

Civil Quarries Ltd – Everett Road Quarry  
Monitoring Programme  
Annual Report  
2017-2018

Technical Report 2018-98

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## Executive summary

Civil Quarries Ltd (the Company) operates a quarry located on Everett Road at Everett Park, in the Kurapete catchment. This report for the period July 2017 to June 2018 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

The Company holds two resource consents, which include a total of 29 conditions setting out the requirements that the Company must satisfy. The Company holds one resource consent to allow it to discharge treated washwater, stormwater and groundwater into an unnamed tributary of the Kurapete Stream, and one consent to abstract groundwater encountered during the quarrying process for the purposes of site dewatering and for use in aggregate washing. These resource consents were transferred to the Company from a previous operator (Inglewood Metals Ltd) in April 2017. The Company applied to vary the conditions of their consents during the period under review and these applications were still being processed at the conclusion of the reported period.

### **During the monitoring period, Civil Quarries Ltd demonstrated an overall level of environmental performance that required improvement.**

The Council's monitoring programme for the year under review included two scheduled inspections and two follow-up inspections after an abatement notice was issued (see below). Two discharge and one receiving water physicochemical surveys were carried out, as was a biological survey of the receiving waters.

The monitoring undertaken showed that there were some adverse effects identified in relation to site discharges during this monitoring period. During a routine inspection visit, it was discovered that discharges from the site were having a significant impact on the visual clarity of the Kurapete Stream, downstream of the discharge point. An abatement notice was issued. During a follow-up inspection, a sample of the discharge from the site was obtained in which suspended solid concentrations were found to exceed consented limits. The discharge was again found to be having impacts on visual clarity of the Kurapete Stream, downstream of the discharge point. An infringement notice was issued. Further inspections carried out over the latter half of the monitoring period found improvements in the quality of the discharge leaving the site. A biomonitoring survey, undertaken in late summer, found that there had not been any recent (or long-term) impacts on benthic invertebrate communities within the Kurapete Stream as a result of discharges from the site. Careful management of water within the site is required to maintain discharge standards.

The requirements of several conditions set out in the groundwater abstraction permit for the site have yet to be complied with following the transfer of the consent to the Company. These include the measuring and reporting of take volumes and the installation of groundwater level monitoring bores. These matters require urgent attention to avoid enforcement action being taken.

During the year the Company demonstrated an overall level of environmental performance that required improvement and a poor level of administrative performance. This should be addressed in the 2018-2019 monitoring period, or enforcement action may be undertaken.

For reference, in the 2017-2018 year, consent holders were found to achieve a high level of environmental performance and compliance for 76% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 20% of the consents, a good level of environmental performance and compliance was achieved.

This report includes recommendations for the 2018-2019 year.

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# 1 Introduction

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

### 1.1.1 Introduction

This report is for the period July 2017 to June 2018 by the Council describing the monitoring programme associated with resource consents held by the Company. The Company operates a quarry situated on Everett Road at Everett Park. This report focusses primarily on the compliance of the current operators under the current consents, but will also present results and discussion regarding the previous operator, Inglewood Metals Ltd. Consent 10247-1 was issued to Inglewood Metals Ltd alongside the renewal of consent 1113-4 on 1 December 2016. Both consents were transferred to the Company on 6 April 2017. At the time of reporting the Company have applied to change the conditions of the consent, which is still being processed.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to abstractions and discharges of water in the Kurapete catchment. This is the 23<sup>rd</sup> annual report to be prepared by the Council to cover the Everett Road quarry site's water discharges and their effects, and the second report under the current Company's management.

### 1.1.2 Structure of this report

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

- consent compliance monitoring under the *Resource Management Act 1991* (RMA) and the Council's obligations;
- the Council's approach to monitoring sites through annual programmes;
- the resource consents held by the Company/companies in the Kurapete catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

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

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

**Section 4** presents recommendations to be implemented in the 2018-2019 monitoring year.

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

### 1.1.3 The Resource Management Act 1991 and monitoring

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

- a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
- b. physical effects on the locality, including landscape, amenity and visual effects;
- c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

- d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
- e. risks to the neighbourhood or environment.

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

#### 1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the Company, this report also assigns them a rating for their environmental and administrative performance during the period under review.

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

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

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

##### Environmental Performance

**High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving 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 2017-2018 year, consent holders were found to achieve a high level of environmental performance and compliance for 76% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 20% of the consents, a good level of environmental performance and compliance was achieved.

## 1.2 Process description

The Company's quarrying operation is located adjacent to the true right bank of the Kurapete Stream at Everett Road, near Inglewood. The current site is approximately 10 ha in total area, encompassing active excavation areas, stormwater treatment ponds, stockpiling and processing areas. Processing facilities include machinery for dry crushing and a washing and screening plant. Some aggregate washing is performed at the site, generating washwater that must be managed as part of the site operations. Photo 1 shows the current operation looking from the upper pond area towards the pit base and excavation area.

Waste washwater is directed through a series of settling ponds before being either recirculated for use in washing or discharged via a further series of ponds to the head an unnamed tributary of the Kurapete Stream. The quarrying area is contoured and bunded so that groundwater and site stormwater are directed back to the settling ponds in the base of the quarry floor (Figure 1) before being pumped to the pond system for washing, or discharging through to the final pond and then to the unnamed tributary. Discharge from the final treatment pond is via a steel pipe access culvert to the tributary which flows approximately 600 m before joining the Kurapete Stream upstream of the Everett Road Bridge. Gravel filtered surface runoff from the entrance to the quarry, off Everett Road, and the upstream farm drainage enter the northern boundary drain, which also discharges into the unnamed tributary (Figure 1).

Over recent years there has been some variability in the configuration of the upper settlement pond system receiving the quarry floor wastewater prior to discharge to the stream. At the time of reporting, the Company are applying to change their discharge consent, which requires modification of their existing water treatment system to increase pond capacity.

The Company have indicated they intend to continue extracting from the base of the current excavation area, and have applied to increase the available quarrying area. In recent years larger ponds have been constructed on the quarry floor for improved retention and settlement of turbid groundwater and stormwater prior to pumping to the upper ponds' treatment system. As the extent of the quarrying area increases, the Company will have to manage an increasing volume of generated water, necessitating the planned changes to their current circulation system, as outlined in their current consent change application.



Photo 1 Everett Road Quarry view from upper pond area, site under Civil Quarries Ltd management

## 1.3 Resource consents

### 1.3.1 Water abstraction permit

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14.

The Company holds water permit **10247-1** to cover the abstraction of groundwater incidental to quarry operations and for aggregate washing purposes. This permit was issued by the Council to the previous site operators (Inglewood Metal Ltd) on 1 December 2016 under Section 87(d) of the RMA. The permit was then transferred to The Company on 6 April 2017.



Figure 1 Quarry operations, wastewater treatment system, Everett Road Quarry

At the time of reporting the Company have applied to change the conditions of the permit, these changes are still being processed. It is due to expire on 1 June 2033.

There are nine special conditions attached to this permit.

- Condition 1 imposes a limit upon the abstraction rate.
- Condition 2 requires the use of an accurate flow measuring and recording device and provides for the supply of abstraction data to the Council.
- Condition 3 stipulates the requirements for record keeping and submission.
- Condition 4 requires the verification of the flow measurement and recording device referred to in Condition 2, and Condition 5 relates to the maintenance of said device.
- Condition 6 sets out a requirement for the implementation of a monitoring programme to assess for possible impacts on groundwater resources from the exercise of the consent.
- Condition 7 requires the installation of data loggers on the aforementioned flow meter devices.
- Condition 8 requires the consent holder to adopt best practical option when exercising the consent.
- Condition 9 is a review provision.

### 1.3.2 Water discharge permit

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.

Water quality is a primary concern to the Council with regard to aggregate extraction. A quarry can operate as either a 'dry' quarry discharging only stormwater, or a 'washing' quarry, where aggregate washing facilities are in place. Many of the quarries in Taranaki have some form of washing facility and also operate in the vicinity of a water body, or have some form of discharge into a water body.

Waste water from aggregate washing has a high silt concentration. Discharge of this water into a waterbody, particularly to a stream during low flow, can result in smothering of instream life and deterioration in aesthetic conditions and can affect downstream abstractions of water, local fisheries and recreational activity.

Stormwater is generally less contaminated (in terms of silt concentration) and run-off tends to occur when rivers and streams are in higher flow. This means that the effect of silt contamination is reduced due to lower quantities, greater dilution, and increased carrying capacity. The installation of appropriate stormwater diversion structures, together with construction and maintenance of contaminated stormwater and aggregate washing discharge treatment facilities, are most important in maintaining water quality.

The Company holds water discharge permit **1113-5** to cover the discharge of treated stormwater (including groundwater seepage) and treated washwater into an unnamed tributary of the Kurapete Stream. This permit was issued by the Council to the previous site operators (Inglewood Metal Ltd) on 1 December 2016 under Section 87(d) of the RMA and was transferred to The Company on 6 April 2017. At the time of reporting the Company have applied to change the conditions of the permit. It is due to expire on 1 June 2033.

There are 20 special conditions attached to this permit.

- Conditions 1 and 2 require the Company to implement upgrades of the existing stormwater and washwater pond system as per documentation supplied as part of the consent application.
- Condition 3 requires the Company to provide a stormwater management plan.
- Condition 4 requires the Company to implement and maintain a circulatory system to isolate washwater from the stormwater system.

- Condition 5 stipulates the geographical location of the discharge point into the Kurapete Stream tributary.
- Condition 6 requires the consent holder to adopt best practical option when exercising the consent.
- Condition 7 limits the total area of the stormwater catchment.
- Condition 8 gives the maximum discharge rate for stormwater and groundwater pumped to the treatment ponds.
- Condition 9 requires the installation and maintenance of an accurate flow measuring and recording device at the point of discharge and provides for the supply of discharge data to the Council.
- Condition 10 states that the Company must notify the Council prior to undertaking alterations to equipment or processes that may result in changes to quality or quantity of discharge water leaving the site.
- Condition 11 restricts the Company from discharging untreated stormwater or washwater.
- Conditions 12 and 13 require the Company to maintain site bunding and contouring to control groundwater, washwater and stormwater in the washwater treatment system and active quarry areas.
- Conditions 14 and 15 discuss site silt control system requirements.
- Condition 16 provides constituent concentration limits for the site discharges.
- Conditions 17 and 18 limit the effects on water quality in the receiving waters of the Kurapete Stream and its tributary relative to site discharges.
- Condition 19 requires the Company to maintain a site contingency plan.
- Condition 20 is a review provision.

The summary of consent conditions above may not reflect the full requirements of each condition. The consent conditions in full can be found in the resource consented which are appended to this report as Appendix I.

## 1.4 Monitoring programme

### 1.4.1 Introduction

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

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

The monitoring programme for the Everett Road Quarry site consisted of four primary components.

### 1.4.2 Programme liaison and management

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

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

### 1.4.3 Site inspections

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

### 1.4.4 Chemical sampling

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

The quarry washwater/stormwater discharge was sampled on three occasions, and the samples analysed for pH, electrical conductivity, suspended solids and turbidity. The Kurapete Stream was sampled on two occasions, and the samples were analysed for the same parameters as the discharge.

### 1.4.5 Biomonitoring surveys

One biomonitoring survey of the Kurapete Stream was conducted at three sites to determine whether or not the discharge of treated stormwater and uncontaminated site and process water has had a detrimental effect on the ecological health of the stream.

## 2 Results

### 2.1 Water

#### 2.1.1 Inspections

##### 13 October 2017

A scheduled inspection of the quarry site was undertaken by an inspecting officer. The compliance programme manager and a second inspecting officer were also present at the time of inspection.

During the inspection, samples of both the discharge and receiving waters were taken. A non-compliance was identified at the point where the discharge entered the receiving water, in that discharge could be seen to have a significant effect on the visual clarity of the Kurapete Stream, in breach of condition 17 of consent 1113-5. Abatement notice EAC-21694 was issued following the inspection.

##### 23 November 2017

Re-inspection was undertaken following issue of the abatement notice at the quarry site and showed that the quality of the discharge into the Kurapete Stream from the site had further deteriorated since the initial inspection. Visually, the discharge was causing the stream to become significantly discoloured, with the bed of the stream still not visible over 100 m downstream from the point of discharge.

The Company was directed to cease discharge immediately due to the effect on the stream. As a result of the breach of consent 1113-5 and abatement notice EAC-21694, the company was issued an infringement notice (EAC-21857),

The results of samples taken during the time of inspection confirmed that the suspended solids in the discharge and downstream receiving waters significantly exceeded consent limits (see Tables 2 and 6).

##### 1 December 2017

A further re-inspection was undertaken in relation to the abatement and infringement notices and found that significant work was underway, or had already been undertaken by the Company in order to comply with consent 1113-5 as follows:

- The wastewater from the wash plant was within a closed loop and retained on site and recycled
- An overflow was in place which, in the case of a pump failure, would direct wastewater back to the quarry floor to ensure it would not enter the discharge system
- Plans were in place to install a valve shutoff in the wastewater/stormwater discharge to enable the flow of the discharge to be altered/cutoff
- Plans were underway to install bigger treatment ponds and a variation to the consent to enable the upgrades has been sought

At the time of inspection the discharge into the receiving water, although still slightly discoloured, was substantially better than it had been and was expected to continue to improve as the ponds cleaned up, due to the wash water no-longer being discharged to them. At the time of the inspection the site was found to be compliant with resource consent conditions.

##### 7 March 2018

A scheduled inspection of the quarry site was undertaken by an inspecting officer. At the time of the inspection there had been significant rainfall at the site. The site was found to be well bunded with all surface water either kept on site or directed to the treatment system. Since the previous inspection significant work had been undertaken to install three new settlement ponds on the lower level of the quarry. These ponds appeared to be working well and along with changes to the wash water system, the quality of

the discharge had improved greatly. Discussion with site personnel were had in regards to cleaning out the final pond in the system, which appeared to have silt in it from when the wash water previously entered it. Overall the Company's management of the stormwater/washwater system has improved.

### 13 June 2018

At the time of inspection, there had recently been a large amount of rainfall at the site. The wash water pad was not active due to a mechanical issue. This was not considered to be an issue as all wash water is now kept on a closed loop and is not discharged to water. The settling ponds appeared to be working well, with water discharged from site appearing only slightly discoloured. Samples were taken at the discharge point, upstream and downstream to assess compliance with consent conditions. The receiving water downstream from the discharge point was murky in colouration, however, this seemed to taper off after the mixing zone (25 m).

## 2.1.2 Results of abstraction, discharge and surface water quality monitoring

Abstraction monitoring will be undertaken in the forthcoming monitoring period following the finalisation of the variation to consent 10247-1. As part of the consenting process the Company will be modifying the existing water management system, including the installation of water metering hardware and the installation of monitoring bores on the site boundary to monitor for groundwater drawdown effects.

Sampling locations are described in Table 1 and Figure 2. Discharge results from 2017-2018 monitoring period sampling are presented in Table 2 against the range of results at each sites over the period July 2000 to June 2017.

Table 1 Locations and details of sampling sites

Site	Location	GPS coordinates	Site code
Quarry washwater / stormwater	At discharge outlets (stormwater included after Feb 1998)	1710431E 5668301N	IND002022
Kurapete Stream	100 m upstream of Everett Road bridge (upstream of quarry tributary)	1710640E 5668709N	KRP000960
Unnamed tributary	5 m upstream of the Kurapete Stream confluence (600 m downstream of discharges at quarry)	1710658E 5668713N	KRP000975
Kurapete Stream	At the Everett Road bridge (approximately 100 m downstream of quarry tributary)	1710695E 5668758N	KRP000980



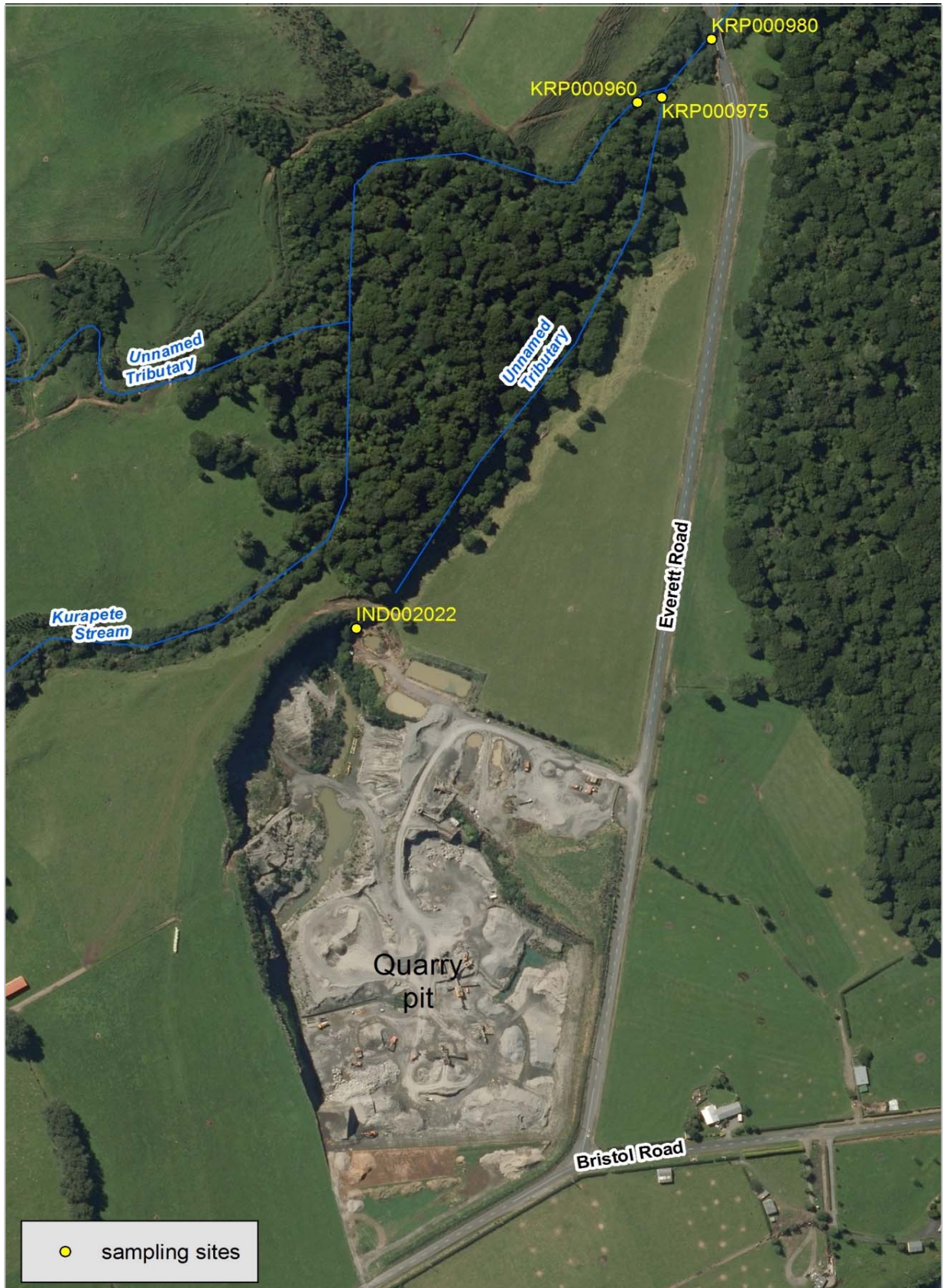


Figure 2 Sampling site locations, Everett Road Quarry

Table 2 Chemical monitoring results for discharge sampling site IND002022

IND002022							
Parameter	Consent limit	Unit	Minimum	Maximum	TRC173591	TRC174216	TRC183061
			July 2000 to June 2017		13-Oct-17	23-Nov-17	13-Jun-18
			-	-	13:55	15:53	12:00
Electrical conductivity	-	mS/m	8.8	43.4	32.8	32.3	49.7
pH	6-9	pH	6.3	7.9	7.7	7.8	7.8
Suspended solids	100	g/m <sup>3</sup>	6	460	39	650	28
Turbidity	-	NTU	1.8	470	35	710	-
Total hydrocarbons	15	g/m <sup>3</sup>	Not analysed				

Discharge samples taken during the October 2017, June 2018 and October 2018 inspections were within consent limits for all measured parameters. The discharge sample taken on 23 November 2017 significantly exceeded the consent limit of 100 g/m<sup>3</sup> suspended solids (650 g/m<sup>3</sup>). To June 2018, there were no visual signs of hydrocarbon presence so samples were not analysed for this, as was outlined in the monitoring programme. The programme has now been updated to include regular sampling for hydrocarbons.

The results of sampling undertaken for the receiving waters during the monitoring period are presented below in Tables 3-6. Refer to Table 1 and Figure 2 for sample locations.

Results have been presented against the historical range of results (July 2000 to June 2017) and the most recent sampling results undertaken in October 2018 for comparison.

Table 3 Surface water monitoring results for KRP000960

Kurapete Stream site (KRP000960)					
Parameter	Unit	Minimum	Maximum	TRC173592	TRC174217
		July 2000- June 2017		13-Oct-17	23-Nov-17
		-	-	14:10	15:30
Electrical conductivity	mS/m	7.3	15.6	14.8	31.2
pH	pH	7.1	7.9	7.5	7.6
Suspended solids	g/m <sup>3</sup>	2	200	23	650
Turbidity	NTU	1	150	16	710

Table 4 Surface water monitoring results for KRP000975

Downstream - confluence (KRP000975)					
Parameter	Unit	Minimum	Maximum	TRC173593	TRC174218
		July 2000- June 2017		13-Oct-17	23-Nov-17
		-	-	14:15	15:34
Electrical conductivity	mS/m	11.2	41.6	11.1	13.2
pH	pH	6.8	7.7	7.6	7.8
Suspended solids	g/m <sup>3</sup>	3	79	3	<2
Turbidity	NTU	3	65	3	2

Table 5 Surface water monitoring results for KRP000980

Downstream - bridge (KRP000980)					
Parameter	Unit	Minimum	Maximum	-	TRC174219
		July 2000- June 2017		13-Oct-17	23-Nov-17
					15:40
Electrical conductivity	mS/m	7.9	21	Not sampled	17.6
pH	pH	7	7.8		7.7
Suspended solids	g/m <sup>3</sup>	2	170		150
Turbidity	NTU	1	140		150

Table 6 Turbidity (NTU) results in relation to Consent 1113-5 (Condition 18).

Site id.	Location	Limit	13-Oct-17	23-Nov-17
KRP000975	Confluence	-	3	2
KRP000980	>25 m downstream	<50% more than confluence	-	150

The significantly higher suspended solids concentration and turbidity results reported in November 2017 show the response downstream to the increased sediment loading in the discharge reported during the same inspection (discussed). The analytical results were non-compliant in both suspended solids, which was significantly higher than the limit of 100 g/m<sup>3</sup>, and turbidity, which is required to be less than 50% more than the confluence, beyond 25 m downstream. All other results reported were within consent limits. The implications of these results are discussed further in Sections 2.2 and 3.2.

### 2.1.3 Biomonitoring

A summer biomonitoring survey was undertaken in March 2018 in relation to the discharge from the Company's Everett Road Quarry site.

The Council's standard 'kick-sampling' technique was used at three established sites to collect streambed macroinvertebrates from the Kurapete Stream. Samples were processed to provide number of taxa (richness), Macroinvertebrate Community Index (MCI) and SQMCI<sub>s</sub> scores, and EPT taxa for each site.

Taxa richness is the most robust index when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. It can also be a reflection of limited food or habitat availability which might be expected if suspended or settled silt was an issue at a 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<sub>s</sub> takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may also provide more relevant information than the MCI in relation to non-organic impacts. Differences in either the MCI or the SQMCI<sub>s</sub> between sites indicate the degree of adverse effects (if any) of the discharges being monitored. EPT taxa are generally more sensitive to fine suspended sediment (Clapcott, et al. 2011) compared with other macroinvertebrate taxa and are therefore particularly useful indicators of potentially harmful sediment discharges.

The macroinvertebrate communities throughout the surveyed reach on the Kurapete Stream had moderate taxa richness. There were no significant differences among MCI scores, SQMCI<sub>s</sub> scores indicated 'good' health and there were relatively high proportions of EPT taxa. Overall, the survey undertaken during the

period under review indicated that the discharge of treated quarry wastewaters from the Company's site had no recent detrimental effects on the macroinvertebrate communities of the Kurapete Stream.

The full biomonitoring report, which includes details of the location of the sampling sites, is attached to this report in Appendix II.

## 2.2 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 Company. 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).

In the 2017-2018 period, the Council was required to issue one abatement notice (EAC-21694) in association with the Company's conditions in resource consents. During a routine inspection the inspecting officer noted the site discharge was having a detrimental effect on water clarity at the point of discharge and downstream of the discharge, which was in contravention of the Company's consent conditions. The Company was issued with the abatement notice on 19 October 2017 requiring them to adhere to consent conditions. The follow up inspection was undertaken on 23 November 2017 and found the Company was still non-complaint with consent conditions and in contravention of abatement notice EAC-21694. In addition, the results from sampling undertaken during the follow-up inspection indicated that suspended solid concentrations were significantly higher than the consent limit and the Company were subsequently issued an infringement notice (EAC-21857). A further inspection undertaken on 13 December showed the Company had made improvements to the water treatment and discharge systems and were compliant with abatement notice. No further action was required.

## 3 Discussion

### 3.1 Discussion of site performance

Assessing site performance at Everett Road Quarry during the 2017-2018 monitoring period is slightly more complex than in previous years due to the recent transition between site operators and potential implications of consent condition variations that were still being processed at the conclusion of the monitoring period.

During the early part of the monitoring period, the management of site stormwater and washwater was poor, which resulted in non-compliant discharges from the site. The Council undertook enforcement action in response to these non-compliances, issuing an abatement and infringement notice. Improvements have since been made to the water treatment system and discharge monitoring during the latter part of year indicated an improvement in discharge quality.

As aforementioned, applications to vary the conditions attached to resource consents for the site were being processed by the Council at the end of the reported period. The changes being sought are likely to result in additional site monitoring requirements and modifications to the existing treatment system, including increasing the pond capacity, changes to pond layout and pumping locations, and the isolation of washwater from other site water. Processing of these consent variations has taken significant time however as a result in delays in the applicant providing adequate information to the Council and while discussions with affected parties was undertaken in an attempt to gain agreement on proposed conditions.

The changes being proposed mean that works required by the Company to achieve compliance with new consents may differ from the work needed to meet standards set out in the current versions, some of which remains outstanding. As a result, an allowance has been made to allow the Company to defer some of the required upgrades until such a point that the requirements of any varied consent conditions are finalised. This is expected to occur during the forthcoming monitoring period. As a result, the Company has not complied with a number of existing consent conditions, mainly related to treatment pond design and the measuring and reporting of groundwater volumes abstracted during quarrying operations.

It has been communicated to the Company that they remain responsible for undertaking measures to reduce the impacts of site activities while the consent variations are being processed. In addition, there are consent conditions that are not currently being complied with that will not be affected by any of the proposed changes to the consents currently applied for, including the installation of groundwater level monitoring bores and initiation a groundwater level monitoring programme. Works to comply with these conditions need to be undertaken immediately to avoid further enforcement action being taken.

### 3.2 Environmental effects of exercise of consents

The main potential environmental effect of quarrying activities on waterways is associated with discharges of washwater and stormwater containing fine silt particles and high suspended solids concentrations. These discharges can result in discolouration of the receiving waters, smother benthic life forms, form a barrier to fish movement and/or affect fish spawning habitats. This has been shown to be particularly relevant in the lower reaches of the Kurapete Stream, near its confluence with the Manganui River.

Previous reports have concluded that discharges from the site were having an undesirable level of impact in the receiving environment, as a result of sediment laden discharges from the site to receiving waters. These impacts have been reflected in the results of previous biomonitoring survey results (TRC, 2016).

Monitoring of the discharges from the site during the early part of the monitoring year identified a continuation of issues with discharge quality. On one occasion, discharges from the site were found to be having an adverse impact of the visual clarity of the Kurapete Stream, downstream of the discharge point. A

sample of the discharge from the site collected during a follow-up inspection recorded suspended sediment concentrations that exceeded consented limits. These events resulted in the issuing of an abatement and infringement notice. It should be noted that discharge quality was found to improve over latter part of reported period, and the results of the biomonitoring survey undertaken showed that discharges from the site during the period under review had not had any significant adverse effects on the invertebrate communities of the Kurapete Stream. There remains significant potential for adverse effects to occur as a result of discharges from the site however, and careful management of water within the site is required to maintain discharge standards.

### 3.3 Evaluation of performance

A tabular summary of both consent holders' compliance record for the year under review is set out in Table 7 and Table 8.

Table 7 Civil Quarries Ltd summary of performance for consent 1113-5

<b>Purpose: To discharge treated stormwater and treated groundwater from quarry activities into an unnamed tributary of the Kurapete Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Company to upgrade pond system as per supplied documentation	Inspections of treatment system and discharge point, liaison with Council	No - not completed
2. Upgrades to be completed within three months of issuing of consent	Inspections of treatment system and discharge point, liaison with Council	No - not completed
3. Provision of stormwater management plan	Plan to be supplied following change to consent conditions	N/A
4. Company to isolate washwater from stormwater unless due to heavy rain events	Inspections of treatment site	Yes
5. Location of discharge point	Inspections of treatment system and discharge point	Yes
6. Company to adopt best practicable option	Inspections of treatment system and discharge point, liaison with Council, sampling of discharge and receiving waters	No - enforcement action undertaken for incident
7. Limits quarry catchment area	Inspections	Yes
8. Maximum discharge rate to not exceed 10 L/s	Inspections and supply of water meter data	No - meter not installed
9. Company to install and maintain water meter and datalogger on discharge	Inspections, meter verification and supply of water meter data	No - meter not installed
10. Company to notify prior to modifying processes or equipment	Notification if and when required	N/A
11. No discharge of untreated stormwater/washwater/ groundwater	Inspections of treatment system and discharge point	No - enforcement action undertaken for incident

<b>Purpose: To discharge treated stormwater and treated groundwater from quarry activities into an unnamed tributary of the Kurapete Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
12. Washwater treatment system to be bunded	Inspections of treatment system	Yes
13. Active quarry site to be contoured and bunded to direct water into treatment system	Inspections of treatment system	Yes
14. Measures taken to reduce sediment in the discharge	Inspections of treatment system and discharge point	Yes
15. Company to maintain silt control structures	Inspections of treatment system and discharge point	No - enforcement action undertaken for incident
16. Discharge concentration limits	Physicochemical sampling	No - enforcement action undertaken for incident
17. Discharge to not adversely affect receiving waters	Inspection and physicochemical sampling of receiving waters, biological sampling	No - enforcement action undertaken for incident
18. Turbidity limit for receiving waters relative to discharge	Physicochemical sampling	No - enforcement action undertaken for incident
19. Contingency plan maintained	Plan received	Yes
20. Optional review of consent	No review sought by Council	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Improvement required</b>
Overall assessment of administrative performance in respect of this consent		<b>Poor</b>

N/A = not applicable

Table 8 Civil Quarries Ltd summary of performance for consent 10247-1.0

<b>Purpose: To take groundwater incidental to quarry operations and for aggregate washing purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Abstraction rate shall not exceed 10 L/s	Inspections and data review	No - no meter installed
2. Installation and maintenance of water meter and datalogger at water take	Inspections and data review	No - no meter installed
3. Abstraction data formatting and supply requirements	Abstraction data review	No - meter not installed
4. Flow meter to be verified	Inspection and certification to be supplied	No - meter not installed
5. Company to notify if recording equipment repairs are required	Notification if and when required	N/A

<b>Purpose: To take groundwater incidental to quarry operations and for aggregate washing purposes</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
6. Company to undertake groundwater monitoring programme	Indicative monitoring programme received, possible modifications depending on outcome of changes to consents	No - no groundwater bores installed
7. Water meters to be accessible for data retrieval	Inspections	N/A
8. Company to adopt best practicable option to minimise adverse effects on groundwater	Inspections, data review, groundwater level monitoring	No - no monitoring programme undertaken
9. Optional review of consent	No review sought by Council	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Improvement required</b>
Overall assessment of administrative performance in respect of this consent		<b>Poor</b>

N/A = not applicable

During the year, the Company demonstrated a level of environmental performance that required improvement and a poor administrative performance, with respect to their resource consents as defined in Section 1.1.4.

A summary of the improvements required are as follows:

- Consent 1113-5
  - a. Works have not been completed to mitigate against further non-compliant discharges from site; - (underway pending completion of consent variation); and
  - b. The required abstraction and discharge water metering at the time of reporting has not been installed.
- Consent 10247-1
  - a. The required abstraction and discharge water metering at the time of reporting has not been installed; and
  - b. Installation of groundwater bores and subsequent groundwater level monitoring required by consent conditions has not yet commenced.

In terms of historical compliance performance, this is the Company's first year as the consented operator of the site, so comparisons with their performance during previous periods is not possible.

### 3.4 Recommendations from the 2016-2017 Annual Report

In the 2016-2017 Annual Report, it was recommended:

1. THAT in the first instance, the Company completes the work specified in their application to change the conditions of discharge permit 1113-5 and abstraction permit 10247-1, including modification of their existing water circulation systems, and implementation of an appropriate groundwater monitoring programme.
2. THAT should there be issues with environmental or administrative performance in 2017-2018, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.



3. THAT monitoring of consented activities at Everett Road Quarry in the 2017-2018 year be amended from that undertaken in 2016-2017, in accordance with the outcome of consent variations as per Recommendation 1.

Applications to change the consent conditions on both resource consents were received on 26 April 2017 and are currently on hold awaiting further information. To date the recommendations from the 2016-2017 report have not been implemented.

### 3.5 Alterations to monitoring programmes for 2018-2019

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

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

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

It is proposed that for 2018-2019 the monitoring programme be undertaken as per current consent condition requirements.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2018-2019.

## 4 Recommendations

1. THAT in the first instance, the Company completes the work specified in their application to change the conditions of discharge permit 1113-5 and abstraction permit 10247-1, including modification of their existing water circulation systems, and implementation of an appropriate groundwater monitoring programme.
2. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT monitoring as per the accepted consent conditions commences immediately or enforcement action be undertaken.

## Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
EPT	Total number of distinct taxa within the groups Trichoptera, Ephemeroptera and Plecoptera.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m <sup>3</sup>	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.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m <sup>2</sup>	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
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.
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.

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	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.

## Bibliography and references

- Taranaki Regional Council (2018): *Civil Quarries Limited-Everett Road Quarry Monitoring Programme Annual Report 2016-2017*. Technical Report 2017-73.
- Taranaki Regional Council (2016): *Inglewood Metal Ltd Quarry Monitoring Programme Annual Report 2015-2016*. Technical Report 2016-119.
- Taranaki Regional Council (2015): *Inglewood Metal Ltd Monitoring Programme Annual Report 2014-2015*. Technical Report 2015-08.
- Taranaki Regional Council (2014): *Inglewood Metal Ltd Monitoring Programme Annual Report 2013-2014*. Technical Report 2014-15.
- Taranaki Regional Council (2013): *Inglewood Metal Ltd Monitoring Programme Annual Report 2012-2013*. Technical Report 2013-28.
- Taranaki Regional Council (2012): *Inglewood Metal Ltd Monitoring Programme Annual Report 2011-2012*. Technical Report 2012-10.
- Taranaki Regional Council (2011): *Inglewood Metal Ltd Monitoring Programme Annual Report 2010-2011*. Technical Report 2011-12.
- Taranaki Regional Council (2010): *Inglewood Metal Ltd Monitoring Programme Annual Report 2009-2010*. Technical Report 2010-17.
- Taranaki Regional Council (2009): *Inglewood Metal Ltd Monitoring Programme Annual Report 2008-2009*. Technical Report 2009-15.
- Taranaki Regional Council (2008): *Inglewood Metal Ltd Monitoring Programme Annual Report 2007-2008*. Technical Report 2008-54.
- Taranaki Regional Council (2007): *Inglewood Metal Ltd Monitoring Programme Annual Report 2006-2007*. Technical Report 2007-49.
- Taranaki Regional Council (2006): *Inglewood Metal Ltd Monitoring Programme Annual Report 2005-2006*. Technical Report 2006-46.
- Taranaki Regional Council (2005): *Inglewood Metal Ltd Monitoring Programme Annual Report 2004-2005*. Technical Report 2005-34.
- Taranaki Regional Council (2004): *Inglewood Metal Ltd Monitoring Programme Annual Report 2003-2004*. Technical Report 2004-47.
- Taranaki Regional Council (2003): *Inglewood Metal Ltd Monitoring Programme Annual Report 2002-2003*. Technical Report 2003-58.
- Taranaki Regional Council (2002): *Inglewood Metal Ltd Monitoring Programme Annual Report 2001-2002*. Technical Report 2002-11.
- Taranaki Regional Council (2001): *Inglewood Metal Ltd Monitoring Programme Annual Report 2000-2001*. Technical Report 2001-39.
- Taranaki Regional Council (2000): *Inglewood Metal Ltd Monitoring Programme Annual Report 1999-2000*. Technical Report 2000-65.
- Taranaki Regional Council (1999): *Quarries Monitoring Programme Annual Report 1998-99 Inglewood Metal Ltd*. Technical Report 99-86.

Taranaki Regional Council (1998): *Quarries Monitoring Programme Annual Report 1997-98. Inglewood Metal Ltd.* Technical Report 98-63.

Taranaki Regional Council (1997): *Quarries Monitoring Programme Annual Report 1996-97. Inglewood Metal Ltd.* Technical Report 97-46.

Taranaki Regional Council (1996): *Quarries Monitoring Programme Annual Report 1995-96. Inglewood Metal Ltd.* Technical Report 96-15c.

Taranaki Regional Council (1992): *Regional Policy Statement Working Paper. Aggregate extraction in Taranaki.* TRC Report.

# Appendix I

## Resource consents held by Civil Quarries Ltd

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





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

Name of  
Consent Holder:           Inglewood Metal Limited  
                                          PO Box 44  
                                          Inglewood 4347

Decision Date:               10 November 2016

Commencement Date:       1 December 2016

**Conditions of Consent**

Consent Granted:           To discharge treated stormwater and treated groundwater  
                                          from quarry activities into an unnamed tributary of the  
                                          Kurapete Stream

Expiry Date:                1 June 2033

Review Date(s):            Annual reviews for the first 5 years and biennial reviews  
                                          thereafter

Site Location:              Everett Road, Inglewood

Grid Reference (NZTM)    1710454E-5668324N

Catchment:                 Waitara

Tributary:                  Manganui  
                                          Kurapete

*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 implement all upgrades proposed for the stormwater and washwater ponds at the site, as described in the detail provided in the application and particularly in the 'Stormwater Management' plan prepared by BTW Company Limited, Referenced 1601-03, Sheet 1, Revision 4, dated 23 August 2016 and shown in Attachment 1 of this consent. The ponds shall be of dimensions and characteristics specified below.

	Pond Reference	Minimum Depth (m)	Minimum Surface Area (m <sup>2</sup> )	Minimum Volume (m <sup>3</sup> )	Maximum Inlet Discharge rate (m <sup>3</sup> / hr.)	Minimum Retention Time (hrs.) @ 10l/s
Washwater Ponds	Pond 1	1	415	415	15	27.7
	Pond 2	1.5	410	615	15	41.0
Stormwater Ponds	Pond 3	1.5	828	1242	51	24.4
	Pond 4	1.5	137	206	51	4.0
	Pond 5	1.5	190	285	51	5.6
	Pond 6	1.5	43	65	51	1.3

*Advice Note: The sizes and retention times are a minimum but may need to be larger to ensure that all other conditions are met.*

2. The upgrades required in condition 1 above shall be completed within three months of the issue of this consent and prior to any further expansion of the active quarry stormwater catchment area from 11 ha.
3. Within one month of the issue of this consent, the consent holder shall provide a stormwater management plan for the quarry. The site shall be operated in accordance with the 'Stormwater Management Plan' 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) monitoring the water quality and rate of the discharge into the receiving water;
  - b) treatment of stormwater, groundwater and incidental groundwater, prior to the discharge into the streams;
  - c) management/recycling of washwater on site;
  - d) disposal of recycled washwater;
  - e) management of the pond treatment systems;
  - f) maintenance of required pond depths and capacities including the minimisation of sediment and silt in the ponds;
  - g) storage and disposal of silt cleaned out from ponds;
  - h) reporting on the exercise of the consent;
  - i) measures and procedures to ensure that pond capacities are retained and maintained, including:

## Consent 1113-5.0

- i. frequency of pond cleaning;
  - ii. minimisation of sediment and silt in the ponds;
  - iii. implementing silt and sediment control measures and cut-off drains; and
  - iv. stockpiling of material cleaned out from the ponds in a way that ensure silt is not remobilised.
4. The consent holder shall implement and maintain a circulatory system that prevents any washwater entering the stormwater treatment system, unless due to heavy rain within a previous 24 hours. For the purposes of this consent 'heavy rain' refers to rainfall, as recorded at the Taranaki Regional Council rainfall recorder located at 'Manganui at Everett Park' that exceeds the intensities listed in the following table:

Time period	Rainfall Intensity (mm)
30 minute	18.6
1 hour	25.4
2 hour	36.9
6 hour	67.7
12 hour	92.1
1 day	111.1
2 day	140

5. The discharge into the unnamed tributary of the Kurapete Stream shall be located at (NZTM) 1710454E-5668324N.
6. At all times, the consent holder shall adopt the best practicable option (as defined in Part 2 of the Resource Management Act 1991) to prevent or minimise any actual or likely adverse effect on the environment associated with the discharges including, but not limited to, the water quality and aquatic habitat of the receiving waters of the Kurapete Stream and its tributary.
7. The active quarry stormwater catchment shall be no more than 13.5 hectares.
8. The maximum discharge rate of stormwater and groundwater, pumped from the lower quarry site to the upper quarry site shall not exceed 10 l/s at the inlet of pond 3, as per Attachment 1.
9. Within a month of the granting of this consent, the consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of discharge into the unnamed tributary of the Kurapete Stream. The meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of the discharge to an accuracy of  $\pm 5\%$ , at intervals not exceeding 15 minutes. Records of the date, the time and the rate and volume the discharge, shall be made available to the Chief Executive, Taranaki Regional Council on request.

*Note: Water meters must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters have a limited lifespan.*

## Consent 1113-5.0

10. Prior to undertaking any alterations to the quarry's processes, operations, equipment or layout, which may significantly change the nature or quantity of discharge into the treatment system and receiving environment, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and its amendments.
11. There shall be no direct discharge of untreated stormwater, groundwater or washwater from the active quarry site into the unnamed tributary of the Kurapete Stream as a result of the exercise of this consent.
12. The washing and washwater treatment system shall be bunded to prevent the inflow of stormwater and groundwater from other areas of the quarry.
13. The active quarry site shall be contoured and bunded so that all water generated in this area is directed to silt retention systems for treatment prior to discharge, and to prevent the flow of uncontaminated stormwater into the quarry, as far as is practicable.
14. The consent holder shall undertake measures to minimise the amounts of silt and sediment that could be contained in the discharge licensed by this consent.
15. The consent holder shall properly and efficiently maintain and operate the silt control structures in such a manner that any discharge which may occur shall not breach the conditions of this consent. The silt control structures shall be operated, as far as practicable, so as to maximise the treatment of the stormwater and minimise the duration, frequency and rate of the discharge.
16. The following concentrations shall not be exceeded in any discharge Component Concentration.

<b>Constituent</b>	<b>Standard</b>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm <sup>-3</sup>
total recoverable hydrocarbons	Concentration not greater than 15 gm <sup>-3</sup>

This condition shall apply prior to the entry of any discharge into the receiving waters of the unnamed tributary of the Kurapete Stream, at a designated sampling point approved by the Chief Executive.

17. Beyond 25 metres downstream of the confluence of the unnamed tributary with the Kurapete Stream, the discharge shall not give rise to any of the following effects in the receiving waters of the Kurapete Stream:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; and/or
  - b) any conspicuous change in the colour or visual clarity; and/or
  - c) any emission of objectionable odour; and/or
  - d) the rendering of fresh water unsuitable for consumption by farm animals; and/or
  - e) any significant adverse effects on aquatic life.

## Consent 1113-5.0

18. Beyond 25 metres downstream of the confluence of the unnamed tributary with the Kurapete Stream, the discharge shall not give rise to an increase in turbidity of the Kurapete Stream of more than 50%, as determined using NTU (nephelometric turbidity units).
19. The consent holder shall maintain a contingency plan to the satisfaction of the Chief Executive, outlining measures and procedures to be undertaken to prevent the 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.
20. 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 annually for the first 5 years and biennially thereafter for the purposes of:
  - a) 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; and/or
  - b) requiring continuous measuring and recording of the flow immediately downstream of the take site; and/or
  - c) requiring any data collected in accordance with the conditions of this consent to be transmitted directly to the Taranaki Regional Council's computer system, in a format suitable for providing a 'real time' record over the internet.

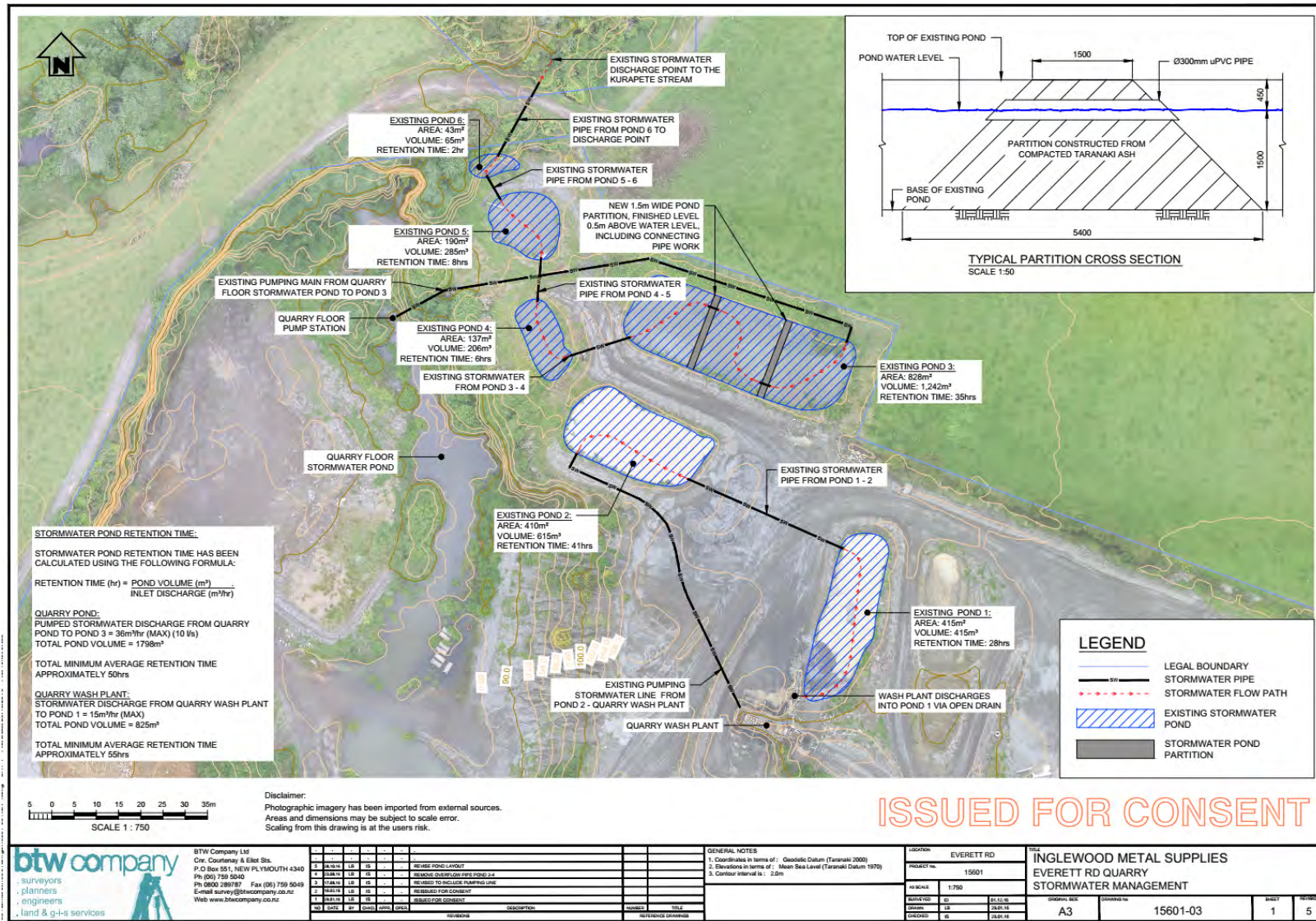
Signed at Stratford on 10 November 2016

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

## Attachment 1: Proposed upgrade to the Stormwater Treatment System



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

Name of  
Consent Holder: Inglewood Metal Limited  
PO Box 44  
Inglewood 4347

Decision Date: 10 November 2016

Commencement Date: 1 December 2016

**Conditions of Consent**

Consent Granted: To take groundwater incidental to quarry operations and for aggregate washing purposes

Expiry Date: 1 June 2033

Review Date(s): Annual reviews for the first 5 years and biennial reviews thereafter

Site Location: Everett Road, Inglewood

Grid Reference (NZTM) 1710429E-5668228N

Catchment: Waitara

Tributary: Manganui  
Kurapete

*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 total rate of taking shall not exceed 10 litres per second.
2. The consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of taking (or a nearby site in accordance with Regulation 10 of the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010). The water meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of  $\pm 5$ , at intervals not exceeding 15 minutes. Records of the date, the time and the rate and volume of water taken shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

*Note: Water meters must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters have a limited lifespan.*

3. The records of water taken shall:
  - a) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing;
  - b) specifically record the water taken as 'zero' when no water is taken; and
  - c) for each 12-month period ending on 30 June, be provided to the Chief Executive, Taranaki Regional Council within one month after end of that period.
4. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring equipment required by the conditions of this consent ('the equipment'):
  - a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or
  - b) has been tested and shown to be operating to an accuracy of  $\pm 5\%$ .

The documentation shall be provided:

- i) within 30 days of the installation of a water meter;
  - ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and
  - iii) no less frequently than once every five years.
5. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.



## Consent 10247-1.0

6. The consent holder shall undertake a monitoring programme that monitors the effects of this consent on the surrounding aquifer. The monitoring programme shall be submitted to the Chief Executive, Taranaki Regional Council for certification before 31 December 2016 and shall include the drilling and monitoring of a minimum of three bores at locations determined after consultation with the Chief Executive, Taranaki Regional Council.
7. The water meters required under condition 2 and 4 and data loggers shall be accessible to Taranaki Regional Council Officers at all reasonable times for inspection and/or data retrieval.
8. At all times, the consent holder shall adopt the best practical option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of groundwater.
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 annually for the first 5 years and biennially thereafter for the purposes of:
  - a) 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; and/or
  - b) requiring continuous measuring and recording of the flow immediately downstream of the take site; and/or
  - c) requiring any data collected in accordance with the conditions of this consent to be transmitted directly to the Taranaki Regional Council's computer system, in a format suitable for providing a 'real time' record over the internet.

Signed at Stratford on 10 November 2016

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**



## Appendix II

### Biomonitoring reports



**To** Sarah Larkin, Job Manager  
**From** Darin Sutherland, Environmental Scientist  
**Document** 2077804  
**Report No** DS094  
**Date** 26 June 2018

## Biomonitoring of the lower reaches of the Kurapete Stream, in relation to Taranaki Civil Construction Limited Quarry discharges, surveyed in March 2018

### Introduction

A formal consent monitoring programme established for the quarry at Everett Road in the lower Kurapete Stream catchment, currently operated by Taranaki Civil Construction Limited, has been the subject of twenty-one TRC Annual Reports to date (e.g. TRC, 2016). Various impacts of the consent holder's quarrying activities have been noted from a programme of regular inspections and physicochemical receiving water sampling. One of the recommendations of these reports required:

*"That monitoring be continued ..... with an appropriate programme formulated in accordance with the requirements of existing consents and taking into account matters addressed in these Annual Reports. This programme to include a limited summer biomonitoring survey undertaken at two sites in the lower reach of the Kurapete Stream (upstream and downstream of the confluence of the quarry tributary stream)."*

This requirement recognised the biological importance of the lower reaches of the Kurapete Stream and the need for a form of monitoring which provided longer-term indications of receiving water quality.

Therefore, late summer-autumn low flow biomonitoring surveys have been undertaken in the lower reaches of the Kurapete Stream situated upstream and downstream of the small tributary receiving quarry run-off and wastes discharges. In addition to these biomonitoring surveys, other surveys were performed in May 1997, in response to an unauthorised incident report (CF145), and in October 2002 (CF259), as a follow-up to the previous summer biomonitoring survey (March 2002) performed under low recession flow conditions in the lower reaches of the Kurapete Stream which indicated a significant impact on the faunal community of the stream below the small turbid tributary draining the quarry area.

In more recent years, confounding issues of significant upstream water quality improvement (due to removal of the Inglewood oxidation ponds effluent discharge from the Kurapete Stream (TRC, 2014a)), together with cattle access in the proximity of the Everett Road bridge site, necessitated the addition of a third monitoring site (KRP000983) some 150 m downstream of the bridge for effects assessment. However, significant progress in terms of riparian fencing and plantings have improved habitat in the short reach of the stream between the small tributary (receiving quarry stormwater) confluence and the Everett Road Bridge.

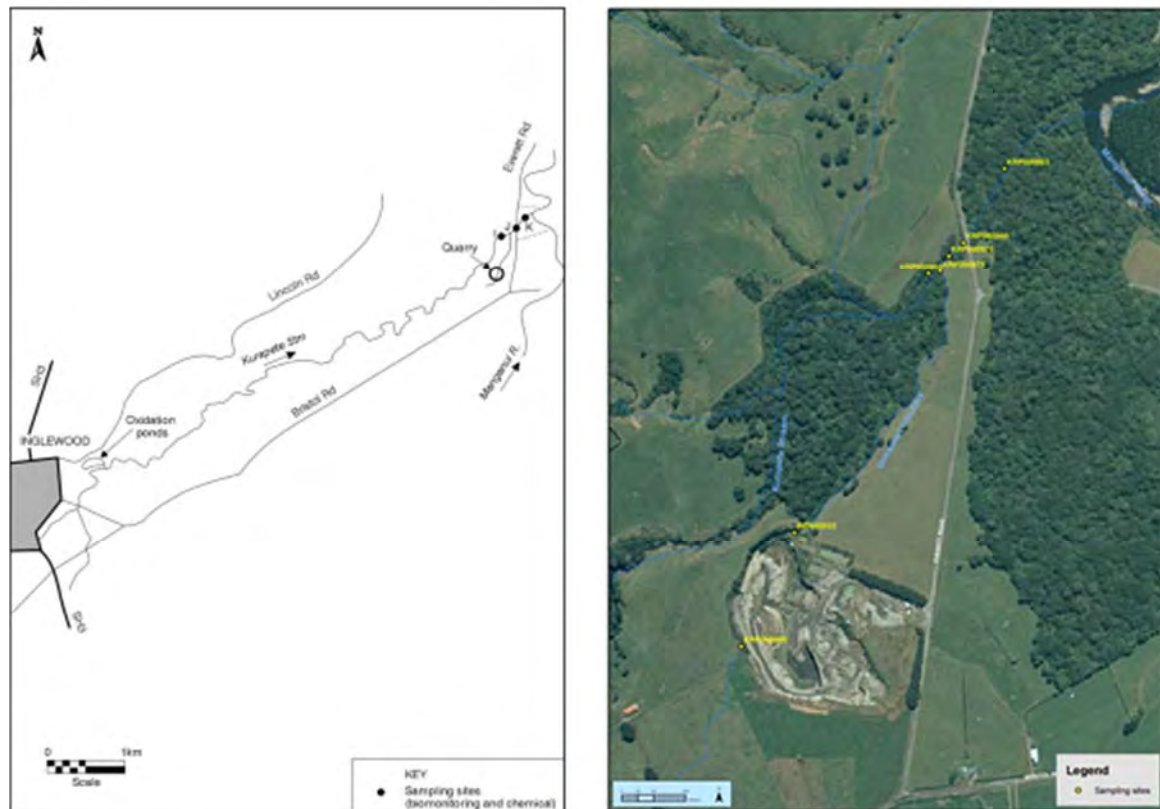
The current March 2018 survey continued the summer biomonitoring component of the formal consent monitoring programme. Due to concerns about impacts on sensitive taxa from the preceding survey (March 2016), the third sampling site is now part of the regular monitoring programme and is no longer provisional.

## Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates from the three established sites (I, J and K) in the lower reaches of the Kurapete Stream, near Everett Park on 6 March 2018 (Table 1 and Figure 1).

**Table 1** Biomonitoring sites in the tributary of the Mangaone Stream that receives stormwater discharges from MASL

Site No	Site code	Grid reference	Location
I	KRP000960	E1710640N 5668709	Upstream of quarry tributary stream
J	KRP000980	E1710695 N5668758	Everett Road bridge, d/s of tributary stream
K	KRP000983	E1710759 N5668874	150m d/s of Everett Road bridge



**Figure 1** Sampling sites in the Kurapete Stream in relation to the Taranaki Civil Construction Limited quarry

This '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).

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 2.

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. By averaging the scores obtained from a list of taxa collected from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. 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 4). More 'sensitive' communities inhabit less polluted waterways. A difference of 10.83 units or more in MCI values is considered significantly different (Stark 1998).

Table 3 Macroinvertebrate health based on MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2015) from Stark's classification (Stark, 1985, Boothroyd and Stark, 2000, and Stark and Maxted, 2007)

TRC Grading	MCI	SQMCI <sub>s</sub>
Excellent	>140	>7.00
Very Good	120-140	6.00-7.00
Good	100-119	5.00-5.99
Fair	80-99	4.00-4.99
Poor	60-79	3.00-3.99
Very Poor	<60	<3.00

A semi-quantitative MCI value (SQMCI<sub>s</sub>) 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<sub>s</sub> is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower. A difference of 0.83 units or more in SQMCI<sub>s</sub> values is considered significantly different (Stark 1998).

## Results

### Site habitat characteristics and hydrology

This summer survey was performed under low flow conditions (approximately one quarter of median flow), 14 days after a fresh in excess of 3 times median flow and 118 days after a fresh of 7 times median flow

(flow gauge at the Mangaoraka Stream at Corbett Rd). The survey followed a relatively dry summer period with only one significant fresh in the preceding month. The water temperature ranged from 18.0-18.2°C. At site I the water speed was swift, water was uncoloured and clear, at site J the water speed was swift, water was uncoloured and cloudy, and at site K the water speed was swift, water was uncoloured and cloudy. It was noted that there was a large silt/sand bank a short distance downstream of the quarry discharge tributary where fine sediment had been settling out and accumulating.

The streambed at site I had slippery algal mats, no filamentous algae, and patchy moss and leaves. The streambed at site J had patchy algal mats, filamentous algae, moss and leaves. The streambed at site K had slippery algal mats, no filamentous algae, patchy moss and widespread leaves and wood. There was complete bed shading from overhanging vegetation at site I and partial shading at sites J and K. Substrate was predominately cobbles at all three sites. Low amounts of fine sediment silt were recorded at sites J (silt and sand both 5%) and K (silt and sand both 10%) which was slightly more than the upstream 'control' site, site I, (silt 0% and sand 5%). Substrate percentages are from riffles which due to their high water velocities typically accumulate the least fine sediment in a stream as opposed to runs and pools.

## Macroinvertebrate communities

Biomonitoring of the impacts of quarrying activities on the Kurapete Stream has been performed previously on 23 occasions at sites I and J and nine occasions at site K.

A summary of comparative data for all three sites since quarry biomonitoring commenced is presented in Table 4.

Table 4 Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1997 and the current survey

Site No.	N	No of taxa			MCI value			SQMCIs value			
		Median	Range	Current survey	Median	Range	Current survey	N	Median	Range	Current survey
I	23	26	19-32	19	98	80-108	95	20	4.5	3.1-6.2	5.8
J	23	26	18-34	22	89	71-102	93	20	3.6	1.7-5.9	5.0
K	9	28	22-35	19	94	87-103	95	9	3.4	2.1-5.7	5.0

The results of the recent survey are presented in Table 5.



Table 5 Macroinvertebrate fauna of the Kurapete Stream in relation to Taranaki Civil Construction Limited's quarry discharge sampled on 6 March 2018

Taxa List	Site Number	MCI score	I	J	K
	Site Code		KRP000960	KRP000980	KRP000983
	Sample Number		FWB18148	FWB18149	FWB18150
NEMERTEA	Nemertea	3	C	C	R
ANNELIDA (WORMS)	Oligochaeta	1	A	A	A
	Lumbricidae	5	-	R	-
MOLLUSCA	<i>Latia</i>	5	-	R	-
	<i>Potamopyrgus</i>	4	C	A	A
CRUSTACEA	Ostracoda	1	-	R	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	A	A	A
	<i>Coloburiscus</i>	7	VA	A	A
	<i>Deleatidium</i>	8	C	C	C
	<i>Zephlebia group</i>	7	R	R	R
COLEOPTERA (BEETLES)	Elmidae	6	A	A	A
	Ptilodactylidae	8	-	-	R
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	A	A	A
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche (Aoteapsyche)</i>	4	A	A	A
	<i>Costachorema</i>	7	R	R	-
	<i>Neurochorema</i>	6	-	C	-
	<i>Confluens</i>	5	R	R	-
	<i>Oxyethira</i>	2	-	R	R
	<i>Pycnocentria</i>	7	-	-	R
	<i>Pycnocentroides</i>	5	R	-	-
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	R	A	C
	Orthoclaadiinae	2	R	-	R
	<i>Polypedilum</i>	3	C	C	C
	Tanytarsini	3	C	C	C
	Empididae	3	R	R	R
	<i>Austrosimulium</i>	3	R	C	C
No of taxa			19	22	19
MCI			95	93	95
SQMCIs			5.8	5.0	5.0
EPT (taxa)			8	8	6
%EPT (taxa)			42	36	32
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa		

R = Rare    C = Common    A = Abundant    VA = Very Abundant    XA = Extremely Abundant

## Site I (upstream of quarry tributary)

A moderate macroinvertebrate community richness of 19 taxa was found at site I ('control' site). This was seven taxa less than the historical median (26 taxa) for this site and two taxa lower than the previous survey (21 taxa) on February 2017 (Table 4, Table 5).

The MCI score of 95 units indicated a community of 'fair' biological was not significantly different (Stark, 1998) to the historical median MCI score of 98 units. The MCI score was significantly lower (Stark, 1998) than the preceding survey (108 units) which was highest MCI score recorded at the site (Figure 2).

The SQMCI<sub>s</sub> score of 5.8 units was significantly higher (Stark, 1998) than the median MCI score of 4.5 units and the same as the previous survey (5.8 units) (Stark, 1998) (Table 4, Table 5).

The community was characterised by two 'tolerant' taxa [oligochaete worms and caddisfly (*Hydropsyche/Aoteapsyche*)] and three 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), and dobsonfly (*Archichauliodes*)] (Table 5).

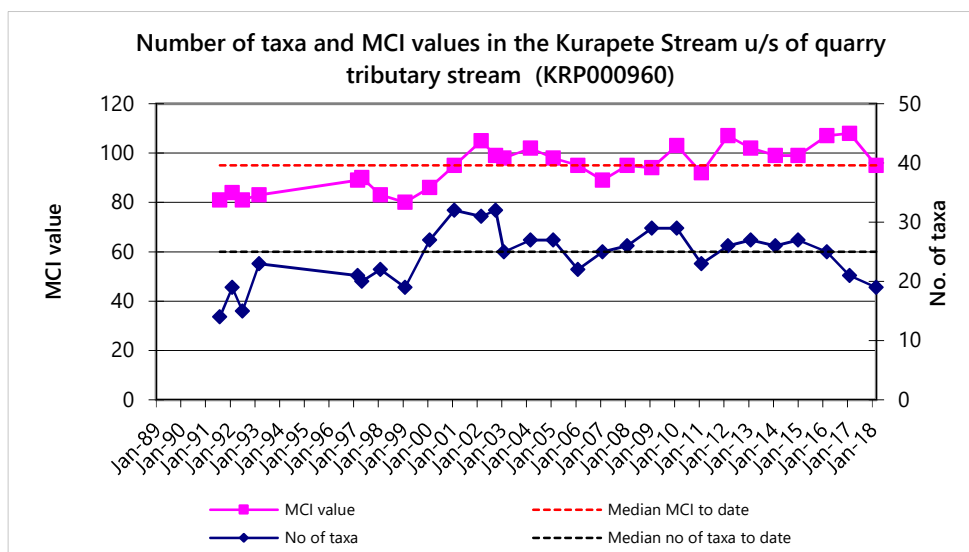


Figure 2 Taxa richness and MCI scores recorded to date at site I

## Site J (Everett Road Bridge downstream of quarry tributary)

A moderate community richness of 22 taxa was found at site I ('primary impact' site). This was four less than the historical median for this site (26 taxa) and 12 taxa lower than the previous survey (34 taxa) which was the highest number ever recorded for the site (Table 4, Table 5).

The MCI score of 93 indicated a community of 'fair' biological health was not significantly different (Stark, 1998) to the historical median MCI score of 89 units. The MCI score was also not significantly different (Stark, 1998) to the previous survey (99 units) (Figure 2).

The SQMCI<sub>s</sub> score of 5.0 units was significantly higher (Stark, 1998) than the median MCI score of 3.6 units (Stark, 1998) and significantly lower than the previous survey score (5.9 units) (Table 4, Table 5).

The community was characterised by three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), and caddisfly (*Hydropsyche/Aoteapsyche*)] and five 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), dobsonfly (*Archichauliodes*), beetle (Elmidae) and cranefly (*Aphrophila*)] (Table 5).

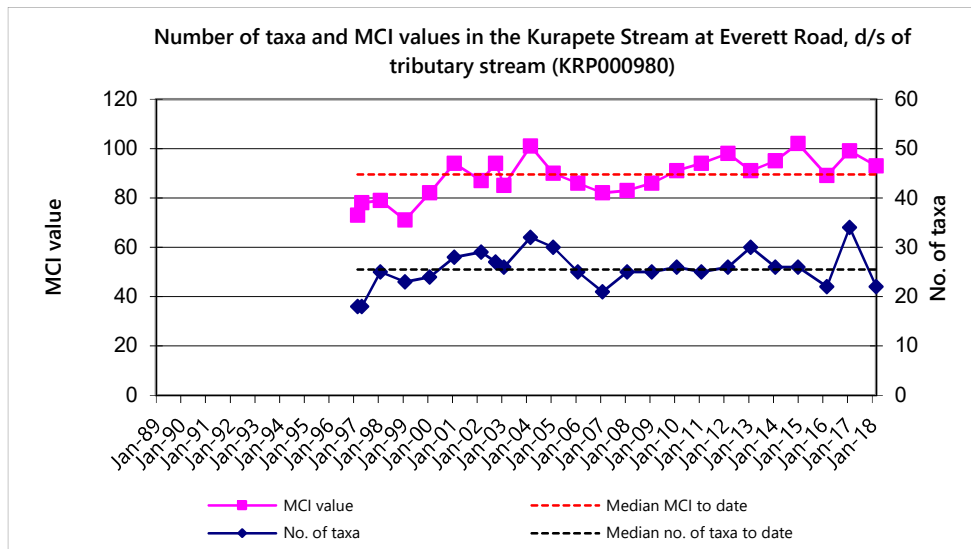


Figure 3 Taxa richness and MCI scores recorded to date at site J

### Site K (150m downstream of Everett Road bridge)

A moderate macroinvertebrate community richness of 19 taxa was found at site K ('secondary impact' site) at the time of the survey. This was nine less than the historical median for this site (28 taxa) and seven less than the previous survey (26 taxa) (Table 4, Table 5).

The MCI score of 95 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) than the historical median MCI score of 94 units. The MCI score was also not significantly different (Stark, 1998) to the previous survey (98 units) (Figure 2).

The SQMCI<sub>s</sub> score of 5.7 units was significantly higher (Stark, 1998) than the median MCI score of 3.4 units (Stark, 1998) and the same as the previous survey (5.7 units) (Table 4, Table 5).

The community was characterised by three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), and caddisfly (*Hydropsyche/Aoteapsyche*)] and four 'moderately sensitive' taxa [mayflies (*Austroclima* and *Coloburiscus*), dobsonfly (*Archichauliodes*), and beetle (Elmidae)] (Table 5).

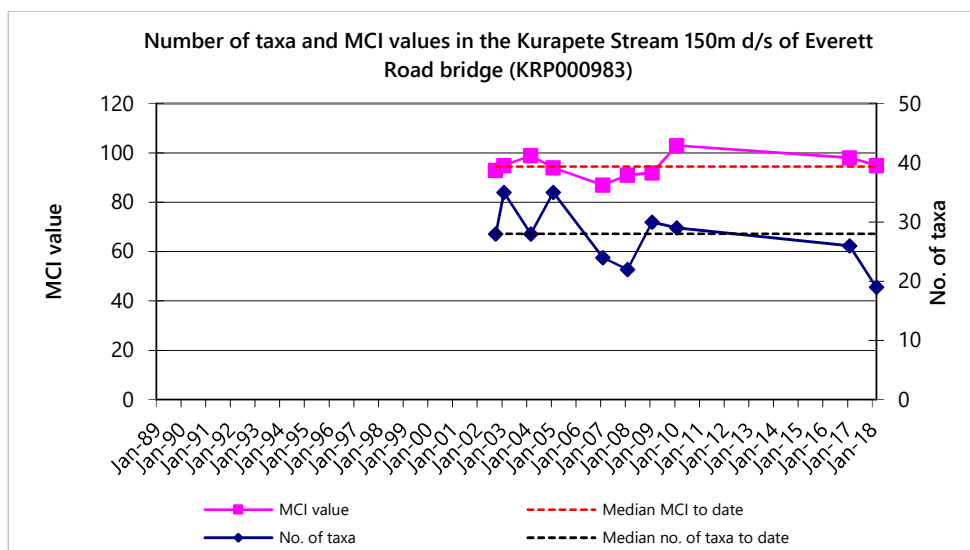


Figure 4 Taxa richness and MCI scores recorded to date at site K

## Discussion and conclusions

This summer biomonitoring survey was performed under a period of low recession flow conditions in the lower reaches of the Kurapete Stream. All three sites had moderate taxa richness. Taxa richness is the most robust index when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. It can also be a reflection of limited food or habitat availability which might be expected if suspended or settled silt was an issue at a site. There was only minor variation among sites with the two 'impact' sites having taxa richness equal to or greater than the 'control' site and no discernible pattern existed from upstream to downstream.

The 'control' site (site I) had 'fair' macroinvertebrate health that was consistent with previous results and the cessation of the Inglewood oxidation ponds system's discharge which has been diverted to the New Plymouth Wastewater Treatment Plant. However, the result was significantly lower than the previous two surveys and the lowest result since 2011 with several recent (consented) overflows from the wastewater treatment system during wet weather periods in spring. Both 'impact' sites were in 'fair' health, and had MCI scores that were not significantly different to the 'control' site score and historic medians.

The SQMCI<sub>s</sub> scores from all three sites were indicative of 'good' water quality and were not significantly different from each other (0-0.8 units) indicating no change in the health of the macroinvertebrates present in the surveyed reach. Furthermore, SQMCI<sub>s</sub> scores were all significantly higher than historical medians indicating better than usual macroinvertebrate community health.

The MCI and SQMCI<sub>s</sub> indexes are indicators of organic pollution but are also usually correlated with deposited sediment so that sites with high levels of silt tend to have lower MCI and SQMCI<sub>s</sub> scores which makes them useful for determining impacts of discharges that are predominately fine sediment such as quarry discharges. However, macroinvertebrate sampling occurs in riffles which have high flow velocities compared with runs and pools and are therefore far less likely to accumulate deposited sediment. During the current survey only minor differences in deposited sediment were evident; the 'control' site had no silt and 5% sand while the 'impact' sites had 5% silt and sand and 10% silt and sand. No silt coating was observed at either 'impact' site though the water was noticeably cloudier downstream of the quarry tributary.

The community composition between the sites showed only small differences in EPT (mayflies, stoneflies and caddisflies) taxa number and percentage of total taxa. EPT taxa are generally more sensitive to fine suspended sediment (Clapcott, et al. 2011) compared with other macroinvertebrate taxa and are therefore particularly useful indicators of potentially harmful sediment discharges. Only a small decrease in EPT taxa at the 'impact' sites was therefore a strong indicator that sediment discharges were not negatively affecting the macroinvertebrate communities.

Overall, the survey indicated that quarry discharges entering the stream from a small tributary draining the quarry area were not having a negative effect on macroinvertebrate communities.

## Summary

The Council's standard 'kick-sampling' technique was used at three established sites to collect streambed macroinvertebrates from the Kurapete Stream. Samples were processed to provide number of taxa (richness), MCI score, SQMCI<sub>s</sub> score and %EPT taxa for each site.

Taxa richness is the most robust index when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. It can also be a reflection of limited food or habitat availability which might be expected if suspended or settled silt was an issue at a 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<sub>s</sub> takes

into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may also provide more relevant information than the MCI in relation to non-organic impacts. Differences in either the MCI or the SQMCI<sub>s</sub> between sites indicate the degree of adverse effects (if any) of the discharges being monitored. EPT taxa are generally more sensitive to fine suspended sediment (Clapcott, et al. 2011) compared with other macroinvertebrate taxa and are therefore particularly useful indicators of potentially harmful sediment discharges

The macroinvertebrate communities throughout the surveyed reach on the Kurapete Stream had moderate taxa richness. There were no significant differences among MCI scores, SQMCI<sub>s</sub> scores indicated 'good' health and there were relatively high proportions of EPT taxa. Overall, this summer macroinvertebrate survey indicated that the discharge of treated quarry wastewaters from the Taranaki Civil Construction Limited quarry site had no recent detrimental effects on the macroinvertebrate communities of the Kurapete Stream.

## References

- Clapcott, JE, Young, RG, Harding, JS, Matthaiei, CD, Quinn, JM and Death, RG, 2011. Sediment assessment methods: protocols and guidelines for assessing the effects of deposited fine sediment on in-stream values. Cawthron Institute, Nelson, New Zealand.
- Fowles CR, 2009: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, February 2009. TRC Internal Report CF481.
- Fowles CR, 2010: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, February 2010. TRC Internal Report CF500.
- Fowles CR, 2011: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, February 2011. TRC Internal Report CF525.
- Fowles CR, 2012: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, March 2012. TRC Internal Report CF552.
- Fowles CR, 2013: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, February 2013. TRC Internal Report CF568.
- Fowles CR, 2014: Biomonitoring of the lower reaches of the Kurapete Stream in relation to Inglewood Metal Ltd quarry discharges, February 2014. TRC Internal Report CF601.
- Fowles CR, 2015: Biomonitoring of the Kurapete Stream in relation to the New Plymouth District Council's Inglewood oxidation ponds system, February 2015. TRC Internal Report CF635.
- Stark JD, 1985: A macroinvertebrate community index of water quality for stony streams. Water and Soil Miscellaneous Publication No. 87.
- Stark, JD, 1998: SQMCI: a biotic index for freshwater macroinvertebrate coded-abundance data. NZJ Mar FW Res. 32: 55-66.
- Stark, J D, 1999: An evaluation of Taranaki Regional Council's SQMCI biomonitoring index. Cawthron Report No 472. 32pp.
- Stark, JD, Boothroyd IKG, Harding JS, Maxted JR, Scarsbrook MR, 2001: Protocols for sampling macroinvertebrates in wadeable streams. New Zealand Macroinvertebrate Working Group Report No 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No 5103. 57p.
- Stark, JD and Fowles CR, 2006: An approach to the evaluation of temporal trends in Taranaki state of the environment macroinvertebrate data. Cawthron Report No 1135. 88pp

- Stark, JD and Fowles CR, 2009: Relationships between MCI, site altitude, and distance from source for Taranaki ring plain streams. Stark Environmental Report No 2009-01. 47pp.
- Sutherland, DL, 2016: Biomonitoring of the Kurapete Stream in relation to the New Plymouth District Council's Inglewood oxidation ponds system, March 2016. TRC Internal Report DS051.
- Sutherland, DL, 2017: Biomonitoring of the Kurapete Stream in relation to the New Plymouth District Council's Inglewood oxidation ponds system, February 2017. TRC Internal Report DS068.
- TRC, 2006: An interpretation of the reasons for statistically significant temporal trends in macroinvertebrate (MCI) SEM data in the Taranaki region 1995-2005. TRC Internal Report, 12pp
- TRC, 2014: Inglewood Metal Limited Quarry Monitoring Programme Annual Report 2013-2014. TRC Report 2014-15.
- TRC, 2014a: New Plymouth District Council Inglewood oxidation ponds' system Monitoring Programme Annual Report 2013-2014. TRC Report 2014-16.
- TRC, 2015: Freshwater Macroinvertebrate Fauna Biological Monitoring Programme Annual State of the Environment Monitoring Report 2013-2014. TRC Technical Services Report 2014-20.