envirowaste Services Ltd demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent, as defined in Section 1.1.5.

4.4.4 Recommendation from the 2014-2015 Annual Report

This the first annual report for compliance monitoring at Envirowaste's site and therefore there was no recommendation made in 2014-2015 report.

4.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remain similar to that undertaken in 2015-2016. A recommendation to this effect is attached to this report.

4.5 Recommendation

THAT monitoring of discharges from Envirowaste Services Ltd in the 2016-2017 period continue at a similar level to that undertaken in the 2015-2016 period.

5. Firth Industries Ltd (Division of Fletcher Concrete and Infrastructure Ltd)

5.1 Process description

Firth Industries Ltd (Firth) operates a concrete batching plant on a 1.19 ha site off Clemow Road, on the true left bank of the Waiwhakaiho River. The plant is situated partly on the flood plain and partly above the escarpment formed by the river. A concrete precast factory operated by Ultimate Engineered Concrete Ltd is also on the site. This includes a bedding plant, which operates from an area above the escarpment.



Figure 8 Firth Industries site location and discharge points

Stormwater from the lower part of the site is treated in a four-pond settling system before being pumped to the Waiwhakaiho River via an old watercourse. Wastewater from the washing of plant and concrete delivery trucks is discharged to the settling system. Where possible, this is then recycled for reuse as wash water. Seepage from the escarpment also flows to the settling ponds. Under heavy or prolonged rainfall conditions, the settled washings are discharged to the Waiwhakaiho River with stormwater. There is a back-flow prevention valve on the discharge line to prevent the Waiwhakaiho River from flooding the site. This system is in the process of being upgraded and is due to be completed in January 2017.

Stormwater from the upper part of the site, where the bedding plant is situated, discharges via two small settling pits to the Waiwhakaiho River at a separate point.

A range of chemicals used in the ready-mix and precast operations are held in the catchment of the main settling system. On the whole, they are either stored indoors or within bunded areas.

Off-specification and surplus concrete, and solids from the settling ponds are deposited along the riverbank. This forms part of the flood protection works for the site. Excess solids are removed from the site periodically.

5.2 Water discharge permit

During the period under review Firth held consent (0392-3) to discharge up to 10 litres per second of truck washing effluent and up to 200 litres per second of stormwater, for a period until 1 June 2014. This consent was granted by the Council on 1 May 1996 and expired on 1 June 2014. An application to renew this consent was received on 27 January 2014, and therefore was exercised under Section 124 of the RMA allowing Firth to continue to operate under the conditions of the expired consent until a decision was made on the renewal. The renewed consent (0392-4) was granted on 21 July 2015.

Consent 0392-4 contains the nine standardised special conditions as set out in section 1.2. It also has one additional condition requiring stormwater and wastewater separation by a certain date.

A copy of the permit is attached to this report in Appendix I.

5.3 Results

5.3.1 Inspections

Firth's site was inspected on four occasions during the period under review. Inspections focussed on general housekeeping, treatment systems, dust and odour, and discharge and receiving waters quality (by visual assessment).

Inspections were undertaken on 24 August 2015, 30 November 2015, 16 February 2016 and 20 May 2016. No issues were raised during inspections and the site was clean and tidy. A trickle discharge that did not reach the river was noted on two occasions. Discussions were held around timing of planned upgrades which had been delayed due to land ownership issues.

Two incidents were raised during the year in relation to Firth. These are discussed in Section 5.3.3.

5.3.2 Results of discharge monitoring

Effluent from Firth's site is monitored where it enters the Waiwhakaiho River below the main settling system. This site receives wastewater from the settling pond from the bedding plant, located above the escarpment to the south west of the main plant, and stormwater runoff from the adjacently property (which is not owned by Firth, but is within the area covered by their resource consent).

Consent conditions require that the discharges do not exceed 15 g/m³ oil and grease or 100 g/m³ suspended solids. Consent conditions also require that discharges do not cause a pH of below 6.0 or above 9.0 and/or an increase of pH of more than 0.5 in the Waiwhakaiho River.

The results for the stormwater drain at the Waiwhakaiho River (site IND002001) are given in Table 10. The results of the receiving water (i.e. for the purposes of monitoring compliance with consent conditions) are given in Section 17.

Table 10 Chemical monitoring results for Firth-site IND002001

Parameter	Conductivity @ 20°C	Oil And Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	6.7	<0.5	9.6	1	7.9	13
Maximum	321	1.9	12.3	610	25.7	420
Median	61.6	<0.5	11.4	42	15.6	89
Number	72	43	72	71	70	23
15 Jul 2015	172	b	12.2	48	12.1	30
08 Jan 2016	22.7	b	9.6	180	18.7	130
Consent limit	-	15	-	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour (deemed to be less than 2 g/m³)

All samples taken during the period under review had no visual hydrocarbons and complied with consent limits for oil and grease. Suspended solids concentrations complied with consent limits on 15 July 2015, but exceeded the consent limit on 8 January 2016. This is discussed further in section 5.3.3. Receiving water results also show that at the time of sampling, that the pH in the Waiwhakaiho River, just beyond the mixing zone, was within the consented limits.

Samples were also taken of the discharge at the upper site on two occasions, the results of these are given in Table 11.

Table 11 Chemical monitoring results for Firth- site STW001080

Parameter	Conductivity @ 20°C	Oil And Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	4.1	0.5	7.7	7	10.1	11
Maximum	55.4	81	10	560	20.7	66
Median	11.7	1.4	8.2	25	15.9	28
Number	27	20	27	26	27	20
15 Jul 2015	22.9	b	7.7	20	10.8	23
08 Jan 2016	17.7	b	8.4	83	19.7	52
Consent limit	-	15	-	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

All samples from site STW001080 complied with consent conditions.

5.3.3 Investigations, interventions, and incidents

During the period under review, the Council was required to undertake additional investigations and interventions, or record incidents, in association with conditions in resource consents or provisions in Regional Plans in regard to Firth's Clemow Road site.

21 July 2015

A complaint was received about an oil spill on Clemow Road. An inspection was carried out and it was found that the spill had been cleaned up prior to Council staff arriving onsite. No further action was taken.

27 October 2015

It was found that the management plan for stormwater upgrades had not been submitted by the deadline on 21 October 2015. A letter requesting explanation was sent and this was accepted. It was outlined that issues in regard to land ownership had delayed the planning of the site improvements. The plans were supplied by 20 November 2015.

8 January 2016

During analysis of samples collected, a breach of consent conditions for suspended solids was recorded. A letter of explanation was requested and accepted. It was outlined that this matter was being address with major upgrades at the site currently being undertaken.

5.4 Discussion

5.4.1 Discussion of site performance

In terms of housekeeping practices, the Firth facilities were generally well managed during the period under review.

There were issues in regard to a stormwater management plan being supplied on time. Due to legal issues over parcel of land that Firth occupies, there was also a delay in the construction of the new wastewater and stormwater treatment systems. However this has now been resolved and construction is now underway. The system is scheduled to be fully operational by January 2017.

One complaint was received regarding an oil spill on the unloading pad on Clemow Road. Upon investigation it was found that ongoing clean up and containment works were being undertaken by Firth.

5.4.2 Environmental effects of exercise of consent

Imposing a pH control limit on the receiving water as opposed to the discharge still appears to be an appropriate control mechanism. Whilst the pH level of the discharges is quite alkaline, this was assimilated within the receiving water with little, if any, effect observed in the Waiwhakaiho River.

Historically, some white staining of the riverbed with calcium deposits has occurred for a distance of up to about 15 metres from the lower discharge point. However, this is within the 50-metre mixing zone and no adverse biological effects have been

observed as a result. It is anticipated that with the improved treatment and wastewater diversion systems currently being built at the site, the pH of the discharges will drop, thus decreasing the likelihood of calcium precipitating out of solution and creating such calcium deposits at the discharge point.

5.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 12 and 13.

Table 12 Summary of performance Firth's consent 0392-3 (to 21 July 2016)

Purpose: To discharge treated concrete truck washings		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge cannot cause specified general adverse effects beyond mixing zone	Sampling and discharge point inspections	Yes
2. Concentration limits upon potential contaminants in the discharge (suspended solids and O&G)	Chemical sampling	Yes
3. pH limits on receiving water as a result of discharge	Chemical sampling	Yes
4. Rate of discharge to be controlled	Observation and discussion at inspection	Yes
5. Efficient maintenance and operation of ponds	Observation and discussion at inspection	Yes
6. Provision and maintenance of a contingency plan	Review of plans provided	Yes
7. Optional review provision re environmental effects	Scheduled for consideration June 2008	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 13 Summary of performance Firth's consent 0392-4 (to 21 July 2016)

Purpose: To discharge stormwater and treated wastewater into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Inspection and programme supervision	Yes
2. Stormwater catchment not to exceed 1.618 Ha	Inspection	Yes
3. Stormwater treatment system to be used	Inspection	Yes
4. Limits on contaminants in discharge	Sampling	No- One high suspended solids result

Purpose: To discharge stormwater and treated wastewater into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
6. Maintain and adhere to a contingency plan	Inspection and programme supervision	Yes
7. Maintain and adhere to a stormwater plan	Inspection and programme supervision	Yes
8. Undertake improvements as set out in the management plan by 22 February 2016	Inspection	No- construction delayed due to land ownership issues
9. Notify Council of any changes at the site	Inspection and liaison with consent holder	Yes
10. Review condition	No review option this period	M/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		Good

During the period under review, Firth Industries Ltd demonstrated a good level of environmental performance and a good level of administrative performance and compliance with their resource consent as defined in Section 1.1.5 in relation to its Clemow Road site. There were some issues in relation to the completion of works within dates set by consent conditions, however these were beyond Firth's control and have since being rectified.

5.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Firth Industries Ltd (Division of Fletcher Concrete and Infrastructure Ltd) in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in full.

5.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remain similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

5.5 Recommendation

THAT monitoring of discharges from Firth Industries Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

6. Fitzroy Engineering Group Ltd

6.1 Process description

Fitzroy Engineering Group Ltd (FEGL) operates an engineering business which involves the manufacturing of heavy engineering components and structures, and activities at the site also include abrasive blasting and painting.

The site was previously leased by FEGL from Technix Group Ltd (TGL), and the stormwater discharges from FEGL's activities were covered under consents held by TGL. In 2013 FEGL purchased the part of the property they operate on from Technix (Figure 9). After the purchase of the property resource consent 0021-3 was transferred from Technix to FEGL. Resource consent 0291-3 was split into two consents as the northern area covered by this consent was now owned by FEGL. The consent number assigned to this catchment area was consent number 9853.



Figure 9 Technix Group Ltd and Fitzroy Engineering Group Ltd subdivided site

The stormwater area for consent 0021 covers the south-west section of FEGL's property. The stormwater drainage system runs from the south and east boundary towards the east boundary, the drainage then runs north towards the Waiwhakaiho River and discharges into the river via a stormwater drain (STW002001, Figure 10). There are multiple sumps along this system to collect stormwater.

The buildings/land use within this area includes:

- Staff offices and facilities,
- Workshops (Machining, plate and general),
- Dangerous goods storage,
- Liquid oxygen tanks, and
- Blast and paint storage.

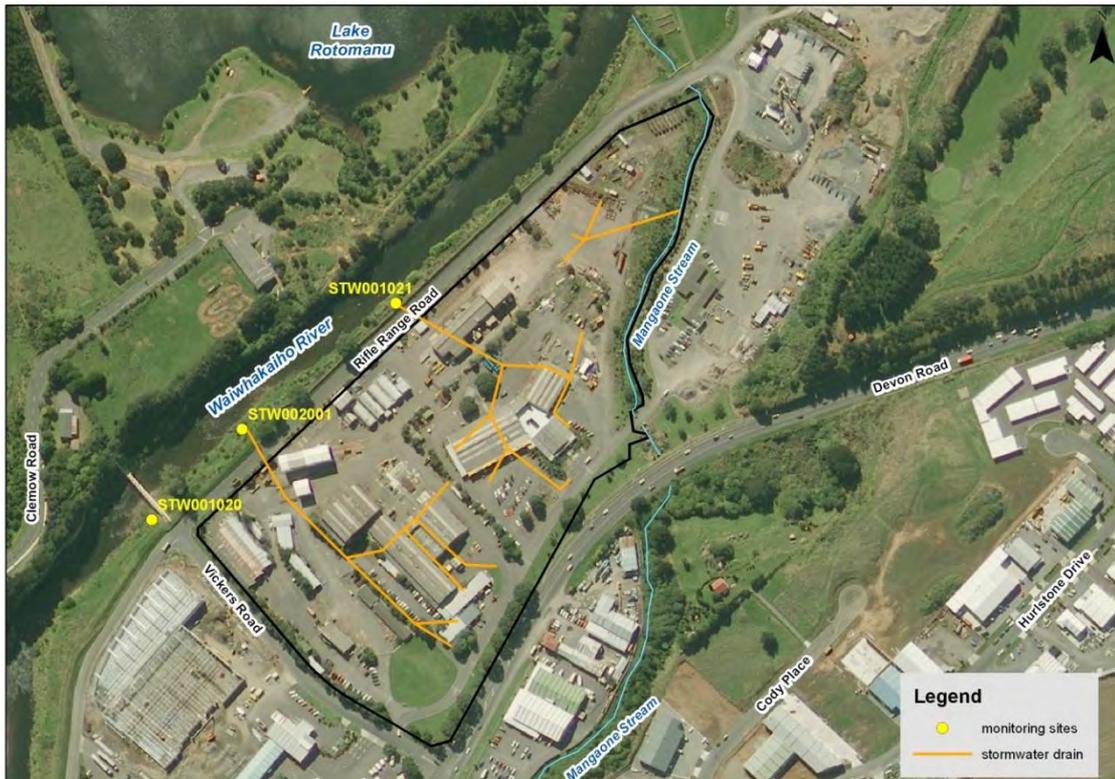


Figure 10 Fitzroy Engineering Group Ltd site and stormwater discharge points

The drainage system for the discharge covered by consent 9853 begins in the adjacent Technix property, continues north through FEGL's section, and discharges into the Waiwhakaiho River via a stormwater drain (STW001021). The system has a sump on the southern boundary and another attached to the blast and paint shop. A dangerous goods storage shed is also in this catchment area.

FEGL undertakes infrequent hydrotesting processes on large fabrications, and also operations involving the passivating of stainless steel. These activities produce wastewater that may contain contaminants such as penetrant dye and rust inhibitor, and also can be acidic. These activities sometimes occur outside. FEGL has advised that the wastewater from these processes will be banded using tarpaulin sheets, and any drains will be blocked with sandbags. Once that activity is finished the waste will be removed by a waste management specialist.

FEGL has provided a stormwater management plan and spill contingency plan.

6.2 Water discharge permits

Discharge permit 0021 was granted on 1 May 1996 to discharge stormwater off a Vickers Road site into the Waiwhakaiho River. This permit was initially held by Technix but the renewed consent 0021-4, to discharge stormwater from an industrial site into the Waiwhakaiho River, was granted to FEGL under Section 88 of the RMA on 12 March 2015. It is due to expire on 1 June 2032.

Consent **9853** provides for the discharge of stormwater to the river opposite FEGL's blast and paint shop. This is a combined discharge point as the catchment includes FEGL's blast and paint operation, another building complex (which has been occupied by about five tenants, but from 1 January 2008 the only occupants were FEGL, Technix Group Ltd and Steelfab), a truck washing area, and a dangerous goods store. The discharges from this whole area were previously covered by a single consent held by Technix (**0291**). A partial transfer of this consent took place on 20 February 2014, with the catchment area now covered by consent **9853-1** shown Figure 9 (area 1). Consent **9853-1** expired on 1 June 2014 and the consent continued to be exercised under Section 124 of the RMA until such time as the renewal was processed.

Discharge permit **9853-2**, to discharge stormwater from an industrial site into the Waiwhakaiho River, was granted to FEGL under Section 88 of the RMA on 12 March 2015. It is due to expire on 1 June 2032.

Both the current consents (**0021-4** and **9853-2**) contain the standardised conditions two of which have been modified to prohibit the discharge of contaminants from hydrotesting and require the notification of any outdoor hydrotesting being undertaken.

The permits are attached to this report in Appendix I.

6.3 Results

6.3.1 Inspections

The site was inspected on four occasions during the monitoring period, on 14 September 2015, 8 December 2015, 13 April 2016 and 30 June 2016. The inspections focussed on housekeeping, evidence of spills, the state of the onsite drains, and dust/odour.

The site was found to be clean and tidy on all occasions. The 14 September 2015 inspection noted slight hydrocarbon sheen in the waste oil and diesel bunds, which were due to be cleaned out.

6.3.2 Results of discharge monitoring

There are two routine sampling points for monitoring of stormwater discharges from FEGL site to the Waiwhakaiho River. These sampling points are opposite FEGL's plate shop (consent 0021, site STW002001), and opposite FEGL's blast and paint shop (consent 9853, site STW001021). The latter discharge point also contains stormwater, and potentially truck wash wastewater from the area covered by Technix's consent 0291.

Opposite FEGL's plate shop (Consent 0021)

The values for pH, suspended solids, and oil and grease are all within the limits set in the special conditions for consent 0021-4.

Table 14 Chemical monitoring results for discharge opposite FEGL's plate shop-site STW002001

Parameter	Conductivity	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@ 20°C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	2.7	0.5	7	5	10.3	5.6
Maximum	234	25	9.7	790	21.5	190
Median	7.9	1	7.4	50	15.8	63
Number	55	42	55	55	53	23
15 Jul 2015	7.1	<0.5	7.6	13	11.1	20
08 Jan 2016	10.2	b	7.2	51	19.5	63
Consent limits	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Opposite FEGL's Blast & Paint (Consent 9853)

As discussed, this discharge contains stormwater from both the Technix and FEGL sites. Up until 20 February 2014, this combined discharge was covered solely by consent 0291 held by Technix. The discharge is now also covered by FEGL consent 9853-2.

The conditions on stormwater composition on consent 9853-2 for pH range, suspended solids and oil and grease were all complied with on each monitoring occasion.

Table 15 Chemical monitoring results for FEGL/Technix combined stormwater discharge-site STW001021

Parameter	Conductivity	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	2.2	0.5	6	2	10.6	6.7
Maximum	24.4	35	7.7	530	23.4	200
Median	6.6	1.3	7.3	36	15.3	36
Number	46	34	46	46	43	23
15 Jul 2015	8.6	b	7.6	26	11.8	50
08 Jan 2016	7.8	b	7.0	100	20.4	100
Consent limits	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

6.4 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with FEGL's conditions in resource consents or provisions in Regional Plans.

6.5 Discussion

6.5.1 Discussion of site performance

Housekeeping at the site over the monitoring period was generally good, and inspection found that the bunds were well managed.

The stormwater discharges from the site were found to be compliant with consent conditions on all monitoring occasions

6.5.2 Environmental effects of exercise of consents

There were no adverse environmental effects noted in the receiving environment as a result of FEGL discharges.

6.5.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in, Table 16.

Table 16 Summary of performance for FEGL's consent 0021-4

Purpose: To discharge stormwater from an industrial site into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option to prevent or minimise adverse effects	Inspections, liaison with consent holder	Yes
2. Catchment not to exceed 3.3 ha	Inspections	Yes
3. No discharge of contaminants from hydrotesting activities	Inspections	Yes
4. Notification of hydrotesting	Not undertaken during monitoring period	N/A
5. Limits on pH, suspended solids, oil and grease and chloride in discharge	Sampling	Yes
6. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection, sampling and biomonitoring	Yes
7. Maintain and update a Contingency Plan	Review of documentation received. Latest version received May 2014	Yes
8. Site to operate in accordance with a Stormwater Management Plan	Review of documentation received. Latest version received November 2014	Yes
9. Notification prior to significant changes to processes or operations	Inspections and liaison with consent holder – no significant changes during period	Yes
10. Provision for review of consent	Next option for review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 17 Summary of performance for FEGL's consent 9853-2

Purpose: To discharge stormwater from an industrial site into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option to prevent or minimise adverse effects	Inspections, liaison with consent holder	Yes
2. Catchment not to exceed 3.3 ha	Inspections	Yes
3. No discharge of contaminants from hydrotesting activities	Inspections	Yes
4. Notification of hydrotesting	Not undertaken during monitoring period	N/A
5. Limits on pH, suspended solids, oil and grease and chloride in discharge	Sampling	Yes
6. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
7. Maintain and update a Contingency Plan	Review of documentation received. Latest version received May 2014	Yes
8. Site to operate in accordance with a Stormwater Management Plan	Review of documentation received. Latest version received November 2014	Yes
9. Notification prior to significant changes to processes or operations	Inspections and liaison with consent holder – no significant changes during period	Yes
10. Provision for review of consent	Next option for review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

During the period under review, Fitzroy Engineering Group Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consents as defined in Section 1.1.5 in relation to its site on Rifle Range Road.

6.5.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Fitzroy Engineering Group Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in full.

6.5.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the

Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in the 2016-2017 period. A recommendation to this effect is attached to this report.

6.6 Recommendation

THAT monitoring of discharges from Fitzroy Engineering Group Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

7. Freight and Bulk Transport Holdings Ltd

7.1 Process description

Freight and Bulk Transport Holdings Ltd (FBT) operate a truck depot that services the rural sector from this 1.77 ha site on Katere Road.

This site was previously monitored under the annual inspection round of truck washes, and was incorporated into the Lower Waiwhakaiho Catchment Monitoring Programme at the start of the 2009-2010 year.



Figure 11 Location of Freight and Bulk Transport Holdings site

FBT stores, blends and distributes dry stock feeds such as crushed meal, palm kernel and grains. Lime, fertiliser and gravel used for farm races are also stored at the site. The lime, stock feeds and fertilisers are stored in the sheds at the northern end of the site; only the gravel is stored outside in the stormwater catchment. Trucks are washed at the site and the wash water is directed to soak holes.

The majority of the stormwater from the site is collected by three stormwater sumps, which discharge to the Mangaone Stream via the mid Katere Road drain. However, stormwater from the catchment area around the truck wash drains to the truck wash sump and soak holes.

Some stormwater is retained on site, and is used in the truck wash.

7.2 Water discharge permit

FBT operates a transport depot on Katere Road, New Plymouth on the northern side of the Mangaone Stream. The site is used for the storage of stock feed and aggregate, and contains a truck wash facility. The consent (**2041-2**) to discharge from the site was granted on 1 May 1996, to provide for the discharge of up to 2.8 cubic metres per day of treated truck washdown water and stormwater onto and into land in the vicinity of the Mangaone Stream, for a period until 1 June 2014.

FBT now holds consent **2041-3** to discharge treated truck wash water and stormwater onto and into land. This was issued by the Council under Section 87(e) of the RMA on 5 June 2015 and it is due to expire on 1 June 2018.

Consent 2041-3 containing seven of the standardised special conditions set out Section 1.2.

FBT now holds consent **10008-1** to discharge stormwater onto and into land and into the Mangaone Stream. This consent was issued by the Council under Section 87(e) of the RMA on 5 June 2015 and it is due to expire on 1 June 2032.

Consent 10008-1 contains nine standard special conditions set out in Section 1.2.

Copies of all permits are attached to this report in Appendix I.

7.3 Results

7.3.1 Inspections

FBT's site was inspected on four occasions during the monitoring period. These were on 2 September 2015, 2 December 2015, 31 March 2016 and 24 May 2016.

The inspections focussed on the truck wash treatment system, product tracking, general, housekeeping, stormwater drains and the receiving waters.

During the period under review the site was found to be reasonably well managed. It was discussed with FBT that the sumps may need to be cleaned more regularly.

No dust or odour issues were noted during the monitoring period.

7.3.2 Results of discharge monitoring

The primary site for monitoring discharges from FBT's site is the stormwater drain located on the western most driveway (site STW001146). This was sampled on three occasions during the period under review. The results are given in Table 18.

The sample taken on 7 August 2015 had a biochemical oxygen demand (BOD) of 24 g/m³ indicating that there was an elevated nutrient load in the discharge. A slight exceedance was also noted the concentration of suspended solids. On this occasion no action was taken, however the consent holder was informed and undertook to have the sump cleaned.

A subsequent sample was found to have a BODC concentration of 38 g/m³ and as this was in breach of consent conditions, an incident was logged and an abatement

notice was issued. Follow up sampling found that the site was compliant with consent conditions and the abatement notice.

Table 18 Chemical monitoring results for FBT's discharge-site STW001146

Parameter	Ammoniacal nitrogen	BODC	BOD	Conductivity @ 20°C	Dissolved reactive P	HCVIS	pH	Suspended solids	Temp.	Un-ionised ammonia
Unit	g/m ³ N	g/m ³	g/m ³	mS/m	g/m ³ P	-	pH	g/m ³	Deg.C	g/m ³
Minimum	-	-	-	-	-	-	-	-	-	-
Maximum	-	-	-	-	-	-	-	-	-	-
Median	-	-	-	-	-	-	-	-	-	-
Number	2	2	1	3	2	2	3	3	3	2
07 Aug 2015	3.81		24*	18.5	0.618	Pass	7.5	110	10.6	0.02851
18 May 2016	0.277	38	-	17.1	0.866	Pass	7.3	410	14.8	0.00179
26 May 2016	-	12	-	15.4	-	-	7.5	64	13.1	-
<i>Consent limits</i>	-	15	-	-	-	-	6-9	100	-	-

Key: Bold = non compliance
* = likely non compliance - not provable

7.3.3 Investigations, interventions, and incidents

In the period under review, the Council was required to record an incident in resource consents or provisions in Regional Plans in relation to this Katere Road site.

15 July 2015

During analysis of samples collected during routine sampling on 15 July 2015 it was found that the BOD and suspended solids concentrations of the discharge were likely to be in breach of resource consent conditions. As this was the first sample from this site the matter was discussed with consent holder and they undertook to track down the source of the contamination.

18 May 2016

Analysis of samples collected during routine monitoring) found that a fertiliser storage and distribution site was not operating within resource consent conditions, in regards to suspended solids, at Katere Road, Bell Block. Abatement notice EAC-21165 was issued requiring works to be undertaken to ensure compliance with resource consent conditions at all times. Re-inspection and re-sampling found the abatement notice was being complied with.

7.4 Discussion

7.4.1 Discussion of site performance

There were issues in regard to the level of suspended solids and biochemical oxygen demand in the discharge, however the most recent sample was found to be compliant with consent conditions.

7.4.2 Environmental effects of exercise of consent

No adverse effects were noted on the water quality in the Mangaone Stream as a result of the exercise of FBT's activities as shown in the surface water monitoring section of this report (section 17). Concentrations of filtered carbonaceous biochemical oxygen demand (BODCF) and unionised ammonia downstream of the

site were found to be within guideline limits. No sewage fungus or other heterotrophic growths were noted in the stream during inspections.

7.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 19 and Table 20.

Table 19 Summary of performance for FBT's consent 2041-3

Purpose: To discharge of treated truck wash wastewater and stormwater onto and into land in the vicinity of the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Inspection and programme supervision	Yes
2. Truck wash discharges to be treated	Inspection	Yes
3. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
4. Maintain and adhere to a contingency plan	Inspection and programme supervision	Yes
5. Maintain and adhere to a stormwater plan	Inspection and programme supervision	Yes
6. Notify the Council of changes at the site	Inspection and programme supervision	N/A
7. Review condition	No review needed	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 20 Summary of performance for FBT's consent 10008-1

Purpose: To discharge stormwater onto and into land and into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Inspection and programme supervision	Yes
2. Stormwater catchment not to exceed 1.77 Ha	Inspection	Yes
3. Limits on contaminants in discharge	Sampling	No
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
5. Maintain and adhere to a contingency plan	Inspection and programme supervision	Yes
6. Maintain and adhere to a stormwater plan	Inspection and programme supervision	Yes
7. Notify the Council of changes at the site	Inspection and programme supervision	N/A

Purpose: To discharge stormwater onto and into land and into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
8. Lapse condition	Consent exercised	N/A
9. Review condition	No review option this period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

During the period under review, Freight and Bulk Transport Holdings Ltd demonstrated a high level of administrative performance and a good level of environmental performance and compliance with their resource consents as defined in Section 1.1.5. There were some issues in regards to elevated BODC and suspended solids in the discharge; however no effects were noted receiving waters as a result.

7.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Freight and Bulk Transport Holdings Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was carried out in full.

7.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017 year programme that monitoring of FBT's discharges remain at a similar level as the 2015-2016 period.

7.5 Recommendation

THAT the compliance monitoring programme for discharges from Freight and Bulk Transport Holdings Ltd in the 2016-2017 continue at a similar level as that undertaken in the 2015-2016 period.

8. Katere Stores Ltd

8.1 Process description

Until recently the decommissioned New Plymouth Feed Mill site was occupied by Farmlands Co-operative Society Ltd (Farmlands) had been in operation on this 1.03 ha site at the eastern end of Katere Road, New Plymouth from 1966 to 2011. Raw grain and supplements were processed into feed for central North Island divisions of PCL Industries Ltd and then Viterria (NZ) Ltd. The site is now occupied by its owner, Katere Stores Ltd (Katere Stores) and is used for feed truck storage.



Figure 12 Katere Stores site and sampling point location

8.2 Water discharge permit

During the period under review, Farmlands held consent 4548 for activities relating to a stock feed mill at the eastern end of Katere Road. Consent 4548-2 was granted by the Council on 11 January 2002 under Section 88 of RMA, and it expires on 1 June 2020. The consent was transferred from Viterria (NZ) Ltd to Farmlands on 10 December 2013 and to Katere Stores Ltd on 18 November 2015.

This consent contains nine of the standard special conditions set out in Section 1.2.

A copy of the permit is attached in Appendix I.

8.3 Results

8.3.1 Inspections

The site was inspected on four occasions on 24 August 2015, 2 December 2015, 22 February 2016 and 20 May 2016. The inspections focussed on housekeeping, evidence of spills, the state of the onsite drains, and dust/odour.

During the period under review no issues were noted during the inspections and the site was found to be in compliance with consent conditions.

Dust and odour were not found to be an issue at the site.

8.3.2 Results of discharge monitoring

There was a discharge occurring from the site on both sampling occasions undertaken during the year under review. The results are presented in, along with a summary of all data from the sampling site (MGO00058).

Table 21 Chemical monitoring results for Katere Stores Ltd-site MGO000058

Parameter	Ammoniacal nitrogen	BOD	Conductivity	Oil and Grease	pH	Suspended solids	Temp	Turbidity
Unit	g/m ³ N	g/m ³	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	0.019	1.5	2.5	0.5	5.9	2	10.1	2.7
Maximum	11.4	690	50.3	13	7.4	530	20.5	96
Median	0.218	10.5	11.1	0.6	6.6	32	16.1	27.5
Number	44	42	47	36	47	45	46	20
15 Jul 2015	0.611	5.2	11.4	b	6.7	6	13.4	7.2
18 May 2016	0.073	4.8	11.7	1.8	7.0	23	14.8	20
Consent limit	-	25	-	15	-	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

BOD biochemical oxygen demand

BOD is Ltd within the consent conditions primarily because of the potential for growth of sewage fungus in the Mangaone Stream, and to a lesser extent because of the potential for de-oxygenation of the stream as the oxygen demand of the contaminants is exerted in the receiving environment. Sewage fungus was not observed in the receiving water during the period under review.

The consent also requires that the discharge not to cause filtered carbonaceous biochemical oxygen demand (BODCF) in the Mangaone Stream to exceed 2.0 g/m³, or unionised ammonia to exceed 0.025 g/m³. Monitoring of the stream showed that this was complied with during the period under review.

8.4 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with Farmland's conditions in resource consents or provisions in Regional Plans.

8.5 Discussion

8.5.1 Discussion of site performance

Housekeeping at the site over the monitoring period was good.

Routine sampling of the stormwater found that consent limits on component concentrations were complied with during the period under review.

In the past, whilst the mill was operating, there had on occasion been a sufficient source of nutrients to cause a growth of sewage fungus in the tributary and later in the stormwater pipe from the site. During the period under review, no sewage fungus was noted as being present in the stormwater drains at the time of the sampling runs, or at inspection.

8.5.2 Environmental effects of exercise of consent

Katere Store's consent requires that the discharge from the feedmill does not result in the unionised ammonia being increased above 0.025 g/m³ or the filtered carbonaceous BOD of the stream being raised above 2 g/m³. The stream is monitored upstream at Egmont Road (site MGO000050) and approximately 200 m downstream of the combined outfall for MGO000058 (at site MGO000075). Several other industrial site as well NPDC's mid Katere Road drain also discharge between these two sites thus contributing to any longitudinal increase in contaminants. The results of the receiving environment monitoring (Mangaone Stream) are given in Section 17.1.2.

During all surveys, the unionised ammonia was well below 0.025 g/m³ at the time of sampling and there was only a small change between the upstream and downstream monitoring sites. The instream concentrations of BODCF downstream of the discharge were found to be within acceptable limits and in compliance with consent conditions.

During the period under review there were no observations reported relating to sewage fungus in the stormwater pipe or the Mangaone Stream. The relevant biomonitoring reports are appended to this report and discussed in section 17.2.1.

8.5.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 22.

Table 22 Summary of performance for Katere Stores consent 4548-2

Purpose: To discharge treated stormwater and minor quantities of wastewater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent to be exercised as per application information	Inspections	Yes
2. Council to be informed prior to changes at site affecting discharge	Mill remained non-operational	Yes

Purpose: To discharge treated stormwater and minor quantities of wastewater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Stormwater system to be maintained to Council's satisfaction	Inspection	Yes
4. Concentration limits on potential contaminants in discharge	Discharge sampling	Yes
5. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
6. Limit on filtered carbonaceous BOD in stream	Receiving water sampling	Yes
7. Limit on unionised ammonia in stream	Receiving water sampling	Yes
8. Prepare and maintain contingency plan	Review of documentation received	Yes
9. Prepare and maintain operation and management plan	Review of documentation received	No- plan not provided by original consent holder
10. Consent to be exercised in accordance with management plan	Inspection and discussion with consent holder	Yes
11. Provisions for review of management plan	No request for plan review during the 2014-2015 period	N/A
12. Provision for review of consent	No further opportunities for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A not applicable or not assessed

During the period under review, Katere Stores Ltd demonstrated a high level of environmental performance and good level of administrative performance and compliance with their resource consent in relation to its site on Katere Road as defined in Section 1.1.5.

8.5.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Farmlands Co-operative Society Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented.

8.5.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and their effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017 the programme remains similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

8.6 Recommendation

THAT monitoring discharges from Katere Stores Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

9. Nankervis Family Trust

9.1 Process description

Activities at the site are undertaken by City Care. This Company operates out of the site owned by the Nankervis Family Trust (Nankervis), who hold the discharge consent for the site. City Care is an underground services company that carries out activities such as: reticulated drainage and sewage system maintenance, and minor earthworks.

The site is located in the Fitzroy industrial area, in the defined urban catchment of New Plymouth, approximately 380 metres from the closest water body, the Mangaone Stream.

Wash down water, from the truck wash bay discharges to a drain which is directed to an inceptor system. This then discharges into the NPDC's stormwater system (via discharge site IND002039) and then into the Mangaone Stream (via discharge site STW001035). It was stated at the time of the application that up to approximately 1.0 m³ of wash water would be discharged per day.

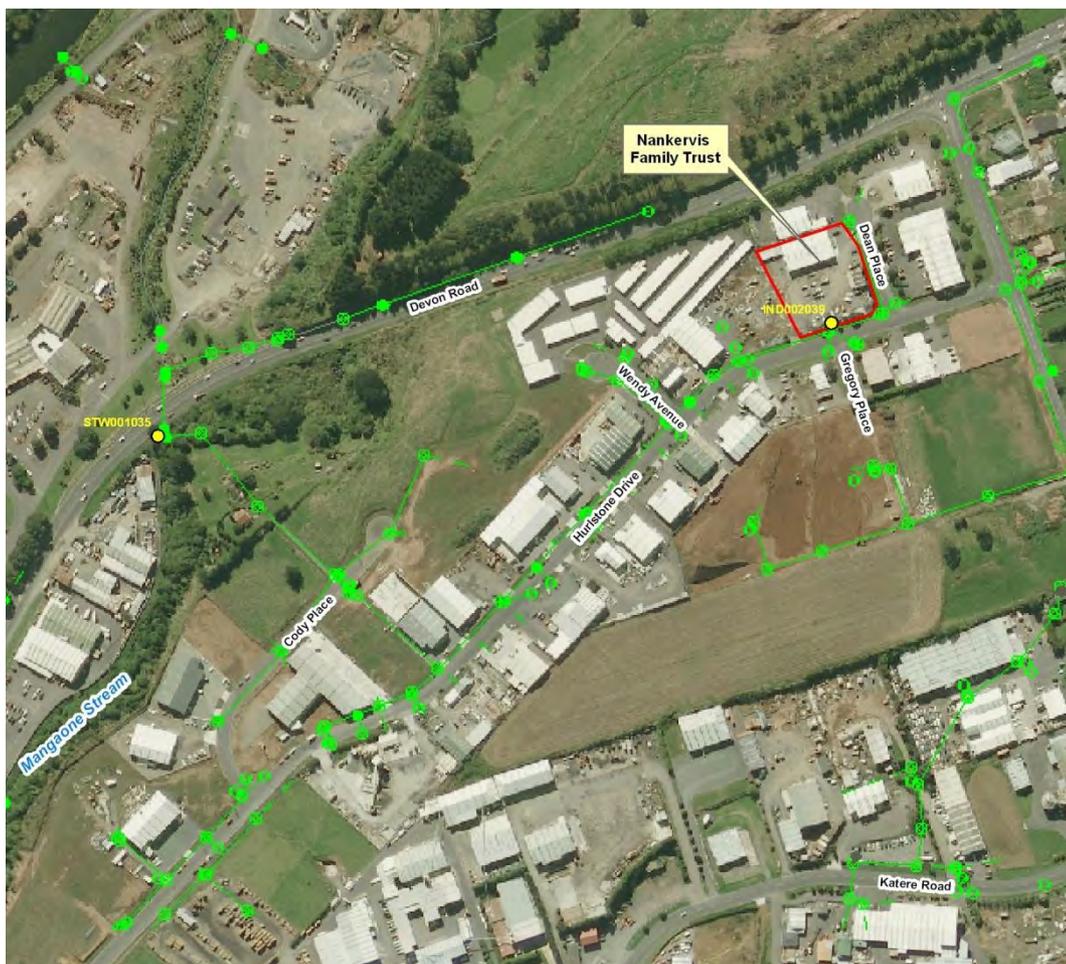


Figure 13 Nankervis Family Trust site location and discharge point

9.2 Water discharge permit

Although the site is operated and managed by City Care, the landowners, Nankervis obtained consent **6965-1** to cover the discharge of truck wash water via an interceptor system into the Mangaone Stream.

The permit was issued by the Council on 20 October 2006 under Section 87(e) of the RMA. It is due to expire on 1 June 2020.

This consent contains nine of the standard special conditions as set out in Section 1.2. It also contains one additional condition that requires the consent be exercised in accordance with information supplied with the application.

The permit is attached to this report in Appendix I.

9.3 Results

9.3.1 Inspections

The Nankervis site was inspected on four occasions during the period under review. These were on 1 September 2015, 2 December 2015, 22 February 2016 and 23 May 2016. The inspections focussed on general housekeeping, the maintenance of the treatment systems, and clarity and visual appearance of any discharges.

During the inspections no issues were noted and it was found that the interceptor was being cleaned on a regular basis. Silt cloths had been installed in some of the drains on site.

9.3.2 Results of discharge monitoring

At the time of the consent application, the stormwater discharged from the site was considered to be a permitted activity, but due to the fact that stormwater from the site contributes to the NPDC discharge at the Devon Road bridge (STW001035), it is visually inspected periodically during the wet weather sample runs, and sampled if considered necessary. Results for the period under review of the wash water and/or stormwater, downstream of the interceptor (site IND002039), are presented in Table 23.

Table 23 Chemical monitoring results for Nankervis Family Trust-site IND002039

Parameter	Conductivity @ 20°C	Oil and grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	3.7	0.5	6.3	2	11.6	6.1
Maximum	21.7	6.6	8.8	200	20.7	170
Median	7.8	0.9	7.6	32	15.8	34
Number	15	8	15	15	15	15
15 Jul 2015	7.8	b	7.8	180	12.4	170
18 May 2016	21.7	6.6	7.7	32	15.8	34
Consent Limit	-	15	6-9	100	-	-
RFWP Limit	-	15	6-9	100	-	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded

b no visible hydrocarbon sheen and no odour

* sampled from sump (combined stormwater and truck wash interceptor discharge)

The samples collected complied with the oil and grease limit (15 g/m³), and had a pH within the specified range (6-9) on all monitoring occasions. On 15 July 2015 it was noted that the wash pad was not in use at the time of sampling, and it was found that the suspended solids concentration in the stormwater discharge at the time exceeded the Regional Freshwater Plan (RFWP) permitted activity limit for suspended solids.

The site operator was advised of the result and undertook to address the issue.

Subsequent sampling found that the site was complying with RFWP limits.

9.3.3 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with Nankervis conditions in resource consents or provisions in Regional Plans.

15 July 2015

Analysis of samples collected during a wet weather run on 15 July 2015 recorded a suspended solids concentration in exceedance of the permitted activity limits conditions. A letter of explanation was requested and the explanation was accepted. The response outlined numerous measures now put in place to ensure the site would be compliant with the RFWP.

9.4 Discussion

9.4.1 Discussion of site performance

Inspections of the pad, treatment system and receiving drain indicated that the facility was well managed.

The suspended solids concentration in the stormwater was found to not comply with the RFWP concentration during one of the two sampling surveys. On this sampling occasion, it was noted that the wash pad was not in use, and the non-compliant discharge was of stormwater rather than treated wastewater.

The consent held for this site is for treated wastewater only, and the suspended solids concentration recorded on this occasion was noted to be in excess of the standards/terms/conditions of the permitted stormwater rule in the RFWP. Should these observations continue, and further or more significant breaches be found in future monitoring, Nankervis will be required to reduce the concentration of suspended solids in the discharge, or obtain a stormwater consent.

It is noted that the most recent result was found to compliant with RFWP limits.

9.4.2 Environmental effects of exercise of consent

There were no adverse effects found during the period under review that were attributable to activities at the Nankervis site.

9.4.3 Evaluation of performance

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

Table 24 Summary of performance for Nankervis' consent 6965-1

Purpose: To discharge truck wash water via an interceptor into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option to avoid, remedy or mitigate effects	Inspection and consultation with site operators	Yes
2. To be exercised in accordance with application information	Inspection and consultation with site operators	Yes
3. Stormwater contingency plan and wash water management plan to be submitted prior to exercising consent	Review of Council records. Updated contingency and stormwater management plans requested during the period under review	Yes
4. Discharge cannot cause specified adverse effects beyond mixing zone	Observation of river during sampling runs	Yes
5. No direct discharge of untreated wash water to Mangaone Stream	Inspection and observations during sampling runs	Yes
6. Limits on chemical composition of discharge	Observation during inspection and discharge sampling	Wash water not sampled this period
7. No degreasers to be used and no wash waters containing concrete products to be discharged	Inspection and consultation with site operators	Yes
8. No adverse effects permitted on surface water or groundwater	Inspection and observations during sampling runs. No groundwater sampling scheduled	Yes

Purpose: To discharge truck wash water via an interceptor into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
9. Consent to lapse after 5 year period if not exercised	Consent has been exercised	N/A
10. Provision for review of consent	No review option this period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

During the period under review, the Nankervis Family Trust demonstrated a good level of environmental and high level of administrative performance and compliance with their resource consent as defined in Section 1.1.5 in relation to its site on Dean Place.

9.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Nankervis Family Trust in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in full.

9.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

9.5 Recommendation

THAT monitoring of discharges from Nankervis Family Trust in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

10. New Plymouth District Council

10.1 Process description

New Plymouth District Council (NPDC) holds consents to discharge stormwater to the lower Waiwhakaiho River and Mangaone Stream, and to discharge landfill leachate to groundwater and the Waiwhakaiho River from an industrial development off Bewley Road. The catchment areas and discharge points associated with the stormwater consents are shown in Figure 14 and Figure 15. The results for the stormwater and leachate discharge monitoring are reported on separately.

NPDC holds two resource consents in relation to discharges to the Lower Waiwhakaiho River below State Highway 3, and one consent in relation to discharges to the Mangaone Stream.



Figure 14 NPDC stormwater drainage and consented discharge points to the Waiwhakaiho River

10.1.1 Stormwater discharges

It has been acknowledged that NPDC has no direct control over the quality of discharges from sites in the catchment. However, road run-off and surface flooding due to poorly maintained drains may contribute to the contamination of stormwater entering the Waiwhakaiho River and Mangaone Stream.

All stormwater screen inlets and outlets in the system are inspected and cleaned regularly by NPDC to ensure that debris is not accumulated in any way that may affect

the network capacity. Outfalls with flap gates are serviced every two months. These inspections are usually undertaken following a heavy rainfall event.

During periods of high rainfall, one of the key features of the performance of the stormwater drainage system is its susceptibility to inlet and outlet blockages. The NPDC maintenance plan aims to reduce reactive maintenance and improve the operation and reliability of the system through preventative maintenance. This includes pipeline condition assessment using video inspection.



Figure 15 NPDC stormwater drainage and consented discharge points to the Mangaone Stream

10.1.2 Bewley Road closed landfill

The old Taranaki County Council (TCC) depot site was quarried at the end of its life, and was then infilled, becoming the Bewley Road Landfill. The former Bewley Road landfill extended for about 740 m along the Waiwhakaiho River bank between Constance Street and Vickers Road, and back to Devon Road. In 2006 the closed landfill area was developed and is now the site of the Valley Mega Centre retail outlet and car park. Leachate from the site discharges to groundwater which seeps into both the stormwater network, and the Waiwhakaiho River, along the river bank between Constance Street and Vickers Road. There is no treatment of the leachate generated from this closed landfill. Leachate is discharged continuously to the river at very low levels and low volumes.

10.2 Water discharge permits

Waiwhakaiho River

NPDC holds consent **5163-2**. This was granted on 10 June 2008 to authorise the discharge of stormwater from the Waiwhakaiho industrial area into the Waiwhakaiho River via multiple outfalls between the State Highway 3 bridge and the confluence with the Mangaone Stream.

Conditions on the consent require the consent holder to adopt the best practicable option to prevent or minimise any adverse effects, address erosion, and prohibit some specific effects. There are provisions to review the conditions of the consent in June 2010, June 2014, and June 2020. The consent is due to expire on 1 June 2026.

NPDC held consent **4984-1** to discharge leachate from the closed Bewley Road landfill to groundwater and the Waiwhakaiho River. It was granted by the Council on 23 August 1998 and expired on 1 June 2014. During the period under review the consent was being exercised under the protection of Section 124 of the RMA. Consent 4984-2 was granted on 16 March 2016 and is due to expire on 1 June 2032.

Consent 4984-2 has conditions that set limits for contaminant concentrations in the discharge, limit effects on receiving water, require the maintenance of monitoring bores, and provide for the review of the consent.

Katere Road industrial area

NPDC holds consent **1275-3**. This consent was granted on 10 June 2008 to provide for the discharge of stormwater from the Katere and Waiwhakaiho industrial areas into the Mangaone Stream via multiple outfalls between Egmont Road and the confluence with the Waiwhakaiho River.

Conditions on the consent require the consent holder to adopt the best practicable option to prevent or minimise any adverse effects, address erosion, and prohibit some specific effects. There are provisions to review the conditions of the consent in June 2010, June 2014, and June 2020. The consent is due to expire on 1 June 2026.

Copies of all the permits are attached to this report in Appendix I.

10.3 Results

10.3.1 Stormwater discharges

10.3.1.1 Inspections

NPDC's discharge sites were inspected on four occasions during the monitoring period, these were 26 August 2015, 18 November 2015, 17 February 2016 and 24 May 2016.

The inspections visually assessed discharge structures for evidence of staining from contaminants and the clarity of any discharges occurring. The receiving waters were also assessed.

During the inspections no issues were noted and discharges were found to be clear and not causing any visual effects on the receiving environment.

10.3.1.2 Chemical monitoring

Chemical monitoring is carried out at six public stormwater drain outlets, three of which also discharge wastewater or stormwater from licensed industrial sites. These are McLeod's Drain at the bottom of Smart Road, the "mid Katere Road" storm drain to the Mangaone Stream and the storm drain to the Mangaone Stream that services the Hurlstone Drive area.

The results of this chemical monitoring are presented in Table 26, Table 29, and Table 30 (respectively), with the results for the three outlets that do not contain additional licensed discharges reported in Table 25.

No contaminant concentration limits have been incorporated into the NPDC consents as it is acknowledged that, for the most part, the district council has no direct control over the quality of the discharges from the industrial and commercial sites. However, the quality of the discharges is still monitored as road run-off and surface flooding due to poorly maintained drains may contribute to the contamination of stormwater entering the receiving waters.

10.3.1.3 Discharge to Waiwhakaiho River from Burton Street

The sampling site that monitors the discharge of stormwater from the Burton Street area as it enters the Waiwhakaiho River was introduced during the 1999-2000 monitoring period. The drain carries stormwater from a number of small commercial sites that are located along Burton Street. The discharge is monitored to determine influences on water quality occurring upstream of other larger discharge sources (such as Firths or McLeod's Drain).

The results of routine chemical monitoring for the period under review are presented in Table 25, Table 27, and Table 28 A summary of all results for each site is also given in the tables.

Table 25 Chemical monitoring results for Burton Street stormwater-site STW001081

Parameter	Conductivity @ 20°C	Oil and grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	1.2	<0.5	6.9	2	10.4	1.9
Maximum	18.7	2.4	7.9	170	21.5	130
Median	5.5	1.3	7.2	12	16.1	12
Number	32	19	32	32	31	23
15 Jul 2015	5.6	b	7.4	14	11.0	11
08 Jan 2016	18.7	b	7.1	6	18.9	5.6
<i>RFWP Guideline</i>	-	15	6-9	100	-	-

Key: b no visible hydrocarbon sheen and no odour

The pH, suspended solids and oil and grease concentrations were determined to be within the standards expected for the permitted activities within this stormwater catchment.

10.3.1.4 Discharge to Waiwhakaiho River from McLeod's drain

The discharge from McLeod's Drain enters the Waiwhakaiho River about 50 metres downstream of the lower end of Smart Road. The drain carries stormwater from the site of Ravensdown Fertiliser's depot on Devon Road (consent 3140), other industrial sites including Smart Road railyard (consent 3258), the residential area of Glen Avon, and a rural area to the south. The discharge is monitored to determine influences on water quality in addition to those of the fertiliser storage depot and railyard. There is likely to be slightly elevated background phosphorus and ammonia concentrations, mainly due to dissolution of fertiliser particles carried by wind or water into storm drains at and around Ravensdown's fertiliser depot, or from spillages during cartage of the fertiliser to and from the site. Ravensdown have policies in place requiring that spills during cartage on site and on public roads are cleaned up by the drivers. The results of routine chemical monitoring for the period under review are presented in Table 26, together with a summary of previous results for comparison.

Table 26 Chemical monitoring results for NPDC McLeod's Drain discharge-site STW001001

Parameter	Conductivity	Dissolved reactive phosphorus	Oil and Grease	pH	Suspended solids	Temp	Un-ionised ammonia
Unit	mS/m@20C	g/m ³ P	g/m ³	pH	g/m ³	Deg.C	g/m ³
Minimum	9.8	0.012	0.5	4	2	10.3	0.00002
Maximum	3450	82.6	9	10.2	420	34	6.38894
Median	30.4	0.712	0.7	7.2	26	17	0.02663
Number	83	52	48	88	71	77	38
15 Jul 2015	25.3	0.520	b	7.2	12	13.9	0.01398
08 Jan 2016	15.4	0.508	b	7.3	140	19.0	0.01656
<i>RFWP Guideline</i>	-	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

The pH, unionised ammonia, and oil and grease concentrations were all determined to be well within the standards expected for a permitted activity and within the prescribed "standardised" limits for the consent holders contributing to this discharge. There was one suspended solid result which exceeded the 100 g/m³ RFWP limit, however no effects were noted as a result of this.

10.3.1.5 Discharge to Waiwhakaiho River from Rifle Range Road and Struthers Place

This was an open drain/tributary that was piped when the Bewley Road area was developed and the Waiwhakaiho stopbank put in. Stormwater from the retail area between Struthers Place and Constance Street, the commercial area of Struthers Place, and part of Rifle Range Road is piped to the Waiwhakaiho via this discharge point.

Table 27 Wet weather chemical monitoring results for Struthers Place-site WKH000872

Parameter	Ammoniacal nitrogen	Oil and Grease	pH	Suspended solids	Temperature	Un-ionised ammonia
Unit	g/m ³ N	g/m ³	pH	g/m ³	Deg.C	g/m ³
Minimum	0.008	0.5	4.6	2	12.2	0.00004
Maximum	29	70	8.8	2400	21.9	0.42552
Median	3.49	0.2	7.1	26	17.3	0.01752
Number	61	21	77	27	66	49
15 Jul 2015 (w)	7.54	b	7.2	<2	13.2	0.03439
<i>RFWP Guideline</i>	-	15		100	-	0.025
<i>Consent Limit</i>	25* and 15	-	6.5-8.5	-	-	-

Key: Results shown in bold within a table indicates that a consent limit or guideline for a particular parameter (derived from Rule 23 of the Regional Freshwater Plan) has been exceeded

b parameter not determined, no visible hydrocarbon sheen and no odour

w wet weather survey d dry weather survey

*Old consent in force until 16 March 2016, then limit of 25 g/m³ applies

The pH, suspended solids and oil and grease concentrations were determined to be similar to or below the median value for this site, and were well within the standards expected for the permitted activities within this stormwater catchment. The ammoniacal unionised ammonia level was elevated and exceeded the permitted activity level of 0.025 g/m³.

It should be noted that this discharge, when at lower rates of flow (as it was on 15 July 2016) may be influenced by the ammonia discharges from the Bewley Road landfill, and this is covered by (and in compliance with) consent 4984.

10.3.1.6 Discharge to Waiwhakaiho River from Vickers Road

This catchment drains the area on both sides of Vickers Road along with a section of Devon Road, to the west of the Katere Road junction. The results for the period under review are given in Table 28 along with a summary of all results from the site.

Table 28 Chemical monitoring results for Vickers Road discharge-site STW001020

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	2.3	0.5	6.6	2	10.4	2.7
Maximum	68.1	549	9.3	510	21.2	160
Median	10.9	1.7	7.3	60	15.6	40
Number	55	47	55	54	57	24
23 Mar 2015	9.3	b	7.5	12	12.5	21
11 Jun 2015	14.3	b	7.2	54	19.0	55
<i>RFWP Guideline</i>	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Sampling showed that the pH, suspended solids and oil and grease concentrations were well within the standards expected for the permitted activities within this stormwater catchment on all monitoring occasions.

10.3.1.7 Discharge to Mangaone Stream from mid Katere Road

Stormwater from the mid section of Katere Road discharges to the Mangaone Stream in between the discharges from Katere Stores feedmill and Taranaki Sawmill's timber treatment plant site, and carries stormwater from a number of permitted activities on the Northern side of Katere Road, and from the Freight and Bulk Transport site.

Monitoring of this discharge commenced in 2007. The results for the period under review are presented in Table 29 along with a summary of all data from the site.

Table 29 Chemical monitoring results for stormwater drain from mid Katere Road to the Mangaone Stream-site STW001116

Parameter	Un-ionised ammonia	BOD	Conductivity @ 20°C	DRP	Oil and Grease	pH	Suspended solids	Temp
Unit	g/m ³	g/m ₃	mS/m@20C	g/m ³ P	g/m ³	pH	g/m ³	Deg .C
Minimum	0.00057	5	4.3	0.048	0.5	7	40	10.5
Maximum	0.04149	43	40.9	2.95	8.8	8.5	280	20.9
Median	0.00925	12	12.2	0.478	2.4	7.6	135	15.4
Number	18	19	20	18	19	20	20	20
15 Jul 2015	0.01768	26	13.9	0.911	8.8	7.5	65	10.5
18 May 2016	0.00174	16	11.7	0.500	4.7	7.6	190	14.5
<i>RFWP Guideline</i>	<i>0.025</i>	<i>5.0</i>	-	-	<i>15</i>	<i>6-9</i>	<i>100</i>	-

Key: DRP Dissolved reactive phosphorus

BOD Biochemical oxygen demand

The consent held by NPDC for discharges into the Mangaone Stream has no conditions relating to the quality of the discharge.

The biochemical oxygen demand of this discharge exceeded the concentration given in the RFWP for Taranaki for permitted activities (Rule 23), on both of the monitoring occasions. However, instream levels of filtered carbonaceous biochemical oxygen demand (BODCF) in the Mangaone Stream were found to be well below the 2.0 g/m³ RFWP guideline values.

The unionised ammonia concentrations were found to be in compliance with the 0.025 g/m³ limit set in the RFWP.

The sample taken on 18 May 2016 also exceeded the 100 g/m³ suspended solids RFWP guideline limit. However no increase in the concentration of suspended solids was noted when comparing samples taken from the Mangaone Stream up and downstream of the discharge point.

10.3.1.8 Discharge to Mangaone Stream from Hurlstone Drive

Stormwater from the industrial area along Hurlstone Drive discharges to the Mangaone Stream immediately upstream of the State Highway 3 bridge, stormwater and wastewater from the batching plant of AMC (consent 4539) and stormwater and wash water from Nankervis (consent 6965) contribute to this discharge.

The results of routine chemical monitoring for the period under review are presented in Table 30, together with a summary of all results for comparison.

The consent does not contain conditions controlling the quality of the stormwater discharged from NPDC's stormwater system, however at the time of sampling the discharge complied with the pH, suspended solids and oil and grease standards expected for a permitted activity, and were within the prescribed limits for consent holders discharging via this outlet.

Table 30 Chemical monitoring results for stormwater drain from Hurlstone Drive to Mangaone Stream at SH3-site STW001035

Parameter	Ammoniacal nitrogen	Conductivity @ 20°C	Oil and grease	pH	Suspended solids	Temp.	Un-ionised ammonia
Unit	g/m ³ N	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	g/m ³
Minimum	0.006	2.8	0.5	6.5	2	10	0.00001
Maximum	0.344	225	8.8	12.1	390	21.4	0.38935
Median	0.063	11.4	0.8	8.9	23	15.1	0.00386
Number	42	56	40	55	55	56	41
15 Jul 2015	0.085	4.5	b	7.4	23	13.0	0.00060
18 May 2016	0.022	20.0	2.4	7.4	21	15.5	0.00019
<i>RFWP Guideline</i>	-	-	15	6-9	100	-	0.025

Key: Results shown in bold within a table indicates that a guideline for a particular parameter (derived from Rule 23 of the Regional Freshwater Plan) has been exceeded

b parameter not determined, no visible hydrocarbon sheen and no odour

10.3.2 Bewley Road industrial development

An area between the right bank of the Waiwhakaiho River and Devon Road was once used as a rubbish dump. The reach of river adjacent to the old dump runs for about 740 metres, from a point between the Devon Road bridge and Constance Street downstream to a point near Vickers Road. The area has been substantially developed and now contains a retail park and a number of commercial operators.

10.3.3 Groundwater monitoring

There are three groundwater monitoring bores located around the periphery of the area, which NPDC is required by their consent to maintain for groundwater monitoring. There is a discharge monitoring point, at the outlet of the main drain which carries the groundwater to the river. The locations of the four sites are shown on Figure 4 as GND0548, GND0555, GND0556, and WKH000872. Stormwater from the retail area between Struthers Place and Constance Street, the commercial area of Struthers Place and part of Rifle Range Road and a small unnamed tributary that once discharged at this location are also piped to the Waiwhakaiho via this discharge point.

Groundwater monitoring bore #3 (the control bore, GND0556) is drilled into natural alluvial deposits beside Devon Road. This bore was affected by the raising of the ground surface around it by approximately 0.5 metres which may not affect the chemical results. The results for GND0556 are shown in Table 31.

Table 31 Chemical monitoring results for Bewley Road landfill control bore #3-site GND0556

Parameter	Unit	Min	Max	Med	N	24 Feb 2016	09 May 2016
Alkalinity Total	g/m ³ CaCO ₃	18	224	163	46	126	125
Ammoniacal nitrogen	g/m ³ N	0.084	3.92	0.798	47	1.51	2.02
Bicarbonate	g/m ³ HCO ₃	111.02	273.28	196.42	40	153.7	152.5
Conductivity @ 20°C	mS/m@20C	9.1	159	99.2	49	153	159
Dissolved reactive phosphorus	g/m ³ P	0.003	0.072	0.027	41	0.017	0.025
Filtered COD	g/m ³	5	64	8	46	8	7
Nitrite/nitrate nitrogen	g/m ³ N	0.008	1.02	0.01	39	<0.01	0.01
pH	pH	5.5	6.9	6.6	49	6.4	6.5
Potassium	g/m ³	12	39.1	27	46	38.2	39.1
Sulphate	g/m ³	20.6	581	300	45	518	581
Temperature	Deg.C	15.5	19.5	17.5	39	19.5	19.5
Un-ionised ammonia	g/m ³	0.00009	0.0064	0.00174	39	0.00175	0.00294
Zinc Dissolved	g/m ³	18	224	163	46	126	125

At bore #3, the levels recorded for each of the parameters analysed were similar to those values previously observed, although it is noted that the ammoniacal nitrogen, potassium and sulphate concentrations have been increasing since the 2004-2005 monitoring year. The exact cause of these increases it is noted that the bores around the Ravensdown site (up gradient and to the west) are known to contain elevated levels of sulphate and ammoniacal nitrogen.

Groundwater bore #1 (the south bore, GND0548) is located near the corner of Struthers Place and Rifle Range Road. This is a replacement bore as the first bore sunk in this area was destroyed during stop-bank construction in 1997. The replacement bore was itself destroyed during landscaping in front of what was then the Hookers site, and a new bore was installed prior to the sampling survey undertaken in October 2002. These facts need to be considered when interpreting the results, and in particular the median values for parameters. The results for GND0548 are shown in Table 32 along with a summary of all monitoring data from the site.

Table 32 Chemical monitoring results for Bewley Road landfill down gradient monitoring bore #1- site GND0548

Parameter	Unit	Min	Max	Med	N	24 Feb 2016	09 May 2016	Consent limit
Alkalinity Total	g/m ³ CaCO ₃	78	409	327	45	364	330	-
Ammoniacal nitrogen	g/m ³ N	1.02	13.7	7.99	50	13.6	13.7	15 (25*)
Bicarbonate	g/m ³ HCO ₃	95.16	498.98	405.04	39	444.1	402.6	-
Conductivity @ 20°C	mS/m@20C	60.4	133	80	52	83.2	85.3	-
Dissolved reactive phosphorus	g/m ³ P	0.003	0.238	0.006	44	0.004	0.010	0.065
Filtered COD	g/m ³	11	50	29	45	41	42	-
Nitrite/nitrate nitrogen	g/m ³ N	0.009	0.7	0.005	41	<0.01	0.01	-
pH	pH	6.5	7.1	6.76	52	6.7	6.7	<7.5 (6.5-8.5**)
Potassium	g/m ³	10.5	26.1	20.6	44	26.1	24.7	-
Sulphate	g/m ³	1	430	7.6	42	<1.0	<1	-
Temperature	Deg.C	15.9	20.1	17.7	43	20.0	20.1	-
Un-ionised ammonia	g/m ³	0.00509	0.0339	0.01907	43	0.03258	0.03307	-
Zinc Dissolved	g/m ³	0.005	0.165	0.006	44	<0.005	<0.005	-

*Old consent in force until 16 March 2016, then limit of 25 g/m³ ammoniacal nitrogen applies

**Old consent in force until 16 March 2016, then limit of pH of 6.5-8.5

The groundwater complied with the consent limits for ammoniacal nitrogen, dissolved reactive phosphorus, and pH. It is noted however that the ammoniacal nitrogen concentration continues to rise setting successive new maximums for this site. A review of the data suggests a long term trend of increasing ammoniacal nitrogen at this bore, however an increase is also noted at the control bore GND00556.

Potassium was also found to be elevated and set a new maximum for the site on one of the monitoring occasions and this also reflects a slow increase in potassium concentrations at the site. However the upper limit on the range of potassium concentrations found is well within acceptable levels for WHO drinking water guidelines¹.

Groundwater monitoring bore #2 (north bore, GND0555) is on Rifle Range Road between Struthers Place and Vickers Road. This bore was also affected by stop-bank construction in a previous review period and had to be re-drilled. During the 2001-2002 monitoring period it was found that this bore had collapsed internally and NPDC was requested to clear the bore or re-drill as necessary. The bore has subsequently been re-drilled (prior to the sampling run undertaken in June 2002) and a bore log was provided to the Council. During the 2007-2008 monitoring period the bore had again been destroyed by development activities in the area. NPDC replaced the bore at the request of the Council. The fact that this bore has been re-drilled a number of times needs to be considered in interpreting the results and in particular median values for parameters. The results for GND0555 are shown in Table 33 with a summary of all monitoring data from the site.

¹ Potassium in Drinking-water Background document for development of WHO *Guidelines for Drinking-Water Quality*. World Health Organization 2009.

Table 33 Chemical monitoring results for Bewley Road landfill down gradient monitoring bore #2- site GND0555

Parameter	Unit	Min	Max	Med	N	24 Feb 2016	09 May 2016	Consent limit
Alkalinity Total	g/m ³ CaCO ₃	36	630	263	39	254	260	-
Ammoniacal nitrogen	g/m ³ N	0.132	14.8	5.63	39	6.28	6.78	15 (25*)
Bicarbonate	g/m ³ HCO ₃	43.92	614.88	317.2	33	309.9	317.2	-
Conductivity @ 20°C	mS/m@20C	31.1	106	56.8	41	52.5	58.4	-
Dissolved reactive P	g/m ³ P	0.003	0.028	0.005	35	0.004	0.010	0.065
Filtered COD	g/m ³	8	75	28	39	16	20	-
Nitrite/nitrate nitrogen	g/m ³ N	0.01	2.02	0.02	31	<0.01	<0.01	-
pH	pH	5.6	7	6.6	41	6.6	6.6	<7.5 (6.5-8.5**)
Potassium	g/m ³	2.8	18.7	10.6	39	11.4	11.8	-
Sulphate	g/m ³	1	270	5.6	39	<1.0	<1	-
Temperature	Deg.C	16.1	21	18.65	30	20.4	20.2	-
Un-ionised ammonia	g/m ³	0.00002	0.02222	0.01274	30	0.01232	0.01310	-
Zinc Dissolved	g/m ³	36	630	263	39	254	260	-

*Old consent in force until 16 March 2016, then limit of 25 g/m³ ammoniacal nitrogen applies

**Old consent in force until 16 March 2016, then limit of pH of 6.5-8.5

The consent limits for ammoniacal nitrogen, dissolved reactive phosphorus, and pH were complied with and all parameters were either similar to median of all results and/or were below the maximum with the exception of ammoniacal nitrogen and potassium. It noted that the rises in potassium and ammoniacal nitrogen are being noted at all bores, however the actual values being recorded either comply with consent conditions (for ammoniacal nitrogen) or are within the WHO guidelines (potassium).

Overall the leachate component concentrations in both downstream bores are relatively low in comparison to most municipal landfill leachates.

10.3.4 Surface water monitoring

The results for the associated surface water and receiving water sampling are shown in Table 34 and Table 35 respectively along with summaries of all data from the sites.

Table 34 Chemical monitoring results for Bewley Road landfill surface water discharge monitoring-site WKH000872

Parameter	Unit	Min	Max	Med	N	24 Feb 2016	09 May 2016	Consent limits
Alkalinity Total	g/m ³ CaCO ₃	27	251	162	50	245	251	-
Ammoniacal nitrogen	g/m ³ N	0.008	29	3.49	61	17.9*	22.5	15* (25)
Conductivity @ 20°C	mS/m@20C	2.5	230	80.8	77	79.1	81.3	-
Dissolved reactive P	g/m ³ P	0.003	3.14	0.005	42	<0.003	0.010	0.065
Filtered COD	g/m ³	5	700	14	48	12	14	-
Nitrite/nitrate nitrogen	g/m ³ N	0.01	8.48	3.6	36	4.57	5.10	-
pH	pH	4.6	8.8	7.1	77	7.4	7.6	<7.5 (6.5-8.5**)
Potassium	g/m ³	2.4	43	27.1	45	24.5	23.4	-
Sulphate	g/m ³	78	880	184	46	123	110	-
Suspended solids	g/m ³	2	2400	26	27	<2	<2	-
Temperature	Deg.C	12.2	21.9	17.3	66	21.7	20.1	-
Turbidity	NTU	11	300	22	23	29	19	-
Un-ionised ammonia	g/m ³	0.00004	0.42552	0.01752	49	0.24167	0.42552	-
Dissolved zinc	g/m ³	0.005	0.345	0.016	48	<0.005	<0.005	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter is exceeded

*Old consent in force until 16 March 2016, then limit of 25 g/m³ applies

The level of ammoniacal nitrogen found in the discharge was found to exceed the consent limit of 15 g/m³. However this is the third such occurrence and investigations undertaken by the consent holder showed other sources of this contaminant entering the network via a connection of unknown origin. No effects were noted in the stream and the subsequent results from sampling undertaken in the next monitoring period showed a marked reduction in ammoniacal nitrogen levels. NPDC was granted with a renewed consent which provides for a higher limit of ammoniacal nitrogen (25 g/m³).

The values obtained during the period under review were within the range of the historical results, with the exception of unionised ammonia, ammoniacal nitrogen, alkalinity and nitrate/nitrite nitrogen.

It is noted that the potassium, sulphate and dissolved zinc concentrations were all similar to or below their respective historical medians at this discharge point.

To assist in the interpretation of 'effects' of the discharge, the biannual groundwater sampling runs were carried out at times of low river flow and the three river sites above (WKH000920), alongside (WKH000925), and below (WKH000942) the dump site were also sampled. The results of this monitoring are given in Table 35.

Table 35 Results for Bewley Road landfill, dry weather receiving water chemical monitoring

Parameter		Waiwhakaiho		
		Constance Street (WKH000920)	Opposite Firth's (Ford) (WKH000925)	Above Mangaone Confluence (WKH000942)
24 Feb 2016				
Time	NZST	12:49	13:22	13:30
Conductivity	mS/m	12.3	12.4	12.3
DRP	g/m ³ P	0.011	0.010	0.010
Unionised ammonia	g/m ³	0.00093	0.00203	0.00069
Ammoniacal N	g/m ³ N	0.010	0.012	0.011
pH	pH	8.3	8.6	8.1
Temperature	Deg.C	20.7	20.4	21.2
Turbidity	NTU	0.53	1.2	0.77
9 May 2016				
Time	NZST	11:07	11:15	11:45
Conductivity	mS/m	11.5	11.5	11.6
DRP	g/m ³ P	0.022	0.023	0.022
Unionised ammonia	g/m ³	0.00016	0.00022	0.00023
Ammoniacal N	g/m ³ N	0.005	0.007	0.007
pH	pH	8.0	8.0	8.0
Temperature	Deg.C	14.6	14.4	15.1
Turbidity	NTU	1.7	0.98	1.2

The analyses showed during the low flow survey undertaken in the period under review, ammoniacal nitrogen increased between WKH000920 and WKH000925, then decreased slightly at WKH000942. Due to the extremely low levels found, there would have been little, if any environmental effect associated with these changes.

10.3.5 Investigations, interventions, and incidents

In the period under review it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents, in association with NPDC's conditions in resource consents or provisions in Regional Plans that are monitored under this programme.

10.4 Discussion

10.4.1 Environmental effects of exercise of consents

During the period under review no significant adverse effects were observed in the receiving environment as a result of the exercise of NPDC's stormwater or leachate consents.

No issues were noted associated with the maintenance of the reticulated stormwater systems or outlet structures on either the Waiwhakaiho River or the Mangaone Stream.

The wet weather surveys found no significant effects downstream of the discharges in the Waiwhakaiho River.

Elevated BOD, unionised ammonia and suspended solids were observed in discharge samples collected from the mid Katere Road drain. No significant adverse effects were noted in the Mangaone Stream at the time of sampling. The on-going discharge quality matters associated with these findings are being addressed with FBT who discharge via this outlet.

Groundwater samples obtained from the Bewley Road landfill during the period under review were in compliance with consent 4984.

Overall, with the exception of bicarbonate, the leachate component concentrations reported were relatively low in comparison to most municipal landfill leachates. There continues to be fluctuations in parameters analysed but this is generally consistent with the flushing effects of rainfall. It is noted that the ammoniacal nitrogen and potassium concentrations in the samples collected from bore 3, the control bore up gradient of the dump area, and bore 1, the south bore on the corner of Struthers Place and Rifle Range Road continue their upward trend. However, the concentrations are not so high as to be of immediate concern, and little, if any effect was observed in the receiving water. Council will continue to monitor any changes.

10.4.2 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 36, Table 37, Table 38 and Table 39.

Table 36 Summary of performance for NPDC's consent 1275-3

Purpose: To discharge stormwater discharge from the Katere Industrial area into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option to minimise adverse effects	Inspection and receiving water monitoring	Yes
2. Prevention of erosion	Visual assessment at inspection and receiving water sampling	Yes
3. Discharge can not cause specified adverse effects in Mangaone Stream	Inspection and receiving water monitoring	Yes
4. Optional review provision re environmental effects	Next opportunity to review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 37 Summary of performance for NPDC's consent 5163-2

Purpose: To discharge stormwater discharge from an industrial subdivision into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option to minimise adverse effects	Inspection and receiving water monitoring	Yes
2. Prevention of erosion	Visual assessment at inspection and receiving water	Yes

Purpose: To discharge stormwater discharge from an industrial subdivision into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
	sampling	
3. Discharge can not cause specified adverse effects in Mangaone Stream	Inspection and receiving water monitoring	Yes
4. Optional review provision re environmental effects	Next opportunity to review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 38 Summary of performance for NPDC's consent 4984-1, (to 16 March 2016)

Purpose: To discharge leachate discharge from a former landfill into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limits on chemical composition of discharge	Inspection and sampling of discharge	Ammoniacal nitrogen exceedance due to private connection to reticulated system
2. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling	Yes
3. Maintenance of monitoring bores	Inspection and accessibility at sampling	Yes
4. Option for review re chemical sampling finding significant adverse effects	Chemical sampling did not find significant adverse effects	N/A
5. Optional review provision re environmental effects	Consent expires 2014. No further opportunities for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 39 Summary of performance for NPDC's consent 4984-2 (from 16 March 2016)

Purpose: To discharge leachate from a former landfill site into groundwater, adjacent to the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limits on chemical composition of discharge	Inspection and sampling of discharge	Yes
2. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling	Yes
3. Maintenance of monitoring bores	Inspection and accessibility at sampling	Yes

Purpose: <i>To discharge leachate from a former landfill site into groundwater, adjacent to the Waiwhakaiho River</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
4. Optional review provision re environmental effects	Next opportunity for review June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the period under review, New Plymouth District Council demonstrated a high level of environmental performance and high level of administrative performance and compliance with its resource consents as defined in Section 1.1.5.

10.4.3 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from New Plymouth District Council in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was carried out in full.

10.4.4 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and their effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remain similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

10.5 Recommendation

THAT monitoring of discharges from New Plymouth District Council in the 2016-2017 period continues at similar a level to that undertaken in the 2015-2016 period.

11. New Zealand Decorative Concrete Ltd

11.1 Process description

New Zealand Decorative Concrete Ltd manufactures products for sealing and colouring concrete using cement, silica sands, plain sands, iron oxides and titanium dioxide. Organic solvents, acrylic resins, thinners and hydrochloric acid are also used at the site. The bulk of the hazardous substances were originally stored in a shipping container in the stormwater catchment, however a new hazardous goods store and a manufacturing building have been constructed. Stormwater from the site runs via a shallow concrete channel round the front of the office and into a stormwater grate connected to NPDC's stormwater drainage system. The stormwater combines with that from a number of other small industrial sites, including that of Katere Stores Ltd, before discharging into the Mangaone Stream about 350 m downstream of Egmont Road.

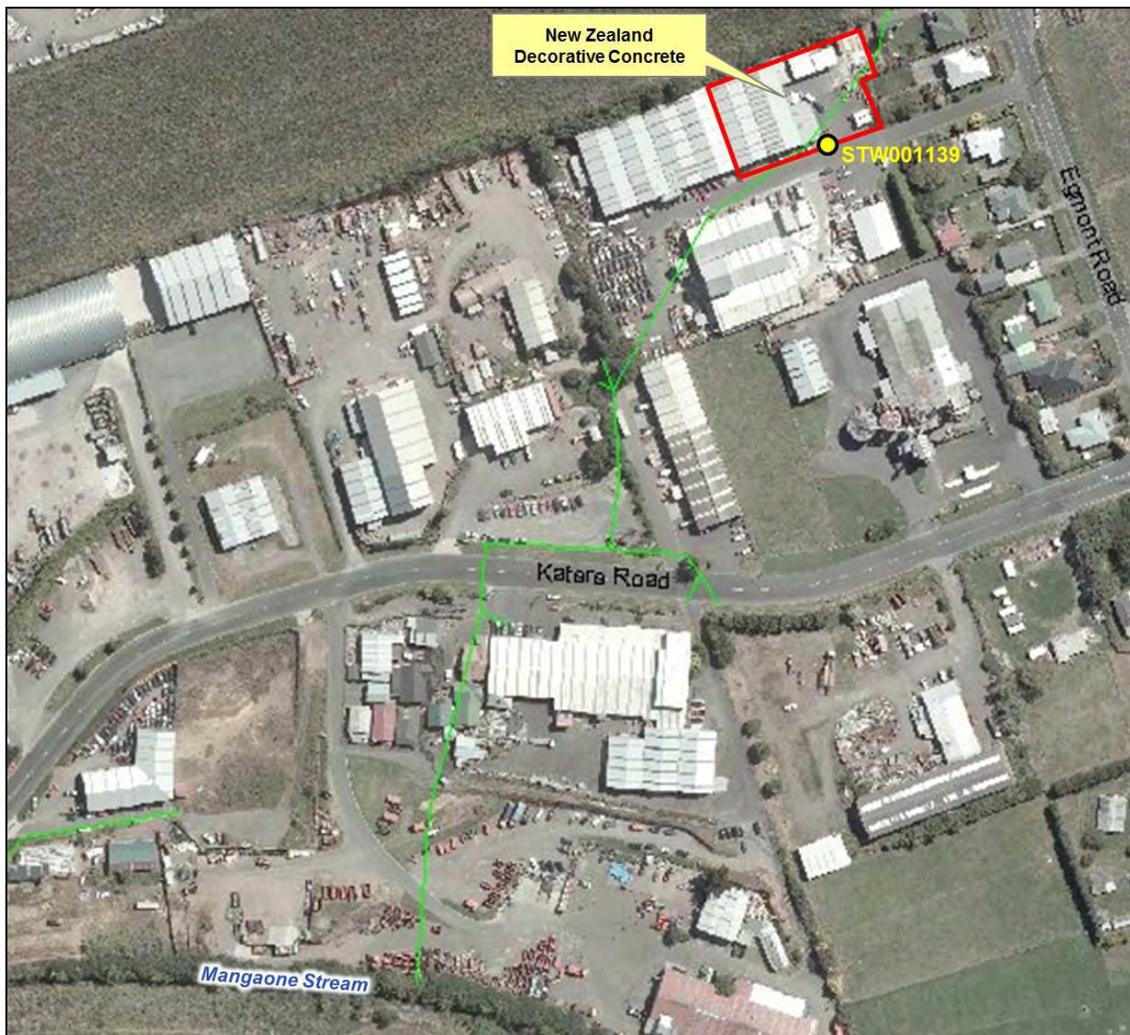


Figure 16 New Zealand Decorative Concrete Ltd site and discharge point

All manufacturing activities occur within the rear bay of the building, with the dry products stored in the front bay. Any liquid wastes generated are directed to a sump within the manufacturing area and are removed on an as required basis by a waste contractor.

The dry products are dusty therefore to minimise the potential for effects on air quality, and the potential for the dust to impact on stormwater quality, the floor of the storage bay is vacuumed daily.

A small amount of water blasting of concrete sample moulds is undertaken at the site to remove any dry concrete residues. This is currently undertaken in the stormwater catchment, but no detergents are used.

The delivery of hazardous substances occurs in the stormwater catchment, and the transport of the substances from storage to the manufacturing area is also through the stormwater catchment.

11.2 Water discharge permits

New Zealand Decorative Concrete Ltd holds consent **7450-1** to cover the discharge of stormwater from a decorative concrete products manufacturing site into the Mangaone Stream in the Waiwhakaiho catchment.

This permit was issued by the Council on 22 December 2009 under Section 87(e) of the RMA. It is due to expire on 1 June 2026.

The consent contains ten standardised special conditions as set out in Section 1.2.

The permit is attached to this report in Appendix I.

11.3 Results

11.3.1 Inspections

The site was inspected on four occasions during the period under review. These were on 24 August 2015, 2 December 2015, 22 February 2016, and 10 June 2016.

The inspections focussed on the conditions of the stormwater drains, evidence of spill and the hazardous chemical storage. It was found that the site was clean and tidy and that the drains were free of sources of contamination.

11.3.2 Results of discharge monitoring

Stormwater from New Zealand Decorative Concrete Ltd.'s site is monitored where the overland flow enters the roadside drain at the entrance to the yard (STW001139). The results for the period under review are given in Table 40 along with a summary of all results from the site.

Table 40 Chemical monitoring results of New Zealand Decorative Concrete Ltd's stormwater-site STW001139

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	3.9	0.5	7.4	6	11.9	4.6
Maximum	17.5	1.6	8.7	63	22.6	79
Median	11.6	0.2	7.9	32	15.5	22
Number	9	8	9	9	9	8
15 Jul 2015	a	a	a	a	a	a
19 May 2016	17.5	<0.5	7.5	42	15.5	31
23 Jun 2016	8.4	b	7.8	9	14.9	-
Consent limit	-	15	6-9	100	-	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded

a Insufficient flow

b no hydrocarbon visible or odour

The discharge complied with the discharge limits for pH, suspended solids and oil and grease at the time of sampling.

11.3.3 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with New Zealand Decorative Concrete Ltd.'s conditions in resource consents or provisions in Regional Plans.

11.4 Discussion

11.4.1 Discussion of site performance

The site was well managed during the period under review. There were no operational practices found at the site that needed addressing, and when sampled, the site discharge complied with the component concentration limits given by the consent.

11.4.2 Environmental effects of exercise of consent

There were no adverse effects found during the period under review that were attributable to activities at the New Zealand Decorative Concrete site.

11.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 41.

Table 41 Summary of performance for New Zealand Decorative Concrete's consent 7450-1,

Purpose: To discharge of stormwater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option to avoid, remedy or mitigate effects	Inspection and consultation with site operators	Yes
2. Stormwater catchment area Ltd to 0.26 ha	Inspection	Yes
3. Stormwater to be treated by March 2010, system to be maintained to Council's satisfaction	Inspection	Yes
4. Hazardous substance storage to be bunded or otherwise contained	Inspection	Yes
5. Limits on chemical composition of discharge	Observation during inspection and discharge sampling	Yes
6. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
7. Preparation of contingency plan by 22 March 2010. Plan to be maintained thereafter	Review of Council records, and consultation with site operator at inspection. Plan accepted as an interim plan, but the consent holder advised that additional details required	Yes
8. Notification of changes to activities at the site	Inspection and consultation with site operators	N/A
9. Consent to lapse on 31 December 2014 if not exercised	Consent has been exercised	N/A
10. Provision for review of consent	No review option this period	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

During the period under review, New Zealand Decorative Concrete Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consent as defined in Section 1.1.5 in relation to its Egmont Road Site.

11.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from New Zealand Decorative Concrete Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was carried out in full.

11.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

11.5 Recommendation

THAT monitoring of discharges from New Zealand Decorative Concrete Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

12. New Zealand Railways Corporation

12.1 Process description

New Zealand Railways Corporation (NZRC) owns a rail terminal on a site off Smart Road. In addition to transportation of freight, the terminal is utilised as a maintenance depot. The freight receipt and dispatch area and the refuelling and maintenance depots are situated at the Smart Road end of the site.



Figure 17 New Zealand Railways Corporation's rail yard and sampling point locations

Drainage from the area to the west and north of the offices (i.e. the refuelling area and maintenance area) flows to the Waiwhakaiho River via McLeod's Drain, an underground pipe that also receives stormwater from Ravensdown's fertiliser depot, other industrial sites, a residential area, and a rural area. Wastewater from washing of wagons, containers and locomotives is treated in a three-stage oil separator before discharge to the river. Liquids from the repair depot and locomotive fuelling point are discharged to an underground holding tank that is emptied by a waste disposal company at two-monthly intervals. The holding tank is also connected to the oil separator via an automatic pump in case of overfilling.

Drainage from the (sealed) freight area and the unsealed areas of the eastern end of the site is to the Mangaone Stream and its tributaries. The consent for this area of the site remained under the name of Tranz Rail Ltd until March 2008.

Railway wagons carrying containers of hazardous substances and the bulk products including urea, resins, fertilisers, di-ammonium phosphate (DAP), lime, oils, bitumen and carbon dioxide are held temporarily on the tracks in this area. No loading or

unloading of freight takes place in the stormwater catchment that drains to the Mangaone Stream.

12.2 Water discharge permits

NZRC holds two consents for the Smart Road railway yard. One consent relates to the discharge of treated wastewater and stormwater to the Waiwhakaiho River, and the other to the discharge of stormwater to the Mangaone Stream. Both consents were previously held by Tranz Rail Ltd.

NZRC held consent **3528** to discharge up to 13 cubic metres/day of stormwater, including treated wastewater from washing and maintenance of wagons, containers and locomotives, into the Waiwhakaiho River. It was granted on 24 July 1996.

The 'standardised' conditions are imposed, with additional conditions that place limits on maximum concentrations on ammonia and dissolved phosphorus (both 20 g/m³), and restrict the type of cleaning operations. The consent is the second issued for the discharge since 1990. This consent expired on 1 June 2014.

An application to renew this consent (under the name of KiwiRail Holdings Ltd) was received by Council on 28 February 2014, and therefore under Section 124 of the RMA, the Council has exercised its discretion and has allowed the activity to continue under the conditions of the expired consent until a decision is made on the renewal application.

NZRC holds consent **1735-3** to discharge stormwater from the Smart Road Rail Terminal into an unnamed tributary of the Mangaone Stream, and into the Mangaone Stream in the Waiwhakaiho catchment. It was granted on 31 July 2009 and will expire on 1 June 2026.

This consent contains the standardised special conditions as set out in Section 1.2

Copies of all permits are attached to this report in Appendix I.

12.3 Results

12.3.1 Inspections

The site was inspected on four occasions during the period under review. These were on 19 August 2015, 16 December 2015, 8 April 2016 and 30 June 2016.

The inspections focussed on treatment systems, evidence of any spills or leaks, the condition of the drains, and the condition of the diesel containment bund.

The inspections found that overall the site was found to be in good order and free of spills and other sources of contamination. On two occasions it was noted that the interceptor was due for cleaning/maintenance. This is now being cleaned out quarterly.

12.3.2 Chemical analysis

12.3.2.1 Results of discharge monitoring

The discharge of stormwater from the freight and fuel handling and storage areas is monitored where the stormwater enters the Smart Road stormwater drain, south of the railway overbridge (site code IND002014). The results for period under review are given in Table 42 with a summary of all results from the site for comparison. A new site (site code STW001117) had been established during the 2006-2007 year for sampling of the site discharge from the eastern end of the site into the Mangaone Stream, via the Mangamiro Stream. As the discharge sampled was only one of approximately eight NZRC discharges that enter the Mangamiro Stream (which is culverted for the entire stretch flowing under their site) it was subsequently decided that this was not truly representative of the overall quality of the NZRC discharges to this receiving water, which exits the culvert immediately upstream of its confluence with the Mangaone Stream. From the start of the 2010-2012 period, a different approach was taken at the NZRC site, with any change in the stream being attributable to the consent holder. The result of this monitoring are reported in 12.3.2.2.

Table 42 Monitoring results for Smart Road rail yard stormwater discharge-site IN002014

Parameter	Ammoniacal nitrogen	BOD	Conductivity @ 20°C	Oil and grease	Dissolved reactive phosphorus	pH	Suspended solids	Temp.	Un-ionised ammonia
Unit	g/m ³ N	g/m ³	mS/m@20C	g/m ³	g/m ³ P	pH	g/m ³	Deg.C	g/m ³
Minimum	0.004	0.5	2.3	43	0.021	5.7	2	10.3	0.00004
Maximum	12	37	62	<0.5	3.24	8.4	160	20.8	0.12254
Median	0.176	3.6	15.4	22.7	0.171	7.2	14	15.5	0.0011
Number	48	43	54	0.9	44	54	52	54	45
14 Jul 2015	0.017	-	23.4	b	-		7.1		0.00006
15 Jul 2015	0.279	4.0	9.7	b	0.614	7.1	35	11.7	-
02 Jun 2016	0.020	-	21.5	b	-	7.4	-	15.2	-
<i>Consent limit</i>	20	-	-	15	20	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Compliance with consent limits was achieved for all parameters during the period under review.

12.3.2.2 Results of receiving environment monitoring

The Mangamiro Stream is culverted under the Smart Road rail terminal and emerges immediately upstream of the confluence of the Mangamiro Stream and Mangaone Stream. The stormwater from the eastern area of the terminal is discharged into the Mangamiro Stream at about eight different points. This part of the yard is predominantly unsealed, although there is a small proportion of this sub-catchment that is sealed and contains the railyard's freight handling activities.

The Mangamiro Stream is monitored at the point of entry into the culvert (site code MMR000061) and at the culvert's outlet to the Mangaone Stream (site code MMR000100). The result of the monitoring undertaken during the period under review is given in Table 43.

Table 43 Receiving environment chemical monitoring results for Smart Road rail yard stormwater discharge to the Mangamiro Stream

Parameter	Unit	15 July 2015		18 May 2016	
		MMR000061 U/s Railyard	MMR000100 D/s Railyard	MMR000061 U/s Railyard	MMR000100 D/s Railyard
Conductivity @20°C	mS/m	20.0	20.1	20.8	19.1
Dissolved reactive phosphorus	g/m ³ P	0.015	0.059	0.008	0.039
Oil and grease	g/m ³	b	b	b	<0.5
Unionised ammonia	g/m ³ N	0.00064	0.00148	0.00112	0.00185
Ammoniacal nitrogen	g/m ³ N	0.284	0.408	0.440	0.358
pH	-	6.9	7.1	6.9	7.2
Suspended solids	g/m ³	25	11	7	35
Temperature	oC	13.0	13.2	14.6	14.9
Turbidity	NTU	19	22	12	55

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

The sampling undertaken 10 December 2014 showed no indication that the discharges from the site were non-compliant in regards to suspended solids, pH, and oil and grease.

12.4 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with NZRC's conditions in resource consents or provisions in Regional Plans.

12.5 Discussion

12.5.1 Discussion of site performance

The bulk diesel bund, interceptors were generally well managed. No other spills were noted in the refuelling area or freight handling area during the period under review.

12.5.2 Environmental effects of exercise of consent

The concentrations of contaminants in the discharge to the Waiwhakaiho River for the period under review were well within the limits imposed by the conditions of the resource consent. The discharge from this site had no effect on the stormwater discharge from McLeod's Drain (Table 26) or on the receiving water.

Physicochemical monitoring found some measurable, changes in some of the parameters monitored in the Mangamiro Stream, however the downstream values were well within acceptable ranges, and no adverse effects were observed.

12.5.3 Evaluation of performance

A tabular summary of the NZRC's compliance record for the period under review is set out in Table 44 and Table 45.

Table 44 Summary of performance for NZRC's consent 1735-3,

Purpose: To discharge stormwater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option to prevent or minimise adverse effects	Inspection and receiving water monitoring	Yes
2. Limits stormwater catchment to 11.28 ha	Inspection	Yes
3. Bunding of hazardous substances if on site for more than three days	Inspection	N/A
4. Concentration limits upon potential contaminants in discharge	By inference from chemical sampling of receiving water	Yes
5. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
6. Prepare and maintain contingency plan	Review of documentation received. Latest version May 2011	Yes
7. Prepare and maintain management plan and review every two years	Review of documentation received	New plan received with application for renewal
8. Provision for lapsing of consent	Consent exercised	N/A
9. Provision for review of conditions	Consent expired-under Section 124 protection	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 45 Summary of performance for NZRC's consent 3528-2

Purpose: To discharge of stormwater and treated wastewater into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Concentration limits upon potential contaminants in discharge	Chemical sampling	Yes
2. Prepare and maintain contingency plan	Review of documentation received. Latest version May 2016	Yes
3. Restriction on products that can be washed from containers	Observations during inspection	Yes
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
5. Provision for review of consent	No further opportunities for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

During the period under review, New Zealand Railways Corporation Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consents as defined in Section 1.1.5 in relation to its Smart Road site.

12.5.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from New Zealand Railways Corporation in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in full.

12.5.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and their effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, that monitoring of this site remain similar to that of the 2015-2016 period. A recommendation to this effect is attached to this report.

12.6 Recommendation

THAT monitoring of discharges from New Zealand Railways Corporation Ltd in the 2016-2017 period remain similar to that undertaken in the 2015-2016 period.

13. Ravensdown Fertiliser Co-operative Ltd

13.1 Process description

The New Plymouth depot of Ravensdown Fertiliser Co-operative Ltd (Ravensdown) occupies an area of about 7 ha bounded by Devon, Smart and Katere Roads, and the Smart Road rail yard (Figure 18). The Mangaone Stream touches the eastern boundary. The depot receives, bags, blends and distributes fertilisers in various forms, namely superphosphate, lime, dolomite and imported high analysis products such as ammonium sulphate, urea, triple super, potassium chloride (potash) and monoammonium and diammonium phosphates (MAP & DAP). Small volumes of trace element fertilisers such as zinc sulphate are also handled through the store. Approximately 250,000 tonnes of fertiliser are distributed per annum.

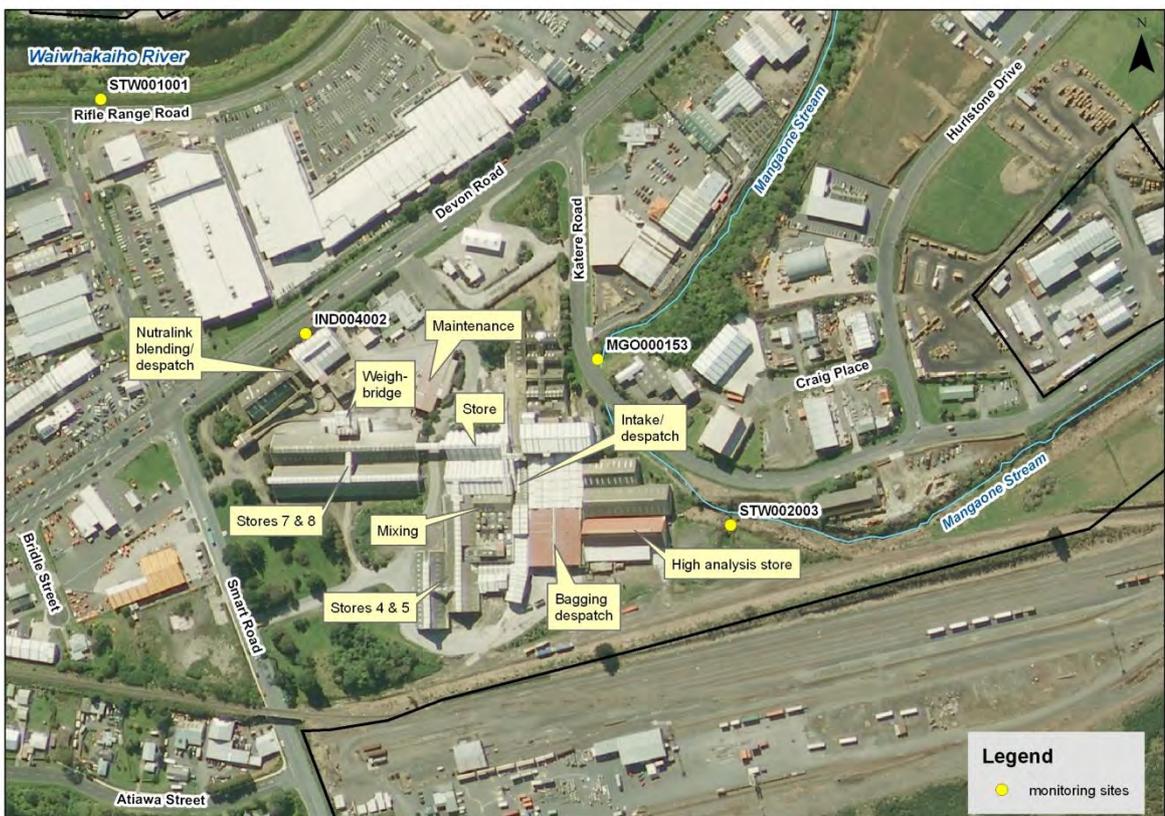


Figure 18 Ravensdown Fertiliser Co-operative Ltd site and sampling point locations

Until 1 July 1997, Farmers Fertiliser Ltd manufactured super phosphate on the site by acidulation of phosphate rock. Sulphuric acid was manufactured from elemental sulphur. A chrome sulphate plant was run in conjunction with the sulphuric acid plant. Hydrofluorosilicic acid was produced as a by-product of the rock acidulation process. The manufacturing plants were all decommissioned and subsequently removed from site, with the acid plant being the last plant to be removed, which was completed during the 2002-2003 year. After decommissioning, the acid tank was retained for storage of liquid wastes containing high levels of fertiliser.

Stormwater from the site discharges to both the Waiwhakaiho River and its tributary the Mangaone Stream.

Drainage from western and northern parts of the site flows to the Waiwhakaiho River (Consent 3140), via an underground drain that runs beside Devon Road to Smart Road intersection, where it meets a piped tributary of the river. The piped tributary, known as McLeod's Drain, originates in the Queens Road area and runs beneath lower Smart Road for about 600 metres from the railway, to join the river about 50 metres downstream of Smart Road. The mean flow of the tributary is about 10 L/s. All of the manufacturing plants were in this catchment.

Drainage from southern and eastern parts of the site flows to the Mangaone Stream at several points (Consent 3865). The catchment area of about 2.8 ha includes the (road and rail) transfer area for fertilisers. Part of the fertiliser transfer area is on land owned by NZRC (formerly TranzRail). The main discharge is via a short ditch that meets the Mangaone Stream about 150 metres above the Katere Road bridge. The Mangamiro Stream, which is a small piped tributary of the Mangaone Stream, exits just upstream of the Ravensdown stormwater drain. The other discharge points are mainly roof drain outlets.

Ravensdown, when seeking new consents for the stormwater discharges in 1997, stated that its activities would be limited to receipt of fertilisers by road from Port Taranaki and by rail from Napier, and the despatch of fertilisers by both road and rail. Ravensdown intended to use only that (south-eastern) part of the site occupied by the old acidulation plant and fertiliser load out areas, and planned to dispose of the remainder by either sale or lease. At that time Council was informed that, to minimise contamination of stormwater, all loading and unloading of fertilisers would be under cover, and vehicles would travel only on sealed surfaces. Ravensdown are continuing to progress towards the sealing of metal areas subject to heavy traffic flow, although occasional loading and unloading of trucks occurs outside the high analysis store in the south east area of the site.

Challenge Petroleum Ltd purchased a parcel (0.65 ha) of the property at the intersection of Devon and Katere Roads for use as a road service station in 1998. This was the location of the old chrome plant building, which was removed completely. The service station has subsequently been redeveloped into an office block, which included the removal of the underground storage tanks.

The old acid plant site was previously occupied by Nutralink for blending of fertilisers, followed by FBT for storage and dispatch of grain and similar products.

13.2 Water discharge permits

Ravensdown blends, stores and distributes fertiliser at a depot situated between Devon, Katere and Smart Roads. Ravensdown was granted two resource consents on 26 November 1997, to discharge stormwater from the depot to the Waiwhakaiho River and to the Mangaone Stream for a period until 1 June 2014.

Discharge permit **3140** provides for the discharge of up to 700 litres per second of stormwater to the Waiwhakaiho River via McLeod's Drain, with 'standardised' conditions. The mixing zone boundary in the Waiwhakaiho River extends 150 metres downstream from the point of discharge of McLeod's Drain. The concentration of un-ionised ammonia in the river may not exceed 0.025 g/m³. Review of conditions may take place in the month of June 1999, 2002 or 2008.

Discharge permit **3865** provides for the discharge of up to 700 litres per second of stormwater to the Mangaone Stream, with 'standardised' conditions. The mixing zone boundary is defined as Katere Road bridge, about 150 metres below the discharge point. The concentration of un-ionised ammonia in the stream may not exceed 0.025 g/m³. The discharge of phosphorus is to be minimised. Review of conditions may take place in the month of June 1999, 2002 or 2008.

Applications to renew these consents were received by Council on 19 November 2013, and therefore under Section 124 of the RMA, the activity can continue under the conditions of the expired consent until a decision is made on the renewal applications.

Ravensdown exercised one other resource consent in relation to the fertiliser depot. Discharge permit **4024-3** provides for emissions to air, mainly dust. Monitoring of this permit is addressed in a separate report.

13.3 Results

13.3.1 Inspections

Compliance monitoring inspections were conducted on four occasions at the Ravensdown site during the period. These were on 16 September 2015, 16 December 2015, 13 April 2016 and 28 June 2016.

The inspections focussed on product tracking, evidence of spills, ongoing works to dismantle and remediate parts of the site, the state of the drains, the treatment wetland and the receiving waters.

During the period under review several small spills of product were noted and these were cleaned up as requested. During inspection the wetlands and receiving waters were inspected and no issues were noted. Earthworks for the new building site were ongoing during the latter half of the year.

13.3.2 Chemical analysis

13.3.2.1 Results of discharge monitoring

Waiwhakaiho River (Consent 3140)

The discharge to the Waiwhakaiho River is sampled at a manhole on the old effluent line to McLeod's Drain (Site Code IND004002). The results of monitoring for the period under review are presented in

Table **46**. A summary of all monitoring data from the site is included for comparison.

The oil and grease concentration limit given in consent 3140 was assessed as having been complied with on all monitoring occasions during the period under review. The pH and suspended solids limits were also complied with on all occasions.

Table 46 Chemical monitoring results for Ravensdown's process effluent discharge to McLeod's Drain- site IND004002

Parameter	Unit	Min	Max	Med	N	15 July 2015 (w)	Consent limits
Ammoniacal N	g/m ³ N	0.005	317	26.5	39	43.4	-
Conductivity	mS/m@ 20C	19.2	4240	95.8	62	90.0	-
DRP	g/m ³ P	0.004	85.9	2.06	65	6.66	-
Fluoride	g/m ³	0.2	570	2.24	63	2.01	-
Oil and grease	g/m ³	<0.5	13	0.4	31	b	15
pH	pH	3.3	10.2	7.6	67	7.6	6-9
Suspended solids	g/m ³	2	1400	45	66	81	100
Temperature	Deg.C	10.4	47.9	17.8	62	11.8	-
Total phosphorus	g/m ³ P	0.043	72.6	6.14	42	9.28	-
Turbidity	NTU	16	400	71	21	71	-
Un-ionised ammonia	g/m ³ N	0.00002	93.38278	0.44592	31	0.44592	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Results show that the composition of the discharge has changed considerably since manufacturing stopped at the site. The turbidity, pH, and the concentration of suspended solids, and the nutrients ammonia and phosphorus have all increased markedly, while the temperature, fluoride concentration and conductivity have, for the most part, reduced. These changes owe largely to the cessation of the discharge of brackish cooling water from the Waiwhakaiho estuary following the closure of the fertiliser works. The large cooling water flow tended to mask any effects of stormwater, resulting in a discharge of relatively low turbidity, suspended solids and nutrient values that had a high conductivity. The elevated ammonia and phosphorus concentrations now typically observed owe to the dissolution of fertiliser particles carried by wind or water into the stormwater drains.

Ammoniacal nitrogen, total phosphorus and dissolved reactive phosphorus were found to be above median values in the sample taken on 15 July 2016, however on subsequent sampling occasions these contaminants were found to be below median values.

The fluoride concentrations found in the discharges similar to the median of the historical results and were below the NZ drinking water guideline of 1.5 mg/L.

Mangaone Stream (Consent 3865)

The main discharge to the Mangaone Stream, comprising stormwater and/or groundwater seepage, is sampled from a ditch in the south-eastern corner of the site, outside the high analysis store (site code STW002003). The results of monitoring for the period under review are presented in Table 47. A summary of previous monitoring data is included for comparison.

Table 47 Chemical monitoring results for Ravensdown main stormwater discharge to the Mangaone Stream-site STW002003

Parameter	Unit	Min	Max	Med	N	15 Jul 2015	18 May 2016	Consent limits
Ammoniacal nitrogen	g/m ³ N	3.97	1210	56.45	60	22.4	54.5	-
Conductivity @ 20°C	mS/m@20C	41.2	1300	162	67	102	120	-
DRP	g/m ³ P	3.4	697	24.7	67	4.71	20.6	-
Fluoride	g/m ³	0.12	100	1.96	62	1.31	1.40	-
Oil and grease	g/m ³	0	360	<0.5	27	b	b	15
Nitrite/nitrate nitrogen	g/m ³ N	3.6	151	26.6	35	20.9	23.0	-
pH	pH	3.3	8.2	6.9	66	7.0	7.3	6-9
Suspended solids	g/m ³	3	1600	28.5	64	28	17	100
Temperature	Deg.C	10.3	23.2	15.1	63	13.0	14.9	-
Total phosphorus	g/m ³ P	4.2	707	19.15	44	5.90	21.1	-
Turbidity	NTU	2.2	170	21	23	14	12	-
Un-ionised ammonia	g/m ³	0.00009	5.67691	0.17168	52	0.06360	0.35453	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Compliance was observed with the pH, oil and grease limits, and suspended solids on all monitoring occasions. All other parameters were either similar or below median values of the site.

13.3.2.2 Results of receiving water monitoring

Monitoring sites have been identified, at which sampling is undertaken during the wet weather runs, in order to assess compliance with the unionised ammonia limits (0.025 g/m³) on Ravensdown's consents. The mix zone provided for in the Waiwhakaiho River is 150 metres downstream of the MacLeod's Drain discharge, and in the Mangaone Stream the mix zone extends to the Katere Road bridge. The results of the Waiwhakaiho sampling are given in Table 48 and Table 49 and the results of the Mangaone Stream sampling are given in Table 50 and Table 51. The tables also include the discharge results to aid in the interpretation of any effects in the receiving water.

Waiwhakaiho River

Sampling of the Waiwhakaiho River, up and downstream of the MacLeod's Drain were undertaken on two occasions during the sampling of the discharges at both Ravensdown and the MacLeod's Drain discharge. These results are given in Table 48 and Table 49. The results show that the downstream results show little of change in the quality of the water of the downstream of MacLeod's Drain when compared to samples taken upstream. During the period under review there were generally only very small changes in the dissolved reactive phosphorus, unionised ammonia, ammoniacal nitrogen, suspended solids and turbidity concentrations of the Waiwhakaiho River 300 metres downstream of where the Ravensdown stormwater discharges (via MacLeod's Drain). There was little, if any, change in the fluoride concentration of the receiving water.

The results from the sampling at the MacLeod's Drain discharge to the Waiwhakaiho show that the quality of the water has improved when compared to the input from Ravensdown indicating that dilution is occurring in the stormwater network.

Table 48 Receiving water nutrient monitoring in relation to Ravensdown's discharge to the Waiwhakaiho River 15 July 2015

Parameter	Unit	WKH000920 Constance Road	IND004002 Ravensdown's discharge to McLeod's Drain	STW001001 McLeod's Drain prior to discharge to Waiwhakaiho	WKH000925 300 m d/s McLeod's Drain
Conductivity @ 20°C	mS/m@20C	11.7	90.0	25.3	12.0
DRP	g/m ³ P	0.025	6.66	0.520	0.032
Fluoride	g/m ³	0.06	2.01	0.06	0.05
Oil and grease	g/m ³	b	b	b	b
Un-ionised ammonia	g/m ³	0.00019	0.44592	0.01398	0.00043
Ammoniacal nitrogen	g/m ³ N	0.012	43.4	2.91	0.042
pH		7.9	7.6	7.2	7.7
Suspended solids	g/m ³	3	81	12	<2
Temperature	Deg.C	8.3	11.8	13.9	8.5
Turbidity	NTU	0.52	71	14	0.62

Key: b no visual evidence of oil and grease contamination

Table 49 Receiving water nutrient monitoring in relation to Ravensdown's discharge to the Waiwhakaiho River 8 January 2016

Parameter	Unit	WKH000920 Constance Road	IND004002 Ravensdown's discharge to McLeod's Drain	STW001001 McLeod's Drain prior to Waiwhakaiho	WKH000925 300 m d/s McLeod's Drain
Conductivity @ 20°C	mS/m@20C	11.9	-	15.4	12.4
DRP	g/m ³ P	0.014	-	0.508	0.017
Fluoride	g/m ³	0.07	-	0.13	0.07
Oil and grease	g/m ³	b	-	b	b
Un-ionised ammonia	g/m ³	0.00010	-	0.01656	0.00131
Ammoniacal nitrogen	g/m ³ N	<0.003	-	1.88	0.062
pH		7.9	-	7.3	7.7
Suspended solids	g/m ³	<2	-	140	2
Temperature	Deg.C	18.4	-	19.0	18.5
Turbidity	NTU	0.56	-	170	1.6

Key: b no visual evidence of oil and grease contamination

Mangaone Stream

On all monitoring occasions increases were observed in the ammoniacal nitrogen and unionised ammonia concentrations at the Katere Road bridge monitoring site, however the absolute levels found at the site immediately downstream of the Ravensdown site were well below the 0.025 g/m³ guideline for chronic toxicity.

No increases were noted in dissolved reactive phosphorus at the site immediately downstream of Ravensdown wetland discharge (site MGO000153) and other parameters tested for were found at acceptable levels in the downstream receiving environment.

Table 50 Receiving water nutrient monitoring in relation to Ravensdown's discharge to the Mangaone Stream 15 July 2015

Parameter	Unit	MGO000148 250m d/s Puremu S. confluence.	STW002003 Rear Ravensdown Stormwater	MGO000153 Katere Road bridge	MGO000190 Rifle Range Road.
Conductivity	mS/m@20C	16.8	102	17.4	17.7
DRP	g/m ³ P	0.020	4.71	0.020	0.031
Oil and grease	g/m ³	b	b	b	b
Un-ionised ammonia	g/m ³	0.00089	0.06360	0.00124	0.00191
Ammoniacal nitrogen	g/m ³ N	0.224	22.4	0.292	0.375
Nitrite/nitrate	g/m ³ N	1.28	20.9	1.25	
pH		7.2	7.0	7.2	7.3
Suspended solids	g/m ³	7	28	8	8
Temperature	Deg.C	11.3	13.0	12.2	11.6
Turbidity	NTU	8.3	14	-	7.2

Key: b no visual evidence of oil and grease contamination

Table 51 Receiving water nutrient monitoring in relation to Ravensdown's discharge to the Mangaone Stream 18 May 2016

Parameter	Unit	MGO000148 250m d/s Puremu S. confluence.	STW002003 Rear Ravensdown Stormwater	MGO000153 Katere Road bridge	MGO000190 Rifle range Road.
Conductivity @ 20°C	mS/m@20C	17.0	120	17.6	18.5
DRP	g/m ³ P	0.061	20.6	0.038	0.116
Oil and grease	g/m ³	b	b	b	b
Un-ionised ammonia	g/m ³	0.00049	0.35453	0.00186	0.00244
Ammoniacal nitrogen	g/m ³ N	0.099	54.5	0.296	0.301
Nitrite/nitrate	g/m ³ N	0.57	23.0	0.68	
pH		7.2	7.3	7.3	7.4
Suspended solids	g/m ³	14	17	12	7
Temperature	Deg.C	14.4	14.9	14.4	14.8
Turbidity	NTU	12	12	-	10

Key: b no visual evidence of oil and grease contamination

13.3.2.3 Results of groundwater monitoring

From the 2002-2003 period, the compliance monitoring programme has provided for a full survey of the groundwater in the immediate vicinity of the Ravensdown site to be undertaken at five sites on one occasion during each monitoring year, along with associated receiving water monitoring. The location of the monitoring bores is shown in Figure 4 and the results of nutrient focused monitoring for the period under review are given in Table 52 and Table 53, while the results of inorganic and metal analyses are given in Table 54.

Table 52 Chemical monitoring results for nutrients in the groundwater and Mangaone Stream in the vicinity of Ravensdown for 7 March 2016

Parameter	Unit	GND1217	GND1218	GND2346	MGO000151	GND0517	MGO000155	GND0518
Conductivity	mS/m	93.7	198	37.0	36.7	197	22.6	43.9
DRP	g/m ³ P	<0.003	<0.003	0.187	0.185	7.25	0.007	0.149
Un-ionised ammonia	g/m ³ N	0.00009	0.02855	0.03955	0.04191	44.33154	0.00447	0.01486
Ammoniacal nitrogen	g/m ³ N	0.687	135	0.942	0.835	224	0.190	1.79
pH	-	5.5	5.7	8.0	8.1	8.8	7.7	7.3
Temperature	Deg.C	18.2	18.3	18.7	18.1	16.7	20.0	18.2

Table 53 Chemical monitoring results for nutrients in the groundwater and Mangaone Stream in the vicinity of Ravensdown for 9 May 2016

Parameter	Unit	GND1218	GND2346	MGO000151	GND0517	MGO000155
Conductivity	mS/m	181	36.7	19.4	148	20.0
DRP	g/m ³ P	0.007	0.185	0.012	8.82	0.011
Unionised ammonia	g/m ³ -N	0.01643	0.04191	0.00048	32.25510	0.00174
Ammoniacal N	g/m ³ N	124	0.835	0.059	158	0.164
pH	-	5.5	8.1	7.4	8.8	7.5
Temperature	Deg.C	18.2	18.1	14.8	17.2	15.3

The data presented in Table 52 shows that there is an elevation in the total and dissolved phosphorus in the groundwater bores in the vicinity of the Ravensdown site. This is especially so in GND0517 which, whilst below its historical maximum was well above the median for the site on both monitoring occasions.

The ammoniacal nitrogen concentration of the groundwater is also elevated at all three bores in the immediate vicinity of the site, with the concentrations found at GND0517, adjacent to Katere Road, continuing to be significantly above background during the period under review.

Although affected to a much lesser extent, the ammoniacal nitrogen concentration at GND1218, on the northern boundary of the site approximately 70 m from the urea store, was found to have more than doubled during the 2012-2014 period. Historical results for this site show that the ammoniacal nitrogen concentration had previously varied between 6.5 and 26.2 g/m³ (Figure 19). In this period the concentrations spiked again in the summer sample to 135 g/m³ and 124 g/m³ in the autumn sample.

Samples taken from the new bore (GND2346) used in place of GND1342 returned results significantly lower than the range of results previously reported for GND1342.

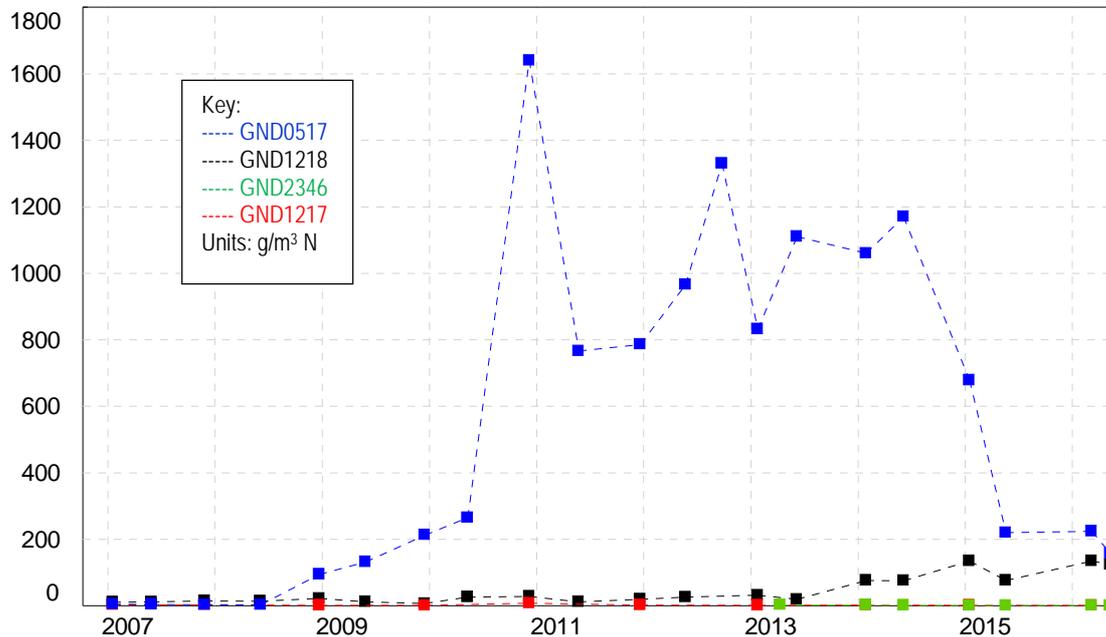


Figure 19 Ammoniacal nitrogen concentration at sites GND0517, GND1218, GND2346 and GND1217 from 2006 to June 2016

In 2003, soon after regular monitoring of this bore commenced, the ammoniacal nitrogen concentration found in this bore was 5,000 g/m³. It was identified that the phosphate rock store (Rock Store) was the likely source of contaminants due to a leaking roof and broken concrete floor. The ammoniacal nitrogen concentration dropped markedly after the store was emptied in December 2003. The ammoniacal nitrogen concentration bottomed out at approximately 3 g/m³ during the 2007-2008 monitoring year before beginning to increase once again. It was subsequently found by Council that this store had been put back into use. The recoverable material was removed from the store in the middle of the 2010-2011 year, and a plastic liner was placed over the remaining material to prevent contact with stormwater entering through the leaks in the roof. Since this intervention site GND0517 has exhibited elevated and fluctuating concentrations in ammoniacal nitrogen. The Rock Store was then demolished between October 2013 and May 2014. This was accompanied with a significant decline in the concentration of ammoniacal nitrogen found at this site. A review of current data indicates that this trend appears to be continuing.

Despite the elevated ammoniacal nitrogen in the vicinity of the Ravensdown site, dry weather in-stream monitoring (Section 17.1.2) showed that during the period under review, there were only slight increases in the ammoniacal nitrogen concentration in the Mangaone Stream as it flowed past the Ravensdown site. However the levels found at the downstream site are well below the 0.025 g/m³ chronic toxicity guideline for freshwater ecosystems. The dissolved reactive phosphorous concentration was found to be slightly in excess of the ANZECC trigger value of 0.010 g/m³ below the site on both monitoring occasions.

At this stage no significant adverse effects are being noted in the Waiwhakaiho River during dry weather (Section 17.1.1.2). The Council is continuing to monitor the situation.

Table 54 Metals and inorganics for groundwater at Ravensdown 7 March 2016

Parameter	Unit	DWSNZ MAV	GND1217 MW1	GND1218 MW2	GND2346	GND0517 MW5	GND0518 MW6
Acid soluble cadmium	g/m ³	0.004	<0.005	<0.005	<0.005	<0.005	<0.005
Conductivity @ 20°C	mS/m@20C	-	197	43.9	93.7	198	37.0
Acid soluble chromium	g/m ³	0.05	<0.03	<0.03	<0.03	<0.03	<0.03
Acid soluble copper	g/m ³	2	<0.01	<0.01	0.03	0.01	<0.01
Fluoride	g/m ³	1.5	0.33	0.38	1.08	0.05	0.12
Nickel acid soluble	g/m ³	0.08	<0.02	<0.02	0.05	<0.02	<0.02
Lead acid soluble	g/m ³	0.01	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH	7-8.5	8.8	7.3	5.5	5.7	8.0
Sulphate	g/m ³	250	240	45.4	412	758	<1
Suspended solids	g/m ³	-	3	19	24	2	4
Temperature	Deg.C	-	16.7	18.2	18.2	18.3	18.7
Total phosphorus	g/m ³ P	-	7.40	0.436	0.008	0.007	0.188
Dissolved vanadium	g/m ³	-	0.020	<0.001	<0.001	<0.001	<0.001
Acid soluble zinc	g/m ³	0.008*	<0.005	<0.005	0.126	0.014	<0.005

Key: Results shown in bold within a table indicates that the maximum acceptable value given in the Drinking-Water Standards for New Zealand 2005 (Revised 2008) (DWSNZ MAV) has been exceeded

*No MAV available for zinc, this is the adopted ANZECC trigger value for freshwater

The results obtained for the concentrations of metals, fluoride and the pH's observed in the groundwater are generally of the same order of magnitude as found in monitoring undertaken in previous period. For context, with the exception of pH and sulphate results groundwater in the vicinity of Ravensdown inorganics and metals were within DWSNZ maximum allowable values (where specified).

13.3.3 Receiving environment monitoring

The programmed receiving environment monitoring undertaken to monitor the condition of the receiving waters of the catchment as a whole is reported in Section 17.

13.3.4 Investigations, interventions, and incidents

In the period under review, the Council was required to record incidents, in association with Ravensdown Fertilisers Co-operative Ltd's conditions in resource consents or provisions in Regional Plans in association with activities undertaken at the existing site.

3 August 2015

During unrelated routine monitoring it was found that pot ash had been tracked onto the road from the Ravensdown site on Smart Road, New Plymouth. Investigation found that pot ash had been tracked from the site along the road for approximately

400 metres, where it was likely to discharge to stormwater. A letter requesting explanation was received and accepted.

3 December 2015

During unrelated monitoring it was found that pot ash was being tracked from a fertiliser store on Smart Road, New Plymouth. Investigation found that pot ash had been tracked from the site along the road for approximately 400 metres, where it was likely to discharge to stormwater. Abatement Notice EAC-21016 was issued requiring works to be undertaken to ensure that no discharge to land occurs where it was likely to enter water.

13.4 Discussion

13.4.1 Discussion of site performance

In general, inspection found that housekeeping at the site during normal operations was generally quite good. However, product tracking during bulk deliveries was observed and an abatement notice was issued as a result of this.

During the period under review the discharge to the Waiwhakaiho River via McLeod's Drain complied with discharge limits.

Consent 3865 covering the discharge of stormwater to the Mangaone Stream contains a requirement that Ravensdown manages the stormwater disposal system to minimise the discharge of free phosphate. During the period under review, the dissolved reactive phosphorous concentrations were found to be similar to, or below median, showing that Ravensdown is continuing to manage activities at the site that might impact on the discharge of free phosphorous.

Receiving water monitoring found that there were no significant adverse effects in the Waiwhakaiho River or in the Mangaone Stream.

Groundwater monitoring indicated that the ammoniacal nitrogen concentration in the groundwater on Katere Road, adjacent to the site, continued to be elevated, however Ravensdown demolished the rock store and this appears to have had a salutary effect on ammoniacal nitrogen levels in bore GND0517.

13.4.2 Environmental effects of exercise of consents

The high ammonia and phosphorus concentrations measured at both discharge points are attributed to the dissolution of fertiliser particles carried by wind or water into the stormwater drains. A measurable increase in concentration of these nutrients below the discharge points was observed during the year under review in both receiving waters (i.e. the Mangaone and Waiwhakaiho). However, the changes were compliant with the conditions of the resource consents and were not expected to have resulted in any significant adverse effects.

During the period under review the biomonitoring reports indicate that there is a deterioration in MCI and SQMCI in the lower Mangaone which is likely to be, in part, be attributable to both direct discharges and enriched groundwater intrusion associated with the Ravensdown site. Contrary to surveys of the previous period which indicated that the longitudinal deterioration may have been reducing, the

summer survey of this period indicated a more pronounced longitudinal deterioration in the Mangaone Stream. The surveys found no such effects in the lower Waiwhakaiho River.

Groundwater analysis results have shown that the ammoniacal nitrogen concentrations in the groundwater in the Katere Road area of the site continued to be elevated. However, remedial works at the site appear to be mitigating the levels of this contaminant in GND0517.

13.4.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 55 and Table 56.

Table 55 Summary of performance for consent 3865-3

Purpose: To discharge stormwater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Concentration limits upon potential contaminants in discharge	Discharge sampling	Yes
2. Minimisation of free phosphate	Discharge sampling	Yes
3. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
4. Prepare and maintain contingency plan	Review of documentation received. Latest version 2011	Yes
5. Provision for review of consent	No further opportunities for Review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A not applicable

Table 56 Summary of performance for consent 3140-2

Purpose: To discharge stormwater into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Concentration limits upon potential contaminants in discharge	Discharge sampling	Yes
2. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
3. Prepare and maintain contingency plan	Review of documentation received. Latest version 2011	Yes
4. Provision for review of consent	No further opportunities for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A not applicable

During the period under review, Ravensdown Fertiliser Co-operative Ltd demonstrated a good level of environmental performance and high level of administrative performance and compliance with their resource consents as defined in Section 1.1.5 in relation to their site on Smart Road. However an abatement notice was issued in response to product tracking which occurred on two occasions and therefore an improvement is required in Ravensdown environmental performance.

13.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Ravensdown Fertiliser Co-operative Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented.

13.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and their effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remain at a similar level as that undertaken in 2015-2016. A recommendation to this effect is attached to this report.

13.5 Recommendation

THAT monitoring of discharges from Ravensdown Fertiliser Co-operative Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

14. Taranaki Sawmills Ltd

14.1 Process description

Taranaki Sawmills Ltd (TSM) has operated a timber treatment plant on Katere Road since 1956. In 1997, an adjoining site was purchased and developed for painting and packaging, packaging componentry, and a domestic despatch yard, some of which has now been on-sold. About 30 persons are employed at the site.

Timber is treated at two plants. At one plant, timber is treated with copper, chromium and arsenic (CCA), and with boron. At the other plant, light organic solvent preservatives (LOSP) is used.



Figure 20 Taranaki Sawmills site and sampling point locations

At the CCA and boron treatment plant, all chemical storage tanks and treatment vessels were once situated in the open, within areas that were sealed and bunded for containment of spillage, and contaminated stormwater from bunded and drip pad areas was collected in sumps and recycled back through the treatment process. The CCA process was changed in February 1999 by the addition of a steam fixation step after CCA treatment, known as the CCA Dry process. This resulted in the elimination of drippage after treatment. Previously, CCA treated timber had to be left on the drip pad for seven days, now the timber only needs to be left on the drip pad for 24 hours to ensure that there is no drippage once the wood is removed from the treatment area. There is no discharge to water as a result of the CCA dry process, as blowdown from this process is recycled. During the 2002-2003 year, a roof was constructed over the drip pad, treatment vessels and chemical storage area, thus eliminating the potential for contaminants to be entrained in the stormwater from these areas.

Some timber is pre-treated by steaming to improve the penetration of the CCA solution. After each steam cycle, the vessel is cooled via an external water heat exchanger to reduce turnaround time. The sludge generated in the steamer vessel, and blowdown from the boiler, was discharged to a settling pit at a rate of about

1,000 L/ day. The settled wastewater, and about 15,000 L/ day of cooling water, was discharged to the Mangaone Stream via a stormwater drain. Sludge that accumulated in the pit was disposed of by a local contractor. During the 2005-2006 year, the condensate from this “steam cracking” of the timber was diverted to sewer. The discharge of cooling water to the Mangaone Stream continued until the 2008-2009 year, during which the cooling water was also diverted to trade waste.

In boron treatment, a vacuum is applied to improve chemical diffusion. The boron treated timber was left under tarpaulins on the drip pad for 14 days for diffusion to complete. An improvement in the boron treatment process was introduced in March 2007. Taranaki Sawmills now employ a dry treatment process using “Framepro”. The process for “Framepro” is that the timber is kiln dried before it is sent to the treatment plant. After treatment it dries in a shed on a drip pad until being shipped out.

A new light organic solvent preservative (LOSP) plant was commissioned in February 1999. The treatment chemicals used in the LOSP process are a range of blends containing one or more of the following, in a white spirit solvent; 3-Iodo-2-propynyl-n-butylcarbamate (IPBC), permethrin, Propiconazole (PRCA) and Tebuconazole (TEBA) depending on end use of the timber. At the old LOSP plant, chemical storage tanks were located outside at the northern end of the site in an area that was bunded. The drippage area, which drained to a recycle sump, was also outside. At the new plant, the process is carried out entirely within a building with internal bunds, under computer control to optimise treatment and minimise chemical use. There is no wastewater discharge.

The use of tributyltin oxide at the site ceased in April 2010. Residual tributyltin and CCA have been found in the site surfaces from historical practices. This has been mapped and managed by progressively concreting the affected areas, as discussed in previous Annual/Biennial Reports.

Uncontaminated stormwater, from outside of bunded areas and from roofs, is channelled into two drains that join prior to exiting the site at Katere Road and discharging to the Mangaone Stream.

14.2 Water discharge permit

TSM holds discharge permit **3491-2** to cover discharge of cooling water and wastewater from a timber drying plant and stormwater from a timber treatment site into the Mangaone Stream in the Waiwhakaiho catchment. This consent was granted by the Council under Section 88 of the RMA on 17 June 2006, and will expire on 1 June 2020.

The special conditions on the consent require that the consent holder: (1) adopts the best practicable option to minimise effects, (2) exercises the consent in a manner consistent with the description in the application, (3) adheres to the New Zealand Timber Preservation Council’s best practice guideline, (4) ensures that the bunding meets HSNO requirements after a certain date, (5) limits the stormwater catchment area, (6) limits the daily discharge volume of cooling water and wastewater, (7) limits the concentration of particular contaminants known to be used in the industry, (8)

limits general (RMA, Section 107) receiving water effects beyond a 30 m mix zone, (9) limits the pH range and change in pH permitted in the receiving water, (10) limits temperature effects and changes in filtered carbonaceous biochemical oxygen demand in the receiving water, (11) requires the investigation of pesticide presence in the receiving water and stream sediment, (12) requires the investigation of copper in the receiving water, (13) sets the deadline by which the results of the investigations be provided to Council, (14) maintains a contingency plan, (15) provision for lapse of the consent if not exercised, (16) provision for review based on effects, and (17) provision for review based on changes in the New Zealand Timber Preservation Council's best practice guideline or specific Hazardous Substances regulations.

14.3 Results

14.3.1 Inspections

TSM's site was inspected on four occasions during the monitoring period. These were on 14 September 2015, 2 December 2015, 22 February 2016 and 7 June 2016.

The inspections focused on any evidence of spills or staining on the concreted areas, the condition of the stormwater drains and associated mitigation measures, the cooling water system (for leaks etc), containment bunding, vehicle tracking and general housekeeping.

On all four occasions the site was found to be compliant with conditions and generally well managed. No tracking from the treatment areas or evidence of spills were noted and the drains were found to be free of contamination upon visual inspection.

14.3.2 Discharge chemical analysis

Historically the primary sampling point for this site was a combined discharge point on the opposite side of Katere Rd (site IND001006). This was sampled on one occasion during the monitoring period, however it was identified by the consent holder that this site could potentially be contaminated with stormwater from Katere Rd.

Subsequently two additional sampling sites were established (IND001068 and IND001069) to sample stormwater from TSM at the point of discharge into NPDC's stormwater network. These sites were each sampled once during the monitoring period and will be the primary sampling point for future surveys.

The results are presented in Table 57 and Table 58. A summary of all monitoring at data from site IND001006 is included for comparative purposes.

Table 57 Chemical monitoring results for TSM stormwater discharge-site IND001006

Parameter	Unit	Min	Max	Med	N	15 Jul 2015	Consent limits
IPBC	g/m ³	0.002	0.002	0.001	10	<0.002	-
Arsenic Total	g/m ³	0.01	0.5	0.074	41	0.152	0.24
BOD	g/m ³	2.4	890	9.7	28	16	-
Boron	g/m ³	0.01	7	0.18	46	0.12	3.7
COD	g/m ³	6	4000	63	43	36	-
Chromium Total	g/m ³	0.023	0.34	0.073	24	0.176	0.4
Conductivity @ 20°C	mS/m	2.3	112	11	61	10.5	-
Copper Dissolved	g/m ³	0.01	0.07	0.02	21	0.03	0.088
Copper Total	g/m ³	0.022	0.26	0.044	24	0.108	-
Dibutyltin (as Sn)	g/m ³	0.00005	0.00217	0.00015	17	0.00023	-
Oil and Grease	g/m ³	0.5	24	2.2	42	0.7	15
Permethrin	g/m ³	0.0002	0.0056	0.0008	10	0.0056*	-
pH	pH	4.4	7.6	6.3	63	7.5	6-9
Propiconazole	g/m ³	0.008	0.052	0.0143	10	0.052*	-
Suspended solids	g/m ³	3	760	65	56	160**	100
Tebuconazole	g/m ³	0.0064	0.049	0.0179	10	0.049*	-
Temperature	Deg.C	9.5	37.8	17.7	59	10.5	-
Tin Total	g/m ³	0.00193	0.4	0.05	25	<0.011	-
Tributyltin (as Sn)	g/m ³	0.00004	0.0036	0.00009	17	0.00013	0.0046
Triphenyltin (as Sn)	g/m ³	0.00003	0.0014	0.00002	17	<0.00007	-
Turbidity	NTU	19	210	72	24	200	-
Zinc Dissolved	g/m ³	0.145	0.537	0.29	20	0.288	0.64
Zinc Total	g/m ³	0.21	5.5	0.52	23	1.10	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded
b parameter not determined, no visible hydrocarbon sheen and no odour
* new maximum value
** sample may have had road water contamination

Table 58 Chemical monitoring results for TSM stormwater discharge 18 May 2016

Parameter	Unit	IND001068 (eastern grate)	IND001069 (western grate)	Consent limits
IPBC	g/m ³	<0.002	<0.002	-
Arsenic Total	g/m ³	0.22	0.0184	0.24
BOD	g/m ³	14	7.4	-
Boron	g/m ³	0.05	0.12	3.7
COD	g/m ³	74	48	-
Chromium Total	g/m ³	0.29	0.0166	0.4
Conductivity @ 20°C	mS/m	9.8	10.7	-
Copper Dissolved	g/m ³	0.03	<0.01	0.088
Copper Total	g/m ³	0.120	0.0152	-
Dibutyltin (as Sn)	g/m ³	<0.00011	<0.00011	-
Oil and Grease	g/m ³	4.8	3.8	15
Permethrin	g/m ³	0.0017	0.0011	-
pH	pH	7.0	7.4	6-9
Propiconazole	g/m ³	0.029	0.037	-
Suspended solids	g/m ³	64	58	100
Tebuconazole	g/m ³	0.029	0.037	-

Parameter	Unit	IND001068 (eastern grate)	IND001069 (western grate)	Consent limits
Temperature	Deg.C	14.9	14.9	-
Tin Total	g/m ³	0.0054	0.00145	-
Tributyltin (as Sn)	g/m ³	<0.00009	<0.00009	<i>0.0046</i>
Triphenyltin (as Sn)	g/m ³	<0.00007	<0.00007	<i>0.64</i>
Turbidity	NTU	90	120	-
Zinc Dissolved	g/m ³	0.334	0.500	-
Zinc Total	g/m ³	0.50	0.80	-

Key: Results shown in bold within a table indicates that a consent limit for a particular parameter has been exceeded
b parameter not determined, no visible hydrocarbon sheen and no odour

Samples taken from both of the new sites complied with all consent conditions in regard to constituent concentrations.

Monitoring of the treatment chemicals IPBC, permethrin, PRCA and TEBA was initiated in the 2010-2011 year after TSM changed to using these chemicals rather than tributyltin. The concentration of PRCA and TEBA were found to be to the highest ever when sampled on 15 July 2016. A slight drop in the concentrations were noted in the subsequent sampling at the new sites, however these results were still higher than the median values from the historical results from the original site (IND001006)

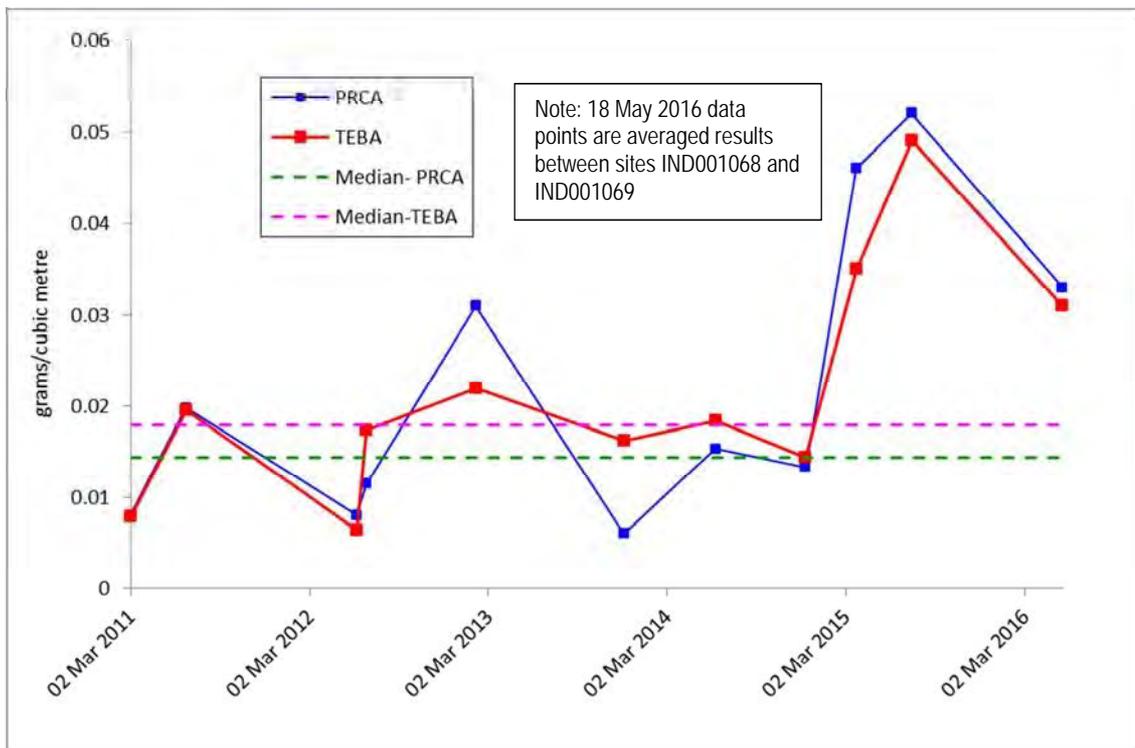


Table 59 LOSP chemical concentrations in TSM's discharge.

PRCA and TEBA were also detected in the receiving water, and the result obtained on 18 May 2016 was found to be the highest recorded. Previously there appeared to be decreasing level of LOSP chemicals in the Mangaone Stream, however the most recent sample showed a significant elevation in PRCA and TEBA concentrations.

Council undertook further sampling of these discharges and instigated upstream sampling for LOSP chemicals to rule out other sources. Recently obtained results show that PRCA and TEBA are present at trace levels upstream of the site, however an increase in the concentrations of these chemicals is noted downstream TSM. Also noted is that the instream levels had returned to levels similar to those found prior to this period.

It was found that the concentrations of the other effluent components monitored were generally within the ranges of previously reported results with most of the parameters being similar to or below the median values.

Tributyltin tin was detected in the discharge but was below detection limits in the Mangaone Stream.

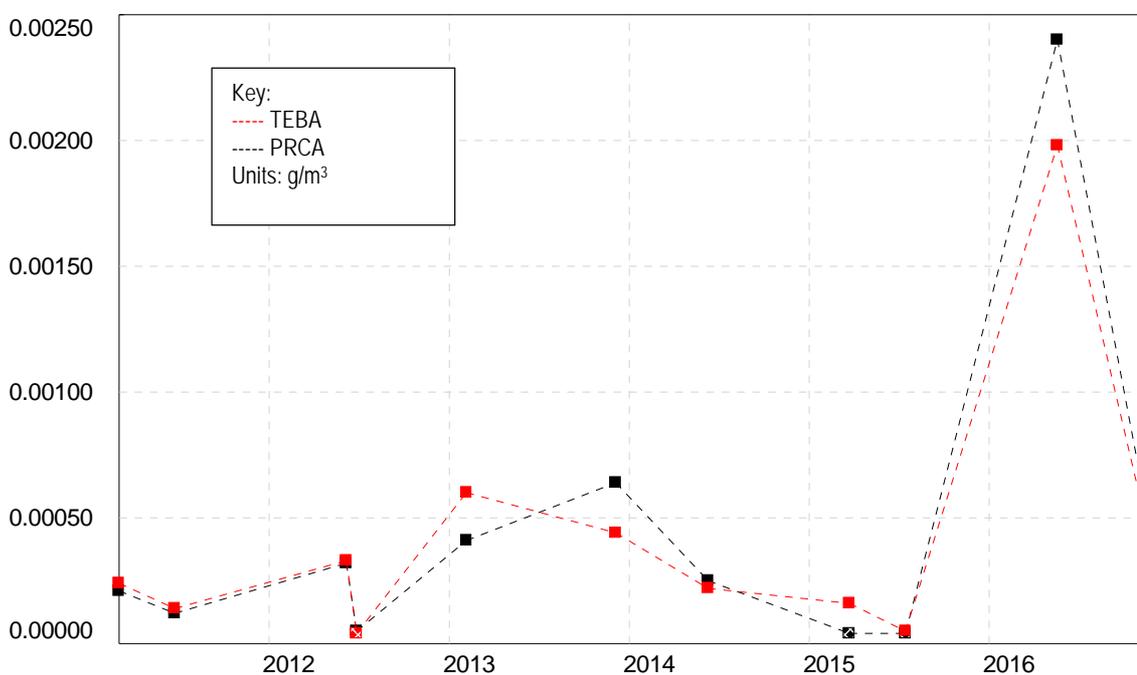


Figure 21 Tebuconazole and Propiconazole concentrations downstream of TSM's discharge

14.3.3 Investigations, interventions, and incidents

In the period under review, the Council was required to undertake significant additional investigations and interventions, or record incidents, in association with TSM's conditions in resource consents or provisions in Regional Plans.

15 July 2015

During analysis of samples collected on 15 July 2015, suspended solids concentrations were found to be in breach of resource consent conditions. A letter of explanation was requested and accepted. The consent holder outlined that the sampling point may include stormwater from the roadway and therefore was not representative of the stormwater from their site. As a result of this, new sampling sites were established to avoid the possibility of road contaminants in the sample.

14.4 Discussion

14.4.1 Discussion of site performance

Housekeeping at the site was considered to be good during the period under review. No significant issues were noted during inspections and the discharge quality during the period under review was compliant with the with all consent conditions. It was noted that TEBA and PRCA concentrations in the discharge appear to be increasing in the period under review and an increase in the levels of the chemicals was also found downstream of the discharges. Further monitoring (subsequent to this monitoring period) found that the concentrations of TEBA and PRCA in the discharges and the Mangaone stream had returned to value commensurate with historical results.

Monitoring found that the remediation previously undertaken at the site to control the discharge of tributyltin from historical activities at the site continued to be effective.

14.4.2 Environmental effects of exercise of consent

Council sampling surveys showed that, during the period under review, compliance was achieved with the conditions imposed on consent 3491 relating to receiving water quality.

Concentrations of tributyltin in the receiving water and sediment in the Mangaone Stream have in the previous period been found above the guideline values given in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (October 2000). It was considered that these high levels may have accounted for some of the changes seen in the macroinvertebrate communities during biomonitoring surveys.

During the period under review, tributyltin was not detected in the water column downstream of the TSM discharge at site MG000145. Two of the replacement treatment chemicals (PRCA and/or TEBA) now in use were found to be present in the stream at elevated concentrations in the survey undertaken on 18 May 2016. Subsequent sampling found that the instream levels had dropped back to concentrations comparable with historical median. Subsequent sampling also found traces of these well upstream of the TSM discharges at site MGO00075.

In terms of effects from the elevated level of these fungicides in the stream, the European Chemical Agency Risk Assessment Committee² found that, for chronic toxicity, TEBA had 'no observable effect concentrations' (NOEC's) of between 1 g/m³ and 0.01 g/m³ (for various species of fish and invertebrates). Similar NOEC's have also been noted for PRCA³. Under this criteria the elevated instream levels of 0.00024 g/m³ for TEBA and 0.00198 g/m³ for PRCA would be below the NOEC values, though not necessarily desirable. Historically instream values for these chemicals are

² European Chemical Agency Risk Assessment Committee (2013): *Annex 1 Background document to the Opinion proposing harmonised classification and labelling at Community level of Tebuconazole*

³ Cawthron Institute (2013): *Report 2357 Ecotoxicity review of 26 pesticides.*

in the 0.0001 to 0.0005 g/m³ range and this is reflected in the most recent sample taken (after this reporting period).

New Zealand's only instream limit for these chemicals are the environmental exposure limits (EEL) for products containing these active ingredients as set down by the New Zealand Environmental Protection Agency (NZEPA- formerly ERMA) under HSNO legislation. BTW Company Ltd (acting as TSM's consultant) identified⁴ that the appropriate EEL's for the product used by TSM as 0.00024 g/m³ for TEBA and 0.0001 g/m³ for PRCA. Whilst these are regularly exceeded in the downstream site (MGO000145) the values found are usually within comparable ranges (0.0001 g/m³ to 0.0006 g/m³).

Limited sampling upstream of TSM (at site MGO000075) undertaken in the next monitoring period found very low levels of TEBA and PRCA that were below EEL concentrations, however their presence indicate that there may also be other sources of these compounds in the catchment.

Based on the empirical NOEC values it is assessed that the levels of TEBA and PRCA found in the Mangaone Stream are not likely to be having significant effects on aquatic life. However biomonitoring at the site 14 (300 m below TSM's discharges) has shown steadily decreasing MCI values since 2013 with latest result being below median value.

This in conjunction with the elevated levels of PRCA and TEBA in the discharges and receiving water warrants further investigation.

⁴ Document #3413412 Correspondence from BTW " Re: Taranaki Sawmills Ltd Stormwater discharge Katere Road Consent 3491-2"

14.4.3 Evaluation of performance

A tabular summary of the TSM's compliance record for the period under review is set out in Table 60.

Table 60 Summary of performance for TSM's consent 3491-2

Purpose: To discharge cooling water, wastewater and stormwater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option	Inspection and discussion with consent holder	Yes
2. Exercise of consent in accordance with application information	Inspection and discussion with consent holder	Yes
3. Adherence to Timber Treatment Best Practice Guideline	Inspection and discussion with consent holder	Yes
4. Bunding to meet HSNO requirements by 31 March 2007	Inspection and discussion with consent holder	No HSNO stationary container certification yet, but compliance plan with ERMA
5. Limits stormwater catchment area	Site inspections	Yes
6. Limit on daily wastewater discharge volume of 12,000 L/day	Discussion at inspection. Discharge directed to sewer	Yes
7. Concentration limits upon potential contaminants in discharge	Chemical sampling	Yes
8. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling, and biomonitoring	Decreases in MCI values noted downstream potentially related to LOSP discharges
9. Limit on pH effects beyond the mix zone	Chemical sampling of the discharge and receiving water	Yes
10. Limits on temperature effects and filtered carbonaceous biochemical oxygen demand (FCBOD) beyond mix zone	Chemical sampling of the discharge and receiving water, and recording the temperatures at the time of sampling	Yes
11. Investigation into specific biocide levels in discharge and receiving environment	Condition met previously	N/A
12. Investigation into dissolved copper levels in discharge and receiving environment	Condition met previously	N/A
13. Report on investigations to be received by 30 August 2007	Report received 30 August 2007	N/A
14. Maintain and prepare contingency plan	Reviewed plan received January 2013	Yes

Purpose: To discharge cooling water, wastewater and stormwater into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
15. Provision for consent to lapse if not exercised	Consent exercised	N/A
16. Provision for review re effects	No further opportunities for review	N/A
17. Provision for review if amendments to HSNO regulations or Timber Treatment Guidelines	N/A	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

During the period under review, Taranaki Sawmills Ltd demonstrated a good level of environmental performance and high level of administrative performance and compliance with the resource consents as defined in Section 1.1.5 in relation to its site on Katere Road. Light organic solvent preservatives were found to be at elevated levels in both the discharges and receiving waters during the period under review.

14.4.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report it was recommended:

THAT the monitoring programme for discharges from Taranaki Sawmills Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in the 2015-2016 monitoring period.

14.4.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and their effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

14.5 Recommendation

THAT monitoring programme for discharges from Taranaki Sawmills Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

15. Technix Group Ltd

15.1 Process description

The engineering complex of Technix Group Ltd (Technix) is the largest industrial site along the lower Waiwhakaiho River. Situated on the true right bank of the river immediately above its confluence with the Mangaone Stream, the 8.4 ha area of land is bounded by Rifle Range Road, Vickers Road, State Highway 3, and the Mangaone Stream. The development comprises several building complexes, roading and drainage systems.

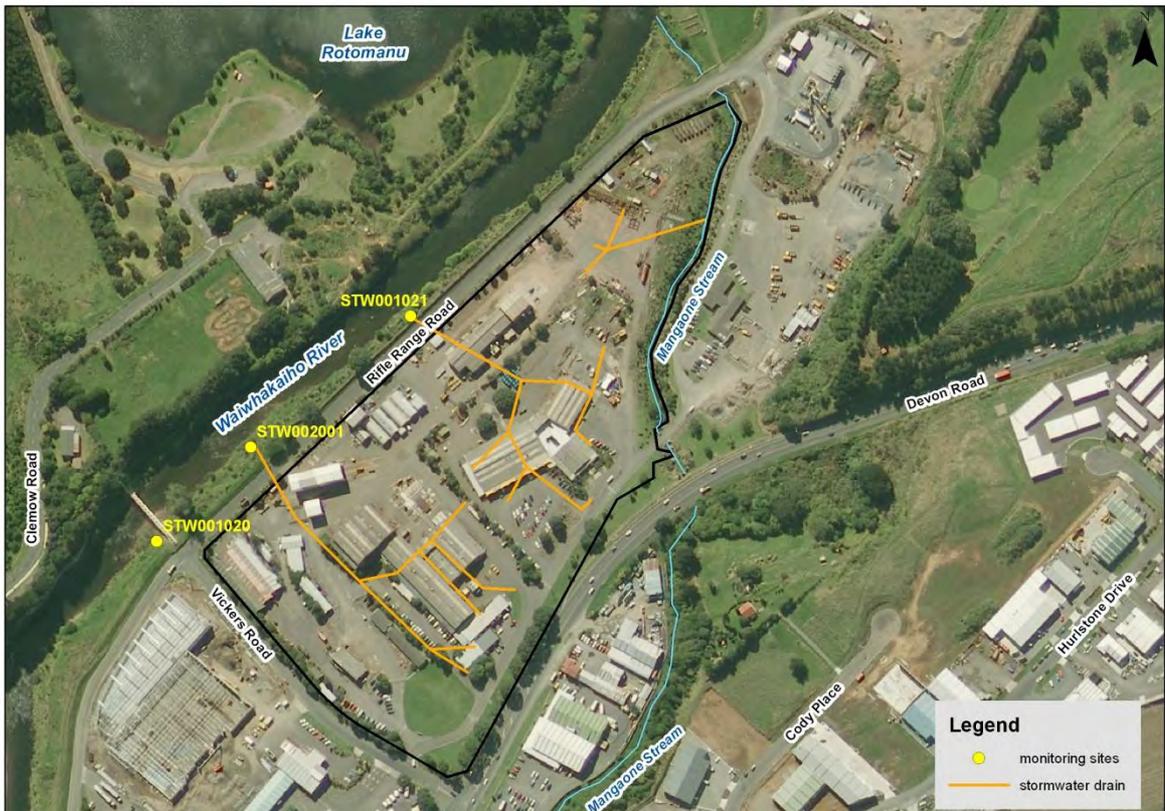


Figure 22 Technix site, drainage system and sampling point locations

Technix Group leases buildings on the site to several tenant companies carrying out a range of activities.

The ground surface cover varies from bitumen seal to gravel to grass. There is a large sealed bitumen area in the northern part of the site that was once used as a truck stop.

Stormwater discharges from the site at four main points, three to the Waiwhakaiho River and one to the Mangaone Stream.

The original consented discharges were; the two discharges to the Waiwhakaiho River from the central areas of the site, and the one to the Mangaone Stream from the eastern area of the site. The other, previously unlicensed, discharge occurs from the western area of the site to the Waiwhakaiho River down Vickers Road, which also

serves commercial properties on the opposite side of the road. This discharge point was included in NPDC's consent 5163-2 when it was renewed on 20 November 2007. Also during the 2007-2008 year, prior to the expiry of the consent held for the discharges to the Mangaone Stream (2230), Council concluded that the activity in this area had become a permitted activity under rule 23 of the RFWP (which became operative in 2001) provided the conditions of rule 23 continued to be adhered to by Technix. Council therefore did not require that this consent was renewed.

In terms of activities with the potential for environmental effects is concerned, contaminants may be discharged to land during the day-to-day activities on the sites. These contaminants may enter water, as at some point in time (i.e. when it rains), the contaminants become entrained in stormwater along with contaminants that may be washed off equipment stored in the yard, and the stormwater is then discharged to the Waiwhakaiho River or Mangaone Stream.

The buildings and land-use in the areas owned by Technix include:

- Staff offices and facilities;
- Workshops (machining, plate and general);
- Dangerous goods storage;
- Liquid oxygen tanks;
- Blast and paint storage and
- Blasting and painting sheds (until February 2014).

Contaminants that may be present on the site include:

- Grease and oils (e.g., diesel, petrol, lubricants & hydraulic oils);
- Metals (ferrous and non-ferrous);
- Paint;
- General workshop contaminants (e.g. welding, cuttings and grinding)and
- Garnet and blasting debris (until February 2014).

The stormwater area for consent 0291 covers the centre section of the site. The stormwater networks run around the perimeter of the building before running under FEGL property and into Waiwhakaiho River via a stormwater drain (STW001021). There are multiple sumps along this system to collect any stormwater. The feed pipes have an internal diameter of 150 mm and the discharge pipe has an internal diameter of 225 mm.

This site also has a truck wash bay, currently if the truck wash is used the valve joining the truck wash and stormwater network is closed. Once the cleaning is finished the user must clean the truck wash, including emptying the separator pits, before opening the valve to allow stormwater to enter the network from the truck wash.

The western area of the site collects the stormwater in a series of pipes ranging between 100 mm and 200 mm in diameter. These pipes discharge onto either Vickers or Rifle Range Road and enter NPDC's stormwater network (which discharges into the Waiwhakaiho River).

The northern area of the site is primarily used as a storage yard, with any stormwater collected discharging via a 375 mm concrete stormwater pipe into the Mangaone Stream.

As Technix leases sections within the multiple areas of its site, the specific type of contaminants can change depending on which business leases the section. Technix makes all tenants aware of the stormwater resource consent, the conditions of the consent, and the spill contingency plan.

15.2 Water discharge permits

Discharge permit **0291** was originally granted on 1 May 1996 to discharge up to 426 litres per second of stormwater, including treated truck wash water, from a Rifle Range Road site into the Waiwhakaiho River for a period until 1 June 2014. This was renewed during the current monitoring period with consent **0291-3**, to discharge stormwater from an industrial site into the Waiwhakaiho River, issued by the Council under Section 87(e) of the RMA on 24 October 2014. It is due to expire on 1 June 2032.

Technix now holds consent **9981-1** to discharge stormwater from an industrial site into the Waiwhakaiho River. This was issued by the Council under Section 87(e) of the RMA on 24 October 2014 and it is due to expire on 1 June 2032.

Technix now also holds consent **9982-1** to discharge stormwater from an industrial site into the Mangaone Stream. This was issued by the Council under Section 87(e) of the RMA on 24 October 2014 and it is due to expire on 1 June 2032.

Consents **9981-1**, **9982-1** and **0291-3** have the standard special conditions as set out in section 1.2. Consent **0291-3** also has a condition prohibiting discharge from the truck wash to the stormwater network.

15.3 Results

15.3.1 Inspections

The site was inspected on four occasions during the monitoring period, on 14 September and 8 December 2015, and 13 April and 30 June 2016.

The site was observed to be tidy during all of the inspections. There were no spills observed and stormwater drains were visually clear of contaminants. The Mangaone Stream and the Waiwhakaiho River were flowing clean and clear. No dust or odours were noted.

15.3.2 Results of discharge monitoring

There were three routine sampling points for monitoring of stormwater discharges from Technix's site, all in relation to the Waiwhakaiho River. They were the storm drain outlets at the bottom of Vickers Road where the discharge has combined with a (previously unlicensed) NPDC discharge, opposite FEGL's plate shop (consent 0021), and opposite FEGL's blast and paint shop (consent 0291). The discharge to the Mangaone Stream (previously consent 2230, permitted during the period under

review) is not sampled routinely owing to inactivity in the catchment and difficulty in access to the outlet. However, due to increased activity in this area, Technix was advised during the latter part of the period under review, that this discharge point should once again be covered by a consent.

As the Vickers Road outlet has now been incorporated into NPDC's consent 5163, monitoring results for this discharge point, previously reported in Technix section, have been moved to the section covering NPDC's discharges. Technix was also advised during the latter part of the period under review, that this discharge point should be covered by a consent. Due to the difficulty in accessing the site during combined wet weather surveys the individual sampling of discharges is planned to be undertaken in the 2016-2017 period during wet weather inspections.

Opposite FEGL's blast & paint (Consent 0291)

This discharge contains stormwater from both the Technix and FEGL sites. Up until 20 February 2014, this combined discharge was covered solely by consent 0291 held by Technix. The partial transfer of consent to FEGL resulted in the FEGL stormwater being covered by their own consent (9853).

The conditions on stormwater composition on consent 0291 and 9853 for pH range, suspended solids and oil and grease were complied with on each monitoring occasion. However it is noted that the suspended solids concentration on one occasion equalled the consent limit.

Table 61 Chemical monitoring results for Technix/FEGL stormwater discharge-site STW001021

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	2.2	0.5	6	2	10.6	6.7
Maximum	24.4	3.5	7.7	530	23.4	200
Median	6.6	1.9	7.3	36	15.3	36
Number	46	6	46	46	43	23
15 Jul 2015	8.6	b	7.6	26	11.8	50
08 Jan 2016	7.8	b	7.0	100	20.4	100
<i>Consent limits</i>	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Vickers Road discharge (consent 9981-1)

This discharge contains stormwater from the south-western end of the Technix site that discharges via NPDC's stormwater reticulation running along Vickers Road. The discharge also contains stormwater from Vickers Road itself as reported in section 9.

Table 62 Chemical monitoring results for combined Technix/Vickers Road discharge-site STW001020

Parameter	Conductivity @ 20°C	Oil and Grease	pH	Suspended solids	Temperature	Turbidity
Unit	mS/m@20C	g/m ³	pH	g/m ³	Deg.C	NTU
Minimum	2.3	0.5	6.6	2	10.4	2.7
Maximum	68.1	549	9.3	510	21.2	160
Median	10.9	1.7	7.3	60	15.6	40
Number	55	47	55	54	57	24
15 Jul 2015	9.3	b	7.5	12	12.5	21
08 Jan 2016	14.3	b	7.2	54	19.0	55
Consent limits	-	15	6-9	100	-	-

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

Mangaone Stream discharge (consent 9982-1)

This discharge contains stormwater from the north eastern end of the Technix site which is discharged to the Mangaone Stream. No discharge samples were taken in this monitoring period, however up and downstream sampling show that Technix is complying with consent conditions in regard to effects of receiving water (Table 63). Due to the difficulty in accessing the site during the combined wet weather surveys, the individual sampling of discharges from this site is planned to be undertaken in the 2016-2017 period.

Table 63 Receiving water results from the Mangaone Stream (Technix)

Parameter	Unit	Katere Road bridge MGO000153	Rifle Range Road (d/s Technix/Dower EDI) MGO000190
15 July 2015			
Time	NZST	09:35	09:45
Conductivity @ 20°C	mS/m	17.4	17.7
Un-ionised ammonia	g/m ³	0.00124	0.00191
Ammoniacal nitrogen	g/m ³ N	0.292	0.375
pH	pH	7.2	7.3
Suspended solids	g/m ³	8	8
Temperature	Deg.C	12.2	11.6
Turbidity	NTU	-	7.2
18 May 2016			
Time	NZST	11:00	12:10
Conductivity	mS/m	17.6	18.5
Un-ionised ammonia	g/m ³	0.00186	0.00244
Ammoniacal nitrogen	g/m ³ N	0.296	0.301
Oil and grease	g/m ³	b	b
pH	pH	7.3	7.4
Suspended solids	g/m ³	12	7
Temperature	Deg.C	14.4	14.8
Turbidity	NTU	-	10

Key: b parameter not determined, no visible hydrocarbon sheen and no odour

15.4 Investigations, interventions, and incidents

In the period under review, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with Technix's conditions in resource consents or provisions in Regional Plans.

15.5 Discussion

15.5.1 Discussion of site performance

Housekeeping at the site over the monitoring period was generally good, and the bunds were well managed. There were no issues noted during any of the inspections.

The stormwater discharges from the site were found to be compliant with consent conditions on all monitoring occasions.

15.5.2 Environmental effects of exercise of consents

There were no adverse environmental effects noted in the receiving environment as a result of Technix discharges.

15.5.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in, Table 64, Table 65 and Table 66.

Table 64 Summary of performance for Technix's consent 0291-3

Purpose: To discharge stormwater from an industrial site into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise effects	Chemical sampling	Yes
2. Catchment area not to exceed 2.2 ha	Inspections	Yes
3. No discharge to stormwater from truck wash after 31 December 2015	Inspections and liaison with consent holder	Yes
4. Concentration limits upon potential contaminants in discharge	Chemical sampling	Yes
5. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
6. Prepare and maintain Contingency Plan	Review of documentation. Received. Latest version approved by Council in July 2014	Yes
7. Preparation of Stormwater Management Plan	Plan Received	Yes
8. Consent holder to notify Council of significant changes to processes or operations	Inspections and liaison with consent holder	Yes

Purpose: To discharge stormwater from an industrial site into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
9. Provision for review of consent	Next option for review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 65 Summary of performance for Technix's consent 9981-1

Purpose: To discharge stormwater from an industrial site into the Waiwhakaiho River		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse effects	Inspections	Yes
2. Catchment area not to exceed 1.8 ha	Inspections	Yes
3. Concentration limits upon potential contaminants in discharge	Chemical sampling	Yes
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes
5. Prepare and maintain Contingency Plan	Review of documentation received. Latest version approved by Council in July 2014	Yes
6. Preparation of Stormwater Management Plan	Plan provided	Yes
7. Consent holder to notify Council of significant changes to processes or operations	Liaison with consent holder	Yes
8. Provision for review of consent	Next option for review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 66 Summary of performance for Technix's consent 9982-1

Purpose: To discharge stormwater from an industrial site into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse effects	Inspections	Yes
2. Catchment area not to exceed 1.3 ha	Inspections	Yes
3. Concentration limits upon potential contaminants in discharge	Not assessed this period	N/A
4. Discharge cannot cause specified adverse effects beyond mixing zone	Visual assessment at inspection and receiving water sampling and biomonitoring	Yes

Purpose: To discharge stormwater from an industrial site into the Mangaone Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Prepare and maintain Contingency Plan	Review of documentation received. Latest version approved by Council in July 2014	Yes
6. Preparation of Stormwater Management Plan	Plan received	Yes
7. Consent holder to notify Council of significant changes to processes or operations	Liaison with consent holder	Yes
8. Provision for review of consent	Next option for review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the period under review, Technix Group Ltd demonstrated a high level of environmental performance and high level of administrative performance and compliance with their resource consents as defined in Section 1.1.5 in relation its sites on Rifle Range Road.

15.5.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

THAT monitoring of discharges from Technix Group Ltd in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented in the 2015-2016 monitoring period.

15.5.5 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA the obligations of the Act in terms of monitoring discharges and effects, and subsequently 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 discharging to the environment.

It is proposed that for 2016-2017, the programme remains similar to that undertaken in the 2015-2016 period. A recommendation to this effect is attached to this report.

15.6 Recommendation

THAT monitoring of discharges from Technix Group Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

16. Investigations, interventions, and incidents

During the monitoring period the Council recorded four incidents (in addition to these reported so far in this document) in the urban Waiwhakaiho catchment area which was related to discharges or potential discharges to the surface water.

22 July 2015 - Unsourced

A complaint was received regarding pieces of goat carcasses dumped in the Waiwhakaiho River, near the outlet of Lake Rotomanu, New Plymouth. The investigating officer could not find any trace of any dead goats. It is likely that one high tide washed them out to sea.

28 October 2015 - Energy City Recyclers

A complaint was received regarding a hydrocarbon sheen on the Mangaone Stream near Hurlstone Drive, New Plymouth. Investigation found that there were hydrocarbons in the Mangaone Stream. An extensive investigation found that diesel had discharged from a tank which was leaking on a recycling site on Hurlstone Drive. Booms were deployed, and the hydrocarbons were contained and recovered. A letter of explanation was received and it was outlined that works would be undertaken to ensure compliance with the RFWP.

16 October 2015 - M Rowe

A complaint was received regarding sediment discharging into an unnamed tributary of the Mangaone Stream due to a motor bike dirt track crossing the unnamed tributary. Inspection found that the previously installed silt and sediment controls had deteriorated and a discharge of sediment was considered likely to occur during rain or track use. The land owner was made aware of the situation and agreed to rectify the controls. Re-inspection found hay bales had been used to retain sediment within the property boundary. The complainant was advised to monitor the situation and inform the Council if the sediment controls were ineffective.

20 January 2016 - Whitaker Engineering

A complaint was received regarding silt/sediment discharging from a residential subdivision into a downstream duck pond at Mangorei Road, New Plymouth. Investigation found that silt and sediment controls had been installed but were inadequate. At the time of inspection there was no runoff of silt and sediment occurring but this was likely to occur and an abatement notice was issued. The contractor undertook to upgrade the silt and sediment controls immediately. Re-inspection found the site was compliant with the abatement notice and rules in the RFWP.

17. Surface receiving water quality

17.1 Chemical analyses

The results of chemical analysis of the receiving water for the period under review are given in Table 67, Table 68, Table 69, Table 70 and Table 71. Refer to Section 1.3.4 for the sampling strategy. Monitoring locations are shown in Figure 1.

17.1.1 Waiwhakaiho River

The lower Waiwhakaiho River was sampled at four points under wet weather (discharge monitoring) and three points under dry weather (groundwater monitoring) conditions:

- **Merrilands Domain (site code WKH000800):** At the riffle just upstream of the swimming area in the Waiwhakaiho River at the Merrilands Domain, about 5.4 km from the coast. This is the upstream, or control site with respect to NPDC's Burton Street stormwater discharge.
- **Constance Street (site code WKH000920):** At the first bend below Devon Road bridge, about 2.6 km from the river mouth. This is the upstream, or control site, with respect to monitoring discharges to the lower Waiwhakaiho River from New Plymouth industrial area including the groundwater discharge from the Bewley Road landfill.
- **Opposite Firth's (site code WKH000925):** On the eastern side, upstream of the site of the old concrete ford opposite Firth Industries, about 540 metres below Constance Street and 280 metres below the confluence with McLeod's Drain. This was effectively the lower mixing zone boundary for the discharge from McLeod's Drain (consent 3138), which serves the largest catchment in the Fitzroy area, including the fertiliser depot (consent 3140) and rail yard (consent 1735). The ford was removed in April 1997 as part of flood protection works.
- **Above Mangaone (site code WKH000942):** Immediately above the confluence with the Mangaone Stream and any tidal saline influence, beside the eastern bank opposite Lake Rotomanu, about 1,300 metres from the river mouth. This is the downstream monitoring site for discharges from Firth (consent 0392), FEGL (consent 0021 and 9853), and the Technix operations along Rifle Range Road (consents 0291 9981).

The results are shown in Table 67 and Table 68.

17.1.1.1 Wet weather surveys

With the exception of a very minor increases in the concentration of ammoniacal nitrogen (and its conjugate species unionised ammonia) and turbidity, there was no discernible trend of increasing contaminant concentrations between the up and downstream receiving waters (Table 67).

The highest concentrations of ammoniacal nitrogen and unionised ammonia were well below ANZECC trigger guideline of 0.9 g/m³ and the RFWP guideline of 0.025 g/m³.

With the exception of one result the instream levels of dissolved reactive phosphorous both up and downstream of the industrial area were found to be below the 0.15-0.03 g/m³ range that may support algal growths.

Table 67 Results of wet weather chemical monitoring of lower Waiwhakaiho River

Parameter	Waiwhakaiho				
	Merrilands Domain	Constance Street	Opposite Firth's (Ford)	Above Mangaone Confluence	
15 July 2015	WKH000800	WKH000920	WKH000925	WKH000942	
Time	NZST	07:45	08:10	08:45	09:50
Conductivity	mS/m@20C	11.7	11.7	12.0	12.6
DRP	g/m ³ P	0.026	0.025	0.032	0.029
Fluoride	g/m ³	-	0.06	0.05	0.23
Un-ionised ammonia	g/m ³	0.00036	0.00019	0.00043	0.00025
Ammoniacal nitrogen	g/m ³ N	0.029	0.012	0.042	0.046
Nitrite/Nitrate	g/m ³ N	-	0.36	-	0.50
pH		7.8	7.9	7.7	7.4
Suspended solids	g/m ³	<2	3	<2	3
Temperature	Deg.C	8.2	8.3	8.5	9.4
Turbidity	NTU	0.45	0.52	0.62	1.3
8 January 2016	WKH000800	WKH000920	WKH000925	WKH000942	
Time	NZST	08:30	09:00	09:30	10:20
Conductivity	mS/m@20C	11.9	11.9	12.4	12.2
DRP	g/m ³ P	0.013	0.014	0.017	0.021
Fluoride	g/m ³	-	0.07	0.07	0.07
Un-ionised ammonia	g/m ³	0.00008	0.00010	0.00131	0.00101
Ammoniacal nitrogen	g/m ³ N	<0.003	<0.003	0.062	0.038
Nitrite/Nitrate	g/m ³ N	-	<0.01	-	0.02
pH		7.8	7.9	7.7	7.8
Suspended solids	g/m ³	<2	<2	2	70
Temperature	Deg.C	18.2	18.4	18.5	18.6
Turbidity	NTU	0.54	0.56	1.6	5.3

17.1.1.2 Dry weather surveys

The sample results for the dry weather surveys (given in Table 68) show that all of the contaminants analysed for were generally relatively stable through the stretch of the river that was monitored. There were slight variations in the concentrations of ammoniacal nitrogen (and its conjugate species unionised ammonia). However the highest concentrations of ammoniacal nitrogen and unionised ammonia found were well below ANZECC trigger guideline of 0.9 g/m³ and the RFWP guideline of 0.025 g/m³ respectively. All results for DRP obtained during the dry weather surveys were below the 0.03-0.15 g/m³ range that may support algal growths.

All other parameters were found to be at acceptable ranges.

Table 68 Results of dry weather chemical monitoring of lower Waiwhakaiho River

Parameter	Waiwhakaiho		
	Constance Street	Opposite Firth's (Ford)	Above Mangaone Confluence
24 February 2016	WKH000920	WKH000925	WKH000942
Time NZST	12:49	13:22	13:30
Conductivity mS/m@20C	12.3	12.4	12.3
DRP g/m ³ P	0.011	0.010	0.010
Unionised ammonia g/m ³	0.00093	0.00203	0.00069
Ammoniacal nitrogen g/m ³ N	0.010	0.012	0.011
pH	8.3	8.6	8.1
Temperature Deg.C	20.7	20.4	21.2
Turbidity NTU	0.53	1.2	0.77
9 May 2016	WKH000920	WKH000925	WKH000942
Time NZST	11:07	11:15	11:45
Conductivity mS/m@20C	11.5	11.5	11.6
DRP g/m ³ P	0.022	0.023	0.022
Unionised ammonia g/m ³	0.00016	0.00022	0.00023
Ammoniacal nitrogen g/m ³ N	0.005	0.007	0.007
pH	8.0	8.0	8.0
Temperature Deg.C	14.6	14.4	15.1
Turbidity NTU	1.7	0.98	1.2

17.1.2 Mangaone Stream

The Mangaone Stream was sampled at up to six points during wet weather and at two points during dry weather.

17.1.2.1 Wet weather surveys

The wet weather sites are as follows:

Egmont Road (site code MGO000050): the uppermost site at Egmont Road Bridge.

Downstream of Katere Stores and NPDC (site code MGO000075): a site established in 2007 approximately 10 m downstream of the NPDC mid Katere Road stormwater discharge. This site acts as the downstream site for Katere Stores feedmill and NPDC's stormwater discharge, and as an upstream "control site" for TSM's timber treatment site.

30m downstream of TSM (site code MGO000145): also established in 2007, this site is at the end of the mix zone specified in TSM's resource consent.

Above Ravensdown (site code MGO000148): a site established in 1996 immediately above the main stormwater drain of Ravensdown's depot (and also above the confluence of the Mangamiro Stream) to enable differentiation of the influence of major tributaries below Egmont Road, particularly the Puremu and Manganaha Streams which flow through Colson Road landfill, from that of discharges from Ravensdown's site.

Katere Road bridge (site code MGO000153): below the discharge from Ravensdown's depot. This site is at the end of the mixing zone specified in Ravensdown's consent 3865.

Rifle Range Road (site code MGO000190): the bottom site at the Rifle Range Road Bridge, immediately above the Waiwhakaiho confluence and about 50 metres below the discharge point of Downer's site.

The results of this monitoring are given in Table 69, Table 70 and Table 71.

Table 69 Results of wet weather chemical monitoring of Mangaone Stream 15 July 2015

Parameter		Egmont Road	D/S Katere Stores and NPDC	D/S Taranaki Sawmills	Above Ravensdown	Katere Road bridge	Rifle Range Road
15 July 2015		MGO000050	MGO000075	MGO000145	MGO000148	MGO000153	MGO000190
Time	NZST	08:00	08:50	09:25	10:05	09:35	09:45
Arsenic Total	g/m ³	-	<0.0011	<0.0011	-	-	-
Boron	g/m ³	-	0.03	<0.01	<0.01	-	-
BODCF	g/m ³	0.6	<0.5	0.6			-
Conductivity @ 20°C	mS/m	17.8	16.2	17.0	16.8	17.4	17.7
Total chromium	g/m ³	-	<0.00053	0.00092	-	-	-
Acid soluble copper	g/m ³	0.003	-	-	-	-	<0.001
Dissolved copper	g/m ³	0.001	<0.001	<0.001	<0.001	-	<0.001
Total copper	g/m ³	-	0.00153	0.00160	-	-	-
Dibutyltin (as Sn)	g/m ³	-	-	<0.00006	-	-	-
Dissolved Reactive P	g/m ³	0.015	<0.003	<0.003	0.020	0.020	0.031
Hydrocarbons	g/m ³	b	b	b	b	b	b
IPBC	g/m ³	-	-	<0.0002	-	-	-
Un-ionised ammonia	g/m ³	0.00030	0.00025	0.00078	0.00089	0.00124	0.00191
Ammoniacal nitrogen	g/m ³ N	0.076	0.063	0.196	0.224	0.292	0.375
Oil and grease	g/m ³	b	b	b	b	b	b
Permethrin	g/m ³	-	-	<0.00002	-	-	-
pH	pH	7.2	7.2	7.2	7.2	-	7.3
Propiconazole	g/m ³	-	-	0.00005	-	-	-
Suspended solids	g/m ³	22	8	10	7	8	8
Tributyltin (as Sn)	g/m ³	-	-	<0.00005	-	-	-
Tebuconazole	g/m ³	-	-	<0.00004	-	-	-
Temperature	Deg.C	11.4	11.4	11.4	11.3	12.2	11.6
Triphenyltin (as Sn)	g/m ³	-	-	0.00004	-	-	-
Turbidity	NTU	13	7.7	7.8	8.3	-	7.2
Acid soluble zinc	g/m ³	0.007	-	-	-	-	<0.005
Dissolved zinc	g/m ³	<0.005	<0.005	0.006	0.006	-	<0.005
Zinc total	g/m ³	-	0.0071	0.0083	-	-	-

Table 70 Results of wet weather chemical monitoring of Mangaone Stream 18 May 2016

Parameter		Egmont Road	D/S Katere Stores and NPDC	D/S Taranaki Sawmills	Above Ravensdown	Katere Road bridge	Rifle Range Road
18 May 2016		MGO000050	MGO000075	MGO000145	MGO000148	MGO000153	MGO000190
Time	NZST	08:03	08:56	09:25	10:45	11:00	12:10
Total arsenic	g/m ³	-	<0.0011	0.0046	-	-	-
Boron	g/m ³	-	0.02	0.03	0.06	-	-
BODCF	-	-	0.8	1.1	-	-	-
Conductivity	mS/m	19.6	17.8	17.4	17.0	17.6	18.5
Total chromium	g/m ³		0.00094	0.0055	-	-	-
Acid soluble copper	g/m ³	0.001	-	-	-	-	0.004
Dissolved copper	g/m ³	0.001	0.004	0.005	0.002		0.004
Total copper	g/m ³	-	0.0036	0.0068	-	-	-
Dibutyltin (as Sn)	g/m ³	-	-	<0.00006	-	-	-
Dissolved reactive P	g/m ³	0.007	0.065	0.058	0.061	0.038	0.116
Hydrocarbons	g/m ³	b	b	b	b	b	b
IPBC	g/m ³	-	-	<0.0002	-	-	-
Un-ionised ammonia	g/m ³	0.00018	0.00034	0.00068	0.00049	0.00186	0.00244
Ammoniacal nitrogen	g/m ³ N	0.037	0.057	0.105	0.099	0.296	0.301
Oil and grease	g/m ³	b	1.4	-	b	b	b
Permethrin	g/m ³	-	-	0.00004	-	-	-
pH	pH	7.2	7.3	7.3	7.2	7.3	7.4
Propiconazole	g/m ³	-	-	0.00198	-	-	-
Suspended solids	g/m ³	3	25	20	14	12	7
Tributyltin (as Sn)	g/m ³	-	-	<0.00005	-	-	-
Tebuconazole	g/m ³	-	-	0.0024	-	-	-
Temperature	Deg.C	14.0	13.9	14.9	14.4	14.4	14.8
Triphenyltin (as Sn)	g/m ³	-	-	<0.00004	-	-	-
Turbidity	NTU	2.9	13	24	12	-	10
Acid soluble zinc	g/m ³	<0.005	-	-	-	-	0.027
Dissolved zinc	g/m ³	<0.005	0.049	0.060	0.039	-	0.018
Zinc total	g/m ³	-	0.086	0.099	-	-	-

The results show that there were downstream increases in the ammoniacal nitrogen and dissolved reactive phosphorus (DRP) concentrations along the stretch of the Mangaone Stream monitored. The longitudinal trends in ammoniacal nitrogen in the stream for the period are shown in Figure 23. The median value for each site show that historically, the sites below Ravensdown site and its discharges are elevated when compared to the upstream sites. During this monitoring period the results were either similar or below the historical medians for each site and all results for unionised ammonia were well below the RFWP guideline value of 0.025 g/m³.

DRP was also found to increase at the site downstream of the Ravensdown site, however all values were found to be similar or below the historical medians as. DRP concentrations appear have reduced at this site since Ravensdown decommissioned and demolished the rock store. In the event that the site is completely demolished and remediated it is expected that phosphorus levels will improve.

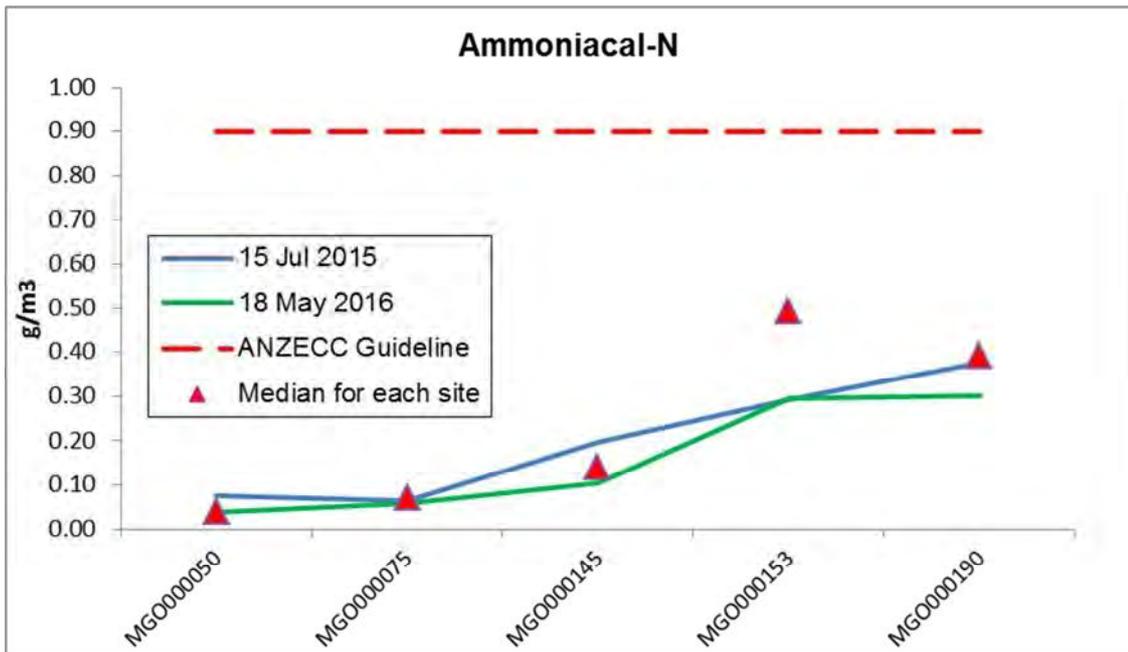


Figure 23 Longitudinal profiles of NH₄-N in the Mangaone Stream

BODCF concentrations during the monitoring year were also found to be low and within RFWP guideline limits.

Tributyltin was not detected in the water column downstream of the TSM discharge during the monitoring period. Two of the replacement treatment chemicals now in use were found to be present in the stream.

Metal and metalloid concentrations are monitored in the Mangaone Stream to determine what, if any, effects may be occurring due to the discharges from TSM and other industrial discharges. Sources of these contaminants include (to varying extents), the industrial sites and other non-point sources such as run-off from roads.

There are several guidelines for zinc and copper for assessing water quality in terms of suitability for sustaining aquatic life. The United States Environmental Protection Agency (USEPA), in defining metals criteria for protection of freshwater aquatic life, has adopted the use of dissolved metals as most closely approximating the bio available fraction of these metals in the water column. Previously, water quality criteria were based on total recoverable metal concentration.

The water quality criteria for dissolved copper and zinc, for water of hardness 50 g/m³ CaCO₃, are 0.005 g/m³ for Cu and 0.058 g/m³ for Zn respectively as a 4 day average, for chronic (long term) exposure. The corresponding criteria for acute (4-hour) exposure are 0.007 g/m³ for Cu and 0.064 g/m³ for Zn. Acute criteria only are applicable to wet weather sampling results, whereas both chronic and acute exposure criteria are applicable to dry weather sampling results.

Both the dissolved copper and dissolved zinc levels in the Mangaone Stream were found to be at or below the acute and chronic toxicity concentration given by the USEPA at all sites at the time of all of the surveys during the period under review.

Increases in total arsenic and total chromium were noted to be occurring at the site below TSM's discharges (MGO000145), however these were found to be below the ANZECC 95% trigger value (for arsenic) and DWSNZ for total chromium.

Low level analyses for zinc and copper were also performed on samples taken at the Egmont Road site to monitor the effects of stormwater discharged upstream of the industries monitored under this programme, from McKechnie Aluminium Solutions Ltd as part of their compliance monitoring programme. It is noted that historically, copper and brass were also processed at this site. The results are shown in Table 71.

Table 71 Results of chemical monitoring of the Mangaone Stream at Egmont Road for McKechnie Aluminium Solutions Ltd compliance monitoring-site MGO000050

Parameter	Unit	Wet run	Wet run	Wet run	Dry run
		15 Jul 2015	06 Aug 2015	18 May 2016	17 Jun 2016
Conductivity @ 20°C	mS/m@20C	17.8	14.1	19.6	18.7
Copper Acid Soluble	g/m ³	0.003	<0.01	0.001	<0.01
Copper Dissolved	g/m ³	0.001	0.002	0.001	<0.001
pH	pH	7.2	6.9	7.2	6.6
Suspended solids	g/m ³	22	24	3	<2
Temperature	Deg.C	11.4	13.1	14.0	12.5
Zinc Acid Soluble	g/m ³	13	-	2.9	-
Zinc Dissolved	g/m ³	0.007	<0.005	<0.005	<0.005

On these monitoring occasions, the copper and zinc concentrations in the receiving water were found to be low upstream of the industries monitored in the Lower Waiwhakaiho Catchment Monitoring Programme.

17.1.2.2 Dry weather surveys

During the period under review dry weather monitoring was undertaken in the Mangaone Stream in conjunction with monitoring of the groundwater in the vicinity of the Ravensdown site (Section 13.3.2.3). The two sites monitored were MGO000151, approximately 20 m downstream of the Ravensdown rear drain, and MGO000155, approximately 15 m downstream of the Katere Road Bridge. As this monitoring is predominantly carried out to assess potential effects from the Ravensdown store, the full results of these surveys are reported in Section 13.3.2.3, Table 52.

Due to elevations in the ammoniacal nitrogen concentration observed in a Ravensdown bore on Katere Road, this is the parameter of primary interest here and Figure 24 shows the trends in ammoniacal nitrogen concentrations at the upstream and downstream sites.

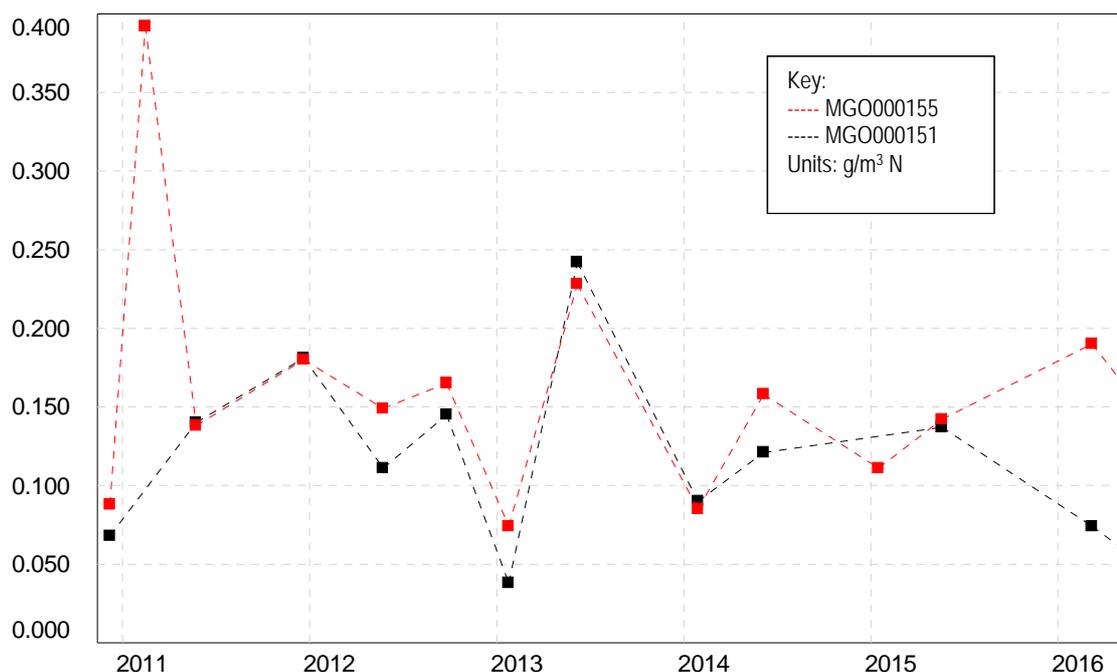


Figure 24 Mangaone Stream ammoniacal nitrogen concentrations in the vicinity of the Ravensdown site under dry weather conditions 2010-2016

Dry weather monitoring shows that, for the most part, the ammoniacal nitrogen of the downstream site was higher than the upstream site to varying degrees.

The increases observed during these dry weather conditions are not considered to be sufficient to cause significant adverse environmental effects during dry weather, however biomonitoring inspections have found that periphyton cover in the Mangaone Stream generally increases downstream of the Ravensdown site. Aquatic macrophytes were common at the stream margins at the top and bottom sites and in the stream at the three middle sites.

17.2 Freshwater biomonitoring programme

17.2.1 Macroinvertebrate surveys

Surveys of benthic macroinvertebrates and microflora in the lower Waiwhakaiho River and/or Mangaone Stream were carried out on 21 December 2015 and 16 March 2016. Three sites in the Waiwhakaiho River and five sites in the Mangaone Stream were sampled. The sites monitored are shown in Figure 3, and described in Table 72. Full copies of the biomonitoring reports are given in Appendix III. A summary of discussion and conclusions of each survey is given below.

The reports both conclude that the results from the surveys indicate that the discharges from the Fitzroy industrial areas were not having a significant effect on the macroinvertebrate communities in the Waiwhakaiho River. The reports also both conclude that the results from the Mangaone Stream indicate the possible effects of groundwater contamination in the vicinity of Ravensdown, however that an overall degradation of the macroinvertebrate community index (MCI) scores persist as one moves downstream through the industrial area. Noted also is the successive deterioration in MCI scores found at site MGO000150 (site 14) which may potentially indicate effects from the presence of LOSP chemicals and metals entering the stream.

Table 72 Biomonitoring sites in the Lower Waiwhakaiho River and the Mangaone Stream

Site No	Site Code	Location
7	WKH000920	Waiwhakaiho River, Constance Street
8	WKH000927	Waiwhakaiho River, below Firth industries, west (left) bank
13	WKH000950	Waiwhakaiho River, final riffle downstream of Lake Rotomanu
12	MGO000050	Mangaone Stream, Egmont Road
16	MGO000054	Mangaone Stream, 20m d/s of Manganaha Stream confluence
14	MGO000150	Mangaone Stream, 300m d/s confluence with Puremu Stream
15	MGO000155	Mangaone Stream, 100m d/s fertiliser works
11	MGO000190	Mangaone Stream, Rifle Range Road

17.2.1.1 Macroinvertebrate survey of 21 December 2015

The Council's standard 'kick sampling' and 'sweep-net' sampling techniques were used to collect streambed macroinvertebrates at five sites in the Mangaone Stream and three sites in the Waiwhakaiho River on 21 December 2015, in order to assess whether discharges from the Lower Waiwhakaiho Industrial area had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and SQMCI₅ scores for each site.

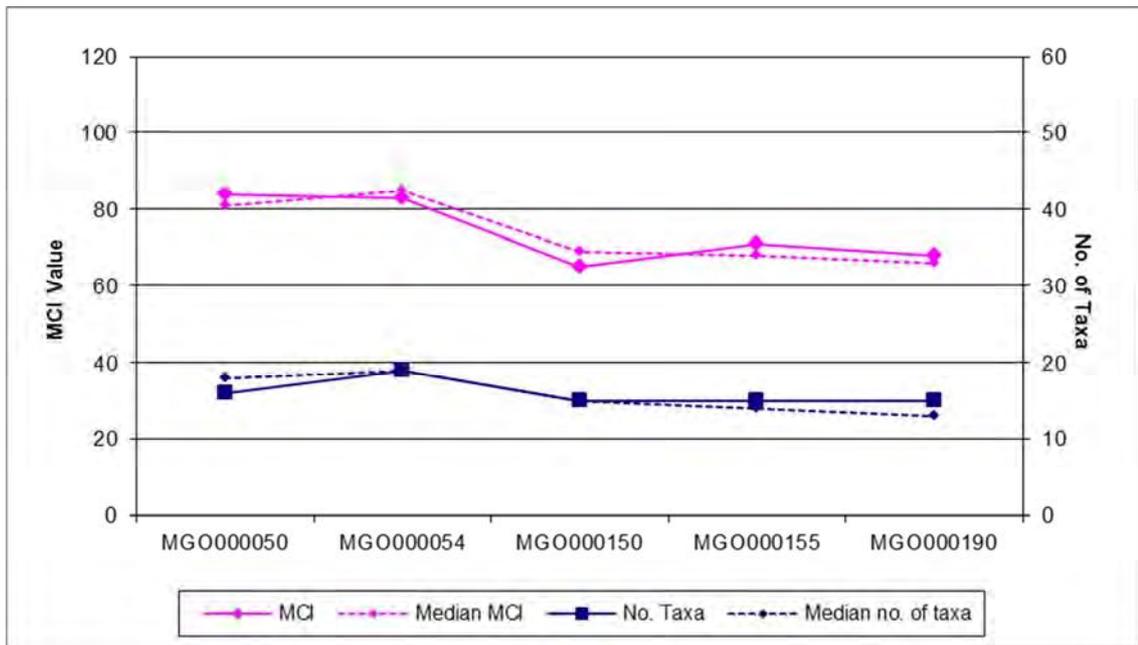
The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The SQMCI₅ takes into account taxa abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or SQMCI₅ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This survey found that all Waiwhakaiho River sampling sites recorded community richnesses similar to or slightly above long term medians for their respective sites, with no trend in richness in a downstream direction. MCI scores were not significantly (Stark, 1998) different to historical medians at all sites with site 7 recording a slightly higher and site 8 a substantially higher MCI score and site 13 recording a substantially lower MCI score. SQMCI₅ scores were higher than historical medians at sites 8 and 13 and slightly lower at site 7. SQMCI₅ scores were also relatively similar between sites, although the SQMCI₅ score at site 8 was substantially higher than that recorded at site 7. The change in communities between site 7 upstream of the industrial area and the downstream site 13 suggests possible recent impacts from industrial discharges. However, communities in the Waiwhakaiho River downstream of Lake Rotomanu may also be inhibited from time-to-time by the variable current speeds caused by tidal flooding. These results did not indicate significant effects of stormwater or wastewater discharges from the Fitzroy industrial area on the macroinvertebrate communities of the Waiwhakaiho River.

It is apparent that the macroinvertebrate communities in the Mangaone Stream were of 'fair' health in the upper reaches deteriorating to 'poor' health in a downstream direction. Most sites had moderate taxa richnesses which were lowest at the three

most downstream sites, while MCI scores were above or near to medians at all sites. SQMCI₅ scores were also above or near to historical medians, with a general decreasing trend recorded in a downstream direction. The five sampling sites in the Mangaone Stream showed a marked decline in MCI and SQMCI₅ values between Egmont Road (site 12) and Rifle Range Road (site 11), with a particularly marked decline in both SQMCI₅ and MCI scores between sites 16 and 14. TSM discharges stormwater to the Mangaone Stream between sites 16 and 14, and sediment sampling undertaken in early 2009 had recorded significant concentrations of not only tributyltin in the stream sediments around TSM, but also elevated concentrations of arsenic, chromium, copper and zinc, all potentially toxic to aquatic biota (see BJ192). Previously there had been increased sedimentation between sites 16 and 14. Further sediment sampling undertaken in April 2012 and early March 2014, showed less contamination than that recorded in 2009; more indicative of physical habitat induced effects contributing to the degree of biological health deterioration found more recently. There was a slight increase in MCI score between sites 14 and 15 however some deterioration in the lower reaches, most likely due to poorer habitat.

Overall, the results from the current survey indicated some improvements in comparison with historical results although a general deterioration in downstream biological health was found by the current survey. Groundwater inputs may have contributed to some of this deterioration recorded immediately downstream of the fertiliser depot in the lower reaches of the stream.



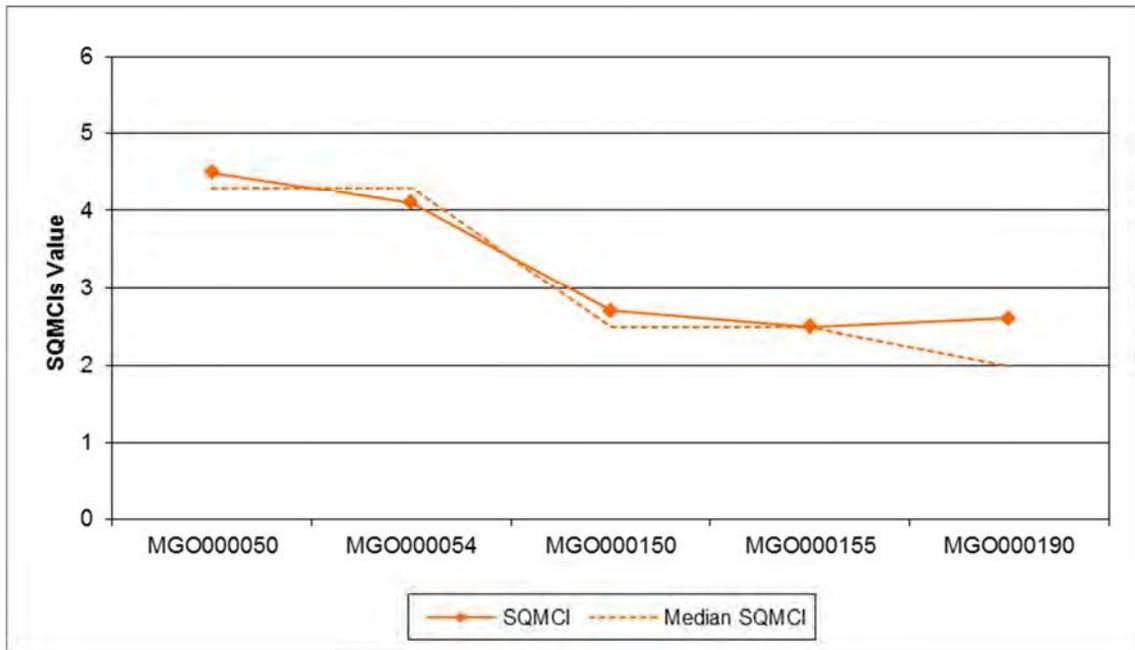


Figure 25 Longitudinal trend in number of taxa, MCI and SQMCI_s values in the Mangaone Stream for the survey of 21 December 2015

17.2.1.2 Macroinvertebrate survey of 16 March 2016

The Council's standard 'kick sampling' and 'sweep-net' sampling techniques were used to collect streambed macroinvertebrates at five sites in the Mangaone Stream and three sites in the Waiwhakaiho River on 16 March 2016, in order to assess whether discharges from the Lower Waiwhakaiho Industrial area had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and SQMCI_s scores for each site.

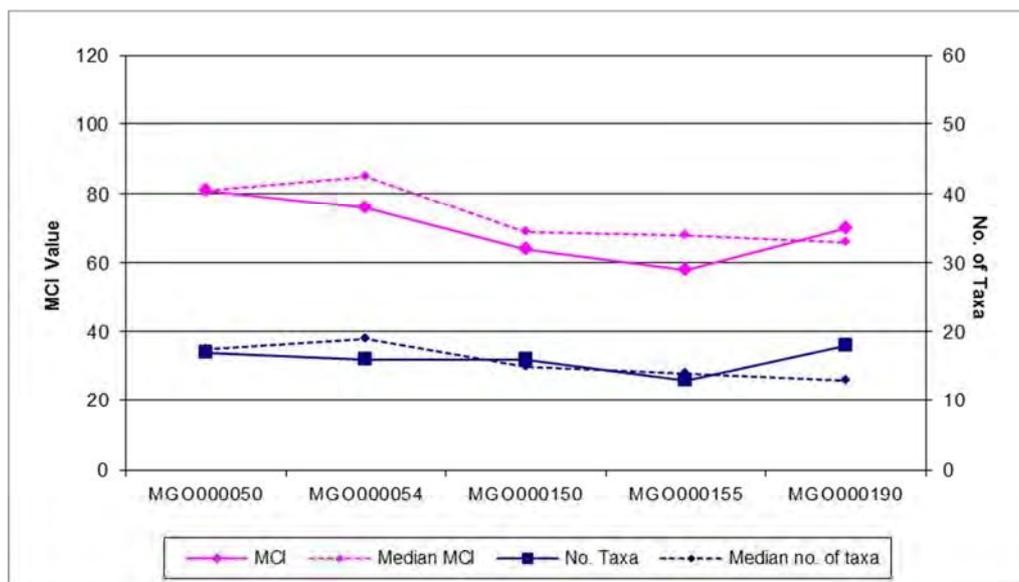
The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The SQMCI_s takes into account taxa abundances as well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

This survey found that all Waiwhakaiho River sampling sites recorded moderate community richnesses similar to long term medians for their respective sites, with no trend in richness in a downstream direction. MCI scores were either not significantly (Stark, 1998) different or significantly higher than historical medians. SQMCI_s scores were higher than historical medians at sites 8 and 13 and slightly lower at site 7. SQMCI_s scores were congruent with MCI scores showing no significant differences between sites and the bottom site had a significantly better score than normal. These results did not indicate significant effects of stormwater or wastewater discharges from the Fitzroy industrial area on the macroinvertebrate communities of the Waiwhakaiho River.

The Mangaone Stream sampling sites recorded moderate community richnesses similar to long term medians for their respective sites indicating that there had not been significant toxic discharges occurring. The macroinvertebrate community at the upstream 'control' site in the Mangaone Stream was of 'fair' health while downstream potentially impacted sites were in 'poor' health with less healthy communities recorded the further downstream the site was until a slight improvement in the bottom most site. MCI scores were generally lower but not significantly different to historical median scores at all sites. The SQMCI₅ scores were congruent with MCI scores indicating that the upstream site 12 had 'fair' health while all the downstream sites had 'poor' health (Stark and Maxted, 2007). However, unlike the MCI scores, the SQMCI₅ scores indicated a large, significant decrease between sites 12 and 16; with all further sites having slightly higher, but still very low, scores. The bottom site showed an insignificant improvement which partially mirrors the significant increase in MCI score between sites 15 and 11 suggesting a healthier macroinvertebrate community at site 11 in relation to the sites further upstream.

The five sampling sites in the Mangaone Stream showed a marked decline in MCI and SQMCI₅ values between Egmont Road (site 12) and Rifle Range Road (site 11), with a particularly marked decline in both SQMCI₅ and MCI scores between sites 12 and 16 and 16 and 14.

Overall, the results indicated that discharges from the industrial area was not having a negative effect on the macroinvertebrate communities in the lower Waiwhakaiho River but there was evidence that discharges were having a negative effect on macroinvertebrate communities present in the lower Mangaone Stream. Groundwater inputs may have contributed to some of this deterioration recorded immediately downstream of the fertiliser depot but other industries may also be contributing to poor water quality in the lower reaches of the Mangaone Stream.



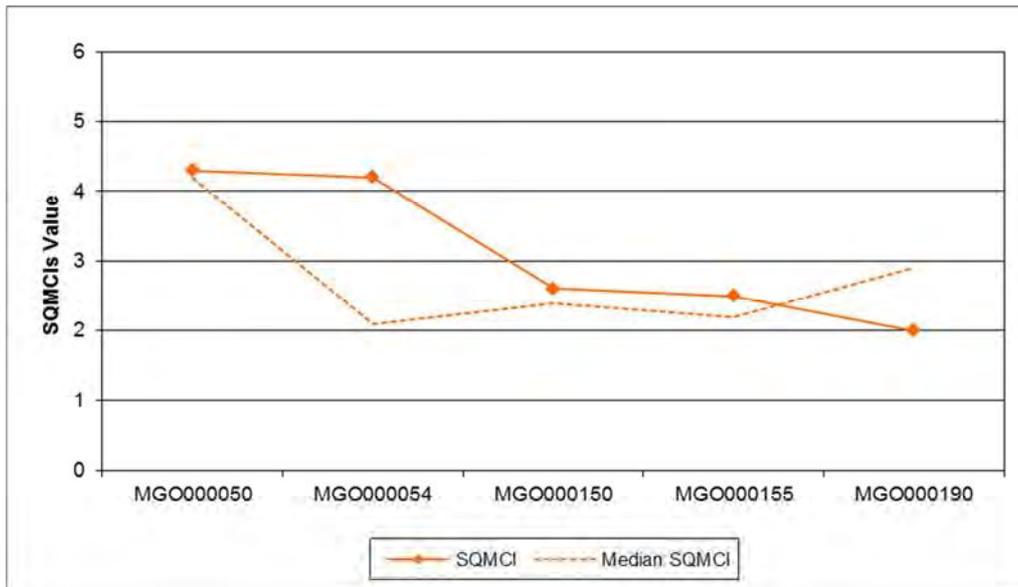


Figure 26 Longitudinal trend in number of taxa, MCI and SQMCI_s values in the Mangaone Stream for the survey of 16 March 2016

18. Summary of recommendations

1. THAT monitoring of discharges from AML Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
2. THAT monitoring of discharges from Downer EDI Works Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
3. THAT monitoring of discharges from Envirowaste Services Ltd in the 2016-2017 period continue at a similar level to that undertaken in the 2015-2016 period.
4. THAT monitoring of discharges from Firth Industries Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
5. THAT monitoring of discharges from Fitzroy Engineering Group Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
6. THAT monitoring of discharges from Freight and Bulk Transport Holdings Ltd in the 2016-2017 continue at a similar level as that undertaken in the 2015-2016 period.
7. THAT monitoring of discharges from Katere Stores Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
8. THAT monitoring of discharges from Nankervis Family Trust in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
9. THAT monitoring of discharges from New Plymouth District Council in the 2016-2017 period continues at similar a level to that undertaken in the 2015-2016 period.
10. THAT monitoring of discharges from New Zealand Decorative Concrete Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
11. THAT monitoring of discharges from New Zealand Railways Corporation in the 2016-2017 period remain similar to that undertaken in the 2015-2016 period.
12. THAT monitoring of discharges from Ravensdown Fertiliser Co-operative Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.
13. THAT monitoring programme for discharges from Taranaki Sawmills Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

14. THAT monitoring of discharges from Technix Group Ltd in the 2016-2017 period continue at a similar level as that undertaken in the 2015-2016 period.

Glossary of common terms and abbreviations

The following abbreviations and terms are 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
BODCF	filtered carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter in the filtered sample, excluding the biological conversion of ammonia to nitrate
CCA	copper-chromium-arsenic preparation used for treating timber
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
conductivity	conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
Cu*	copper
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
<i>E.coli</i>	<i>escherichia coli</i> , an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample
EEL	An environmental exposure limit (EEL) establishes the maximum concentration of an ecotoxic substance that is allowable in a particular environmental medium (for example, water, soil or sediment). This includes the deposition of a substance onto surfaces (for example via spray drift).
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
IBC	intermediate bulk container, a square 1000L plastic tank, generally encased in a steel cage.
IPBC	Iodopropynyl Butyl Carbamate- carbamate based fungicide used for treating timber

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
Incident Register	Incident Register entry- an event recorded by the Council on the basis that it had potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan
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
L/s	litres per second
LOSP	Light organic solvent preservative- a class of wood treatment compounds that include PRCA, TEBA and IPBC.
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
NH ₄	ammonium, normally expressed in terms of the mass of nitrogen (N)
NH ₃	unionised ammonia, normally expressed in terms of the mass of nitrogen (N)
NO ₃	nitrate, normally expressed in terms of the mass of nitrogen (N)
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water
NZEPA	New Zealand Environmental Protection Agency
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)
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)
PRCA	Propiconazole- A triazole fungicide used to treat timber
NOEC	No Observed Effect Concentration- is the highest concentration of a given contaminant that does not cause a statistically different effect than the negative control through statistical hypothesis
resource consent	refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15)
RMA	Resource Management Act 1991 and including all subsequent amendments
SS	suspended solids

SQMCI	semi quantitative macroinvertebrate community index;
TEBA	Tebuconazole- A triazole fungicide used to treat timber
Temp	temperature, measured in °C (degrees Celsius)
Turb	turbidity, expressed in NTU
USEPA	United States Environmental Protection Agency
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 the Council's laboratory.

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- World Health Organization (2009). *Potassium in Drinking-water Background document for development of WHO Guidelines for Drinking-water Quality.*

Appendix I

Resource consents to discharge into the lower Waiwhakaiho River and Mangaone Stream catchments in alphabetical order

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

Waiwhakaiho River

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

Name of
Consent Holder: Fitzroy Engineering Group Limited
Private Bag 2053
New Plymouth 4342

Decision Date: 12 March 2015

Commencement Date: 12 March 2015

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Waiwhakaiho River

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 10

Site Location: 691 Devon Road, Bell Block

Legal Description: Lot 2 DP 470783 (Discharge source & site)

Grid Reference (NZTM) 1696451E-5677694N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 3.3 ha.

Note: For the purpose of this condition the catchment area defined in this condition is a total for resource consent 0021-4.0 and 9853-2.0.

3. There shall be no discharge of contaminants from hydrotesting activities into the stormwater network.
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 24 hours prior to undertaking any hydrotesting activities outside of the workshop. Notification shall include the location and date of the proposed discharge, and shall be emailed to worknotification@trc.govt.nz.
5. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 50 gm ⁻³

This condition shall apply before entry of the stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

6. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
7. The consent holder consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures to be undertaken to prevent spillage or any discharge of contaminants not authorised by this consent The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity as being adequate to avoid, remedy or mitigate the environmental effects of such an event.

Consent 0021-4.0

8. The site shall be operated in accordance with a 'Stormwater Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the conditions of this consent and shall include but not be limited to:
 - a) Identification of sources of contaminants,
 - b) Methods that will be practised to ensure contaminants entering stormwater is at a practical minimum,
 - c) Methods that will be practised to ensure contaminants from hydrotesting activities will be prevented from entering stormwater;
 - d) the loading and unloading of materials;
 - e) maintenance of conveyance systems;
 - f) general housekeeping; and
 - g) management of any interceptor system.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - a) during the month of June 2020 and/or June 2026 and/or
 - b) within 3 months of receiving a notification under special condition 9 above;

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 12 March 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Fitzroy Engineering Group Limited
Private Bag 2053
New Plymouth 4342

Decision Date: 12 March 2015

Commencement Date: 12 March 2015

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Waiwhakaiho River

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 10

Site Location: 691 Devon Road, Bell Block

Legal Description: Lot 2 DP 470783 (Discharge source & site)

Grid Reference (NZTM) 1696577E-5677800N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 3.3 ha.

Note: For the purpose of this condition the catchment area defined in this condition is a total for resource consent 0021-4.0 and 9853-2.0.

3. There shall be no discharge of contaminants from hydrotesting activities into the stormwater network.
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council in writing at least 24 hours prior to undertaking any hydrotesting activities outside of the workshop. Notification shall include the location and date of the proposed discharge, and shall be emailed to worknotification@trc.govt.nz.
5. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 50 gm ⁻³

This condition shall apply before entry of the stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

6. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
7. The consent holder consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures to be undertaken to prevent spillage or any discharge of contaminants not authorised by this consent The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity as being adequate to avoid, remedy or mitigate the environmental effects of such an event.

Consent 9853-2.0

8. The site shall be operated in accordance with a 'Stormwater Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the conditions of this consent and shall include but not be limited to:
 - a) Identification of sources of contaminants,
 - b) Methods that will be practised to ensure contaminants entering stormwater is at a practical minimum,
 - c) Methods that will be practised to ensure contaminants from hydrotesting activities will be prevented from entering stormwater;
 - d) the loading and unloading of materials;
 - e) maintenance of conveyance systems;
 - f) general housekeeping; and
 - g) management of any interceptor system.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - a) during the month of June 2020 and/or June 2026 and/or
 - b) within 3 months of receiving a notification under special condition 9 above;

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 12 March 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of Consent Holder: Firth Industries Ltd (Division of Fletcher Concrete & Infrastructure Ltd)
P O Box 3122
Fitzroy
NEW PLYMOUTH

Change To Conditions Date: 29 May 2000 [Granted: 1 May 1996]

Conditions of Consent

Consent Granted: To discharge up to 200 litres/second of stormwater and up to 10 litres/second [2 cubic metres/day] of treated washdown water into the Waiwhakaiho River at or about GR: P19:067-397

Expiry Date: 1 June 2014

Review Date(s): June 2002, June 2008

Site Location: Fitzroy Road / Clemow Road, Fitzroy

Legal Description: DP 10146 New Plymouth City

Catchment: Waiwhakaiho

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. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not give rise to any or all of the following effects in the receiving waters of the Waiwhakaiho River:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

2. The following limits shall not be exceeded in the discharge effluent:

Suspended solids	100	mg/L
Oil & grease	15	mg/L

This condition shall apply prior to the entry of the discharge into the receiving waters of the Waiwhakaiho River at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

3. After allowing for reasonable mixing within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not give rise to an increase of greater than 0.5 pH increment, or a pH outside the range of 6.0 to 9.0 within the receiving waters of the Waiwhakaiho River.
4. The consent holder shall ensure that the rate of the discharge can be controlled at all times, and ceased if required, to ensure compliance with the special conditions of this consent.

Consent 0392-3

5. The consent holder shall properly and efficiently maintain and operate the ponds system in such a manner that any discharge which may occur shall not breach the required standards, and any corrective measures shall be designed and constructed to a standard to the satisfaction of the Chief Executive, Taranaki Regional Council.
6. The consent holder shall provide and maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants.
7. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2002 and/or June 2008, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects of the discharge on the receiving environment arising from the exercise of this 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.

Transferred at Stratford on 17 February 2006

For and on behalf of
Taranaki Regional Council

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: Firth Industries Limited
PO Box 3122
New Plymouth 4341

Decision Date: 21 July 2015

Commencement Date: 21 July 2015

Conditions of Consent

Consent Granted: To discharge stormwater and treated wastewater into the
Waiwhakaiho River

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 10

Site Location: Clemow Road, Fitzroy

Legal Description: Lot 1 DP 10146 Lot 2 DP 15134 & Sec 219 Hua Dist
(Discharge source & site)

Grid Reference (NZTM) 1696258E-5677519N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from an area not exceeding 1.618 Ha.
3. All stormwater shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.
4. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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) many significant adverse effects on aquatic life;
 - f) a pH of less than 6.0 or greater than 9.0;
 - g) a increase of pH greater than 0.5.
6. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

Consent 0392-4.0

7. By 21 October 2015 the consent holder shall prepare an updated 'Management Plan' to be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
 - a) the loading and unloading of materials;
 - b) general housekeeping;
 - c) design drawings and specifications for proposed upgrades to the wastewater treatment system and site improvements as set out in pre-design documents submitted in support of application 0392-4.0 by Firth Industries Limited on 3rd and 4th March 2015;
 - d) a schedule of time frames for the construction and commissioning of proposed wastewater treatment system and site improvements;
 - e) a schedule of inspections and maintenance of wastewater and stormwater treatment systems; and
 - f) any extra silt controls and stormwater management to be undertaken during construction of the upgrades.
8. By 22 February 2016 the consent holder shall undertake site improvements and upgrades to the wastewater treatment system as set out in the management plan required by condition seven. After 22 February 2016 wastewater shall not be included in the stormwater discharge.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge, site improvement construction, and or change in treatment systems. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act 1991. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - a) during the month of June 2020 and/or June 2026;
 - b) within 3 months of receiving a notification under special condition 9 above;

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 21 July 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

TRK964984

DISCHARGE 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

Consent
Granted Date: 23 August 1996

CONDITIONS OF CONSENT

Consent Granted: TO DISCHARGE UP TO 20 LITRES/SECOND OF LEACHATE FROM THE FORMER LANDFILL SITE AT BEWLEY ROAD BETWEEN CONSTANCE STREET AND VICKERS ROAD, NEW PLYMOUTH, INTO GROUNDWATER, AND INTO THE WAIWHAKAIHO RIVER VIA THE FLOW OF CONTAMINATED GROUNDWATER AT OR ABOUT GR: P19:064-393

Expiry Date: 1 June 2014

Review Date[s]: June 2002 and June 2008

Site Location: LAND BETWEEN STATE HIGHWAY 3 [DEVON ROAD] AND THE WAIWHAKAIHO RIVER AND FROM CONSTANCE STREET TO VICKERS ROAD, FITZROY

Legal Description: PT 2 DP17437, DP10423 SEC 1 DP1102 SEC 2 DP10423 PT 1 & SEC 2 DP9932 SEC 1 DP15861 BEING RESERVE ALSO SEC 201 BEING RESERVE BLK V PARITUTU SD

Catchment: WAIWHAKAIHO 392.000

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

TRK964984

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;
 - (ii) charges for the carrying out of the Council's functions under section 35 in relation to this consent; and
 - (iii) charges authorised by regulations.

SPECIAL CONDITIONS

1. THAT the following limits shall not be exceeded in the discharge:

Total Ammonia [as N]	15 mg/L
Dissolved Reactive Phosphorus	0.065 mg/L
pH	7.5

2. THAT the discharge shall not give rise to any of the following effects in the receiving water:

- a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
- 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, habitats, or ecology.

3. THAT the consent holder shall ensure that the three piezometers situated at the Bewley Road site are maintained for monitoring purposes.

4. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving written notice, should further chemical sampling reveal levels of contamination resulting in significant adverse environmental effects.

5. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2002 and/or June 2008 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects of the discharge on the environment.

Signed at Stratford on 23 August 1996

For and on behalf of
TARANAKI REGIONAL COUNCIL

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

TRK964984

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 4342

Decision Date: 16 March 2016

Commencement Date: 16 March 2016

Conditions of Consent

Consent Granted: To discharge leachate from a former landfill site into
groundwater, adjacent to the Waiwhakaiho River

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026

Site Location: Devon Road, Constance Street/Vickers Road,
New Plymouth

Grid Reference (NZTM) 1696236E-5677324N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The discharge shall not cause groundwater to breach the standards shown in the following table.

Constituent	Standard
Total Ammonia	Concentration not greater than 25 mg/L
Dissolved reactive phosphorus	Concentration not greater than 0.065 mg/L
pH	Within the range 6.5 to 8.5

2. The discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Waiwhakaiho downstream of the sampling site WKH000925:
 - a. the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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;
 - f. a concentration of unionised ammonia greater than 0.0025 g/m³ -N.
3. The consent holder shall ensure that the three piezometers situated at the Bewley Road site are maintained for monitoring purposes (sites GND0548, GND0555, GND0556).
4. 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 2020 and/or June 2026, 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 16 March 2016

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
NEW PLYMOUTH 4342

Consent Granted 10 June 2008
Date:

Conditions of Consent

Consent Granted: To discharge stormwater from the Waiwhakaiho industrial area into the Waiwhakaiho River via multiple outfalls between the State Highway 3 bridge and the confluence with the Mangaone Stream at or about (NZTM) 1695807E-5676977N, 1695902E-5677235N, 1696113E-5677288N, 1696233E-5677323N, 1696377E-5677616N, 1696472E-5677706N, 1696539E-5677767N, 1696573E-5677800N, 1696611E-5677837N, and 1696683E-5677904N

Expiry Date: 1 June 2026

Review Date(s): June 2010, June 2014, June 2020

Site Location: Rifle Range Road, New Plymouth

Legal Description: Various

Catchment: Waiwhakaiho

*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 consent holder shall prevent, where possible, or mitigate any erosion occurring as a result of the exercise of this consent.
3. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Waiwhakaiho River:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

Consent 5163-2

4. 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 2010 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 10 June 2008

For and on behalf of
Taranaki Regional Council

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 Zealand Railways Corporation
 P O Box 593
 WELLINGTON 6140

Consent Granted
Date: 24 July 1996

Conditions of Consent

Consent Granted: To discharge up to 13 cubic metres/day of stormwater,
 including treated wastewater from washing and
 maintenance of wagons, containers and locomotives, into
 the Waiwhakaiho River at or about (NZTM)
 1696313E-5676749N

Expiry Date: 1 June 2014

Review Date(s): June 2002, June 2008

Site Location: Rail Terminal, Smart Road, New Plymouth

Legal Description: Pt Lot 1 DP 3582 Pt CT F1/350 Pt Sec 144 Hua Dist SO
 11437 Blk VI Paritutu SD

Catchment: Waiwhakaiho

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. That components of the discharge shall not exceed the following concentrations:

pH [range]	6 - 9	
Oil and grease	15	gm ⁻³
Suspended solids	100	gm ⁻³
Ammonia	20	gm ⁻³
Reactive dissolved phosphate	20	gm ⁻³

This condition shall apply prior to the entry of the discharge into the Waiwhakaiho River, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

2. That the consent holder shall maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants, and the procedures to be carried out should such a spillage occur.
3. That wastewater from cleaning operations shall be restricted to the cleaning of railway wagons and containers used for freighting the following substances: meat; dairy products; fertiliser; resin; tallow; urea and woodchips.
4. That after allowing for reasonable mixing the discharge shall not give rise to any of the following effects in the receiving waters:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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, habitats or ecology.

Consent 3528-2

5. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2002 and/or June 2008 for the purpose of ensuring That the conditions are adequate to deal with any adverse effects of the discharge on the receiving waters.

Transferred at Stratford on 1 June 2009

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TRK973140

DISCHARGE PERMIT

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

Name of Consent Holder: RAVENSDOWN FERTILISER CO-OPERATIVE LIMITED
P O BOX 452 DUNEDIN

Renewal Granted Date: 26 November 1997

CONDITIONS OF CONSENT

Consent Granted: TO DISCHARGE UP TO 700 LITRES/SECOND OF STORMWATER FROM A FERTILISER STORAGE DEPOT VIA MCLEODS DRAIN INTO THE WAIWHAKAHIO RIVER AT OR ABOUT GR: P19:062-390

Expiry Date: 1 June 2014

Review Date[s]: June 1999, June 2002 and June 2008

Site Location: SMART ROAD NEW PLYMOUTH

Legal Description: WAIWHAKAIHO RIVER RESERVE BLK VI PARITUTU SD

Catchment: WAIWHAKAIHO 392.000

Tributary: MCLEODS DRAIN

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

TRK973140

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 following limits shall not be exceeded in the discharge:

pH [range]	6.0-8.5
Suspended solids	100 gm ⁻³
Oil and grease	15 gm ⁻³

This conditions shall apply prior to the entry of the discharge into the receiving water at a designated sampling point.

2. THAT allowing for a mixing zone of 150 metres extending downstream of the discharge from McLeods Drain, the discharge shall not give rise to any of the following effects in the receiving water of the Waiwhakaiho River:
- i) an un-ionised ammonia concentration of greater than 0.025 gm⁻³;
 - ii) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - iii) any conspicuous change in the colour or visual clarity;
 - iv) any significant adverse effects on aquatic life, habitats, or ecology.
3. THAT the consent holder shall maintain a contingency plan, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants in the stormwater catchment and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge. The consent holder shall annually review and maintain the plan.
4. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 1999, June 2002 and/or June 2008, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects of the discharge on the environment arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Signed at Stratford on 26 November 1997

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: Technix Group Limited
Private Bag 2222
New Plymouth 4342

Decision Date: 24 October 2014

Commencement Date: 24 October 2014

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Mangaone Stream

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 8

Site Location: 691 Devon Road, Bell Block

Legal Description: Lot 1 DP 20360 (Discharge source & site)

Grid Reference (NZTM) 1696748E-5677890N

Catchment: Waiwhakaiho

Tributary: Mangaone

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 1.3 ha.
3. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 50 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

Consent 9982-1.0

6. Within three months of the granting of this consent, the site shall be operated in accordance with a 'Stormwater Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the conditions of this consent and shall include as a minimum:
 - a) identification of sources of contaminants,
 - b) methods that will be practised to ensure contaminants entering stormwater is at a practical minimum,
 - c) the loading and unloading of materials;
 - d) maintenance of conveyance systems;
 - e) general housekeeping; and
 - f) management of the interceptor system.
7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. 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:
 - a) during the month of June 2020 and/or 2026 and/or
 - b) within 3 months of receiving a notification under special condition 7 above and/or
 - c) within 3 months of receiving the Stormwater Management Plan under special condition 6 above

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 24 October 2014

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

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

Name of
Consent Holder: Technix Group Limited
Private Bag 2222
New Plymouth 4342

Decision Date: 24 October 2014

Commencement Date: 24 October 2014

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Waiwhakaiho River

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 9

Site Location: 691 Devon Road, Bell Block

Legal Description: Lot 2 DP 20360 (Discharge source & site)

Grid Reference (NZTM) 1696623E-5677733N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 2.2 ha.
3. After 31 December 2015 there shall be no discharge from the truckwash to the stormwater network.
4. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 50 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
6. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

Consent 0291-3.0

7. Within three months of the granting of this consent, the site shall be operated in accordance with a 'Stormwater Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the conditions of this consent and shall include as a minimum:
 - a) identification of sources of contaminants,
 - b) methods that will be practised to ensure contaminants entering stormwater is at a practical minimum,
 - c) the loading and unloading of materials;
 - d) maintenance of conveyance systems;
 - e) general housekeeping; and
 - f) management of the interceptor system.
8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act 1991. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
9. 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:
 - a) during the month of June 2020 and/or 2026 and/or
 - b) within 3 months of receiving a notification under special condition 8 above and/or
 - c) within 3 months of receiving the Stormwater Management Plan under special condition 7 above.

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 24 October 2014

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

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

Name of
Consent Holder: Technix Group Limited
Private Bag 2222
New Plymouth 4342

Decision Date: 24 October 2014

Commencement Date: 24 October 2014

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Waiwhakaiho River

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 8

Site Location: 691 Devon Road, Bell Block

Legal Description: Lot 1 DP 20360 (Discharge source & site)

Grid Reference (NZTM) 1696449E-5677553N

Catchment: Waiwhakaiho

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 1.8 ha.
3. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 50 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

Consent 9981-1.0

6. Within three months of the granting of this consent, the site shall be operated in accordance with a 'Stormwater Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site will be managed to achieve compliance with the conditions of this consent and shall include as a minimum:
 - a) identification of sources of contaminants,
 - b) methods that will be practised to ensure contaminants entering stormwater is at a practical minimum,
 - c) the loading and unloading of materials;
 - d) maintenance of conveyance systems;
 - e) general housekeeping; and
 - f) management of the interceptor system.
7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act 1991. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. 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:
 - a) during the month of June 2020 and/or 2026 and/or
 - b) within 3 months of receiving a notification under special condition 7 above and/or
 - c) within 3 months of receiving the Stormwater Management Plan under special condition 6 above

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 24 October 2014

For and on behalf of
Taranaki Regional Council



A D McLay
Director - Resource Management

Mangaone Stream

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

Name of
Consent Holder: AML Limited [Trading as Allied Concrete]
P O Box 3318
NEW PLYMOUTH

Consent Granted
Date: 30 July 2008

Conditions of Consent

Consent Granted: To discharge stormwater and treated wastewater from truck washing at a concrete batching plant into the Mangaone Stream in the Waiwhakaiho catchment at or about (NZTM) 1696910E-5677375N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020 and/or within 3 months of receiving a notification under special condition 9

Site Location: 67 Hurlstone Drive, Bell Block

Legal Description: Lot 1 DP 17583 Blk II Paritutu SD

Catchment: Waiwhakaiho

Tributary: Mangaone

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. Notwithstanding any conditions within this consent, 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 maximum stormwater catchment area shall be no more than 5880 m².
3. Any above ground hazardous substances storage areas shall be bunded with drainage to the wastewater treatment system, and not directly to the stormwater catchment.
4. Concentrations of the following components shall not be exceeded in the discharge:

Component	Concentration
suspended solids	100 g/m ³
oil and grease	15 g/m ³

This condition shall apply prior to the entry of the stormwater and wastewater into the receiving waters, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Mangaone Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

Consent 4539-2

6. After allowing for reasonable mixing, within a mixing zone extending 50 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to an increase in pH of greater than 0.5, or a pH outside the range of 6.0 to 8.0 within the receiving waters of the Mangaone Stream.
7. The consent holder shall maintain, and adhere to, a contingency plan detailing measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent, and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
8. Within three months of the granting of this consent, the consent holder shall prepare and maintain an operation and management plan. This plan shall be adhered to at all times and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall include but not necessarily be limited to:
 - a) the loading, unloading and storage of materials;
 - b) maintenance of conveyance systems;
 - c) general housekeeping; and
 - d) management of the wastewater treatment system.
9. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes in the processes undertaken at the site, or the chemicals used or stored on site, which could alter the nature of the discharge. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - a) during the month of June 2014 and/or June 2020; and/or
 - b) within 3 months of receiving a notification under special condition 9 above,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 30 July 2008

For and on behalf of
Taranaki Regional Council

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: Downer EDI Works Limited
PO Box 272
New Plymouth 4340

Decision Date: 20 May 2015

Commencement Date: 20 May 2015

Conditions of Consent

Consent Granted: To discharge treated stormwater and minor amounts of treated air scrubber waste water from an asphalt manufacturing plant onto land and into the Mangaone Stream

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special condition 8

Site Location: Rifle Range Road, New Plymouth

Legal Description: Sec 4 SO 436795 (Discharge source & site)

Grid Reference (NZTM) 1696712E-5677949N

Catchment: Waiwhakaiho

Tributary: Mangaone

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from a catchment area not exceeding 6.5 Ha.
3. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total recoverable hydrocarbons	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.
6. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as a minimum:
 - a) the loading and unloading of materials;
 - b) general housekeeping; and
 - c) management of the treatment systems.

Consent 3917-3.0

7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. 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:
 - a) during the month of June 2020 and/or June 2026; and/or
 - b) within 3 months of receiving a notification under special condition 7 above;

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 May 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Envirowaste Services Limited
Private Bag 92810
Penrose
Auckland 1642

Decision Date: 6 May 2015

Commencement Date: 6 May 2015

Conditions of Consent

Consent Granted: To discharge stormwater from an industrial site into the
Puremu Stream and an unnamed tributary of the Mangaone
Stream

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 9

Site Location: 31 Colson Road, New Plymouth

Legal Description: Lot 1 DP 3582, Pt Sections 144 and 145 Hua District, Pt Lot 1 DP
2210, Pt Purakau A2 2B, Pt Lot DP 8654, Pt Sections 19 Blk VI
Paritutu SD (Discharge source & site)

Grid Reference (NZTM) 1696639E-5676673N (Discharge point 1)
1696993E-5676758N (Discharge point 2)

Catchment: Waiwhakaiho

Tributary: Puremu
Mangaone

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from an area not exceeding 4.93 ha and as shown in the attached plan.
3. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. At the point at which the discharge enters the Mangaone Stream, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.
6. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
 - a) the loading and unloading of materials;
 - b) general housekeeping; and
 - c) management of the stormwater system.

Consent 10109-1.0

7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. This consent shall lapse on 30 June 2020, 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(1)(b) of the Resource Management Act 1991.
9. 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:
 - a) during the month of June 2020 and/or June 2026 and/or
 - b) within 3 months of receiving a notification under special condition 7 above;

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 6 May 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Freight & Bulk Transport Limited
PO Box 472
New Plymouth 4340

Decision Date: 5 June 2015

Commencement Date: 5 June 2015

Conditions of Consent

Consent Granted: To discharge treated truck wash water and stormwater onto
and into land

Expiry Date: 1 June 2018

Review Date(s): In accordance with special condition 7

Site Location: 69 Katere Road, New Plymouth

Legal Description: Lot 1 DP 13577 Lot 2 DP 17884 & Sec 184 Hua Dist Blk VI
& Paritutu SD Lot 2 DP 9418 Lot 1 DP 9418
(Discharge source & site)

Grid Reference (NZTM) 1697056E – 5677302N
1697091E – 5677315N

Catchment: Waiwhakaiho

Tributary: Mangaone

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

General condition

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

Special conditions

1. The consent holder shall 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. All truck wash water shall be directed through the treatment system for treatment prior to discharge in accordance with the special conditions of this permit.
3. The discharge shall not, either by itself or in combination with other discharges, give rise to any of the following effects in the Mangaone Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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;
 - f) the concentration of unionised ammonia to exceed 0.025 g/m³;
 - g) an increase in in the concentration of filtered carbonaceous biochemical oxygen demand of 2.00 g/m³.
4. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.
5. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
 - a) the maintenance and management of primary treatment measures;
 - b) the scheduling of sampling and trigger values for desludging the collection sump; and
 - c) general housekeeping.

Consent 2041-3.0

6. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
7. 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 within 3 months of receiving a notification under special condition 0 above; 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 5 June 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Freight & Bulk Transport Limited
PO Box 472
New Plymouth 4340

Decision Date: 5 June 2015

Commencement Date: 5 June 2015

Conditions of Consent

Consent Granted: To discharge stormwater onto and into land and into the
Mangaone Stream

Expiry Date: 1 June 2032

Review Date(s): June 2020, June 2026 and in accordance with special
condition 9

Site Location: 69 Katere Road, New Plymouth

Legal Description: Lot 1 DP 13577 Lot 2 DP 17884 & Sec 184 Hua Dist Blk VI
& Paritutu SD & Lot 2 DP 9418 Pt Lot 1 DP 9418
(Discharge source & site)

Grid Reference (NZTM) 1697103E – 5677252N
1697061E – 5677209N
1697033E – 5677144N

Catchment: Waiwhakaiho

Tributary: Mangaone

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

General condition

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

Special conditions

1. The consent holder shall 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 stormwater discharged shall be from an area not exceeding 1.77 Ha.
3. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
carbonaceous biochemical oxygen demand	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling points approved by the Chief Executive, Taranaki Regional Council.

4. After allowing for reasonable mixing, within a mixing zone extending 30 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in Mangaone Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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; and
 - f) an unionised ammonia concentration of greater the 0.025 g/m³-N.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity.

Consent 10008-1.0

6. The site shall be operated in accordance with an up to date 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the site is to be managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
 - a) the loading and unloading of materials;
 - b) general housekeeping;
 - c) management of the treatment systems; and
 - d) timeframes for any proposed improvements.

Note: A Stormwater Management Plan template is available in the Environment section of the Taranaki Regional Council's web site www.trc.govt.nz.

7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. This consent shall lapse on 30 June 2020 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(1)(b) of the Resource Management Act 1991.
9. 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:
 - a) during the month of June 2020 and/or June 2026
 - b) within 3 months of receiving a notification under special condition 7 above;

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 5 June 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Farmlands Co-operative Society Limited
23 Sir William Pickering Society Drive
CHRISTCHURCH 8053

Decision Date: 11 January 2002

Commencement Date: 11 January 2002

Conditions of Consent

Consent Granted: To discharge minor volumes of treated industrial wastewater and up to 128 litres/second of treated stormwater from a stockfeed milling plant into an unnamed tributary of the Mangaone Stream in the Waiwhakaiho catchment at or about (NZTM) 1697412E-5677349N

Expiry Date: 1 June 2020

Review Date(s): June 2003, June 2005, June 2008, June 2014

Site Location: 99 Katere Road, New Plymouth

Legal Description: Lot 2 DP 15406 Blk VI Paritutu SD

Catchment: Waiwhakaiho

Tributary: Mangaone

*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. This consent shall be exercised generally in accordance with the information submitted in support of application 1669 and to ensure the conditions of this consent are maintained.
2. The consent holder shall advise the Chief Executive, Taranaki Regional Council, prior to making any change in the processes undertaken at the site, or the materials used on site, which could alter the quantity or nature of the discharge.
3. The stormwater treatment system shall be maintained to the satisfaction of the Chief Executive, Taranaki Regional Council.
4. The following concentrations shall not be exceeded within the discharge effluent:

Component	Concentration
pH (range)	6.0-9.0
suspended solids	100 gm ⁻³
oil and grease	15 gm ⁻³
biochemical oxygen demand	25 gm ⁻³

This condition shall apply prior to the entry of the treated stormwater and wastewater into the Katere Road stormwater system, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. The discharge shall not give rise to any of the following effects in the receiving waters of the Mangaone Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

Consent 4548-2

6. The discharge shall not cause the concentration of filtered carbonaceous biochemical oxygen demand to exceed 2.00 gm⁻³ in the Mangaone Stream.
7. The discharge shall not cause the concentration of unionised ammonia to exceed 0.025 gm⁻³ in the Mangaone Stream.
8. The consent holder shall prepare and maintain a contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants, and procedures to be carried out should such a spillage or discharge occur.
9. That within three months of the granting of this consent, the consent holder shall prepare and maintain an operation and management plan to the satisfaction of the Chief Executive, Taranaki Regional Council including but not limited to:
 - a) The loading and unloading of materials;
 - b) maintenance of conveyance systems;
 - c) general housekeeping;
 - d) management of the interceptor system.
10. The consent will be exercised in accordance with the procedures set out in the operation and management plan, and the consent holder shall subsequently adhere to and comply with the procedures, requirements, obligations and all other matters specified in the operation and management plan, except by specific agreement of the Chief Executive, Taranaki Regional Council. In the case of contradiction between the operation and management plan and the conditions of this resource consent, the conditions of the resource consent shall prevail.
11. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the operation and management plan. Should the Taranaki Regional Council wish to review the operation and management plan, one month's notice shall be provided to the consent holder.
12. 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 2003 and/or June 2005 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.

Transferred at Stratford on 10 December 2013

For and on behalf of
Taranaki Regional Council

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: Nankervis Family Trust
165 Lower Flag Range Road
R D 9
HASTINGS 4179

Consent Granted
Date: 20 October 2006

Conditions of Consent

Consent Granted: To discharge truck washwater via an interceptor system
into the Mangaone Stream in the Waiwhakaiho catchment
at or about GR: P19:073-394

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2014

Site Location: 1 Dean Place, New Plymouth

Legal Description: Lot 2 DP 350826

Catchment: Waiwhakaiho

Tributary: Mangaone

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 adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the riverbed and any adverse effects on water quality.
2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4368. In the case of any contradiction between the documentation submitted in support of application 4368 and the conditions of this consent, the conditions of this consent shall prevail.
3. Prior to the exercise of this consent, the consent holder shall provide for the written approval of the Chief Executive, Taranaki Regional Council, a management plan relating to contingency planning and management of stormwater and washwater for the site.
4. After reasonable mixing, the contaminant whether by itself or in combination with other contaminants, shall not cause any of the following effects:
 - a) the production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emissions of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals; and
 - e) any significant adverse effects on aquatic life.
5. There shall be no direct discharge of untreated washwater into the Mangaone Stream, as a result of the exercise of this consent.

Consent 6965-1

6. The following concentrations shall not be exceeded in the discharge:

Component	Concentration
pH [range]	6-9
Suspended solids	100 gm ⁻³
Oil and Grease	15 gm ⁻³

This condition shall apply prior to the entry of the washwater discharge into the Mangaone Stream at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

7. The consent holder shall not discharge any product used to degrease plant or equipment or discharge any detergent used for truck washing in terms of this consent. The consent holder shall not discharge any water containing concrete, cement or water used to remove concrete and/or cement products from either trucks or equipment.
8. The consent holder shall ensure that no adverse effects shall occur to surface water or groundwater as a result of the exercise of this consent.
9. This consent shall lapse on the expiry of five years after the date of issue 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(1)(b) of the Resource Management Act 1991.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 20 October 2006

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
NEW PLYMOUTH 4342

Consent Granted 10 June 2008
Date:

Conditions of Consent

Consent Granted: To discharge stormwater from the Katere and
Waiwhakaiho industrial areas into the Mangaone Stream
via multiple outfalls between Egmont Road and the
confluence with the Waiwhakaiho River at or about (NZTM)
1697233E-5677145N, 1697032E-5677145N,
1696882E-5677087N, 1696734E-5676990N,
1696545E-5677175N, 1696755E-5677622N,
1696757E-5677671N, 1696771E-5677957N, and
1696777E-5677965N

Expiry Date: 1 June 2026

Review Date(s): June 2010, June 2014, June 2020

Site Location: Katere Road, New Plymouth

Legal Description: Various

Catchment: Waiwhakaiho

Tributary: Mangaone

*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 consent holder shall prevent, where possible, or mitigate any erosion occurring as a result of the exercise of this consent.
3. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the Mangaone Stream:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

Consent 1275-3

4. 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 2010 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 10 June 2008

For and on behalf of
Taranaki Regional Council

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 Zealand Decorative Concrete Limited
 P O Box 7022
 NEW PLYMOUTH 4341

Consent Granted 22 December 2009
Date:

Conditions of Consent

Consent Granted: To discharge stormwater from a decorative concrete
 products manufacturing site into the Mangaone Stream in
 the Waiwhakaiho catchment at or about (NZTM)
 1697381E-5677456N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: 42A Egmont Road, New Plymouth

Legal Description: Lot 1 DP 12763

Catchment: Waiwhakaiho

Tributary: Mangaone

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 stormwater discharged shall be from a catchment area not exceeding 0.26ha.
3. By 22 March 2010, all stormwater shall be directed for treatment through a drain warden or equivalent stormwater treatment system, to be installed and maintained to the satisfaction of the Chief Executive, Taranaki Regional Council, for discharge in accordance with the special conditions of this permit.
4. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not directly to the stormwater catchment.
5. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

Consent 7450-1

6. After allowing for reasonable mixing, within a mixing zone extending 30 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.
7. By 22 March 2010, the consent holder shall prepare and maintain a contingency plan. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to worknotification@trc.govt.nz. Notification by fax or post is acceptable if the consent holder does not have access to email.
9. This consent shall lapse on 31 December 2014, 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(1)(b) of the Resource Management Act 1991.
10. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review:
 - a) during the month of June 2014 and/or June 2020; and/or
 - b) within 3 months of receiving a notification under special condition 8 above;

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 22 December 2009

For and on behalf of
Taranaki Regional Council

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 Zealand Railways Corporation
 P O Box 593
 WELLINGTON 6140

Consent Granted 31 July 2009
Date:

Conditions of Consent

Consent Granted: To discharge stormwater from the Smart Road Rail
 Terminal into an unnamed tributary of the Mangaone
 Stream, and into the Mangaone Stream in the
 Waiwhakaiho catchment at or about (NZTM)
 1696529E-5676921N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: Smart Road, New Plymouth

Legal Description: Pt Sec 144 & 145 Hua Dist, Pt Lot 1 DP 2210 & Pt Lot 2
 DP 8654

Catchment: Waiwhakaiho

Tributary: Mangaone

*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. Notwithstanding any other condition of this consent, 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 stormwater discharged shall be from a catchment area not exceeding 11.28ha.
3. By 30 September 2009, where goods are on site in excess of 3 days, any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or discharged via a three stage interceptor and stop valve such that the flow can be isolated in the event of a spill.
4. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
Oil and Grease	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

5. After allowing for reasonable mixing, within a mixing zone extending to the Katere Road Bridge (NZTM 1696444E-5676696N) downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - 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.

Consent 1735-3

6. The consent holder shall maintain a contingency plan, which shall be reviewed at not more than 2 yearly intervals. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
7. By 30 September 2009, the consent holder shall prepare and maintain a stormwater management plan. This plan shall be adhered to at all times and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall include but not necessarily be limited to:
 - a) the loading and unloading of materials;
 - b) maintenance of conveyance systems;
 - c) general housekeeping; and
 - d) management of the interceptor system;and shall be reviewed at not more than 2 yearly intervals.
8. This consent shall lapse on 30 September 2014, 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(1)(b) of the Resource Management Act 1991.
9. 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 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 31 July 2009

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TRK973865

DISCHARGE PERMIT

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

Name of RAVENSDOWN FERTILISER CO-OPERATIVE LIMITED
Consent Holder: P O BOX 452 DUNEDIN

Renewal
Granted Date: 26 November 1997

CONDITIONS OF CONSENT

Consent Granted: TO DISCHARGE UP TO 700 LITRES/SECOND OF STORMWATER
FROM A FERTILISER STORAGE DEPOT INTO THE MANGAONE
STREAM IN THE WAIWHAKAIHO CATCHMENT AT OR ABOUT GR:
P19:066-388

Expiry Date: 1 June 2014

Review Date[s]: June 1999, June 2002 and June 2008

Site Location: KATERE ROAD NEW PLYMOUTH

Legal Description: 18166 175 PT SUB 5 17WC 3UR SEC 1, 2 & 143 BLK VI PARITUTU
SD

Catchment: WAIWHAKAIHO 392.000

Tributary: MANGAONE 392.010

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

TRK973865

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 following limits shall not be exceeded in the discharge:

pH [range]	6.0-8.5
Suspended solids	100 gm ⁻³
Oil and grease	15 gm ⁻³
- 2. THAT the consent holder shall manage the stormwater disposal system in such a manner as to minimise the discharge of free phosphate to the Mangaone Stream.
- 3. THAT allowing for a mixing zone extending downstream to the Katere Road bridge, the discharge shall not give rise to any of the following effects in the receiving water of the Mangaone Stream:
 - i) an un-ionised ammonia concentration of greater than 0.025 gm⁻³;
 - ii) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - iii) any conspicuous change in the colour or visual clarity;
 - iv) any significant adverse effects on aquatic life, habitats, or ecology.
- 4. THAT the consent holder shall maintain a contingency plan, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants in the stormwater catchment and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge. The consent holder shall annually review and maintain the plan.
- 5. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 1999 and/or June 2002 and/or June 2008, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects of the discharge on the environment arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at that time.

Signed at Stratford on 26 November 1997

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: Taranaki Sawmills Limited
P O Box 7145
Fitzroy
NEW PLYMOUTH

Consent Granted
Date: 17 October 2006

Conditions of Consent

Consent Granted: To discharge cooling water and wastewater from a timber drying plant and stormwater from a timber treatment site into the Mangaone Stream in the Waiwhakaiho catchment at or about GR: P19:069-388

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2009, June 2010, June 2014

Site Location: 45 & 53 Katere Road, Fitzroy, New Plymouth

Legal Description: Lot 1 DP 20347 Lot 2 DP 12871 Sec 177 Hua Dist Blk VI Paritutu SD

Catchment: Waiwhakaiho

Tributary: Mangaone

Consent 3491-2

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 application 4046. In the case of any contradiction between the documentation submitted in support of application 4046 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall adhere to the New Zealand Timber Preservation Council "Best Practice Guideline for the Safe Use of Timber Preservatives and Antisapstain Chemicals" September 2005 in so far as these guidelines address any matter relevant to the activity authorised by this consent. Where there is a conflict between the requirements of this guideline and the conditions of this consent, then the conditions of this consent shall prevail.
4. From the 31 March 2007 the consent holder shall ensure that all bunding (secondary containment) and any internal bunding, including but not limited to the internal LOSP bunding, meet the requirements of regulations 35 to 41 of the Hazardous Substances (Emergency Management) Regulations 2001 as amended by the Hazardous Substances (Classes 1 to 5 Controls) Amendment Regulations 2004 .
5. The maximum stormwater catchment area shall be no more than 5.3188 ha.
6. The wastewater/cooling water discharge shall be no more than 12 cubic metres per day.

Consent 3491-2

7. The following concentrations shall not be exceeded in the discharge:

Component	Concentration
oil and grease	15 g/m ³
suspended solids	100 g/m ³
Arsenic	0.24 g/m ³
Boron	3.7 g/m ³
Copper (dissolved)	0.088 g/m ³
Chromium	0.4 g/m ³
Tributyltin	0.0046 g/m ³
Zinc (dissolved)	0.64 g/m ³

This condition shall apply prior to the discharge of the stormwater into the receiving environment, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

8. After allowing for reasonable mixing, within a mixing zone extending 30 metres downstream of the discharge point, the discharge shall not either by itself, or in combination with other discharges, give rise to any or all of the following effects in the receiving waters of the Mangaone Stream:
- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - any conspicuous change in the colour or visual clarity;
 - any emission of objectionable odour;
 - the rendering of fresh water unsuitable for consumption by farm animals;
 - any significant adverse effects on aquatic life.
9. After allowing for reasonable mixing within a mixing zone extending 30 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to an increase of greater than 0.5 pH increment, or a pH outside the range of 6.0 to 9.0 within the receiving waters of the Mangaone Stream.
10. After allowing for reasonable mixing, within a mixing zone extending 30 metres downstream of the discharge point, the discharge shall not either by itself or in combination with other discharges give rise to any or all of the following effects in the receiving waters of the Mangaone Stream:
- an increase in temperature of more than 3 degrees Celsius;
 - the natural temperature of the water to exceed 25 degrees Celsius;
 - a filtered carbonaceous 5 day biochemical oxygen demand of more than 2 g/m³.
11. The consent holder shall investigate the permethrin, iodocarb, propiconazole and tebuconazole levels in site discharge, receiving water and Mangaone Stream sediment and to satisfaction of Chief Executive, Taranaki Regional Council

Consent 3491-2

12. The consent holder shall investigate to satisfaction of Chief Executive, Taranaki Regional Council:
 - (a) The assimilative capacity of the Mangaone Stream under wet weather conditions, in relation to the dissolved copper concentration of the site discharge, the Mangaone Stream and the critical maximum concentration as per the United States Environmental Protection Agency National Recommended Water Quality Criteria 2006.
 - (b) What, if any remedial action is required at the site to ensure that the discharge from the site does not result in the water quality criteria, described in 12(a), from being exceeded.
13. The consent holder shall report on the investigations required by conditions 11 and 12 to the satisfaction of the Chief Executive, Taranaki Regional Council by 30 August 2007.
14. The consent holder shall provide and maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants.
15. This consent shall lapse on the expiry of five years after the date of issue 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(1)(b) of the Resource Management Act 1991.
16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008, and/or June 2009, and/or June 2010, 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.
17. Conditions 3 and 4 of this resource consent may be reviewed at any time, consequent to any amendment or revision of the New Zealand Timber Preservation Council "Best Practice Guideline for the Safe Use of Timber Preservatives and Antisapstain Chemicals" September 2005, or regulations 35 to 41 of the Hazardous Substances (Emergency Management) Regulations 2001 as amended in the Hazardous Substances (Classes 1 to 5 Controls) Amendment Regulations 2004

Signed at Stratford on 17 October 2006

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix II

Biomonitoring reports – macroinvertebrate surveys

To L Smith, Scientific Officer
From B Jansma and B Thomas, Scientific Officers
Document 1677050
Report No. BT059
Date 06 May 2016

Biomonitoring of the Lower Waiwhakaiho River and the Mangaone Stream in the Fitzroy Industrial Area, December 2015

Introduction

This was the first of two scheduled surveys in the 2015-2016 monitoring programme, for the combined industries of the Fitzroy industrial area. Results from surveys performed since the 2000-2001 monitoring years are discussed in several reports referenced at the end of this report. The monitoring related to the wastewater/stormwater discharge permits tabulated below:

Consent holder	Consent No
Ravensdown	3140,3865
Firth Industries	0392
Hooker Brothers	3141
NPDC (Stormwater)	3138,1126,1275
NPDC (Bewley Road)	4984
TranzRail	1735,3528
Farmlands	4548
Allied Concrete Ltd	4539
Taranaki Sawmills	3491
Technix Group Ltd	0021,0291,2230
Works Infrastructure Ltd	3917

Methods

On 21 December 2015, the standard '400 ml kick sampling' technique was used to collect streambed macroinvertebrates from three sites in the lower Waiwhakaiho River and from four sites in the Mangaone Stream, while the standard '400 ml sweep-sampling' technique was used to collect streambed macroinvertebrates from site 12 in the Mangaone Stream (Table 1, Figure 1). The 'sweep-net-sampling' technique is very similar to Protocol C2 (soft-bottomed, semi-quantitative), and the 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative), of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark *et al*, 2001).

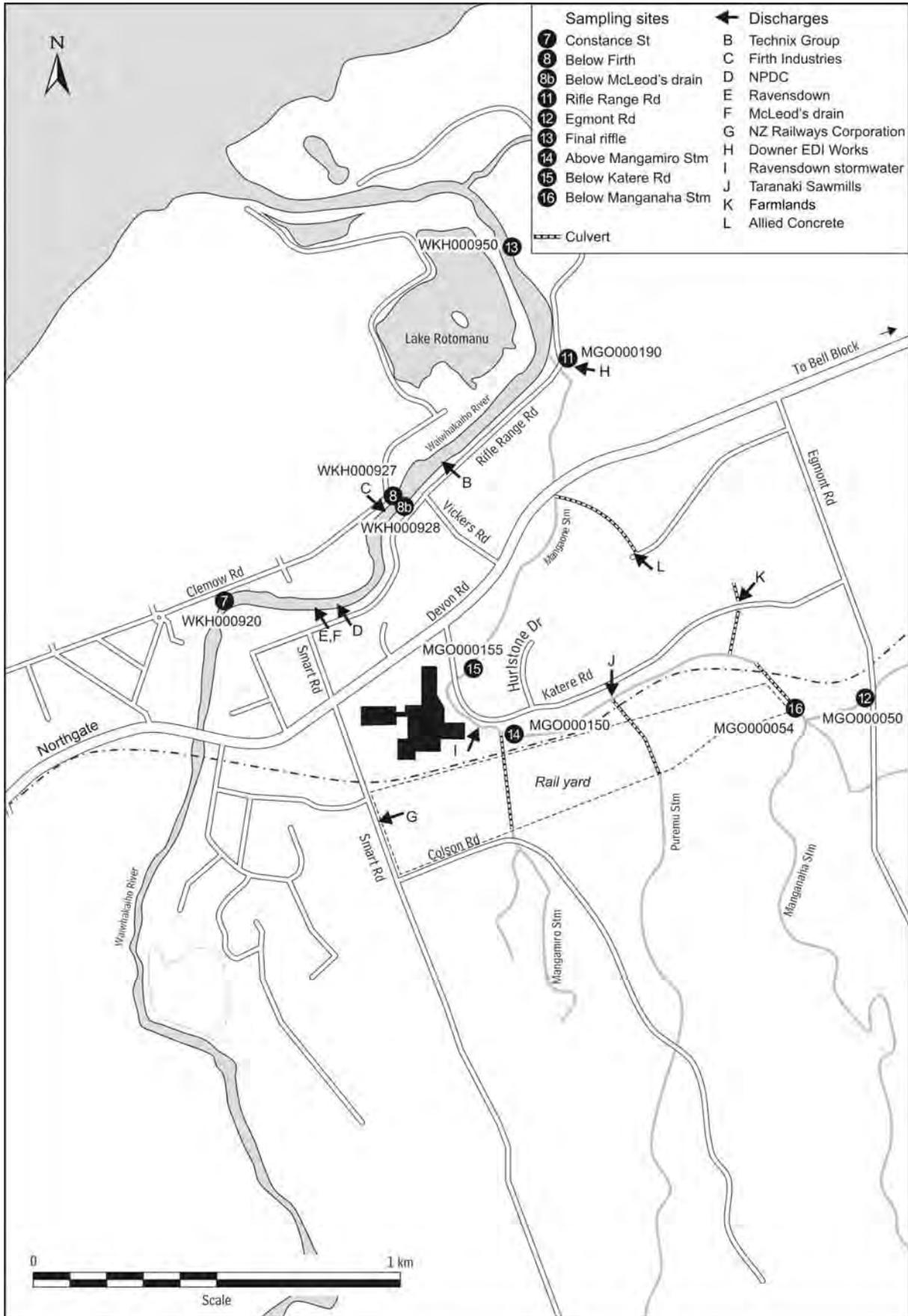


Figure 1 Biomonitoring sites in the Lower Waiwhakaiho River and the Mangaone Stream

The three sites from the Waiwhakaiho River used in this survey have been sampled biannually in recent years. In the Mangaone Stream, two sites have been sampled biannually in the past with sampling of the other three sites (14, 15 and 16) biannually since February 2005.

Table 1 Biomonitoring sites in the Lower Waiwhakaiho River and the Mangaone Stream

Site No	Site Code	Location
7	WKH000920	Waiwhakaiho River, Constance Street
8	WKH000927	Waiwhakaiho River, below Firth industries, west (left) bank
13	WKH000950	Waiwhakaiho River, final riffle downstream of Lake Rotomanu
12	MGO000050	Mangaone Stream, Egmont Road
16	MGO000054	Mangaone Stream, 20m d/s of Manganaha Stream confluence
14	MGO000150	Mangaone Stream, 300m d/s confluence with Puremu Stream
15	MGO000155	Mangaone Stream, 100m d/s fertiliser depot
11	MGO000190	Mangaone Stream, Rifle Range Road

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al. 2001). Macroinvertebrate taxa found in each sample were recorded as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value.

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams (such as the Mangaone Stream site 12) is possible if results are related to physical habitat (e.g. good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

A semi-quantitative MCI value (SQMCI_s) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI_s is not multiplied by a scaling factor of 20, therefore SQMCI_s values range from 1 to 10, while MCI values range from 20 to 200.

Results and discussion

This December 2015 survey was performed during low to moderate flow conditions (eight days since the last fresh of three times median flow and 20 days after seven times the median flow in the Waiwhakaiho River). The moderate flow at all three sampling sites in the Waiwhakaiho River was clear and uncoloured at the time of this survey. Filamentous algae was patchy at all sites and periphyton mats were patchy at sites 7 and 13 and widespread at site 8. Water temperatures in the Waiwhakaiho River ranged from 19.5 to 19.8°C at the time of this mid morning survey. Substrate at all three sites was comprised predominantly of cobbles and boulders, with gravels and sand also being an important component. A proportion of silt (5%) was also recorded at site 13. No macrophytes were recorded at any of the three Waiwhakaiho River sites.

The low to moderate flow in the Mangaone Stream was uncoloured and clear at sites 12 and 16, and uncoloured and cloudy at sites 14, 15 and 11 below the Manganaha Stream confluence. Water flow was slow at site 12, steady at sites 16 and 14 and swift at sites 15 and 11. Periphyton cover generally increased in a downstream direction and comprised slippery mats at site 12, slippery mats and patchy filaments at site 16, patchy mats and widespread filaments at sites 14 and 15 and widespread mats and patchy filaments at site 11. Aquatic macrophytes were common at the stream margins at sites 12 and 14 but were not recorded growing at sites 16, 15 or 11.

An observation made at the time of the March 2009 survey at site 11, was that the Waiwhakaiho River may have backed up the Mangaone Stream, reducing the flushing potential of the previous fresh. This was confirmed in 2010 (see photos in BJ192), and is likely to be a common feature of larger floods in this catchment.

Samples were collected from all sites using the kick sampling technique, except for site 12, as this was mainly a weedy, silty site. The substrate at site 12 was comprised entirely of silt whereas substrate at site 16 was predominantly silt with a combination of sand and gravels with some cobble. The substrate at sites 14, 15 and 11 comprised mainly of gravel, cobble and boulder (with some sand and silt). Water temperatures at the time of this morning survey in the Mangaone Stream ranged from 15.4° to 16.9°C.

Macroinvertebrate communities

A summary of taxa numbers and MCI values from previous surveys performed in the Waiwhakaiho River and the Mangaone Stream in relation to the Fitzroy industrial area are presented in Table 2 together with current results. The full results of the survey are presented in Table 3 (Waiwhakaiho River) and Table 4 (Mangaone Stream).

Table 2 Numbers of taxa and MCI and SQMCI_s values recorded in previous surveys performed in the Waiwhakaiho River and Mangaone Stream since July 1983 in relation to the Fitzroy industrial area, together with the results of the survey of 21 December 2015

Location	Site No.	Numbers of taxa				MCI values			SQMCI _s Values			
		N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
Waiwhakaiho River	7	58	20	12-29	18	89	66-110	92	34	3.3	1.7-7.3	3.0
	8	56	21	13-30	28	87	69-115	97	34	3.3	1.8-6.3	3.9
	13	49	20	12-30	19	87	67-111	79	34	2.7	1.6-7.4	3.5
Mangaone Stream	12	46	18	8-28	16	81	66-95	84	34	4.3	2.4-4.9	4.5
	16	29	19	3-30	19	85	47-103	83	26	4.3	1.2-5.5	4.1
	14	31	15	6-28	15	69	53-95	65	27	2.5	1.1-3.7	2.7
	15	23	14	7-23	15	68	48-81	71	22	2.5	1.5-3.8	2.5
	11	51	13	4-21	15	66	50-85	68	34	2.0	1.5-3.6	2.6

Table 3 Macroinvertebrate fauna of the Waiwhakaiho River in relation to the Fitzroy industrial area sampled on 21 December 2015

Taxa List	Site Number	MCI score	7	8	13
	Site Code		WKH000920	WKH000927	WKH000950
	Sample Number		FWB15390	FWB15391	FWB15392
NEMERTEA	Nemertea	3	-	-	R
NEMATODA	Nematoda	3	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	VA	A	A
MOLLUSCA	<i>Potamopyrgus</i>	4	-	C	A
CRUSTACEA	<i>Paracalliope</i>	5	-	-	R
	<i>Paratya</i>	3	-	R	-
EPHEMEROPTERA (MAYFLIES)	<i>Coloburiscus</i>	7	-	C	R
	<i>Deleatidium</i>	8	C	R	-
	<i>Ichthybotus</i>	8	-	R	-
	<i>Nesameletus</i>	9	-	C	-
PLECOPTERA (STONEFLIES)	<i>Zephlebia group</i>	7	-	C	-
	<i>Austroperla</i>	9	R	-	-
COLEOPTERA (BEETLES)	<i>Zelandobius</i>	5	-	R	R
	Elmidae	6	C	A	A
MEGALOPTERA (DOBSONFLIES)	Hydraenidae	8	-	R	-
	<i>Archichauliodes</i>	7	R	C	C
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche (Aoteapsyche)</i>	4	VA	VA	A
	<i>Costachorema</i>	7	R	-	-
	<i>Hydrobiosis</i>	5	C	C	R
	<i>Neurochorema</i>	6	R	R	-
	<i>Olinga</i>	9	-	R	-
	<i>Oxyethira</i>	2	R	A	A
DIPTERA (TRUE FLIES)	<i>Pycnocentroides</i>	5	-	R	-
	<i>Aphrophila</i>	5	A	A	A
	<i>Maoridiamesa</i>	3	A	A	A
	Orthoclaadiinae	2	A	A	A
	<i>Polypedilum</i>	3	-	R	-
	Tanytarsini	3	R	C	R
	<i>Paradixa</i>	4	R	-	-
	Empididae	3	-	R	R
	Ephydriidae	4	R	A	R
	Muscidae	3	-	R	R
<i>Austrosimulium</i>	3	R	R	R	
Tanyderidae	4	R	-	-	
No of taxa			18	28	19
MCI			92	97	79
SQMCIs			3.0	3.9	3.5
EPT (taxa)			6	11	4
%EPT (taxa)			33	39	21
'Tolerant' taxa		'Moderately sensitive' taxa		'Highly sensitive' taxa	

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Waiwhakaiho River

Constance Street (site 7)

A moderate taxa richness (18 taxa) was found at this site, upstream of all discharges from the Fitzroy industrial area. This was two taxa less than the median richness for this site (Table 2 and Figure 2), but within the range of previous richnesses.

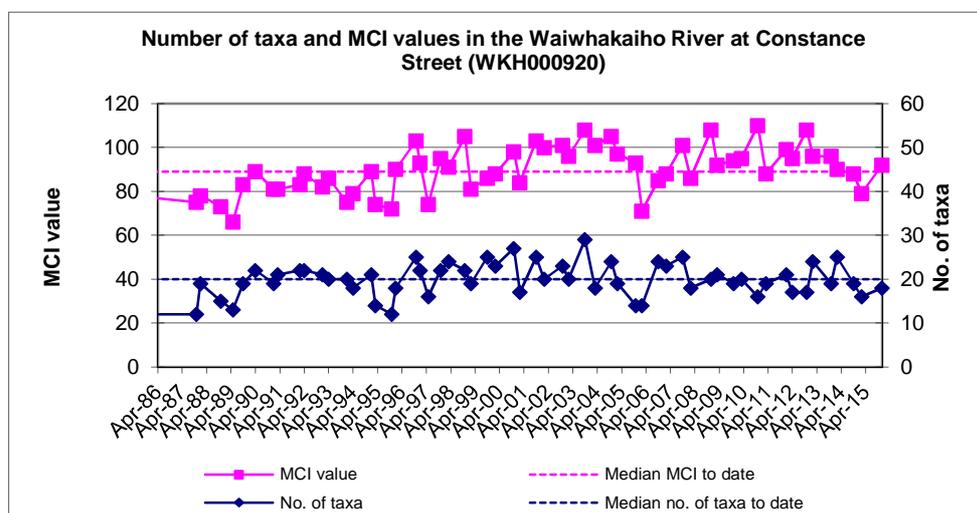


Figure 2 Numbers of taxa and MCI values for Waiwhakaiho River at Constance Street since 1987

No 'highly sensitive' taxa were recorded in abundance at site 7. The community was characterised by four 'tolerant' taxa [oligochaete worms, net-building caddisfly (*Aoteapsyche*), orthoclad midges and chironomid midge (*Maoridiamesa*)] and one 'moderately sensitive' taxon [crane fly (*Aphrophila*)] (Table 3).

The higher proportion of 'tolerant' taxa (56% of richness) present in the community was reflected in the MCI score of 92 units, an insignificant 3 units higher than the median score for this site (Table 2 and Figure 2). This was a significant (Stark, 1998) 13 units higher than the previous summer survey score, and similar to the predictive values (Stark and Fowles, 2009) for this site situated in the lower reaches of a ringplain river (MCI of 90 units) (TRC, 2015).

The SQMCI_s value of 3.0 units was 0.3 unit below the median value for this site, more typical of values for the lower reaches of ringplain streams and rivers subject to nutrient enrichment. This score reflected the numerical dominance by mainly 'tolerant' taxa and was below the previous summer survey score at this site (by 0.7 unit).

Below Firth Industries, left bank (site 8)

This site had a moderately high community richness (28 taxa); seven taxa more than the historical median at this site (Table 2 and Figure 3).

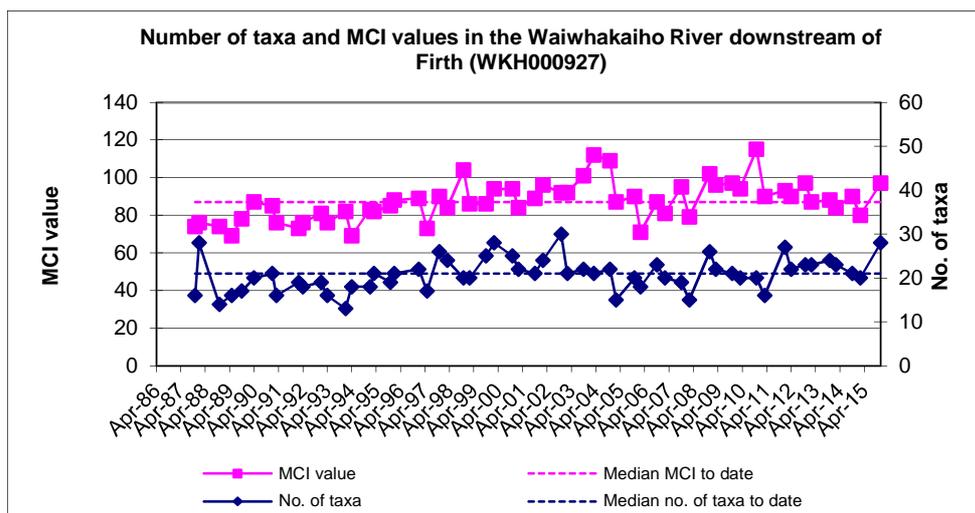


Figure 3 Numbers of taxa and MCI values for Waiwhakaiho River below Firth Industries (left bank) since 1987

No ‘highly sensitive’ taxa were found in abundance at this site. The community was characterised by eight taxa; six ‘tolerant’ taxa [oligochaete worms, net-building caddisfly (*Aoteapsyche*), axehead caddis (*Oxyethira*), shore flies (Ephydriidae), orthoclad midges and chironomid midge (*Maoridiamesa*) and two ‘moderately sensitive’ taxa [elmid beetles and crane fly (*Aphrophila*)](Table 3).

An equal proportion of ‘tolerant’ and ‘sensitive’ taxa in this site’s community was reflected by the MCI score of 97 units. This was a significant (Stark, 1998) 17 units higher than the score recorded by the previous summer survey (Figure 3) and was 10 units higher than the median for this site (Table 2). The score was also five units higher than that recorded upstream at site 7. There were six significant changes in community composition recorded between the two sites 7 and 8 including the increased abundance of three ‘tolerant’ taxa, two ‘moderately sensitive’ taxa and one ‘highly sensitive’ taxon. The MCI score of 97 units was higher than median ‘control’ scores for such a site in the lower reaches of a ringplain river (TRC, 2015).

The SQMCI_s score of 3.9 units recorded at site 8 was a substantial 0.9 unit higher than that recorded at the upstream site and higher (by 0.6 unit) than the historical median for this site. It was also 0.3 unit higher than the value found by the previous summer survey.

Overall, this indicated that this survey was preceded by moderate physicochemical water quality conditions.

Downstream of Lake Rotomanu (site 13)

A moderate richness of 19 taxa was found at this site, situated downstream of all industrial discharges to the lower catchment, within a reach where high tides may slow river current speeds (and very occasionally increase salinity) near the river mouth. This richness was four taxa more than that recorded by the previous summer survey and one taxon less than the historical median richness, and nine taxa less than recorded at site 8 below Firth Industries (Table 2 and Figure 4).

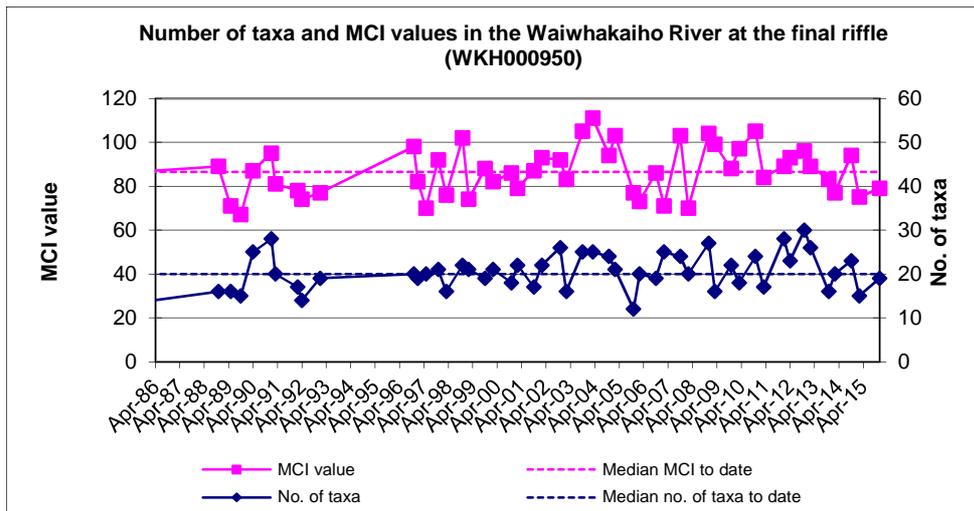


Figure 4 Numbers of taxa and MCI values for Waiwhakaiho River d/s of Lake Rotomanu since 1987

The macroinvertebrate community was characterised by six ‘tolerant’ taxa [oligochaete worms, snail (*Potamopyrgus*), net-building caddisfly (*Aoteapsyche*), axehead caddis (*Oxyethira*), orthoclad midges and chironomid midge (*Maoridiamesa*)] and two ‘moderately sensitive’ taxa [elmid beetles and cranefly (*Aphrophila*)](Table 3). There were two significant differences in individual taxon abundances recorded between sites 8 and 13 including the decrease of two ‘sensitive’ taxa.

The high proportion of ‘tolerant’ taxa in the community at site 13 (63%) was higher than that recorded at site 8, resulting in a lower MCI score of 79 units, which was a substantial 8 units lower than the long term median for this site (Figure 4). In addition a numerical dominance of six ‘tolerant’ taxa resulted in the SQMCI_s value of 3.5 units which was 0.4 unit less than that recorded upstream at site 8. This result was substantially (0.8 unit) higher than the median score for this site (2.7 units) but slightly lower (by 0.1 unit) than that recorded by the previous summer (2015) survey (Table 2).

Mangaone Stream

Macroinvertebrate samples collected from the two sites at the upper (site 12) and lower (site 11) ends of the surveyed reach in the Mangaone Stream in the past have found distinctly different community compositions at the two sites with much of the variation due to the streambed habitat differences, i.e. sandy-weedy, softer substrate at the upstream site (site 12 at Egmont Road) and harder, stony-gravel substrate at the downstream site (site 11 at Rifle Range Road). Additional sites have been sampled in recent years (in the reach between these historically surveyed sites) to further ascertain why poor water quality is indicated at site 11 at Rifle Range Road despite the improvement in habitat when compared to site 12 upstream of all the industrial discharges.

Table 4 Macroinvertebrate fauna of the Mangaone Stream in relation to the Fitzroy industrial area sampled on 21 December 2015

Taxa List	Site Number	MCI score	12	16	14	15	11
	Site Code		MGO000050	MGO000054	MGO000150	MGO000155	MGO000190
	Sample Number		FWB15393	FWB15394	FWB15395	FWB15396	FWB15397
COELENTERATA	Coelenterata	3	-	-	R	-	-
NEMERTEA	Nemertea	3	-	R	-	R	R
ANNELIDA (WORMS)	Oligochaeta	1	-	A	VA	VA	XA
	Lumbricidae	5	-	-	-	-	R
MOLLUSCA	<i>Gyraulus</i>	3	R	-	-	-	-
	<i>Physa</i>	3	-	-	R	R	-
	<i>Potamopyrgus</i>	4	XA	A	VA	VA	XA
	Sphaeriidae	3	-	R	-	-	-
CRUSTACEA	Ostracoda	1	-	R	R	C	C
	<i>Paracalliope</i>	5	XA	VA	A	C	A
	Paraleptamphopidae	5	C	A	C	-	-
	<i>Paratya</i>	3	C	-	-	-	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	R	R	-	-	-
	<i>Zephlebia</i> group	7	C	C	R	-	-
ODONATA (DRAGONFLIES)	<i>Xanthocnemis</i>	4	A	R	-	-	-
HEMIPTERA (BUGS)	<i>Microvelia</i>	3	A	-	-	-	-
COLEOPTERA (BEETLES)	Elmidae	6	-	C	-	R	R
	Hydrophilidae	5	R	-	-	-	-
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	-	-	-	R	-
TRICHOPTERA (CADDISFLIES)	<i>Psilochorema</i>	6	-	R	-	-	-
	Oeconesidae	5	-	R	-	-	-
	<i>Oxyethira</i>	2	-	-	C	A	A
	<i>Paroxyethira</i>	2	-	-	R	-	-
	<i>Tripletides</i>	5	VA	C	-	-	-
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	-	-	R	R	C
	Orthoclaadiinae	2	R	A	A	A	A
	<i>Polypedilum</i>	3	-	A	C	C	C
	<i>Paradixa</i>	4	A	-	-	-	-
	Empididae	3	-	-	C	C	C
	Ephydriidae	4	C	-	-	-	-
	Muscidae	3	-	-	C	A	A
	Sciomyzidae	3	R	-	-	-	-
	<i>Austrosimulium</i>	3	C	C	-	-	R
	Tanyderidae	4	-	C	-	-	-
ACARINA (MITES)	Acarina	5	-	C	-	R	R
No of taxa			16	19	15	15	15
MCI			84	83	65	71	68
SQMCI			4.5	4.1	2.7	2.5	2.6
EPT (taxa)			3	5	1	0	0
%EPT (taxa)			19	26	7	0	0
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa				

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Egmont Road (site 12)

A moderate community richness (16 taxa) was found amongst the vegetation and the soft silt-bottomed habitat of this site. This was two taxa less than the median richness for this site and two taxa more than found by the previous summer (2015) survey (Table 2 and Figure 5).

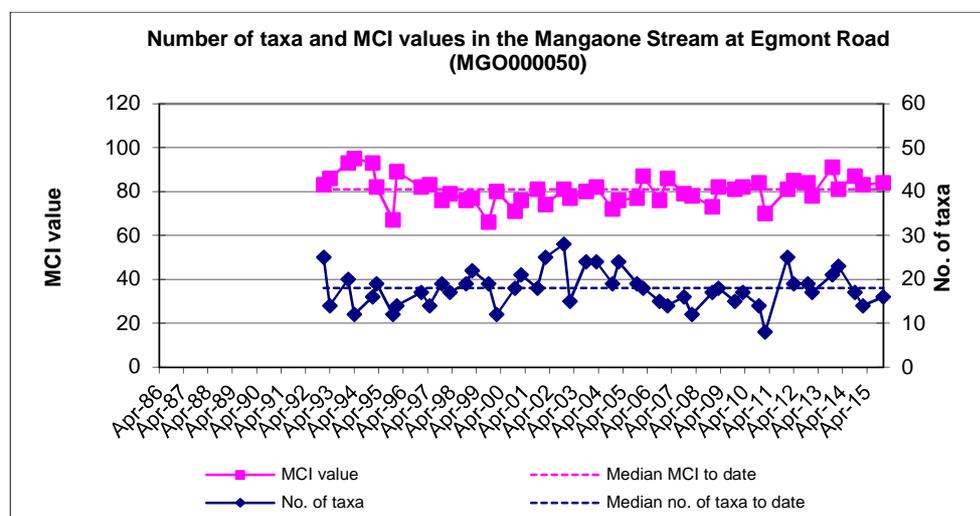


Figure 5 Number of taxa and MCI values for Mangaone Stream at Egmont Road since 1992

No 'highly sensitive' taxa were found in this community (Table 4) which was characterised by six taxa. These included four 'tolerant' taxa [snail (*Potamopyrgus*), damselfly (*Xanthocnemis*), water strider (*Microvelia*) and midge (*Paradixa*)] and two 'moderately sensitive' taxa [amphipods (*Paracalliope* (extremely abundant) and stick caddis (*Triplectides*)] (Table 4). This was typical of the community found at this site which has been characterised by taxa commonly associated with vegetation in lowland streams and/or with softer-bottomed substrates and indicative of moderate physicochemical water quality.

The community comprised a relatively high proportion (63%) of 'tolerant' taxa resulting in the MCI score of 84 units which was slightly above the historical median score (Table 2) and similar to that recorded by the previous spring survey (Figure 5).

The numerical dominance by one 'moderately sensitive' taxon and one 'tolerant' taxon (both extremely abundant) resulted in the relatively high SQMCI₅ value of 4.5 units. This was 0.2 unit higher than the median for this site and 0.4 unit below the highest score recorded to date at this site (Table 2).

These results indicated that the macroinvertebrate community present at this site in the Mangaone Stream under low flow conditions were of 'fair' health (see TRC, 2013) with similar health to that found by the previous summer survey performed under lower, warmer flow conditions.

20m downstream of Manganaha Stream confluence (site 16)

A moderate richness (19 taxa) was recorded at this site, which was the same as the long term median for this site, 11 taxa less than that recorded by the previous spring survey, and three taxa more than that found upstream at site 12 (Figure 6, Table 2).

There were no 'highly sensitive' taxa present in the community at this site. The community was dominated by four 'tolerant' taxa; [oligochaete worms, snail (*Potamopyrgus*), chironomid

midge (*Polypedilum*) and orthoclad midges] and two 'moderately sensitive' taxa; [amphipods (*Paracalliope*) and (*Paraleptamphopidae*)] (Table 4).

There were twelve significant changes in individual taxon abundances between adjacent sites 12 and 16. The changes were coincident with an increase in periphyton substrate cover and decrease in aquatic vegetation, at the downstream site, increased hard-gravel substrate, and the resultant change in sampling technique.

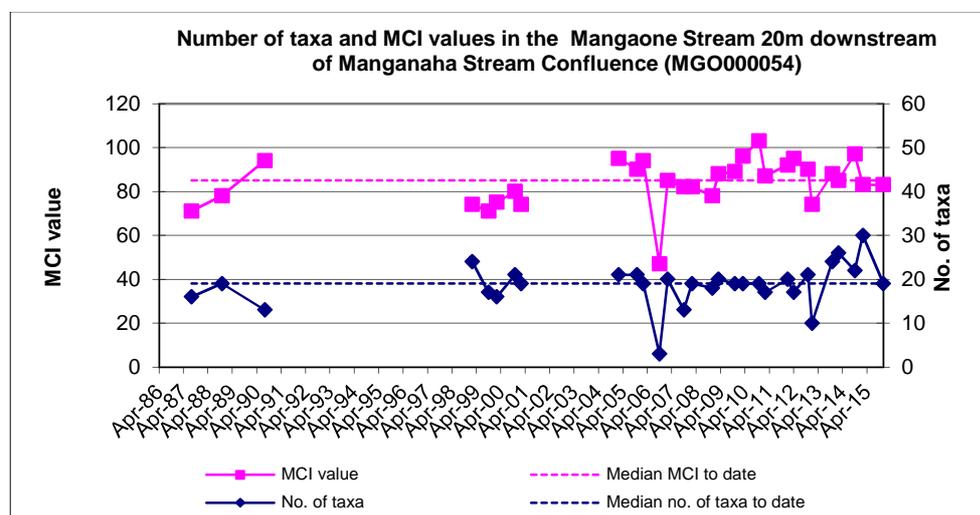


Figure 6 Numbers of taxa and MCI values for the Mangaone Stream downstream of the confluence with Manganaha Stream since 1987

The community comprised a significant proportion of 'tolerant' taxa (53%), resulting in the MCI score of 83 units. This score was an insignificant two units lower than the median for this site and therefore, well within the range of previous scores for this site. This score was also similar to the score at the upstream 'control' site 12 and the same as that recorded by the previous spring survey.

The numerical dominance by one 'sensitive' taxon was tempered by the abundance of several 'tolerant' taxa which resulted in the moderate SQMCI_s score of 4.1 units, which was 0.2 unit fewer than the median of past values at this site, and slightly lower than the SQMCI_s score recorded at this site by the previous summer survey (Table 2). This indicated typical health of the community which was in the 'fair' generic MCI category (TRC, 2013) at the time of these lower flow conditions during spring.

Mangaone Stream 300m downstream of Puremu Stream confluence (site 14)

Moderate taxa richness (15 taxa) was recorded at site 14 in the Mangaone Stream, downstream of the Puremu Stream confluence and discharges from Taranaki Sawmills and Farmlands (Figure 1). This was slightly lower than that recorded at the site directly upstream and that recorded by the 'control' site at Egmont Road (Table 2). Taxa richness was similar to that recorded by the previous summer survey and was the same as the long term median for this site. Previous reports have suggested that the sporadic observations of low community richnesses at this site may have been related to preceding toxic discharges. The current survey results didn't appear to reflect a similar recent occurrence.

Earlier surveys had noted extensive filamentous algal growth at this site. Although not as apparent during several more recent surveys, such growth was widespread at the time of the current survey and aquatic vegetation was also present at the edges of the stream. This

may indicate that the surveyed riffle has become more stabilised with reduced substrate turnover during high flows, allowing for greater periphyton establishment.

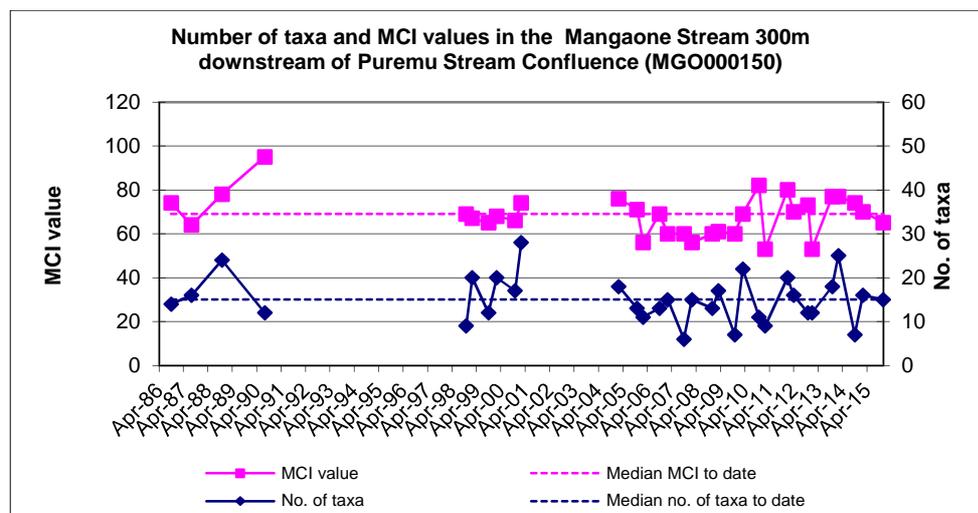


Figure 7 Numbers of taxa and MCI values for Mangaone Stream downstream of the confluence with Puremu Stream since 1986

There were no ‘highly sensitive’ taxa found in the community which was dominated by three ‘tolerant’ taxa [oligochaete worms, snail (*Potamopyrgus*) and orthoclad midges] and one ‘moderately sensitive’ taxon [amphipod (*Paracalliope*)](Table 4). These taxa were the same as those taxa characteristic to the previous summer survey. There were five significant individual taxon abundance differences between adjacent sites, including a decreased abundance of two ‘moderately sensitive’ taxa and an increased abundance within three ‘tolerant’ taxa.

The increased proportion of ‘tolerant’ taxa in the community (73% of taxa richness) resulted in a ‘poor’ MCI score of 65 units. However, this score was similar to that recorded in the previous summer (2015) survey (70 MCI units) and similar to the long term median recorded at this site (69 MCI units) (Figure 7). This MCI score was however a significant (Stark, 1998) 18 units lower than that recorded upstream at site 16 upstream, typical of the trend at this site.

The numerical dominance by ‘tolerant’ taxa (particularly worms and snails) was reflected in the relatively low SQMCI_s value of 2.7 units which was a substantial 1.4 units lower than that recorded at the nearest upstream site 16, but 0.2 unit above the median score for this site.

Overall, the reductions in MCI and SQMCI_s scores at site 14, due to gains and/or increased abundances of certain ‘tolerant’ taxa, may be considered to have been related to the poorer habitat compared with that at the upstream site (16), but possibly as a result of industrial discharges contributing to this deterioration.

100 m downstream of the fertilizer depot (site 15)

A moderate richness (15 taxa) was also recorded at this site, 100 m downstream of the discharges from the fertilizer depot. This richness was slightly above the median historical richness and slightly above that recorded by the previous summer survey (Table 2).

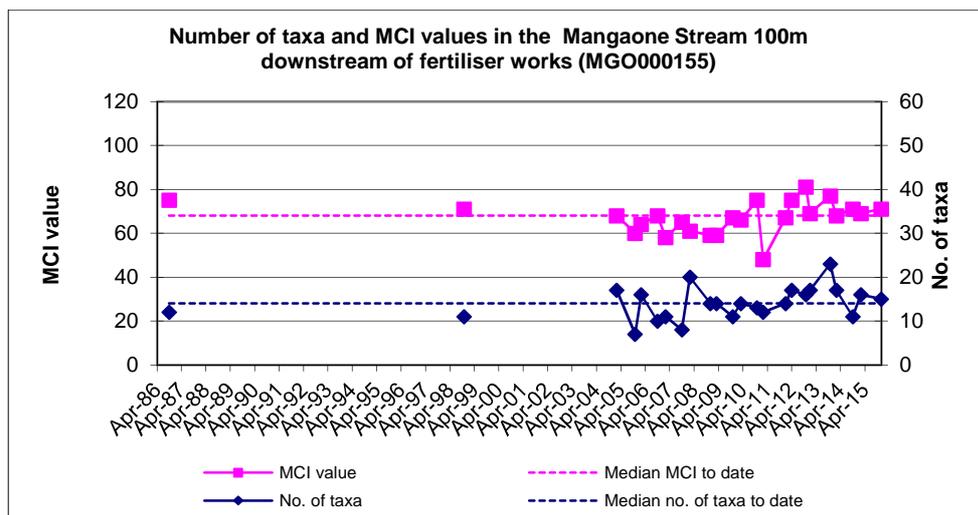


Figure 8 Numbers of taxa and MCI values for Mangaone Stream 100 m downstream of the fertilizer works/depot since 1986

The community was dominated by five 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), orthoclad midges, house fly (*Muscidae*) and axehead caddis (*Oxyethira*)] (Table 4). Only one significant individual taxon abundance difference was recorded between sites 14 and 15 coincidental with similar periphyton cover and substrates observed at this site.

The predominance of 'tolerant' taxa (67% of richness) in this community was reflected by the 'poor' MCI score of 71 units. This was an insignificant (Stark, 1998) three units higher than the historical median for this site, and six units higher than the score recorded at the nearest upstream site (14) (Table 2).

The numerical dominance by two 'tolerant' taxa (snail (*Potamopyrgus*) and oligochaete worms) resulted in the SQMCI₅ value of 2.5 units, the same as the median for this site. This score was 0.2 unit below that recorded upstream, typical of the trend of downstream deterioration observed by most previous surveys, although this score reflected lesser deterioration in macroinvertebrate community than previously recorded downstream of the Puremu Stream confluence.

Rifle Range Road (site 11)

A moderate taxa richness (15) was found at site 11. This richness was two taxa more than the long term median for this site (Table 2 and Figure 9), and one taxon less than recorded by the previous summer survey. Previous surveys have shown poorer communities possibly as a result of a combination of factors. These include occasional inundation by high flows in the adjacent Waiwhakaiho River (slowing flows which provide an unsuitable habitat for riffle-dwelling invertebrates (see BJ192)) and a lack of downstream drift recruitment of typical stony habitat taxa as the majority of the upstream habitat is softer-bottomed and weedy. Deterioration in physicochemical water quality between sites 12 and 11 may also have been a factor, as this reach, which runs through an industrial catchment, receives several stormwater discharges including localised run-off.

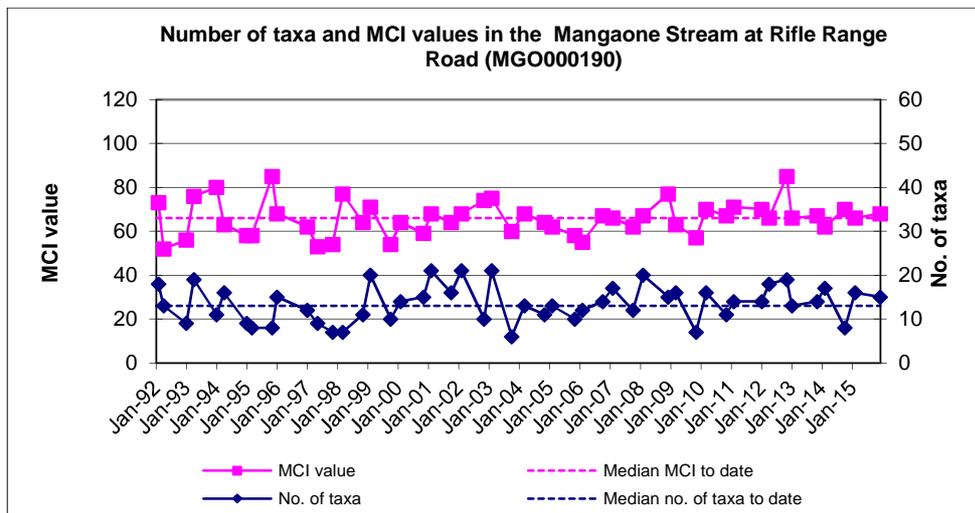


Figure 9 Numbers of taxa and MCI values for Mangaone Stream at Rifle Range Road since 1992

The community was dominated by five of the same taxa as those characteristic to site 15 with the addition of one ‘moderately sensitive’ taxon (amphipod (*Paracalliope*)) (Table 4). As typically has been recorded, there was a significant contrast in dominant taxa between this site and the upstream ‘control’ site (12). In addition, there was a significant difference in taxa composition, with only three taxa common to both sites from a total of 27 taxa found at these two sites (12 and 11).

The predominance (67%) of ‘tolerant’ taxa in the community was reflected by the ‘poor’ MCI score of 68 units, which was two units above the historical median (Table 2) and two units higher than the score found by the previous summer survey. This was a significant (Stark, 1998) 16 units lower than the score recorded at site 12, and a three unit decrease from the score at the nearest upstream site (16).

The numerical abundance of ‘tolerant’ taxa resulted in the low SQMCI_s value of 2.6 units. However, this still exceeded the long term median SQMCI_s score by 0.6 unit and was within the range of previous scores (Table 2). It was also similar to the SQMCI_s scores recorded at sites 14 and 15.

There was significant deterioration in SQMCI_s and MCI between sites 16 and 14, and then 16 and 11, which was more related to the deterioration in habitat (increase in algal substrate cover and aquatic vegetation) downstream of the fertiliser depot.

General comments

The longitudinal trends in the number of taxa, MCI and SQMCI_s values along the reach of the Mangaone Stream surveyed in December 2015 are illustrated in Figure 10.

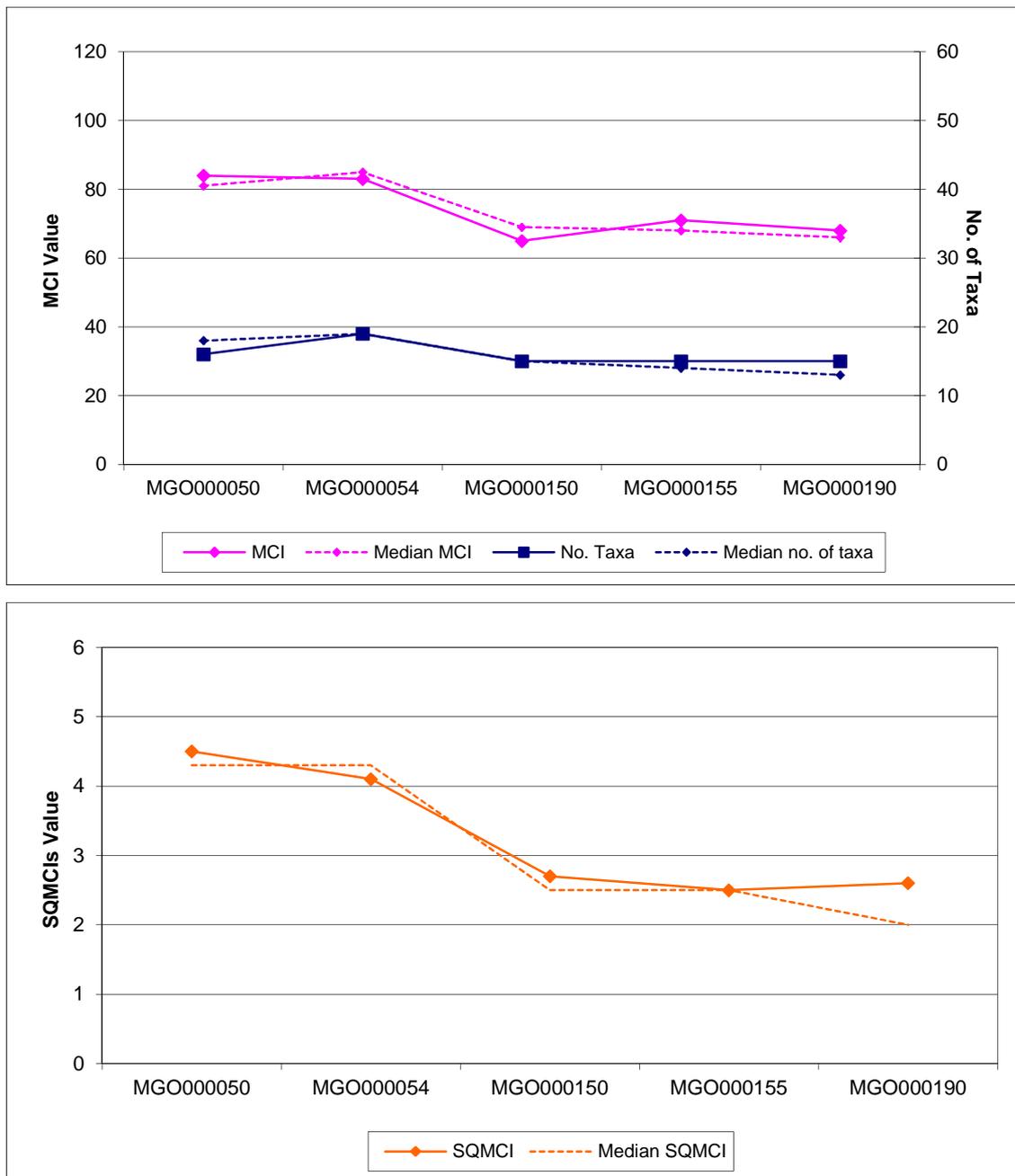


Figure 10 Longitudinal trend in number of taxa, MCI and SQMCI_s values in the Mangaone Stream for the survey of 21 December 2015

Unlike typically recorded, the upstream site 12 recorded a lower number of taxa (16) than that recorded at site 16 which recorded the highest number of taxa (19). The three most downstream sites all recorded the same number of taxa (15). The MCI was also variable, but showed a slight decreasing trend through the mid reaches without recovery in the lower reaches. All sites showed MCI scores insignificantly different from historical median scores, and more typical of biological communities found under low to moderate, cooler flow conditions in late December.

When considering changes in community structure, the SQMCI_s scores (which take into account abundances within taxa, as well as their sensitivity to pollution) was found to follow a relatively similar pattern to the MCI scores in the upper reaches with a slightly more pronounced decrease in mid reaches and minimal recovery through the lower reaches. All

sites recorded SQMCI₅ scores similar to their historical medians, with site 11 recording a slight improvement.

Summary and conclusions

The Council's standard 'kick sampling' and 'sweep-net' sampling techniques were used to collect streambed macroinvertebrates at five sites in the Mangaone Stream and three sites in the Waiwhakaiho River on 21 December 2015, in order to assess whether discharges from the Lower Waiwhakaiho Industrial area had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and SQMCI₅ 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 SQMCI₅ takes into account taxa abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or SQMCI₅ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This survey found that all Waiwhakaiho River sampling sites recorded community richnesses similar to or slightly above long term medians for their respective sites, with no trend in richness in a downstream direction. MCI scores were not significantly (Stark, 1998) different to historical medians at all sites with site 7 recording a slightly higher and site 8 a substantially higher MCI score and site 13 recording a substantially lower MCI score. SQMCI₅ scores were higher than historical medians at sites 8 and 13 and slightly lower at site 7. SQMCI₅ scores were also relatively similar between sites, although the SQMCI₅ score at site 8 was substantially higher than that recorded at site 7. The change in communities between site 7 upstream of the industrial area and the downstream site 13 suggests possible recent impacts from industrial discharges. However, communities in the Waiwhakaiho River downstream of Lake Rotomanu may also be inhibited from time-to-time by the variable current speeds caused by tidal flooding. These results did not indicate significant effects of stormwater or wastewater discharges from the Fitzroy industrial area on the macroinvertebrate communities of the Waiwhakaiho River.

It is apparent that the macroinvertebrate communities in the Mangaone Stream were of 'fair' health in the upper reaches deteriorating to 'poor' health in a downstream direction. Most sites had moderate taxa richnesses which were lowest at the three most downstream sites, while MCI scores were above or near to medians at all sites. SQMCI₅ scores were also above or near to historical medians, with a general decreasing trend recorded in a downstream direction. The five sampling sites in the Mangaone Stream showed a marked decline in MCI and SQMCI₅ values between Egmont Road (site 12) and Rifle Range Road (site 11), with a particularly marked decline in both SQMCI₅ and MCI scores between sites 16 and 14. Taranaki sawmills discharges stormwater to the Mangaone Stream between sites 16 and 14, and sediment sampling undertaken in early 2009 had recorded significant concentrations of not only tributyltin in the stream sediments around Taranaki Sawmills, but also elevated concentrations of arsenic, chromium, copper and zinc, all potentially toxic to aquatic biota (see BJ192). Previously there had been increased sedimentation between sites 16 and 14. Further sediment sampling undertaken in April 2012 and early March 2014, showed less contamination than that recorded in 2009; more indicative of physical habitat induced effects contributing to the degree of biological health deterioration found more recently. There was

a slight increase in MCI score between sites 14 and 15 however some deterioration in the lower reaches, most likely due to poorer habitat.

Overall, the results from the current survey indicated some improvements in comparison with historical results although a general deterioration in downstream biological health was found by the current survey. Groundwater inputs may have contributed to some of this deterioration recorded immediately downstream of the fertiliser depot in the lower reaches of the stream.

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To Scott Cowperthwaite, Job Manager
From Darin Sutherland, Scientific Officer
Document 1703113
Report No. DS053
Date June 2016

Biomonitoring of the Lower Waiwhakaiho River and the Mangaone Stream in the Fitzroy Industrial Area, March 2016

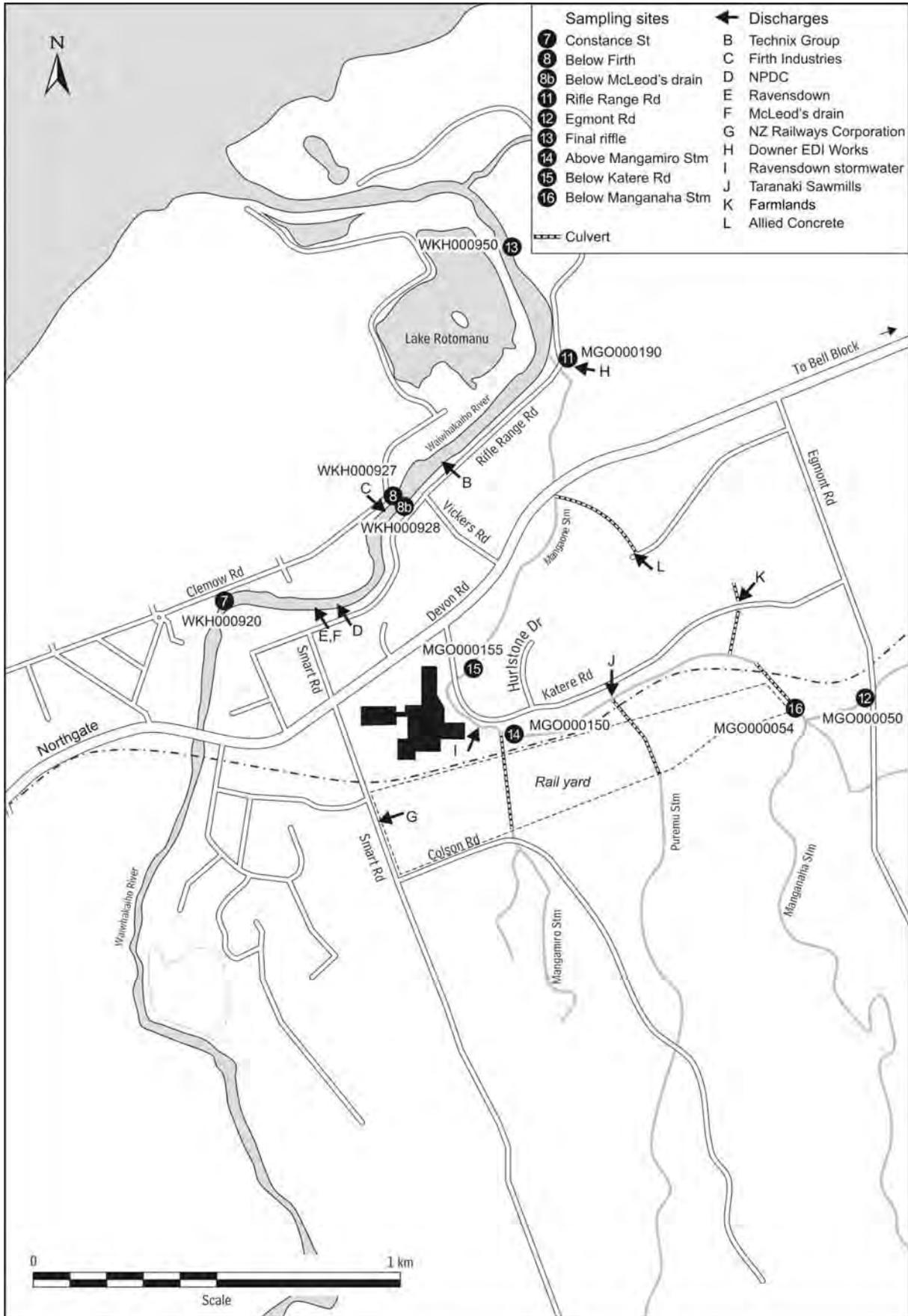
Introduction

This was the second of two scheduled surveys in the 2015-2016 monitoring programme, for the combined industries of the Fitzroy industrial area. Results from surveys performed since the 2000-2001 monitoring years are discussed in several reports referenced at the end of this report. The monitoring related to the wastewater/stormwater discharge permits tabulated below:

Consent holder	Consent No
Ravensdown	3140,3865
Firth Industries	0392
NPDC (Stormwater)	3138,1126,1275
NPDC (Bewley Road)	4984
NZ Railways Corporation	1735,3528
Katere Stores Limited	4548
Allied Concrete Ltd	4539
Taranaki Sawmills	3491
Technix Group Ltd	0021,0291,2230
Downer EDI Works	3917

Methods

On 16 March 2016, the standard '400 ml kick sampling' technique was used to collect streambed macroinvertebrates from three sites in the lower Waiwhakaiho River and from four sites in the Mangaone Stream, while the standard '400 ml sweep-sampling' technique was used to collect streambed macroinvertebrates from site 12 in the Mangaone Stream (Table 1, Figure 1). The 'sweep-net- sampling technique is very similar to Protocol C2 (soft-bottomed, semi-quantitative), and the 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative), of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark *et al*, 2001).



The three sites from the Waiwhakaiho River used in this survey have been sampled biannually in recent years. In the Mangaone Stream, two sites have been sampled biannually, with three further sites (14, 15 and 16) added since February 2005 and sampled under the same regime.

Table 1 Biomonitoring sites in the Lower Waiwhakaiho River and the Mangaone Stream

Site No	Site Code	Location
7	WKH000920	Waiwhakaiho River, Constance Street
8	WKH000927	Waiwhakaiho River, below Firth industries, west (left) bank
13	WKH000950	Waiwhakaiho River, final riffle downstream of Lake Rotomanu
12	MGO000050	Mangaone Stream, Egmont Road
16	MGO000054	Mangaone Stream, 20m d/s of Manganaha Stream confluence
14	MGO000150	Mangaone Stream, 300m d/s confluence with Puremu Stream
15	MGO000155	Mangaone Stream, 100m d/s fertiliser depot
11	MGO000190	Mangaone Stream, Rifle Range Road

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al. 2001). Macroinvertebrate taxa abundances scored based on the categories presented in Table 1.

Table 2 Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	500+

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value. A gradation of biological water quality conditions based upon MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985 and Boothroyd and Stark, 2000) (Table 2). A difference of 10.83 units or more in MCI values is considered significantly different (Stark 1998).

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams (such as the Mangaone Stream site 12) is possible if results are related to physical habitat (e.g. good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

Table 3 Macroinvertebrate health based on MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985 and Boothroyd and Stark, 2000)

Grading	MCI
Excellent	>140
Very Good	120-140
Good	100-119
Fair	80-99
Poor	60-79
Very poor	<60

A semi-quantitative MCI value (SQMCI_s) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI_s is not multiplied by a scaling factor of 20, therefore SQMCI_s values range from 1 to 10, while MCI values range from 20 to 200. A difference of 0.83 units or more in SQMCI_s values is considered significantly different (Stark 1998).

Results

Site habitat characteristics and hydrology

This summer survey was performed under moderately low flow conditions (approximately three quarters of median flow of 3930 l/s), 27 days after a fresh in excess of both 3 times and 7 times median flow (flow gauge at the Waiwhakaiho River at Egmont Village). The survey followed a relatively dry summer period with only one significant river fresh recorded over the preceding month. Water temperature was in the range 18.2-21.1°C. The Waiwhakaiho River sites all had uncoloured, clear water while the Mangaone Stream sites had either uncoloured or grey coloured water which was cloudy. Only site 12 had partial bed shading while all other sites were unshaded.

Silt composition is displayed in Table 4 and other environmental variables found within the river are displayed in Table 5.

Table 4 Substrate composition at the eight sites surveyed

Site	Silt	Sand	Fine gravel	Course gravel	Cobble	Boulder	Bedrock	Hard clay	Wood/ root	Concrete/ gabion
7		5	10	15	45	25				
8				10	40	50				
13	5	5	10	10	50	20				
12	100									
16	30	20	35	10					5	
14	10	5	5	20	60					
15	10	5	10	5	65	5				
11	10			10	75	5				

Table 5 Algal, plants, debris and silt found on the streambed

Site	Algal mats	Algal filaments	Moss	Leaves	Wood	Aquatic plants	Iron oxide/silt coating
7	None	None	None	Patchy	Patchy	None	None
8	Widespread	Patchy	None	None	None	None	None
13	Widespread	Widespread	None	None	None	None	None
12	None	None	None	None	None	On bed too	None
16	Patchy	Patchy	None	Patchy	Patchy	On bed too	None
14	Widespread	Widespread	None	None	None	Edges only	None
15	Patchy	Widespread	None	None	None	On bed too	None
11	Patchy	Widespread	None	None	None	Edges only	Present

Macroinvertebrate communities

A summary of taxa numbers and MCI values from previous surveys performed in the Waiwhakaiho River and the Mangaone Stream in relation to the Fitzroy industrial area are presented in Table 6 together with current results. The full results of the survey are presented in Table 7 (Waiwhakaiho River) and Table 8 (Mangaone Stream).

Table 6 Numbers of taxa and MCI and SQMCI_s values recorded in previous surveys performed in the Waiwhakaiho River and Mangaone Stream since July 1983 in relation to the Fitzroy industrial area, together with the results of the survey of 16 March 2016

Location	Site No.	Numbers of taxa				MCI values			SQMCI _s Values			
		N	Median	Range	Current	Median	Range	Current	N	Median	Range	Current
Waiwhakaiho River	7	59	20	12-29	18	89	66-110	93	35	3.3	1.7-7.3	2.8
	8	57	21	13-30	19	87	69-115	83	35	3.3	1.8-6.3	2.3
	13	50	20	12-30	19	87	67-111	99	35	2.7	1.6-7.4	3.6
Mangaone Stream	12	47	18	8-28	17	81	66-95	81	35	4.3	2.4-4.9	4.4
	16	30	19	3-30	16	85	47-103	76	27	4.2	1.2-5.5	2.1
	14	32	15	6-28	16	69	53-95	64	28	2.6	1.1-3.7	2.4
	15	24	14	7-23	13	68	48-81	58	23	2.5	1.5-3.8	2.2
	11	52	13	4-21	18	66	50-85	70	35	2.0	1.5-3.6	2.9

Table 7 Macroinvertebrate fauna of the Waiwhakaiho River in relation to the Fitzroy industrial area sampled on 16 March 2016

Taxa List	Site Number	MCI score	7	8	13
	Site Code		WKH000920	WKH000927	WKH000950
	Sample Number		FWB16167	FWB16168	FWB16169
NEMERTEA	Nemertea	3	R	R	R
NEMATODA	Nematoda	3	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	VA	VA	C
MOLLUSCA	<i>Potamopyrgus</i>	4	R	R	C
CRUSTACEA	<i>Paracalliope</i>	5	R	-	-
	<i>Paratya</i>	3	-	R	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	-	R	-
	<i>Coloburiscus</i>	7	C	-	-
	<i>Deleatidium</i>	8	A	-	R
	<i>Zephlebia</i> group	7	-	-	R
PLECOPTERA (STONEFLIES)	<i>Austroperla</i>	9	-	R	-
	<i>Megaleptoperla</i>	9	-	-	R
HEMIPTERA (BUGS)	<i>Saldula</i>	5	R	-	-
COLEOPTERA (BEETLES)	Elmidae	6	C	C	C
	Hydraenidae	8	R	-	R
	Staphylinidae	5	R	-	-
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	C	C	R
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche</i> (<i>Aoteapsyche</i>)	4	A	A	A
	<i>Hydrobiosis</i>	5	-	-	R
	<i>Olinga</i>	9	-	-	R
	<i>Oxyethira</i>	2	A	A	C
	<i>Pycnocentroides</i>	5	-	R	R
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	R	C	C
	Orthoclaadiinae	2	C	VA	A
	Tanypodinae	5	R	-	-
	Tanytarsini	3	-	A	C
	Ephydriidae	4	R	A	-
	Muscidae	3	-	R	R
	<i>Austrosimulium</i>	3	R	R	R
ACARINA (MITES)	Acarina	5	-	R	-
		No of taxa	18	19	19
		MCI	93	83	99
		SQMCI	2.8	2.3	3.6
		EPT (taxa)	3	4	7
		%EPT (taxa)	17	21	37
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa		

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Waiwhakaiho River

Constance Street (site 7)

A moderate macroinvertebrate community richness of 18 taxa was found at site 7 ('control' site), upstream of all discharges from the Fitzroy industrial area at the time of this summer survey. This was two taxa lower than the historical median for this site and the same number as the previous survey on 21 December 2015 (Table 6 and Figure 2).

The MCI score of 93 units indicated a community of 'fair' biological health which was not significantly higher (Stark, 1998) than the historical median MCI score of 89 units. The MCI score was not significantly different (Stark, 1998) to the preceding survey (90 units) and to the median score for a waterbody arising from the National Park close to sea level (MCI of 90 units) (TRC, 2015) (Table 6 and Figure 2).

The SQMCI₅ score of 2.8 units was not significantly different (Stark, 1998) to the historical median SQMCI₅ score of 3.3 units and the previous score of 3.0 units (Stark, 1998) (Table 6).

The community was characterised by one 'very abundant' taxon ['tolerant' oligochaete worms] and three 'abundant' taxa ['tolerant' caddisfly (*Hydropsyche/Aoteapsyche* and *Oxyethira*), and 'highly sensitive' mayfly (*Deleatidium*)] (Table 7).

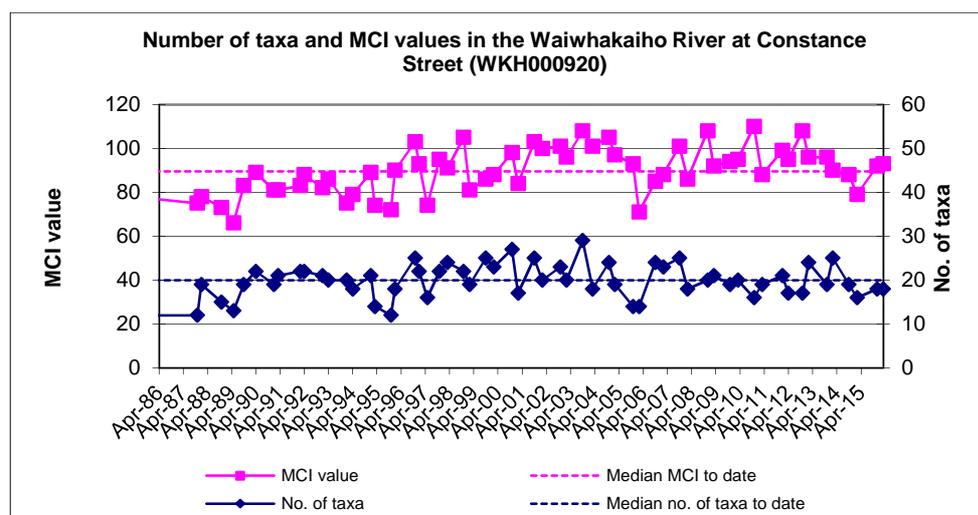


Figure 2 Numbers of taxa and MCI values for Waiwhakaiho River at Constance Street since 1987

Below Firth Industries, left bank (site 8)

A moderate macroinvertebrate community richness of 19 taxa was found at site 8 at the time of this summer survey. This was two taxa lower than the historical median for this site and nine taxa less than the previous survey on 21 December 2015 (Table 6 and Figure 3).

The MCI score of 83 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the historical median MCI score of 87 units. The MCI score was significantly lower (Stark, 1998) than the preceding survey (97 units) but not significantly different to the median score for a waterbody arising from the National Park close to sea level (MCI of 90 units) (TRC, 2015) (Table 6 and Figure 3).

The SQMCI₅ score of 2.3 units was significantly lower (Stark, 1998) than the historical median SQMCI₅ score of 3.3 units and to the previous score of 3.9 units (Stark, 1998) (Table 6).

The community was characterised by two ‘very abundant’ taxa [‘tolerant’ oligochaete worms and orthoclad midges] and four ‘abundant’ taxa [‘tolerant’ caddisfly (*Hydropsyche* / *Aoteapsyche* and *Oxyethira*), and midges (Tanytarsini and Ephydriidae)] (Table 7).

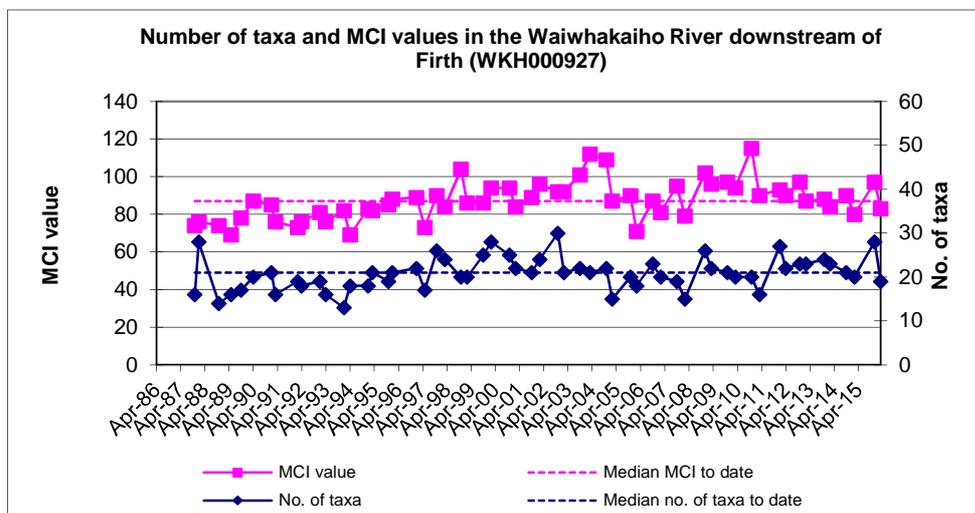


Figure 3 Numbers of taxa and MCI values for Waiwhakaiho River below Firth Industries (left bank) since 1987

Downstream of Lake Rotomanu (site 13)

A moderate macroinvertebrate community richness of 19 taxa was found at site 13 at the time of this summer survey. This was one taxon lower than the historical median for this site and the same number as the previous survey on 21 December 2015 (Table 6 and Figure 4).

The MCI score of 99 units indicated a community of ‘fair’ biological health which was significantly higher (Stark, 1998) than the historical median MCI score of 87 units. The MCI score was also significantly higher (Stark, 1998) than the preceding survey (79 units) but not significantly different to the median score for a waterbody arising from the National Park close to sea level (MCI of 90 units) (TRC, 2015) (Table 6 and Figure 4).

The SQMCI₅ score of 3.6 units was significantly higher (Stark, 1998) than the historical median SQMCI₅ score of 2.7 units but was not significantly different to the previous survey (3.5 units) (Stark, 1998) (Table 6).

The community was characterised by two ‘abundant’ taxa [‘tolerant’ caddisfly (*Hydropsyche* / *Aoteapsyche*) and orthoclad midges] (Table 7).

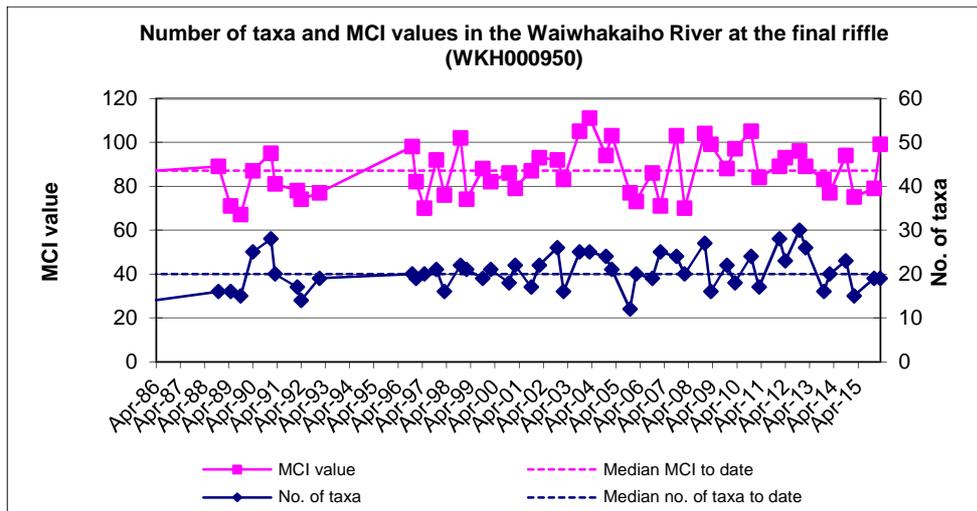


Figure 4 Numbers of taxa and MCI values for Waiwhakaiho River d/s of Lake Rotomanu since 1987

Mangaone Stream

Macroinvertebrate samples collected from the two sites at the upper (site 12) and lower (site 11) ends of the surveyed reach in the Mangaone Stream in the past have found distinctly different community compositions at the two sites with much of the variation due to the streambed habitat differences, i.e. sandy-weedy, softer substrate at the upstream site (site 12 at Egmont Road) and harder, stony-gravel substrate at the downstream site (site 11 at Rifle Range Road). Additional sites have been sampled in recent years (in the reach between these historically surveyed sites) to ascertain why poor water quality is indicated at site 11 at Rifle Range Road despite the improvement in habitat when compared to site 12 upstream of all the industrial discharges.

Table 8 Macroinvertebrate fauna of the Mangaone Stream in relation to the Fitzroy industrial area sampled on 16 March 2016

Taxa List	Site Number	MCI score	12	16	14	15	11
	Site Code		MGO000050	MGO000054	MGO000150	MGO000155	MGO000190
	Sample Number		FWB16170	FWB16171	FWB16172	FWB16173	FWB16174
COELENTERATA	Coelenterata	3	-	-	-	-	R
PLATYHELMINTHES (FLATWORMS)	<i>Cura</i>	3	-	-	R	-	-
NEMERTEA	Nemertea	3	-	C	C	-	A
ANNELIDA (WORMS)	Oligochaeta	1	C	XA	XA	VA	VA
	Lumbricidae	5	-	-	R	-	R
HIRUDINEA (LEECHES)	Hirudinea	3	-	R	R	-	R
MOLLUSCA	Lymnaeidae	3	-	-	-	R	-
	<i>Physa</i>	3	-	-	C	R	R
	<i>Potamopyrgus</i>	4	XA	VA	XA	VA	XA
	Sphaeriidae	3	-	R	-	-	-
CRUSTACEA	Ostracoda	1	-	R	VA	A	VA
	<i>Paracalliope</i>	5	XA	VA	VA	A	C
	Paraleptamphopidae	5	C	-	-	-	-
	<i>Paratya</i>	3	A	-	-	-	-
Ephemeroptera (MAYFLIES)	<i>Zephlebia</i> group	7	R	R	-	-	-
ODONATA (DRAGONFLIES)	<i>Xanthocnemis</i>	4	C	-	-	-	-
HEMIPTERA (BUGS)	<i>Microvelia</i>	3	R	-	-	-	-
COLEOPTERA (BEETLES)	Elmidae	6	R	R	R	-	R
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	-	-	-	-	R
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche</i> (<i>Aoteapsyche</i>)	4	-	-	-	R	-
	<i>Hydrobiosis</i>	5	-	R	-	-	-
	<i>Polypsectropus</i>	6	R	-	-	-	-
	<i>Oxyethira</i>	2	-	-	XA	XA	VA
	<i>Paroxyethira</i>	2	-	-	R	R	R
	<i>Triplectides</i>	5	C	A	-	-	-
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	-	-	-	R	C
	<i>Corynoneura</i>	3	A	-	-	-	-
	Orthoclaadiinae	2	C	C	C	C	VA
	<i>Polypedilum</i>	3	C	-	-	-	-
	Tanytarsini	3	-	-	-	-	R
	<i>Paradixa</i>	4	C	R	-	-	-
	Muscidae	3	-	-	R	C	R
	<i>Austrosimulium</i>	3	R	C	R	C	-
	Tanyderidae	4	-	R	-	-	-
ACARINA (MITES)	Acarina	5	R	C	R	-	R
No of taxa			17	16	16	13	18
MCI			81	76	64	58	70
SQMCIs			4.4	2.1	2.4	2.2	2.9
EPT (taxa)			3	3	0	1	0
%EPT (taxa)			18	19	0	8	0
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa				

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Egmont Road (site 12)

A moderate macroinvertebrate community richness of 17 taxa was found at site 12 ('control' site) at the time of this summer survey. This was one taxon lower than the historical median for this site and for the previous survey on 21 December 2015 (Table 6 and Figure 5).

The MCI score of 81 units indicated a community of 'fair' biological health which was the same as the historical median MCI score and the preceding survey score. The score was not significantly different from the median score recorded from other lowland coastal streams (MCI of 79 units) (TRC, 2015) (Table 6 and Figure 5).

The SQMCI_s score of 2.3 units was significantly lower (Stark, 1998) than the historical median SQMCI_s score of 3.3 units and to the previous survey (4.5 units) (Stark, 1998) (Table 6).

The community was characterised by two 'extremely abundant' taxa ['tolerant' snail (*Potamopyrgus*) and 'moderately sensitive' amphipod (*Paracalliope*)] (Table 8).

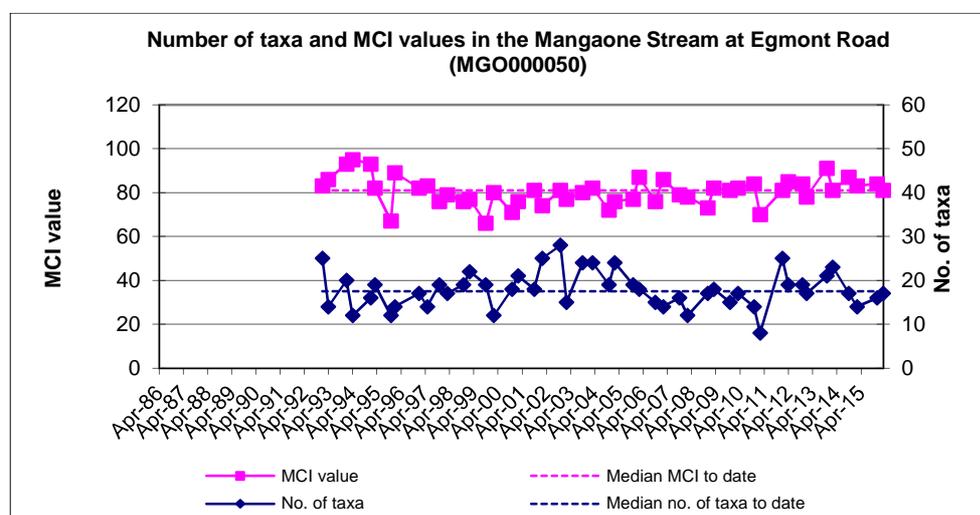


Figure 5 Number of taxa and MCI values for Mangaone Stream at Egmont Road since 1992

20m downstream of Manganha Stream confluence (site 16)

A moderate macroinvertebrate community richness of 16 taxa was found at site 16 at the time of this summer survey. This was three taxa lower than the historical median for this site and for the previous survey on 21 December 2015 (Table 6 and Figure 6).

The MCI score of 76 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the historical median MCI (85 units) and the preceding survey (83 units). The score was not significantly different from the median score recorded from other lowland coastal streams (MCI of 79 units) (TRC, 2015) (Table 6 and Figure 6).

The SQMCI_s score of 2.3 units was significantly lower (Stark, 1998) than the historical median SQMCI_s score of 4.2 units and to the previous survey (4.1 units) (Stark, 1998) (Table 6).

The community was characterised by one 'extremely abundant' taxon ['tolerant' oligochaete worms] and two 'very abundant' taxa ['tolerant' snail (*Potamopyrgus*) and 'moderately sensitive' amphipod (*Paracalliope*)] (Table 8).

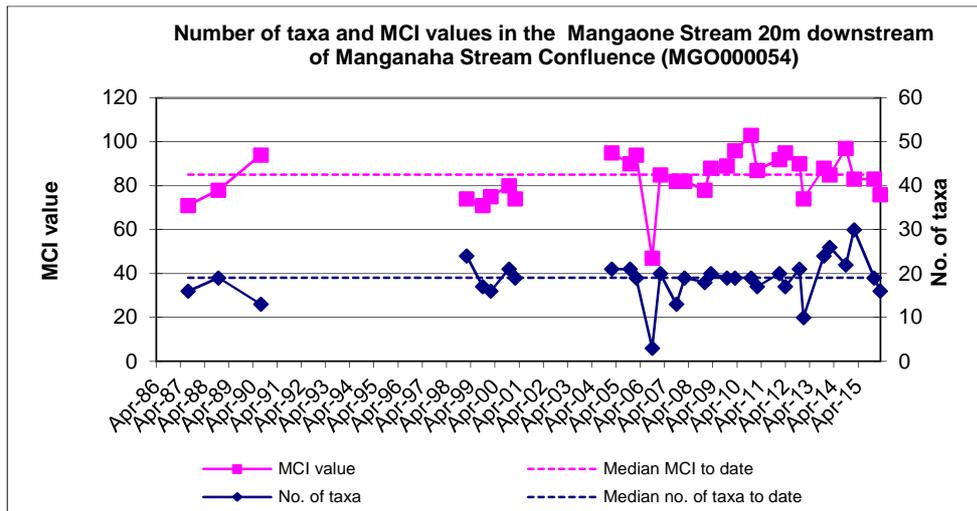


Figure 6 Numbers of taxa and MCI values for the Mangaone Stream downstream of the confluence with Manganaha Stream since 1987

Mangaone Stream 300m downstream of Puremu Stream confluence (site 14)

A moderate macroinvertebrate community richness of 16 taxa was found at site 14 at the time of this summer survey. This was one taxon lower than the historical median for this site and for the previous survey on 21 December 2015 (Table 6 and Figure 7). Previous reports have suggested that the sporadic observations of low community richnesses at this site may have been related to preceding toxic discharges.

The MCI score of 64 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the historical median MCI (69 units) and the preceding survey (65 units). The score was significantly lower than the median score recorded from other lowland coastal streams (MCI of 79 units) (TRC, 2015) (Table 6 and Figure 7).

The SQMCI₅ score of 2.4 units was not significantly different (Stark, 1998) from the historical median SQMCI₅ score of 2.6 units and to the previous survey (2.7 units) (Stark, 1998) (Table 6).

The community was characterised by three 'extremely abundant' taxa ['tolerant' oligochaete worms, snail (*Potamopyrgus*) and caddisfly (*Oxyethira*)] and two 'very abundant' taxa ['tolerant' seed shrimp (Ostracoda) and 'moderately sensitive' amphipod (*Paracalliope*)] (Table 8).

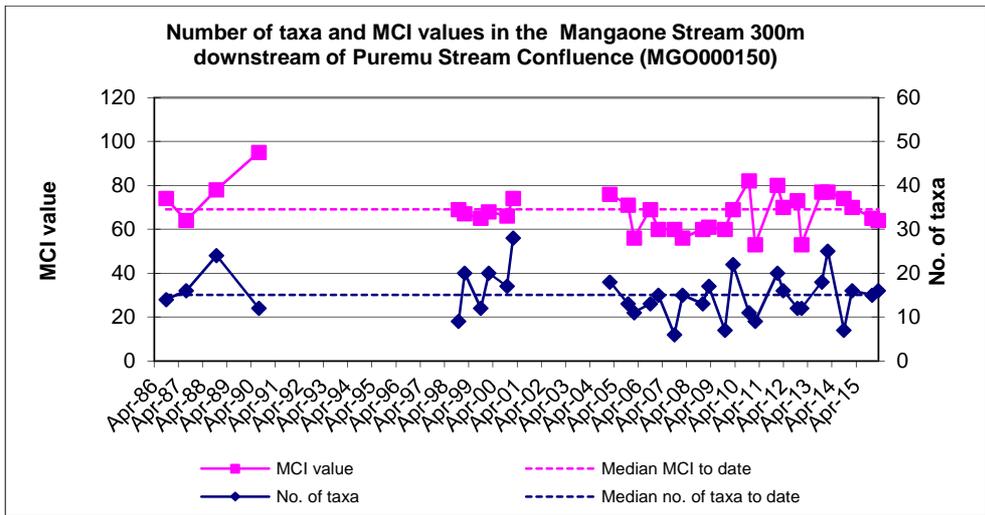


Figure 7 Numbers of taxa and MCI values for Mangaone Stream downstream of the confluence with Puremu Stream since 1986

100 m downstream of the fertilizer depot (site 15)

A moderately low macroinvertebrate community richness of 13 taxa was found at site 15 at the time of this summer survey. This was one taxon lower than the historical median for this site and two taxa lower than the previous survey on 21 December 2015 (Table 6 and Figure 8).

The MCI score of 58 units indicated a community of ‘very poor’ biological health which was not significantly different (Stark, 1998) to the historical median MCI (68 units) but was significantly lower than the preceding survey (71 units). The score was also significantly lower than the median score recorded from other lowland coastal streams (MCI of 79 units) (TRC, 2015) (Table 6 and Figure 8).

The SQMCI_s score of 2.2 units was not significantly different (Stark, 1998) from the historical median SQMCI_s score of 2.5 units and to the previous survey (2.7 units) (Stark, 1998) (Table 6).

The community was characterised by one ‘extremely abundant’ taxon [‘tolerant’ caddisfly (*Oxyethira*)] and two ‘very abundant’ taxa [‘tolerant’ oligochaete worms and snail (*Potamopyrgus*)] (Table 8).

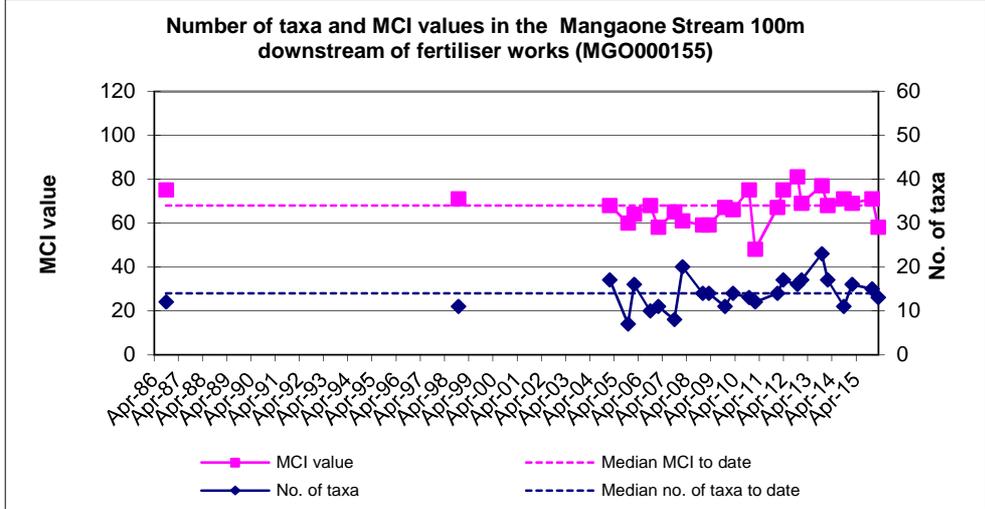


Figure 8 Numbers of taxa and MCI values for Mangaone Stream 100 m downstream of the fertilizer works/depot since 1986

Rifle Range Road (site 11)

A moderate macroinvertebrate community richness of 18 taxa was found at site 11 at the time of this summer survey. This was five taxa higher than the historical median for this site and three taxa higher than the previous survey on 21 December 2015 (Table 6 and Figure 9).

The MCI score of 70 units indicated a community of 'poor' biological health which was not significantly different (Stark, 1998) to the historical median MCI (66 units) and the preceding survey (68 units). The score was also not significantly lower than the median score recorded from other lowland coastal streams (MCI of 79 units) (TRC, 2015) (Table 6 and Figure 9).

The SQMCI₅ score of 2.9 units was significantly higher (Stark, 1998) than the historical median SQMCI₅ score of 2.0 units and to the previous survey (2.6 units) (Stark, 1998) (Table 6).

The community was characterised by one 'extremely abundant' taxon ['tolerant' snail (*Potamopyrgus*)] three 'very abundant' taxa ['tolerant' oligochaete worms, seed shrimps (Ostracoda), caddisfly (*Oxyethira*) and orthoclad midges] (Table 8).

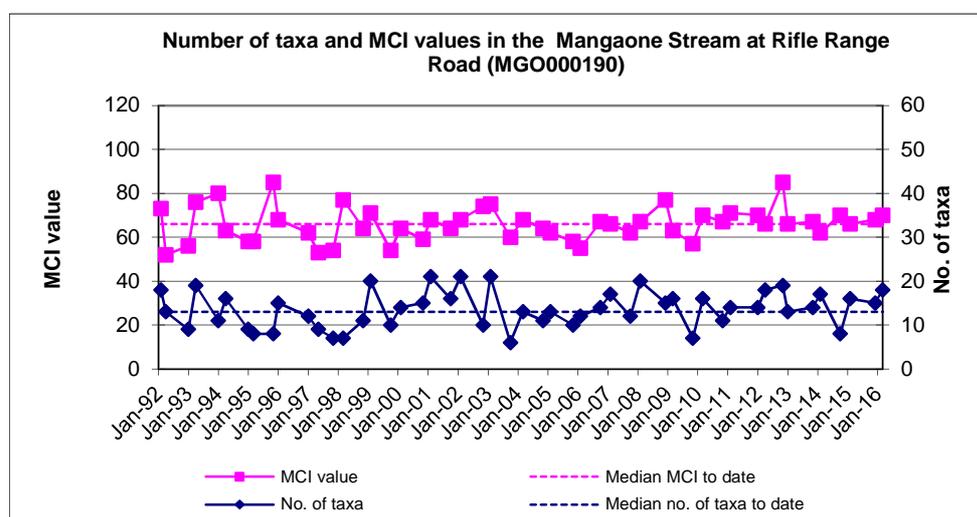


Figure 9 Numbers of taxa and MCI values for Mangaone Stream at Rifle Range Road since 1992

Overview of Mangaone Stream sites

The longitudinal trends in the number of taxa, MCI and SQMCI₅ values along the reach of the Mangaone Stream surveyed in March 2016 are illustrated in Figure 10.

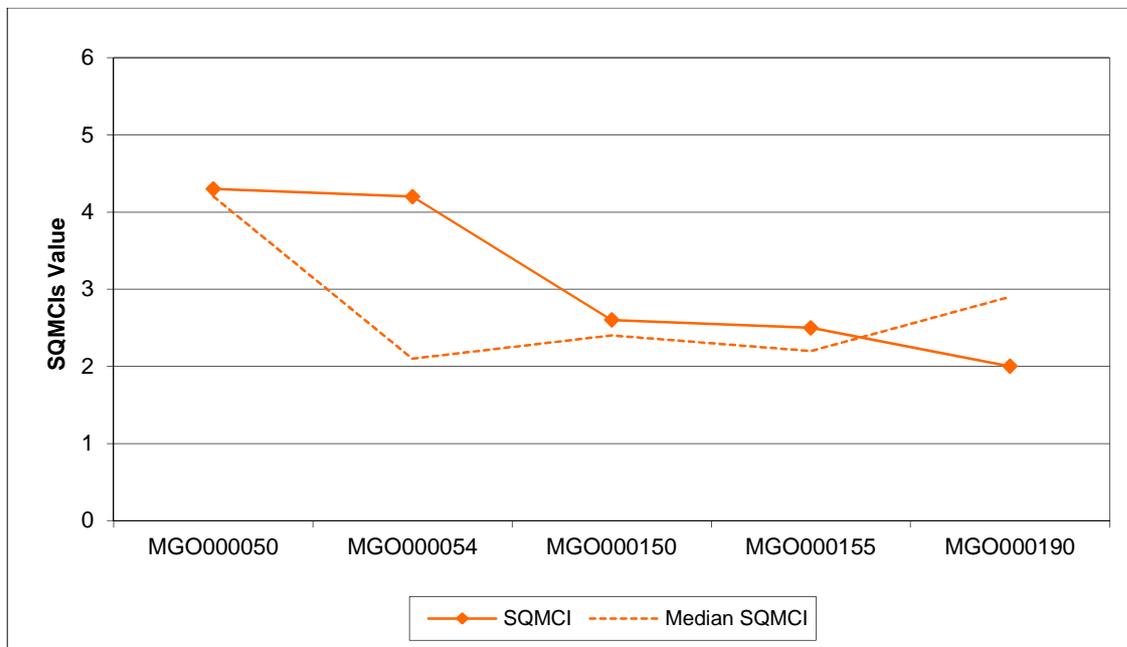
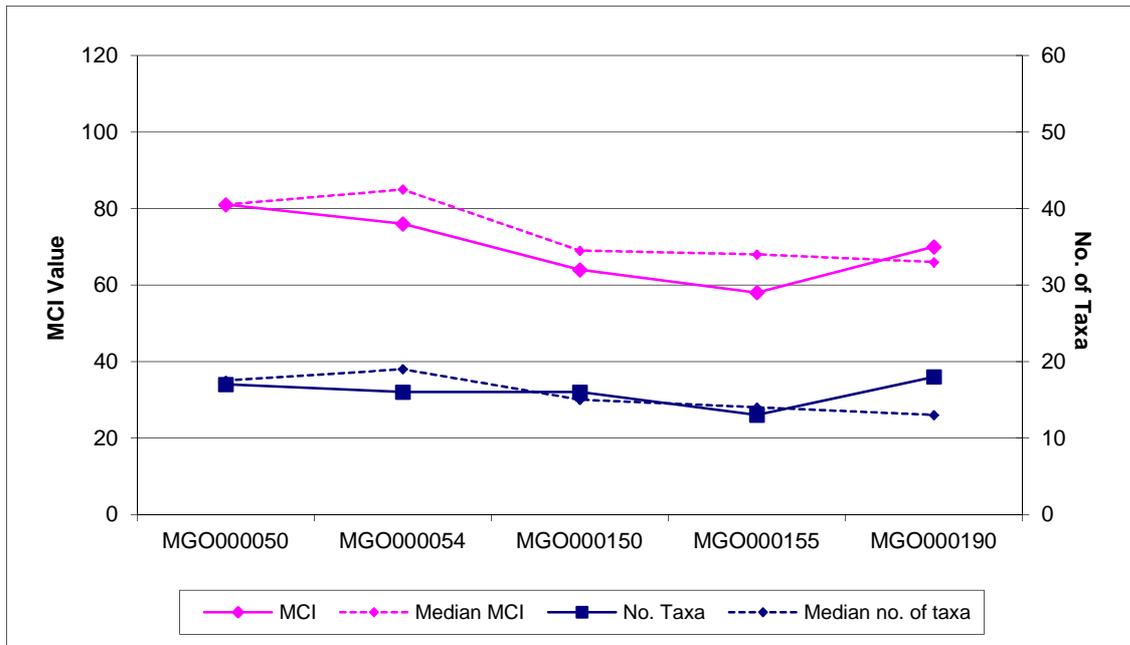


Figure 10 Longitudinal trend in number of taxa, MCI and SQMCI_s values in the Mangaone Stream for the survey of 16 March 2016

Unlike typically recorded, the downstream site 11 recorded a higher number of taxa (18) than that of other sites. The MCI was variable, but showed a slight decreasing trend through the mid reaches with a recovery at the bottom site. All sites showed MCI scores not significantly different from historical median scores.

When considering changes in community structure, the SQMCI_s scores (which take into account abundances within taxa, as well as their sensitivity to pollution) was found to follow a relatively similar pattern to the MCI scores in the upper and middle reaches but the bottom site had the lowest score unlike the MCI. Two sites recorded SQMCI_s scores significantly different to their historical medians, with site 16 recording a large improvement and site 11 recording a small but significant decrease.

Discussion and conclusions

Macroinvertebrate richnesses among the three Waiwhakaiho River sites were very similar to each other and their respective historic medians indicating that the sites had moderate richness which were unlikely to have been affected by toxic discharges. Macroinvertebrate richnesses among the five Mangaone Stream sites were more variable but differences were still relatively small (0-5 taxa) among sites with the majority of sites having moderate taxa richness that were not greatly different to historical medians. Again, there was no evidence of toxic discharges. Taxa richness is the most robust index when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. Macroinvertebrates when exposed to toxic chemicals may die or deliberately drift downstream thus potentially lowering taxa richness at a site. It had been previously reported that Taranaki sawmills discharged stormwater to the Mangaone Stream between sites 16 and 14, and sediment sampling undertaken in early 2009 had recorded significant concentrations of not only tributyltin in the stream sediments around Taranaki Sawmills, but also elevated concentrations of arsenic, chromium, copper and zinc, all potentially toxic to aquatic biota (see BJ192). Previously, there had been increased sedimentation between sites 16 and 14. Further sediment sampling undertaken in April 2012 and early March 2014, showed less contamination than that recorded in 2009

MCI scores for the three Waiwhakaiho River sites indicated that the macroinvertebrate communities were in 'fair' health but that there was significant variation in MCI score among sites. There was an insignificant decrease of MCI score from site 7 to site 8 (10 MCI units) and a significant increase from site 8 to site 13 (16 MCI units) which was largely due to the significantly better than normal health of the macroinvertebrate community at the bottom site (site 13). The SQMCIs scores were congruent with MCI scores in terms of trends but indicated that the macroinvertebrate communities were of 'poor' health (Stark and Maxted, 2007). There was an insignificant drop in score from the upstream site 7 to site 8 (0.5 SQMCIs units) while there was a significant increase from site 8 to site 13 (1.3 SQMCIs units) which was due to the significantly higher than normal score at site 13. The MCI and SQMCIs scores indicated that there was no evidence that discharges had had a detrimental impact on the macroinvertebrate communities of the Waiwhakaiho River.

The MCI scores site 12, the 'control' site for the Mangaone Stream indicated that the macroinvertebrate community was in 'fair' health which was typical for this site under low flow conditions and was similar to the previous summer surveys performed under lower, warmer flow conditions. The four downstream sites were all in 'poor' health.

Site 12 had a MCI score that was not significantly different from site 16 but it was significantly higher than sites 14, 15 and 11 and there was a clear trend of decreasing MCI score from site 12 to site 15 (23 MCI units) though there was a significant increase (12 MCI units) from site 15 to the bottom most site (site 11). The biggest and only significant decrease between individual sites was between sites 16 and site 14 (12 MCI units). The SQMCIs scores were again congruent with MCI scores indicating that the upstream site 12 had 'fair' health while all the downstream sites had 'poor' health (Stark and Maxted, 2007). However, unlike the MCI scores, the SQMCIs scores indicated a large, significant decrease between sites 12 and 16; with all further sites having slightly higher, but still very low, scores. The bottom site showed an insignificant improvement which partially mirrors the significant increase in MCI score between sites 15 and 11 suggesting a healthier macroinvertebrate community at site 11 in relation to the sites further upstream.

The SQMCI_s scores were again congruent with MCI scores indicating that the upstream site 12 had 'fair' health while all the downstream sites had 'poor' health (Stark and Maxted, 2007). However, unlike the MCI scores, the SQMCI_s scores indicated a large, significant decrease between sites 12 and 16; with all further sites having slightly higher, but still very low, scores. The bottom site showed an insignificant improvement (0.7 SQMCI_s units) which partially mirrors the significant increase in MCI score between sites 15 and 11 suggesting a healthier macroinvertebrate community at site 11 in relation to the sites further upstream (sites 16, 14, and 15).

These results are similar to past results which show downstream sites in the Mangaone Stream typically support poor macroinvertebrate communities but unlike past results site 16 had lower macroinvertebrate health than usual while site 11 had higher macroinvertebrate community health.

Earlier surveys including the preceding survey on 21 December 2015 have noted extensive filamentous algal growth at site 14. Widespread algal mats and filamentous algae growths were present at the time of the current survey and aquatic vegetation was also present at the edges of the stream. Previous reports (TRC, 2015) have suggested that the riffle may have become more stable due to an upstream flood retention scheme reducing freshes. The low MCI and SQMCI_s scores and high periphyton biomass was probably a result of a combination of a lack of significant freshes preceding the survey (27 days) and nutrient enrichment upstream. A possible source of the nutrient enrichment were groundwater inputs linked to the fertiliser depot situated upstream of site 14 but other industries occur upstream of the site which could also be contributing to poor water quality.

Overall, the results indicated that discharges from the industrial area was not having a negative effect on the macroinvertebrate communities in the lower Waiwhakaiho River but there was evidence that discharges were having a negative effect on macroinvertebrate communities present in the lower Mangaone Stream.

Summary

The Council's standard 'kick sampling' and 'sweep-net' sampling techniques were used to collect streambed macroinvertebrates at five sites in the Mangaone Stream and three sites in the Waiwhakaiho River on 16 March 2016, in order to assess whether discharges from the Lower Waiwhakaiho Industrial area had had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed 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 abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more relevant index if non-organic impacts are occurring. Significant differences in either the MCI or SQMCI_s between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This survey found that all Waiwhakaiho River sampling sites recorded moderate community richnesses similar to long term medians for their respective sites, with no trend

in richness in a downstream direction. MCI scores were either not significantly (Stark, 1998) different or significantly higher than historical medians. SQMCI₅ scores were higher than historical medians at sites 8 and 13 and slightly lower at site 7. SQMCI₅ scores were congruent with MCI scores showing no significant differences between sites and the bottom site had a significantly better score than normal. These results did not indicate significant effects of stormwater or wastewater discharges from the Fitzroy industrial area on the macroinvertebrate communities of the Waiwhakaiho River.

The Mangaone Stream sampling sites recorded moderate community richnesses similar to long term medians for their respective sites indicating that there had not been significant toxic discharges occurring. The macroinvertebrate community at the upstream 'control' site in the Mangaone Stream was of 'fair' health while downstream potentially impacted sites were in 'poor' health with less healthy communities recorded the further downstream the site was until a slight improvement in the bottom most site. MCI scores were generally lower but not significantly different to historical median scores at all sites. The SQMCI₅ scores were congruent with MCI scores indicating that the upstream site 12 had 'fair' health while all the downstream sites had 'poor' health (Stark and Maxted, 2007). However, unlike the MCI scores, the SQMCI₅ scores indicated a large, significant decrease between sites 12 and 16; with all further sites having slightly higher, but still very low, scores. The bottom site showed an insignificant improvement which partially mirrors the significant increase in MCI score between sites 15 and 11 suggesting a healthier macroinvertebrate community at site 11 in relation to the sites further upstream.

The five sampling sites in the Mangaone Stream showed a marked decline in MCI and SQMCI₅ values between Egmont Road (site 12) and Rifle Range Road (site 11), with a particularly marked decline in both SQMCI₅ and MCI scores between sites 12 and 16 and 16 and 14.

Overall, the results indicated that discharges from the industrial area was not having a negative effect on the macroinvertebrate communities in the lower Waiwhakaiho River but there was evidence that discharges were having a negative effect on macroinvertebrate communities present in the lower Mangaone Stream. Groundwater inputs may have contributed to some of this deterioration recorded immediately downstream of the fertiliser depot but other industries may also be contributing to poor water quality in the lower reaches of the Mangaone Stream.

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Appendix III

External lab results

ANALYSIS REPORT

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Client:	Taranaki Regional Council	Lab No:	1450759	SPV1
Contact:	L Smith C/- Taranaki Regional Council Private Bag 713 STRATFORD 4352	Date Registered:	16-Jul-2015	
		Date Reported:	28-Jul-2015	
		Quote No:	58029	
		Order No:	52137	
		Client Reference:	Receiving and Discharge water July -2014 - June 2015	
		Submitted By:	Mr J Williams	

Sample Type: Aqueous

Sample Name:	152248	152249	152250		
	MGO000075	IND001006	MGO000145		
Lab Number:	1450759.1	1450759.2	1450759.3		

Individual Tests

Total Tin	g/m ³	-	< 0.011	-	-	-
Total Zinc	g/m ³	0.0071	1.10	0.0083	-	-

OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS

Acetochlor	g/m ³	-	-	< 0.00004	-	-
Alachlor	g/m ³	-	-	< 0.00004	-	-
Atrazine	g/m ³	-	-	< 0.00004	-	-
Atrazine-desethyl	g/m ³	-	-	< 0.00004	-	-
Atrazine-desisopropyl	g/m ³	-	-	< 0.00008	-	-
Azaconazole	g/m ³	-	-	< 0.00002	-	-
Azinphos-methyl	g/m ³	-	-	< 0.00008	-	-
Benalaxyl	g/m ³	-	-	< 0.00002	-	-
Bitertanol	g/m ³	-	-	< 0.00008	-	-
Bromacil	g/m ³	-	-	< 0.00004	-	-
Bromopropylate	g/m ³	-	-	< 0.00004	-	-
Butachlor	g/m ³	-	-	< 0.00004	-	-
Captan	g/m ³	-	-	< 0.00008	-	-
Carbaryl	g/m ³	-	-	< 0.00004	-	-
Carbofenthion	g/m ³	-	-	< 0.00004	-	-
Carbofuran	g/m ³	-	-	< 0.00004	-	-
Chlorfluazuron	g/m ³	-	-	< 0.00004	-	-
Chlorothalonil	g/m ³	-	-	< 0.00004	-	-
Chlorpyrifos	g/m ³	-	-	< 0.00004	-	-
Chlorpyrifos-methyl	g/m ³	-	-	< 0.00004	-	-
Chlortoluron	g/m ³	-	-	< 0.00008	-	-
Cyanazine	g/m ³	-	-	< 0.00004	-	-
Cyfluthrin	g/m ³	-	-	< 0.00004	-	-
Cyhalothrin	g/m ³	-	-	< 0.00004	-	-
Cypermethrin	g/m ³	-	-	< 0.00008	-	-
Deltamethrin (including Tralomethrin)	g/m ³	-	-	< 0.00006	-	-
Diazinon	g/m ³	-	-	< 0.00002	-	-
Dichlofluanid	g/m ³	-	-	< 0.00004	-	-
Dichloran	g/m ³	-	-	< 0.0002	-	-
Dichlorvos	g/m ³	-	-	< 0.00008	-	-
Difenoconazole	g/m ³	-	-	< 0.00008	-	-
Dimethoate	g/m ³	-	-	< 0.00008	-	-
Diphenylamine	g/m ³	-	-	< 0.00008	-	-
Diuron	g/m ³	-	-	< 0.00004	-	-

Sample Type: Aqueous

Sample Name:		152248	152249	152250		
Lab Number:		MGO000075	IND001006	MGO000145		
		1450759.1	1450759.2	1450759.3		
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GC MS						
Fenpropimorph	g/m ³	-	-	< 0.00004	-	-
Fluazifop-butyl	g/m ³	-	-	< 0.00004	-	-
Fluometuron	g/m ³	-	-	< 0.00004	-	-
Flusilazole	g/m ³	-	-	< 0.00004	-	-
Fluvalinate	g/m ³	-	-	< 0.00004	-	-
Furalaxyl	g/m ³	-	-	< 0.00002	-	-
Haloxifop-methyl	g/m ³	-	-	< 0.00004	-	-
Hexaconazole	g/m ³	-	-	< 0.00004	-	-
Hexazinone	g/m ³	-	-	< 0.00002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m ³	-	-	< 0.0002	-	-
Kresoxim-methyl	g/m ³	-	-	< 0.00002	-	-
Linuron	g/m ³	-	-	< 0.00005	-	-
Malathion	g/m ³	-	-	< 0.00004	-	-
Metaxyl	g/m ³	-	-	< 0.00004	-	-
Metolachlor	g/m ³	-	-	< 0.00004	-	-
Metribuzin	g/m ³	-	-	< 0.00004	-	-
Molinate	g/m ³	-	-	< 0.00008	-	-
Myclobutanil	g/m ³	-	-	< 0.00004	-	-
Naled	g/m ³	-	-	< 0.0002	-	-
Norflurazon	g/m ³	-	-	< 0.00008	-	-
Oxadiazon	g/m ³	-	-	< 0.00004	-	-
Oxyfluorfen	g/m ³	-	-	< 0.00002	-	-
Paclobutrazol	g/m ³	-	-	< 0.00004	-	-
Parathion-ethyl	g/m ³	-	-	< 0.00004	-	-
Parathion-methyl	g/m ³	-	-	< 0.00004	-	-
Pendimethalin	g/m ³	-	-	< 0.00004	-	-
Permethrin	g/m ³	-	-	< 0.00002	-	-
Pirimicarb	g/m ³	-	-	< 0.00004	-	-
Pirimiphos-methyl	g/m ³	-	-	< 0.00004	-	-
Prochloraz	g/m ³	-	-	< 0.0002	-	-
Procymidone	g/m ³	-	-	< 0.00004	-	-
Prometryn	g/m ³	-	-	< 0.00002	-	-
Propachlor	g/m ³	-	-	< 0.00004	-	-
Propanil	g/m ³	-	-	< 0.0002	-	-
Propazine	g/m ³	-	-	< 0.00002	-	-
Propiconazole	g/m ³	-	-	0.00005	-	-
Pyriproxyfen	g/m ³	-	-	< 0.00004	-	-
Quizalofop-ethyl	g/m ³	-	-	< 0.00004	-	-
Simazine	g/m ³	-	-	< 0.00004	-	-
Simetryn	g/m ³	-	-	< 0.00004	-	-
Sulfentrazone	g/m ³	-	-	< 0.0002	-	-
TCMTB [2-(thiocyanomethylthio)benzothiazole, Busan]	g/m ³	-	-	< 0.00008	-	-
Tebuconazole	g/m ³	-	-	< 0.00004	-	-
Terbacil	g/m ³	-	-	< 0.00004	-	-
Terbufos	g/m ³	-	-	< 0.00004	-	-
Terbumeton	g/m ³	-	-	< 0.00004	-	-
Terbutylazine	g/m ³	-	-	< 0.00002	-	-
Terbutylazine-desethyl	g/m ³	-	-	< 0.00004	-	-
Terbutryn	g/m ³	-	-	< 0.00004	-	-
Thiabendazole	g/m ³	-	-	< 0.0002	-	-
Thiobencarb	g/m ³	-	-	< 0.00004	-	-
Tolyfluanid	g/m ³	-	-	< 0.00002	-	-
Triazophos	g/m ³	-	-	< 0.00004	-	-
Trifluralin	g/m ³	-	-	< 0.00004	-	-

Sample Type: Aqueous

Sample Name:	152248 MGO000075	152249 IND001006	152250 MGO000145		
Lab Number:	1450759.1	1450759.2	1450759.3		
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GC MS					
Vinclozolin	g/m ³	-	-	< 0.00004	-
Organonitro&phosphorus Pesticides Screen in MR W ater Liq/liq					
Acetochlor	g/m ³	-	< 0.0004	-	-
Alachlor	g/m ³	-	< 0.0003	-	-
Atrazine	g/m ³	-	< 0.0004	-	-
Atrazine-desethyl	g/m ³	-	< 0.0004	-	-
Atrazine-desisopropyl	g/m ³	-	< 0.0007	-	-
Azaconazole	g/m ³	-	< 0.0002	-	-
Azinphos-methyl	g/m ³	-	< 0.0007	-	-
Benalaxyl	g/m ³	-	< 0.0002	-	-
Bitertanol	g/m ³	-	< 0.0007	-	-
Bromacil	g/m ³	-	< 0.0004	-	-
Bromopropylate	g/m ³	-	< 0.0004	-	-
Butachlor	g/m ³	-	< 0.0004	-	-
Captan	g/m ³	-	< 0.0007	-	-
Carbaryl	g/m ³	-	< 0.0004	-	-
Carbofuran	g/m ³	-	< 0.0004	-	-
Chlorfluazuron	g/m ³	-	< 0.0004	-	-
Chlorothalonil	g/m ³	-	0.0004	-	-
Chlorpyrifos	g/m ³	-	< 0.0004	-	-
Chlorpyrifos-methyl	g/m ³	-	< 0.0004	-	-
Chlortoluron	g/m ³	-	< 0.0007	-	-
Cyanazine	g/m ³	-	< 0.0004	-	-
Cyfluthrin	g/m ³	-	< 0.0005	-	-
Cyhalothrin	g/m ³	-	< 0.0004	-	-
Cypermethrin	g/m ³	-	< 0.0009	-	-
Deltamethrin (including Tralomethrin)	g/m ³	-	< 0.0004	-	-
Diazinon	g/m ³	-	< 0.0002	-	-
Dichlofluanid	g/m ³	-	< 0.0004	-	-
Dichloran	g/m ³	-	< 0.002	-	-
Dichlorvos	g/m ³	-	< 0.0007	-	-
Difenoconazole	g/m ³	-	< 0.0007	-	-
Dimethoate	g/m ³	-	< 0.0007	-	-
Diphenylamine	g/m ³	-	< 0.0007	-	-
Diuron	g/m ³	-	< 0.0004	-	-
Fenpropimorph	g/m ³	-	< 0.0004	-	-
Fluazifop-butyl	g/m ³	-	< 0.0004	-	-
Fluometuron	g/m ³	-	< 0.0004	-	-
Flusilazole	g/m ³	-	< 0.0004	-	-
Fluvalinate	g/m ³	-	< 0.0003	-	-
Furalaxyl	g/m ³	-	< 0.0002	-	-
Haloxifop-methyl	g/m ³	-	< 0.0004	-	-
Hexaconazole	g/m ³	-	< 0.0004	-	-
Hexazinone	g/m ³	-	< 0.0002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m ³	-	< 0.002	-	-
Kresoxim-methyl	g/m ³	-	< 0.0002	-	-
Linuron	g/m ³	-	< 0.0004	-	-
Malathion	g/m ³	-	< 0.0004	-	-
Metaxyl	g/m ³	-	< 0.0004	-	-
Metolachlor	g/m ³	-	< 0.0003	-	-
Metribuzin	g/m ³	-	< 0.0004	-	-
Molinate	g/m ³	-	< 0.0007	-	-
Myclobutanil	g/m ³	-	< 0.0004	-	-
Naled	g/m ³	-	< 0.002	-	-

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	2
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS	Liquid/liquid extraction, GPC (if required), GCMS analysis	-	3
Copper, Chrome and Arsenic, Total, Trace	Nitric acid digestion, ICP-MS, trace level	0.00053 - 0.0011 g/m ³	1-3
Tributyl Tin Trace in Water samples by GCMS	Solvent extraction, ethylation, SPE cleanup, GC-MS SIM analysis	0.00003 - 0.00005 g/m ³	2-3
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 22 ^d ed. 2012 (modified).	-	1-3
Total Tin	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 ^d ed. 2012.	0.00053 g/m ³	2
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 ^d ed. 2012 / US EPA 200.8.	0.0011 g/m ³	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental Division

ANALYSIS REPORT

Page 1 of 5

Client:	Taranaki Regional Council	Lab No:	1587103	SPV1
Contact:	Scott Cowperthwaite C/- Taranaki Regional Council Private Bag 713 Stratford 4352	Date Registered:	20-May-2016	
		Date Reported:	03-Jun-2016	
		Quote No:	58029	
		Order No:	58048	
		Client Reference:	TSM Mangaone	
		Submitted By:	Scott Cowperthwaite	

Sample Type: Aqueous

Sample Name:	161655 18-May-2016 9:25 am	161669 18-May-2016 9:18 am	161652 18-May-2016 9:11 am	161651 18-May-2016 8:56 am	
Lab Number:	1587103.1	1587103.2	1587103.3	1587103.4	
Individual Tests					
Total Tin	g/m ³	-	0.00145	0.0054	-
Total Zinc	g/m ³	0.099	0.80	0.50	0.086
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS					
Acetochlor	g/m ³	< 0.00004	-	-	-
Alachlor	g/m ³	< 0.00004	-	-	-
Atrazine	g/m ³	< 0.00004	-	-	-
Atrazine-desethyl	g/m ³	< 0.00004	-	-	-
Atrazine-desisopropyl	g/m ³	< 0.00008	-	-	-
Azaconazole	g/m ³	< 0.00002	-	-	-
Azinphos-methyl	g/m ³	< 0.00008	-	-	-
Benalaxyl	g/m ³	< 0.00002	-	-	-
Bitertanol	g/m ³	< 0.00008	-	-	-
Bromacil	g/m ³	< 0.00004	-	-	-
Bromopropylate	g/m ³	< 0.00004	-	-	-
Butachlor	g/m ³	< 0.00004	-	-	-
Captan	g/m ³	< 0.00008	-	-	-
Carbaryl	g/m ³	< 0.00004	-	-	-
Carbofenothion	g/m ³	< 0.00004	-	-	-
Carbofuran	g/m ³	< 0.00004	-	-	-
Chlorfluazuron	g/m ³	< 0.00004	-	-	-
Chlorothalonil	g/m ³	< 0.00004	-	-	-
Chlorpyrifos	g/m ³	< 0.00004	-	-	-
Chlorpyrifos-methyl	g/m ³	< 0.00004	-	-	-
Chlortoluron	g/m ³	< 0.00008	-	-	-
Cyanazine	g/m ³	< 0.00004	-	-	-
Cyfluthrin	g/m ³	< 0.00004	-	-	-
Cyhalothrin	g/m ³	< 0.00004	-	-	-
Cypermethrin	g/m ³	< 0.00008	-	-	-
Deltamethrin (including Tralomethrin)	g/m ³	< 0.00006	-	-	-
Diazinon	g/m ³	< 0.00002	-	-	-
Dichlofluanid	g/m ³	< 0.00004	-	-	-
Dichloran	g/m ³	< 0.0002	-	-	-
Dichlorvos	g/m ³	< 0.00008	-	-	-
Difenoconazole	g/m ³	< 0.00008	-	-	-
Dimethoate	g/m ³	< 0.00008	-	-	-
Diphenylamine	g/m ³	< 0.00008	-	-	-
Diuron	g/m ³	< 0.00004	-	-	-

Sample Type: Aqueous

Sample Name:		161655 18-May-2016 9:25 am	161669 18-May-2016 9:18 am	161652 18-May-2016 9:11 am	161651 18-May-2016 8:56 am	
Lab Number:		1587103.1	1587103.2	1587103.3	1587103.4	
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS						
Fenpropimorph	g/m ³	< 0.00004	-	-	-	-
Fluazifop-butyl	g/m ³	< 0.00004	-	-	-	-
Fluometuron	g/m ³	< 0.00004	-	-	-	-
Flusilazole	g/m ³	< 0.00004	-	-	-	-
Fluvalinate	g/m ³	< 0.00004	-	-	-	-
Furalaxyl	g/m ³	< 0.00002	-	-	-	-
Haloxyfop-methyl	g/m ³	< 0.00004	-	-	-	-
Hexaconazole	g/m ³	< 0.00004	-	-	-	-
Hexazinone	g/m ³	< 0.00002	-	-	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m ³	< 0.0002	-	-	-	-
Kresoxim-methyl	g/m ³	< 0.00002	-	-	-	-
Linuron	g/m ³	< 0.00005	-	-	-	-
Malathion	g/m ³	< 0.00004	-	-	-	-
Metalaxyl	g/m ³	< 0.00004	-	-	-	-
Metolachlor	g/m ³	< 0.00004	-	-	-	-
Metribuzin	g/m ³	< 0.00004	-	-	-	-
Molinate	g/m ³	< 0.00008	-	-	-	-
Myclobutanil	g/m ³	< 0.00004	-	-	-	-
Naled	g/m ³	< 0.0002	-	-	-	-
Norflurazon	g/m ³	< 0.00008	-	-	-	-
Oxadiazon	g/m ³	< 0.00004	-	-	-	-
Oxyfluorfen	g/m ³	< 0.00002	-	-	-	-
Paclobutrazol	g/m ³	< 0.00004	-	-	-	-
Parathion-ethyl	g/m ³	< 0.00004	-	-	-	-
Parathion-methyl	g/m ³	< 0.00004	-	-	-	-
Pendimethalin	g/m ³	< 0.00004	-	-	-	-
Permethrin	g/m ³	0.00004	-	-	-	-
Pirimicarb	g/m ³	< 0.00004	-	-	-	-
Pirimiphos-methyl	g/m ³	< 0.00004	-	-	-	-
Prochloraz	g/m ³	< 0.0002	-	-	-	-
Procymidone	g/m ³	< 0.00004	-	-	-	-
Prometryn	g/m ³	< 0.00002	-	-	-	-
Propachlor	g/m ³	< 0.00004	-	-	-	-
Propanil	g/m ³	< 0.0002	-	-	-	-
Propazine	g/m ³	< 0.00002	-	-	-	-
Propiconazole	g/m ³	0.00198	-	-	-	-
Pyriproxyfen	g/m ³	< 0.00004	-	-	-	-
Quizalofop-ethyl	g/m ³	< 0.00004	-	-	-	-
Simazine	g/m ³	< 0.00004	-	-	-	-
Simetryn	g/m ³	< 0.00004	-	-	-	-
Sulfentrazone	g/m ³	< 0.0002	-	-	-	-
TCMTB [2-(thiocyanomethylthio)benzothiazole, Busan]	g/m ³	< 0.00008	-	-	-	-
Tebuconazole	g/m ³	0.0024	-	-	-	-
Terbacil	g/m ³	< 0.00004	-	-	-	-
Terbufos	g/m ³	< 0.00004	-	-	-	-
Terbumeton	g/m ³	< 0.00004	-	-	-	-
Terbuthylazine	g/m ³	< 0.00002	-	-	-	-
Terbuthylazine-desethyl	g/m ³	< 0.00004	-	-	-	-
Terbutryn	g/m ³	< 0.00004	-	-	-	-
Thiabendazole	g/m ³	< 0.0002	-	-	-	-
Thiobencarb	g/m ³	< 0.00004	-	-	-	-
Tolyfluanid	g/m ³	< 0.00002	-	-	-	-
Triazophos	g/m ³	< 0.00004	-	-	-	-

Sample Type: Aqueous

Sample Name:		161655 18-May-2016 9:25 am	161669 18-May-2016 9:18 am	161652 18-May-2016 9:11 am	161651 18-May-2016 8:56 am	
Lab Number:		1587103.1	1587103.2	1587103.3	1587103.4	
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS						
Trifluralin	g/m ³	< 0.00004	-	-	-	-
Vinclozolin	g/m ³	< 0.00004	-	-	-	-
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Acetochlor	g/m ³	-	< 0.0004	< 0.0004	-	-
Alachlor	g/m ³	-	< 0.0003	< 0.0003	-	-
Atrazine	g/m ³	-	< 0.0004	< 0.0004	-	-
Atrazine-desethyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Atrazine-desisopropyl	g/m ³	-	< 0.0007	< 0.0007	-	-
Azaconazole	g/m ³	-	< 0.0002	< 0.0002	-	-
Azinphos-methyl	g/m ³	-	< 0.0007	< 0.0007	-	-
Benalaxyl	g/m ³	-	< 0.0002	< 0.0002	-	-
Bitertanol	g/m ³	-	< 0.0007	< 0.0007	-	-
Bromacil	g/m ³	-	< 0.0004	< 0.0004	-	-
Bromopropylate	g/m ³	-	< 0.0004	< 0.0004	-	-
Butachlor	g/m ³	-	< 0.0004	< 0.0004	-	-
Captan	g/m ³	-	< 0.0007	< 0.0007	-	-
Carbaryl	g/m ³	-	< 0.0004	< 0.0004	-	-
Carbofuran	g/m ³	-	< 0.0004	< 0.0004	-	-
Chlorfluazuron	g/m ³	-	< 0.0004	< 0.0004	-	-
Chlorothalonil	g/m ³	-	< 0.0004	< 0.0004	-	-
Chlorpyrifos	g/m ³	-	< 0.0004	< 0.0004	-	-
Chlorpyrifos-methyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Chlortoluron	g/m ³	-	< 0.0007	< 0.0007	-	-
Cyanazine	g/m ³	-	< 0.0004	< 0.0004	-	-
Cyfluthrin	g/m ³	-	< 0.0005	< 0.0005	-	-
Cyhalothrin	g/m ³	-	< 0.0004	< 0.0004	-	-
Cypermethrin	g/m ³	-	< 0.0009	< 0.0009	-	-
Deltamethrin (including T ralomethrin)	g/m ³	-	< 0.0004	< 0.0004	-	-
Diazinon	g/m ³	-	< 0.0002	< 0.0002	-	-
Dichlofluanid	g/m ³	-	< 0.0004	< 0.0004	-	-
Dichloran	g/m ³	-	< 0.002	< 0.002	-	-
Dichlorvos	g/m ³	-	< 0.0007	< 0.0007	-	-
Difenoconazole	g/m ³	-	< 0.0007	< 0.0007	-	-
Dimethoate	g/m ³	-	< 0.0007	< 0.0007	-	-
Diphenylamine	g/m ³	-	< 0.0007	< 0.0007	-	-
Diuron	g/m ³	-	< 0.0004	< 0.0004	-	-
Fenpropimorph	g/m ³	-	< 0.0004	< 0.0004	-	-
Fluazifop-butyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Fluometuron	g/m ³	-	< 0.0004	< 0.0004	-	-
Flusilazole	g/m ³	-	< 0.0004	< 0.0004	-	-
Fluvalinate	g/m ³	-	< 0.0003	< 0.0003	-	-
Furalaxyl	g/m ³	-	< 0.0002	< 0.0002	-	-
Haloxifop-methyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Hexaconazole	g/m ³	-	< 0.0004	< 0.0004	-	-
Hexazinone	g/m ³	-	< 0.0002	< 0.0002	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	g/m ³	-	< 0.002	< 0.002	-	-
Kresoxim-methyl	g/m ³	-	< 0.0002	< 0.0002	-	-
Linuron	g/m ³	-	< 0.0004	< 0.0004	-	-
Malathion	g/m ³	-	< 0.0004	< 0.0004	-	-
Metalaxyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Metolachlor	g/m ³	-	< 0.0003	< 0.0003	-	-
Metribuzin	g/m ³	-	< 0.0004	< 0.0004	-	-
Molinate	g/m ³	-	< 0.0007	< 0.0007	-	-

Sample Type: Aqueous						
Sample Name:	161655 18-May-2016 9:25 am	161669 18-May-2016 9:18 am	161652 18-May-2016 9:11 am	161651 18-May-2016 8:56 am		
Lab Number:	1587103.1	1587103.2	1587103.3	1587103.4		
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq						
Myclobutanil	g/m ³	-	< 0.0004	< 0.0004	-	-
Naled	g/m ³	-	< 0.002	< 0.002	-	-
Norflurazon	g/m ³	-	< 0.0007	< 0.0007	-	-
Oxadiazon	g/m ³	-	< 0.0004	< 0.0004	-	-
Oxyfluorfen	g/m ³	-	< 0.0002	< 0.0002	-	-
Paclobutrazol	g/m ³	-	< 0.0004	< 0.0004	-	-
Parathion-ethyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Parathion-methyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Pendimethalin	g/m ³	-	< 0.0004	< 0.0004	-	-
Permethrin	g/m ³	-	0.0011	0.0017	-	-
Pirimicarb	g/m ³	-	< 0.0004	< 0.0004	-	-
Pirimiphos-methyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Prochloraz	g/m ³	-	< 0.002	< 0.002	-	-
Procymidone	g/m ³	-	< 0.0004	< 0.0004	-	-
Prometryn	g/m ³	-	< 0.0002	< 0.0002	-	-
Propachlor	g/m ³	-	< 0.0004	< 0.0004	-	-
Propanil	g/m ³	-	< 0.002	< 0.002	-	-
Propazine	g/m ³	-	< 0.0002	< 0.0002	-	-
Propiconazole	g/m ³	-	0.037	0.029	-	-
Pyriproxyfen	g/m ³	-	< 0.0004	< 0.0004	-	-
Quizalofop-ethyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Simazine	g/m ³	-	< 0.0004	< 0.0004	-	-
Simetryn	g/m ³	-	< 0.0004	< 0.0004	-	-
Sulfentrazone	g/m ³	-	< 0.002	< 0.002	-	-
TCMTB [2-(thiocyanomethylthio)benzothiazole, Busan]	g/m ³	-	< 0.0007	< 0.0007	-	-
Tebuconazole	g/m ³	-	0.037	0.029	-	-
Terbacil	g/m ³	-	< 0.0004	< 0.0004	-	-
Terbufos	g/m ³	-	< 0.0004	< 0.0004	-	-
Terbumeton	g/m ³	-	< 0.0004	< 0.0004	-	-
Terbutylazine	g/m ³	-	< 0.0002	< 0.0002	-	-
Terbutylazine-desethyl	g/m ³	-	< 0.0004	< 0.0004	-	-
Terbutryn	g/m ³	-	< 0.0004	< 0.0004	-	-
Thiabendazole	g/m ³	-	< 0.002	< 0.002	-	-
Thiobencarb	g/m ³	-	< 0.0004	< 0.0004	-	-
Tolyfluanid	g/m ³	-	< 0.0002	< 0.0002	-	-
Triazophos	g/m ³	-	< 0.0004	< 0.0004	-	-
Trifluralin	g/m ³	-	< 0.0004	< 0.0004	-	-
Vinclozolin	g/m ³	-	< 0.0004	< 0.0004	-	-
Copper, Chrome and Arsenic, Total, Trace						
Total Arsenic	g/m ³	0.0046	0.0184	0.22	< 0.0011	-
Total Chromium	g/m ³	0.0055	0.0166	0.29	0.00094	-
Total Copper	g/m ³	0.0068	0.0152	0.120	0.0036	-
Tributyl Tin Trace in Water samples by GCMS						
Dibutyltin (as Sn)	g/m ³	< 0.00006	< 0.00011	< 0.00011	-	-
Tributyltin (as Sn)	g/m ³	< 0.00005	< 0.00009	< 0.00009	-	-
Triphenyltin (as Sn)	g/m ³	< 0.00004	< 0.00007	< 0.00007	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Organonitro&phosphorus Pesticides Screen in MR Water Liq/liq	Liquid / liquid extraction, GPC (if required), GC-MS analysis	-	2-3

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
OrganoNitrogen & Phosphorus pesticides, trace, liq/liq GCMS	Liquid/liquid extraction, GPC (if required), GCMS analysis	-	1
Copper, Chrome and Arsenic, Total, Trace	Nitric acid digestion, ICP-MS, trace level	0.00053 - 0.0011 g/m ³	1-4
Tributyl Tin Trace in Water samples by GCMS	Solvent extraction, ethylation, SPE cleanup, GC-MS SIM analysis	0.00003 - 0.00005 g/m ³	1-3
Total Digestion	Boiling nitric acid digestion. APHA 3030 E 22 ^d ed. 2012 (modified).	-	1-4
Total Tin	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 ^d ed. 2012.	0.00053 g/m ³	2-3
Total Zinc	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 22 ^d ed. 2012 / US EPA 200.8.	0.0011 g/m ³	1-4

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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