Ample Group Ltd
Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-116

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Executive summary

The Ample Group Ltd (the Company) operate an abattoir and rendering plant, located on Mountain Road at Stratford, in the Kahouri Stream catchment, a tributary of the Patea River. The Company processes sheep and beef. Wastewater is treated in a two pond system, which is either irrigated to land when conditions allow, or to the Kahouri Stream during high flow conditions. This report for the period July 2015 to June 2016 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental 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. Note that the Company took over the site and resource consents from Gold International Meat Processors in January 2016 and though this reporting period is for July 2015 to June 2016, only monitoring from January 2016 onwards applies to the Company.

The Company holds six resource consents, which include a total of 90 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to allow it to take and use water, two consents to discharge effluent and stormwater into the Kahouri Stream, two consents to discharge wastewater and degenerating product to land, and one consent to discharge emissions into the air at this site.

During the monitoring period, Ample Group Ltd demonstrated an overall good level of environmental performance.

The Council's monitoring programme for the year under review included four inspections, eight water samples collected for physicochemical analysis, two hydrological gaugings and two, three site biomonitoring surveys of receiving waters.

As in previous years, the monitoring indicated that the day to day running of the site was generally of a good standard. There were processes in place to minimise the contamination of stormwater and to minimise the generation of wastewater, but this could be further improved. The discharge of wastewater into the Kahouri Stream did not cause any recorded impact on the macroinvertebrate communities of this stream, and the impact on water quality was minimal. However, discharge rates to the Kahouri Stream need to be reduced to ensure a 1:100 dilution. The irrigation of wastewater was undertaken with no significant adverse effects on the environment, but further improvement regarding preferentially applying wastewater to land as opposed to the Kahouri Stream would be desirable. Furthermore, improvement is still required regarding compliance with the application depth of wastewater. Water quality monitoring indicated an increase in ammoniacal nitrogen in the unnamed tributary as it flowed through these paddocks, although not to the extent as to have a lethal impact on the stream biota. This increase may be due to the historical over application of nitrogen to these paddocks.

There were no unauthorised incidents recording non-compliance in respect of this consent holder during the period under review. In addition, although odour was noted during one inspection, there was no odour noted that was considered likely to cause off-site effects. The rendering plant has closed, and this is likely to reduce the number of odour complaints related to the site.

During the year, the Company demonstrated a good level of environmental and administrative performance with the resource consents.

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

In terms of overall environmental and compliance performance the consent holder is at a good level.

This report includes recommendations for the 2016-2017 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Ample Group Ltd (the Company). The Company operates an abattoir and rendering plant situated on Mountain Road (SH3) at Stratford, in the Kahouri Stream catchment, a tributary of the Patea River. These resource consents were previously held by Gold International Meat Processors Ltd, but were transferred to the new owner on 18 January 2016.

The report includes 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 within the Kahouri Stream catchment, and the air discharge permit held by Ample Group Ltd to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the first annual report by the Council for the Company. Previously, monitoring of the site was reported in a Kahouri Stream Catchment report, which included a number of industries. All eighteen of these previous reports are included in the references at the end of this report. A further two reports, which report monitoring of the site when it was owned by Taranaki Abattoirs Ltd, for the period 2010-2014 (TRC, 2014) and Gold International Meat Processors Ltd, for the period 2014-2015 are also included in the references.

1.1.2 Structure of this report

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

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by the Company/companies in the Kahouri Stream 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 2016-2017 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 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

1.2 Process description

The Company operates an abattoir and rendering plant situated beside State Highway 3 at the Kahouri Stream bridge, about one kilometre north of Stratford. The facility generally operates Monday to Friday and slaughters cattle and sheep. Meat meal and tallow are also by-products that could be manufactured on site through the rendering plant, but this was not operational during the monitoring period.

The facility has been upgraded and its capacity expanded significantly since 1995. Figure 1 shows the annual kill of beef, sheep and pigs for the years ending 30 June since 1995.

In the reported period ending 30 June 2016, the total number of stock processed dropped significantly. This was primarily as a result of no pigs being processed (Figure 1). The number of sheep and beef processed was also very low, being the lowest to date. Sheep kills have gradually decreased since 2000-2001, but over the reported period were the largest component of the total kill.

Figure 2 shows monthly kills over the reporting period. There were very large fluctuations in the type of stock killed. Sheep were the main component between January to March but were then phased out and replaced by cattle which were processed in very low numbers from March to June 2016. Overall, the number of animals processed at the factory was significantly less than any previously reported period. It is likely that this resulted in a reduced organic and nutrient loadings in the treatment system.

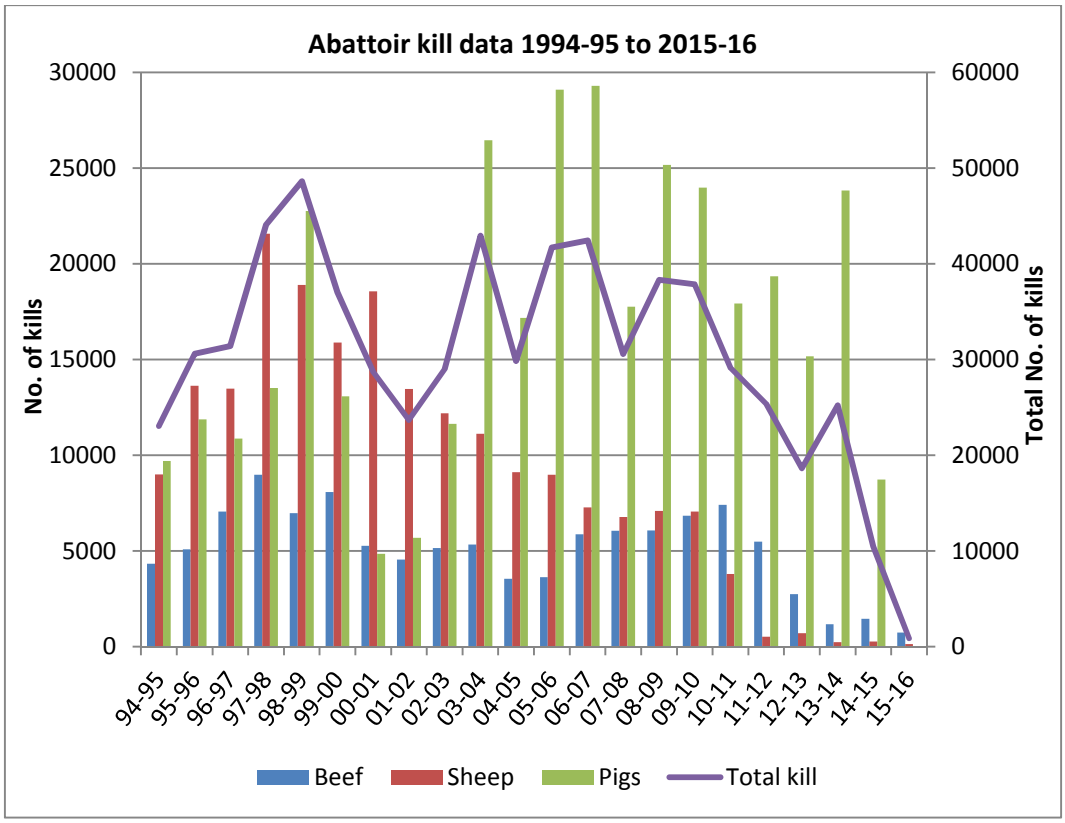

Figure 1 Annual kill for beef, sheep and pigs at the abattoir from 1994-95 to 2015-2016

The rendering plant was not operating during the reported period and the Company has signalled its intention to discard rendering from its operation but this stance may change in the future. The rendering plant normally processes soft and hard offal from the adjacent abattoir. Material is processed in one of two batch cookers. Heating requirements are supplied from two package boilers. Cooked material is discharged into a percolator pan and the product centrifuged to remove surplus tallow. Solid material is milled and bagged. Tallow is refined and stored in bulk. The batch melter used has a capacity of 1,500 kg raw material. Cooker gases are routed to a trash cyclone, then to an indirect condenser, with non-condensable gases passed to a compost filter before discharge to atmosphere.

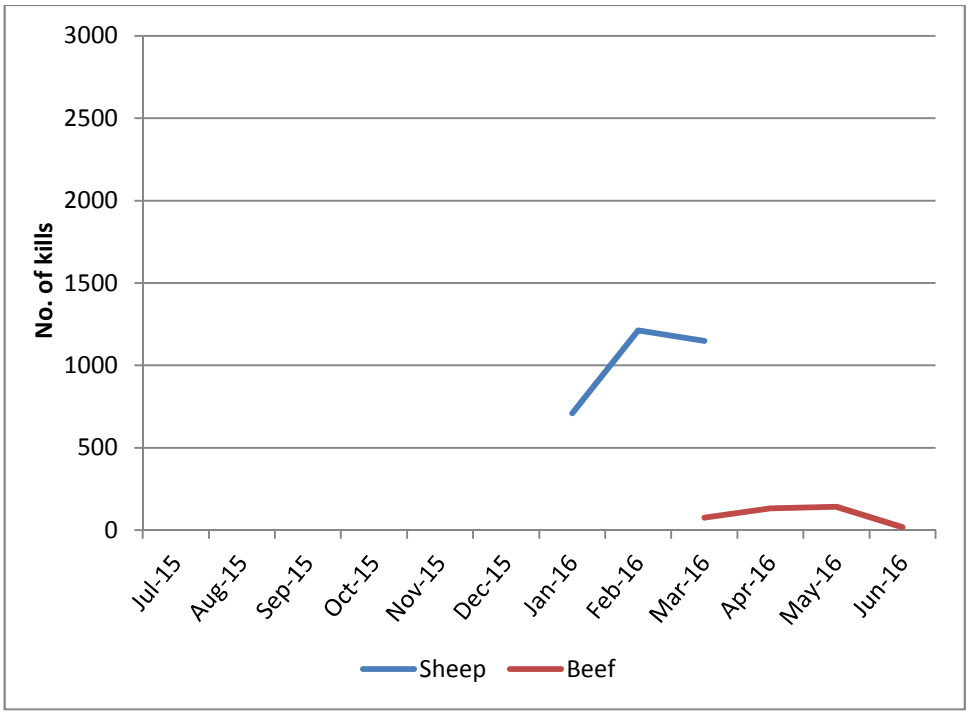

Figure 2 Monthly kills of cattle, sheep and pigs at the abattoir in the 2015-16 period

Water supply for the site comes from two sources. Water for stock and yard washing used to be drawn at a small weir on an unnamed tributary of the Kahouri Stream, but a variation to the consent in 2008 allowed the point of take to be from the Kahouri Stream proper, approximately 200 m upstream of the abattoir, whilst water for slaughter and process areas comes from the Stratford municipal supply.

The wastewater treatment system is a conventional two-pond system, which is essentially a scaled-up version of those used to treat farm dairy wastes. It consists of an anaerobic pond of approximately 2,000 cubic metres volume followed by an aerobic pond about of 3,200 square metres in area. In 2011, this system experienced a large upgrade. The treated wastewater, which was originally discharged to an unnamed tributary of the Kahouri Stream, was now being irrigated to land when conditions allowed, or discharged to the Kahouri Stream during high flows, when adequate dilution existed. Initially, only the land around the abattoir received irrigated wastewater, but in 2013 the irrigation area was expanded significantly, to include the area on the other side of Mountain Road (Photo 1).

Wastewater comes from three main sources, namely the slaughterhouse, stockyards and rendering plant. Slaughterhouse wastewater passes through a screening system that removes gross solids and then flows by gravity to the anaerobic pond. Drainage from the partially covered stockyards is also gravity-fed to the treatment system. Waste liquor and floor washings from the rendering process are pumped up to the drainage system. Boiler condensate is disposed of in a soak hole.

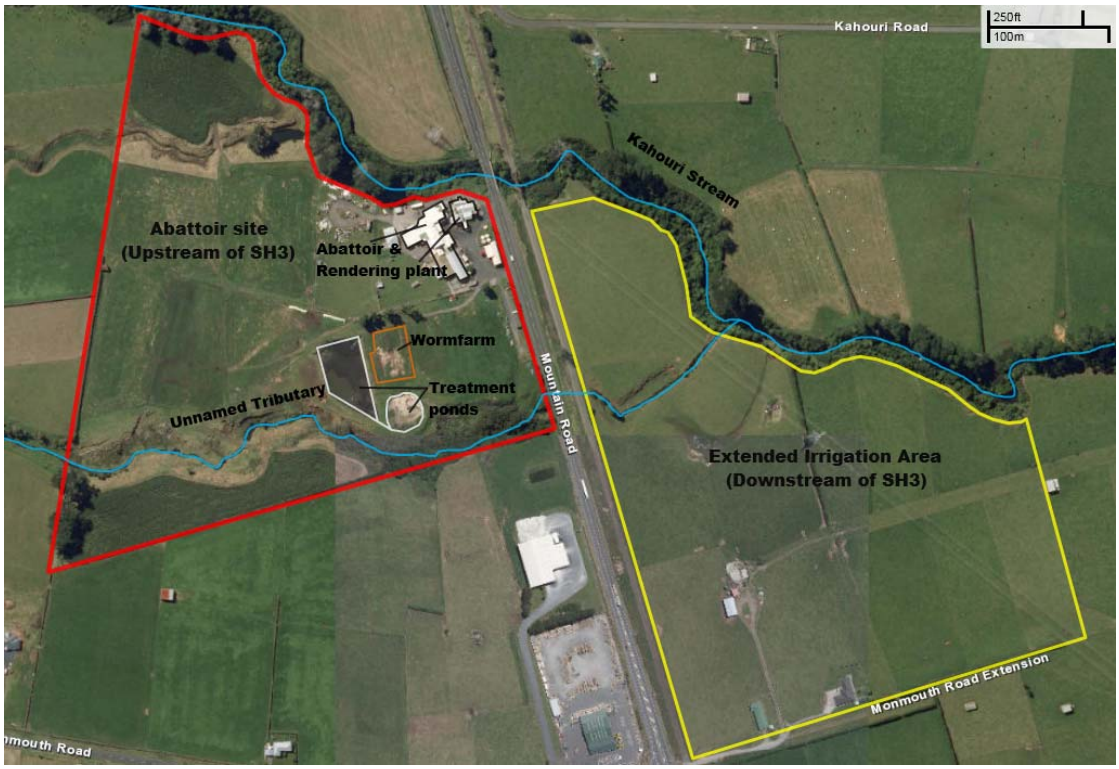

Photo 1 The Company's site, including irrigation area

The Company disposes of material unsuitable for rendering by composting in a paddock next to the effluent treatment system, an area commonly referred to as the worm farm. The composted material is then spread over pasture. Runoff from this area is also directed to the wastewater treatment system. In addition, the Company has a burial pit which receives product that has spoiled, and is no longer suitable for rendering. This may happen when there is a breakdown with the cooker for example.

The site has recently changed ownership to Ample Group Ltd from Gold International Meat Processors Limited. This report largely focuses on the period from January 2016 onwards when Ample Group Ltd was operating but Gold International Meat Processors Limited operated on a very reduced scale between July to December 2015 of the reported period. Unfortunately, no stock kills or water abstraction data was collected for this period.

It is understood that the Company are expecting the number of sheep and beef killed to increase significantly in the future but pig processing is unlikely. The Council is currently liaising with the Company to ensure all associated wastes are dealt with, and that adequate provisions are in place for the increase in throughput.

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 **5176-1** to take water from the Kahouri Stream for stock and yard washing purposes. This permit was issued by the Council on 19 May 2008 under Section 87(d) of the RMA. It expired on 1 June 2016 but renewal of the consent has been applied for by the Company and is due to be shortly granted.

Special condition 1 requires the consent holder to adopt the best practical option.

Special condition 2 relates to abstraction limits.

Special condition 3 states that a flow meter shall be installed and maintained with the collection and supply of records required by special condition 4.

Special condition 5 specifies the minimum flow in the Kahouri Stream, below which all abstraction must cease.

Special condition 6 states that the consent holder shall ensure the intake is screened to avoid the entrainment of fish.

Special condition 7 relates to the review of the consent.

The permit is attached to this report in Appendix I.

1.3.2 Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

The Company holds water discharge permit **7662-1** to discharge treated wastewater directly into the Kahouri Stream. This permit was issued by the Council on 7 November 2011 under Section 87(e) of the RMA. It expires on 1 June 2028.

Special conditions 1 and 2 relate to adopting the best practicable option and exercising the consent in accordance with the application, and notification requirements.

Special conditions 3 and 4 relate to pre activity requirements of the exercise of the consent, including how this consent relates to consent 0108, and requiring the installation of a flow meter.

Special condition 5 relates to flow meter requirements, and special conditions 6 and 7 relate to the installation, calibration and maintenance of a staff gauge.

Special conditions 8 and 9 relate to minimising the volume of wastewater created.

Special conditions 10 to 15 relate to managing the discharge in terms of meeting dilution rates, limiting instream impacts, and maintaining site access.

Special conditions 16 and 17 relate to activities intended to minimise the frequency of an after hours discharge from the aerobic pond.

Special condition 18 requires the consent holder to favour the irrigation of wastes to land when conditions allow, even if adequate dilution is available in the stream. Special conditions 19, 20 and 21 relate to the quality of the treated wastewater, and enabling sampling.

Special condition 22 requires the consent holder to maintain records of the discharge.

Special condition 23 requires the consent holder to implement riparian fencing and planting.

Special condition 24 requires the consent holder to notify Council of any adverse environmental incidents.

Special conditions 25 and 26 relates to the lapse and review of the consent.

The Company holds water discharge permit **7660-1** to discharge uncontaminated stormwater to land, in association with meat processing, rendering and associated activities. This permit was issued by the Council on 7 November 2011 under Section 87(e) of the RMA. It expires on 1 June 2028.

Special condition 1 requires the consent holder to adopt the best practical option.

Special conditions 2 and 3 states the constituents the discharge must meet.

Special condition 4 relates to the review of the consent.

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

1.3.3 Air discharge pemit

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

The Company holds air discharge permit **4055-3** to discharge emissions to air, in association with meat processing, rendering and associated activities. This permit was issued by the Council on 7 November 2011 under Section 87(e) of the RMA. It expires on 1 June 2028.

Special condition 1 states that the consent holder shall adopt the best practicable option to prevent or minimise adverse effects on the environment.

Special conditions 2 and 3 relate to a contingency plan. Operations shall be undertaken in accordance with the contingency plan and the contingency plan must be updated and submitted every two years.

Special conditions 4 requires the consent holder to notify Council of any changes to processes, operations or chemicals used or stored on site that could alter the nature of the discharge.

Special condition 5 states no fish or fish parts shall be received or processed onsite while special condition 6 states that only offal from purpose killed animals shall be received and processed onsite, and no putrescible materials may be stored onsite, as per condition 7.

Special condition 8 states emissions must be extracted to the biofilter for treatment prior to discharge, and special condition 9 specifies that the emissions entering the biofilter must not exceed 35°C.

Special conditions 10 and 11 relate to the calibration of the temperature detector and recorder. It must be in working order at all times.

Special condition 12 states the consent holder must minimise emissions by ensuring the effective operation and maintenance of all equipment and processes.

Special conditions 13 and 14 state that there is to be no objectionable or offensive odour or dust beyond the boundary of the site.

Special condition 15 requires the consent holder to notify the Council of any adverse environmental incidents.

Special condition 16 relates to the review of the consent.

The permit is attached to this report in Appendix I.

1.3.4 Discharges of wastes to land

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

The Company holds discharge permit **5221-2** to discharge treated wastewater from a treatment system onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream. This permit was issued by the Council on 7 November 2011 under Section 87(e) of the RMA. It expires on 1 June 2028.

Special conditions 1 and 2 require the consent holder to adopt the best practical option and to notify Council upon any change in on-site processes.

Special conditions 3 and 4 relate to flow meter requirements.

Special conditions 5 to 8 require the consent holder to develop and adhere to a wastewater irrigation management plan.

Special conditions 9 to 16 relate to application restrictions, such as operating a stirrer in the aerobic pond during discharge, limiting the amount of nitrogen discharged to land, application rate and sodium adsorption ratio, and preventing any discharge to water, discharge across the boundary, or too close to any dwelling house.

Special condition 17 states that the consent holder shall minimise discharges to Kahouri Stream whenever possible.

Special condition 18 states that the consent holder when applying solids, vermicast and blood to land should avoid discharges to surface water.

Special condition 19 states the consent holder shall maintain records.

Special conditions 20 and 21 require the consent holder to notify Council of any adverse environmental incidents.

Special condition 22 relates to the review of the consent.

The Company holds discharge permit **6570-1** to cover the discharge of degenerating raw product onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream. This permit was issued by the Council on 24 March 2005, under Section 87(e) of the RMA. It is due to expire on 1 June 2022.

Special conditions 1 to 4 relate to adopting the best practicable option, exercising the consent in accordance with the application, and notification requirements.

Special condition 5 defines the information to be included in a Waste Burial Management Plan, and that the disposal shall be in accordance with this plan.

Special conditions 6 and 7 define the type of product and circumstances (emergency) in which this consent should be used.

Special conditions 8 and 9 restrict the discharge of contaminants to surface water, or any adverse effects to groundwater.

Special conditions 10 requires records to be kept, while special conditions 11 to 14 specify how the covering of buried wastes is to be undertaken and also remediation of the land following burial.

Special conditions 15 and 16 are lapse and review provisions.

A copy of each permit is attached to this report in 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 Company's abattoir and rendering plant site consisted of four primary components as set out in sections below. It should be noted that not all components of the monitoring programme were implemented, as the sites productivity was significantly reduced as they waited on certification that would allow them to export meat to China.

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 reviews;
- renewals;
- new consents;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

The Company's abattoir and rendering plant site was visited six times during the monitoring period. The site visits comprised of four compliance monitoring inspections and two hydrological inspections. 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. The hydrological inspections were undertaken to maintain the rating curve for the staff gauge located at the Mountain Road bridge.

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 irrigated wastewater discharge was sampled on one occasion. The sample was analysed for calcium, conductivity, potassium, potassium adsorption ratio, magnesium, sodium, ammoniacal nitrogen, nitrates, pH, sodium adsorption ratio, temperature, total nitrogen and total phosphorus.

The wastewater discharged to the Kahouri Stream was sampled on two occasions, with two receiving environment samples collected at the same time, upstream and downstream of the discharge. These samples were analysed for biological oxygen demand (carbonaceous (discharge only), total and filtered carbonaceous), chloride, conductivity, dissolved reactive phosphorus, E.coli, faecal coliforms, unionised

ammonia, ammoniacal nitrogen, pH, suspended solids, temperature, total nitrogen, total phosphorus and turbidity.

In addition to sampling in relation to the point source discharges, additional sampling was undertaken when no point source discharge was occurring. This sampling was undertaken in an attempt to understand the degree of leaching that may be occurring, in relation to the irrigation of wastewater or burial of poor quality product. This sampling was undertaken on one occasion, at four sites. These sites were located where site boundary crossed the upstream and downstream ends of the Kahouri Stream and unnamed tributary. These samples were analysed for conductivity, dissolved reactive phosphorus, faecal coliforms, unionised ammonia, ammoniacal nitrogen, nitrate, pH, suspended solids, temperature, total nitrogen and turbidity.

1.4.5 Biomonitoring surveys

A biological survey was performed on two occasions in the Kahouri Stream to determine whether or not the discharge of treated wastewater from the site has had a detrimental effect upon the macroinvertebrate communities of the stream.

2. Results

2.1 Water

2.1.1 Inspections

The first compliance monitoring inspection of the reported period was undertaken on 19 August 2015. It was noted that the plant remained at a low level of production. It was suggested that the staff gauge should be permanently marked for easy reference. There was a set up to aid aeration of the first pond but the only time that this pond should be disturbed was for pumping out. It was not recommended that any air be pumped into this pond as it needed to remain anaerobic and stirring it up may release odour. Due to heavy rain, there was significant runoff from the paddocks, but it appeared that the vast majority of this was being directed around the ponds, towards the unnamed tributary. Closer to the main site, there were bins stored just inside the paddock gate. Some of these had not been properly rinsed, but these were impervious. There were three other bins that were not impervious, and it is important that these are either rinsed properly or stored in the wastewater catchment. It is important that the water currently held in the intact bins is not discharged to the stormwater system, but should either be discharged to land, or the wastewater system. No issues were noted regarding stormwater leaving this area during the inspection. Overall, the stormwater leaving the site appeared very clean, and was therefore not sampled. The paved area was well managed with all product stored in the wastewater area. The drainage from the wastewater area had recently been maintained to improve flow rates. All blood was being collected in a roofed area, and was being transported off site for processing. There was no rendering taking place, and no tallow held on site. Rainwater from two roofed areas was entering the wastewater system, which could be easily diverted to stormwater. These areas were at the paunch contrashear and rendering plant. There were no stock noted in the cut and carry paddocks. The irrigation area east of Mountain Rd was observed to be water logged and unsuitable for irrigation.

On 16 December 2015 the second compliance monitoring inspection was undertaken. The site continued to have little throughput, and as such there has been little wastewater to dispose of. The rendering plant was not operating. The general site was very clean, with little fat in the fat traps, some product awaiting pickup stored in the wastewater catchment area, and no odour noted. The worm farm was well grassed, and was only receiving the occasional load of paunch. There was no stock in the cut and carry paddocks. The burial pit had a small amount of material exposed, generating a minor amount of odour we should have been covered.

On 5 April 2016 the third compliance monitoring inspection was undertaken. The concreated area around yards was clear of contaminants. There was one bin of paunch awaiting transfer to the worm farm. No notable odours were being generated from this area. The area around the tallow tank was clean, with no meal noted on the tarmac. No obvious odour from the pond. The worm farm was relatively tidy with the area fully vegetated. Steam was being emitted from a condenser and the water tank near the condenser was overflowing but the water was contained within the site. Another water tank used for stock water was overflowing causing some scouring which could lead to sediment entering the stream. This needs to be addressed. The area around the tank was also untidy with empty sacks strewn around which could enter the watercourse.

On 20 May 2016 the fourth compliance monitoring inspection was undertaken. Throughput at the plant remained at a low level. Inspection of the treatment ponds found that wastewater was being pumped to the stream. At the time of inspection the pond level was 0.10m. There was a distinct odour close to the second pond. The worm farm was relatively tidy with the area well vegetated with only a small area of recently disposed paunch being bare of grass. There was no stock noted in the paddocks. There was a significant amount of stream being emitted from a condenser. Apparently this may need to be replaced as minor repairs have proven insufficient. No issues were noted regarding stormwater leaving this area during the inspection. Overall, the stormwater leaving the site appeared very clean, and was therefore not sampled. The paved area continues to be well managed.

During each compliance monitoring inspection, the site was clean and tidy, and no strong odours were noted at the site boundary. At all times, bins containing product were stored in the wastewater catchment, and no contaminants were stored in the stormwater catchment.

The first hydrological inspection was completed on 17 June 2016. This inspection found that flows in the Kahouri Stream were at 525 L/s and the stage gauge was at 0.663 m at the time of the inspection.

The second hydrological inspection was completed on 28 June 2016. This inspection found that flows in the Kahouri Stream were at 1246 L/sec and the stage gauge was at 0.774 m at the time of the inspection.

2.1.2 Results of abstraction and discharge monitoring

Various sites are monitored for discharge or receiving environment water quality monitoring. The site locations are summarised in Table 1 and shown in Figure 3.

Table 1 Detail for those sites monitored for discharge or receiving environment water quality

Sample source	Site	Site Code	Site Description
Discharge to Kahouri Stream	D1	IND003002	Wastewater discharge pumped to Kahouri Stream
Irrigated effluent	I1	IND004008	Effluent irrigated to land
Kahouri Stream	K1	KHI000295	Upstream property boundary
	K2	KHI000297	Approx. 150 m upstream of SH3
	K3	KHI000300	Downstream property boundary and approx. 90 m downstream of wastewater discharge (SH3)
	K4	KHI000307	50 m downstream of confluence with unnamed tributary
Unnamed tributary	T1	KHI000294	Upstream property boundary
	T2	KHI000302	Approx. 50 m downstream of previous wastewater discharge

Figure 3 Sites monitored for discharge or receiving environment water quality

2.1.2.1 Irrigated effluent & wastewater discharge to Kahouri Stream

The irrigated effluent was sampled on one occasion by the Council (site I1). This sampling was undertaken for two reasons, to estimate the nutrients (total nitrogen and phosphorus) being discharged to land (and consequently not directly to the Kahouri Stream), and to determine compliance with consent conditions, specifically the restriction on the sodium adsorption ratio (SAR) of the discharge, which is intended to prevent soil losing its structure. If irrigation water with a high SAR is applied to a soil for years, the sodium in the water can displace the calcium and magnesium in the soil. This will cause a decrease in the ability of the soil to form stable aggregates and a loss of soil structure. This will also lead to a decrease in infiltration and permeability of the soil to water leading to problems with crop production.

Table 2 shows that the SAR consent limit of 15 was complied with the sample recording a ratio of less than 3. In addition, the ratios recorded for the sample collected in the reported period was the lowest ever recorded.

Table 2 Chemical monitoring results for the irrigated wastewater (IND004008) for the 2015-2016 monitoring period

Parameter	Summary of previous data				2015-2016
	N	Median	Min	Max	5-Apr-16
Total Nitrogen (g/m^3)	10	88.2	45.6	461	34.9
Total phosphorus (g/m^3)	10	14.8	3.72	85.2	5.7
Ammoniacal nitrogen (g/m^3)	10	77.55	44.4	123	28.2
Sodium absorption ratio	10	1.78	1.30	2.59	1.25

The nutrient concentrations in the irrigated effluent are presented in Figure 4. The result was within the range of previously recorded concentrations for total phosphorus. Total nitrogen was the lowest it has ever been recorded at; presumably due to the lowest ever kill volume. Generally, there appears to be a decrease in concentration of both nutrients over time.

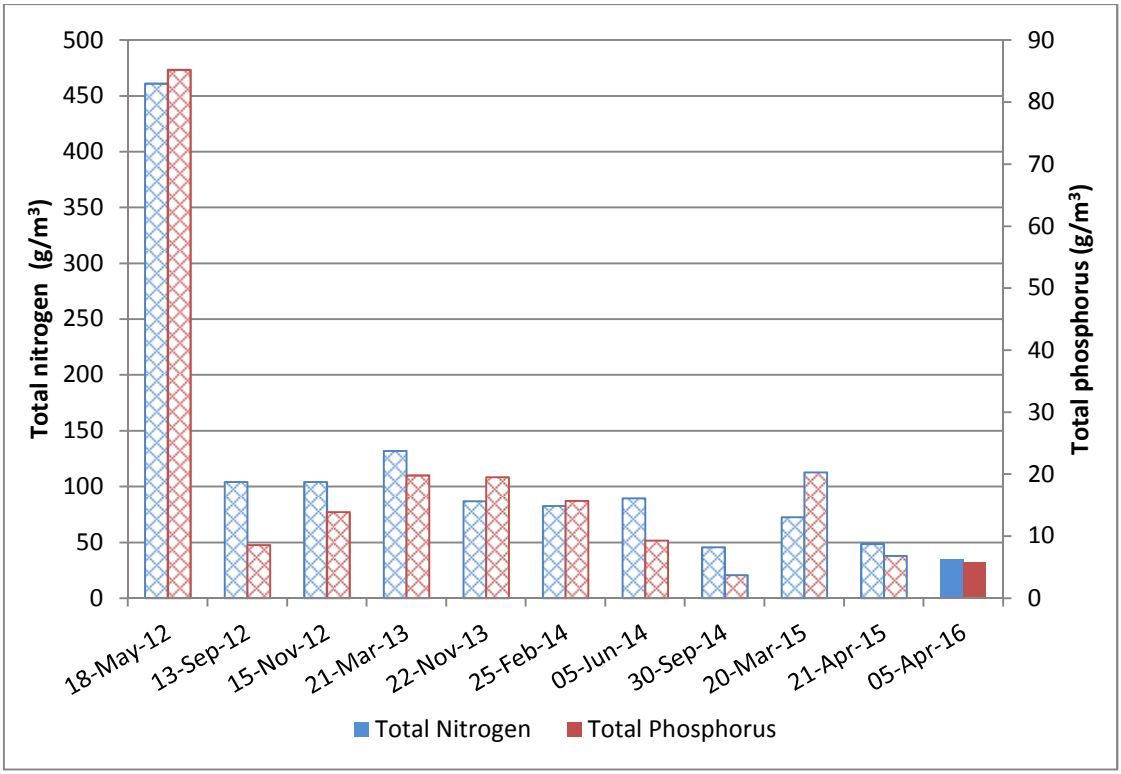

Figure 4 Concentrations of total nitrogen and total phosphorus in the irrigated wastewater. The solid bars those samples collected in the 2015-2016 monitoring period

Table 3 presents the results for selected parameters contained in the wastewater discharged to the Kahouri Stream. The two samples collected during the reported period contained nutrients concentrations less than any of the five previously collected samples. This reduced concentration of nutrients is most likely related to the reduced throughput at the plant. However, it is possible that at this time there was increased ingress of stormwater to the ponds, diluting the wastewater. It should be noted that as effluent is primarily pumped to the river during wet weather, the proportion of effluent

sourced as stormwater will be higher. It is possible that future site upgrades, such as roofing all stockyards, or retiring the worm farm, could reduce this stormwater ingress.

In terms of compliance with consent conditions, the wastewater discharges to the Kahouri Stream sampled on 19 August 2015 and 20 May 2016 had a total BOD_5 of less than 110 g/m^3 (Table 3). In addition, the dilution ratio, estimated using dissolved reactive phosphorus concentrations, was above 100:1 during this sampling occasion (Table 7). This indicates that the discharge was well managed.

Table 3 Chemical monitoring results for the wastewater discharged to the Kahouri Stream (IND003002) for the 2015-2016 monitoring period

	Summary of previous data				2015-2016	
Parameter	Number of previous samples	Median	Min	Max	19 Aug 15	20 May 16
Total Nitrogen (g/m^3)	5	78.9	37.1	134	26	22.3
Total phosphorus (g/m^3)	5	6.37	4.4	19	2.08	1.7
Ammoniacal nitrogen (g/m^3)	5	59.2	27.8	130	16.4	16.8
Total dissolved reactive phosphorus (g/m^3)	5	5.34	2.72	16	1.18	0.88
Total BOD (g/m^3)	4	34.5	33	37	8.6	20

2.1.3 Provision of consent holder data

The consent holder has provided data on abstraction rates, the discharge of effluent to water, irrigation of effluent to land, and the discharge of any other nitrogenous wastes to land. This data is presented in the summaries.

2.1.3.1 Abstraction data

The Company abstracts water from the Kahouri Stream, under consent 5176-1. Under this consent, they are required to maintain records of abstraction. These records have been provided to the Council, and are summarised in Figure 5.

The daily rate is restricted to 178 m^3/day. Figure 5 shows that the Company has complied with this restriction. The highest daily volume abstracted occurred on 26 February 2016, when 65 m^3 was taken. This was possibly associated with the increased number of sheep processed at this time (Figure 2).

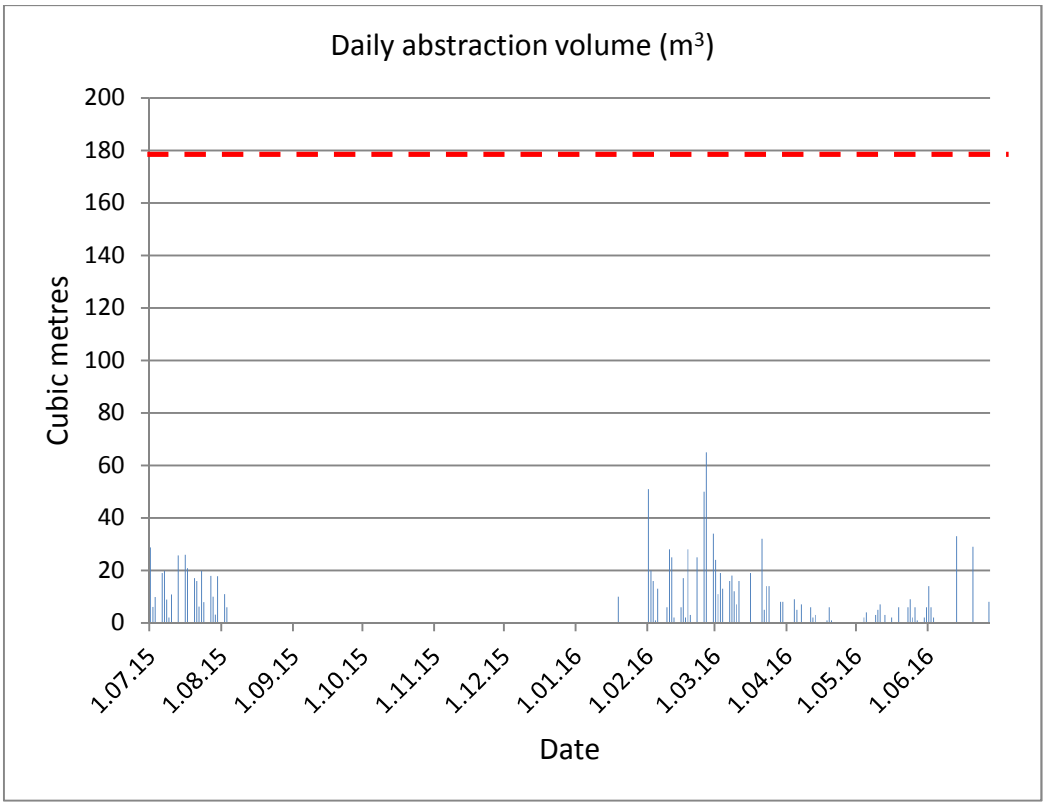

Figure 5 Daily abstraction volume for the 2015-16 period, from the Kahouri Stream (Compliance limit – – –)

2.1.3.2 Irrigation of wastewater

The irrigation of wastewater has occurred over two areas in the past, but in the 2015-2016 period, only the land east of Mountain Rd (SH3) was irrigated (paddocks J2, J3, J5, and J8, Figure 6). The Wastewater Irrigation Management Plan relevant to the 2015-2016 period identified the land surrounding the abattoir as cut and carry. This means that the land was not to be stocked, and the feed grown on this land was to be harvested and removed, to be fed to stock off site. This had the intention of removing the nitrogen applied, and consequently this land may have a higher nitrogen application rate. The consent allows for the application of up to 600 kg of nitrogen to be applied per hectare per year to cut and carry paddocks, while a limit of 200 kg applies to the land east of SH3. The land east of SH3 is also used by the landowner to run stock.

During the reported period, no wastewater was irrigated to the cut and carry paddocks, as these paddocks received significant amounts of nitrogen in the 2011-2012 monitoring period. It was considered appropriate at the time to temporarily halt any further application of nitrogen, to reduce the potential for groundwater contamination. Table 4 presents both the volume of wastewater and estimated total nitrogen applied to land in the 2015-2016 period. The total nitrogen loading has been estimated using the nitrogen concentration from the irrigated wastewater sample. It is clear that two paddocks were favoured for irrigation, receiving more than twice as much effluent than any other paddock. Due to a combination of low wastewater volumes and low nitrogen content from the irrigated wastewater, nitrogen volumes that paddocks received were far below the 200 kg/hectare/year limit. It should be noted that the quality of this wastewater can vary both between occasions, and throughout the day. In addition, the sporadic use of the stirrer will also influence the nitrogen content of the

effluent. This suggests that the figures provided in Table 4 are indicative only, and possibly conservative.

Figure 6 The irrigation areas, showing the cut and carry paddocks (green) and regular paddocks (blue). Please note that the boundary lines are indicative only

Table 4 Total volume of wastewater and total nitrogen applied to land during the reported period

Year	Parameter	Paddock number									Average
		J1	J2	J3	J4	J5	J6	J7	J8	J9	
2015-2016	Total volume (m^3)	0	110	310	0	170	0	0	170	0	
	Total N (kg/ha)	0	1.27	8.32	0	8.86	0	0	3.83	0	5.57

There is also a restriction on the application depth within any area of irrigation, which is not to exceed 24 mm over any 15 day period. Table 5 presents a summary of the application depth for the reported period. Of the four paddocks that received wastewater, only one exceeded the maximum application depth of 24 mm over a 15 day period. This breach was recorded in paddock J5 which had 25.4 mm of wastewater applied over a 15 day period. Paddock J3 came very close to breaching the guideline as well with 23.8 mm applied over a 15 day period. Essentially, every 240 m^3 of wastewater needs to be irrigated over one hectare of land in order to comply with this condition. Paddock J5 is relatively small (0.67 ha) and 170 m^3 of wastewater was applied over the course of one day on the 4th March 2016 causing the breach. The maximum amount of wastewater that could have been applied to this paddock in a 15 day period was 160 m^3.

The intention of this condition, which is consistent with appendix VIIA of the Regional Freshwater Plan, is to avoid surface ponding, runoff into waterways, leaching and groundwater contamination. Exceeding this limit may also lead to damaged pasture.

Although inspections of the irrigation area did not note any runoff, nor was there any excessive ponding, the consent holder does need to manage the irrigation system with this condition in mind. In essence, it appears that there needs to be better management of the rotation system to ensure that the appropriate amount of wastewater is irrigated to each paddock.

Table 5 Application depth statistics for the paddocks that received irrigated wastewater during the reported period

Year	Application depth	Paddock number								
		J1	J2	J3	J4	J5	J6	J7	J8	J9
2014-2015	Max 15 day application depth (mm)	0	3.6	23.8	0	25.4	0	0	11.0	0
	Average 15 day application depth (mm)	0	0.15	0.98	0	1.04	0	0	0.03	0

Other nitrogenous wastes

From time to time the consent holder may discharge vermicast from the wormfarm to land and blood from the abattoir. A record of each discharge must be kept, and these have been provided to Council. No vermicast was spread during the reported period and the consent holder has indicated that blood is now transported to an offsite rendering plant.

2.1.3.3 Discharge to the Kahouri Stream

When the discharge consent was originally applied for, the applicant committed to restricting the discharge rate to 3.3 L/s. Although this was not included as a consent condition, the consent did require that no discharge was to occur when flows in the Kahouri Stream were less than 330 L/s to enable compliance with the 1:100 dilution ratio also required by consent. The discharge records, which include a record of the stage height in the stream at the time of discharge, indicate that this minimum flow was complied with on most occasions but the Kahouri Stream was below the consented limit on two occasions, 18th February 2016 and 5th May 2016. It is clear that the discharge was never at the proposed rate of 3.3 L/s (Table 6). Although this is not strictly non-compliant with the consent, as the consent does not specify a maximum discharge rate

Of more concern is that the majority of wastewater discharges did not comply with the 1:100 dilution ratio condition (Figure 7). There were only four instances when discharges actually complied with the 1:100 dilution volume and 22 instances when the staff gauge was not recorded to allow assessment of the stream flow. The consent holder either has to decrease the flow rate of the wastewater to the stream or only discharge when the stream is in flood (e.g. >1670 L/s) based on current discharge levels (Table 6).

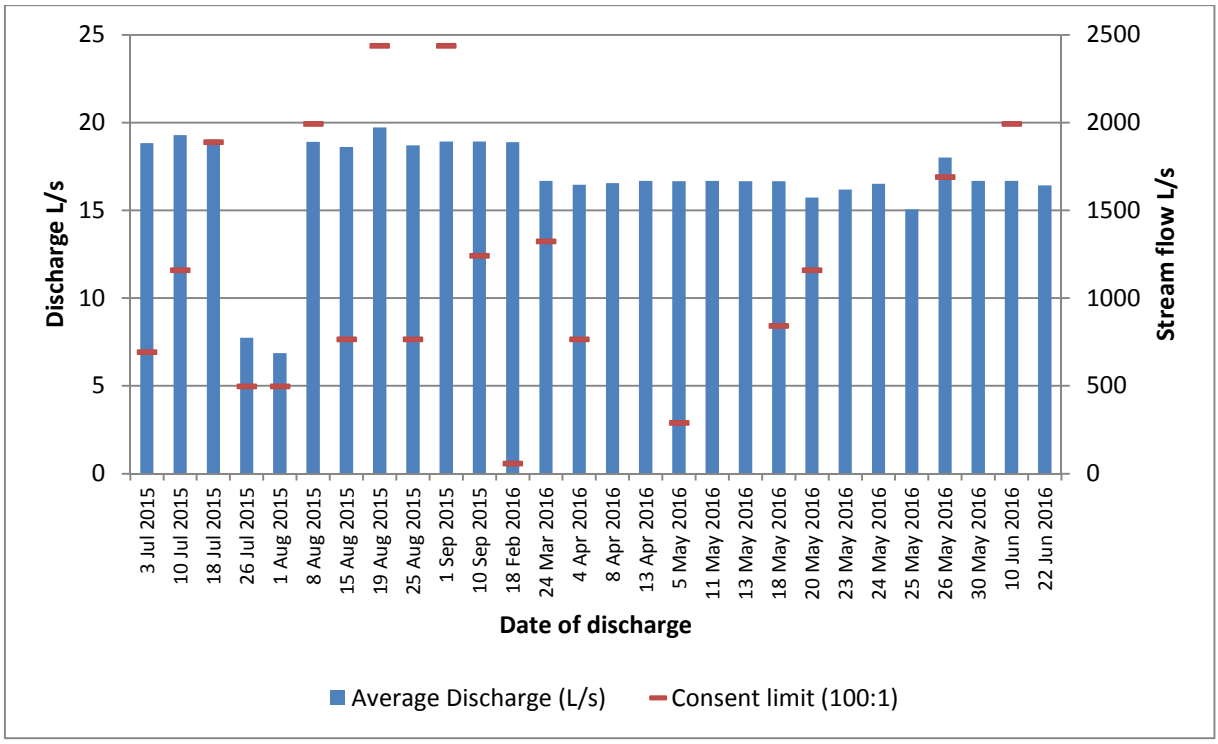

Figure 7 The average volume of wastewater discharged to the Kahouri Stream in relation to stream flow and the 100:1 consent limit

In addition, when the discharge figures are assessed, it was possible to calculate statistics for the discharge rates. The statistics are based on each discharge event, as opposed to daily statistics, as some discharges occurred continuously for a number of days. These statistics are in Table 6.

Table 6 Wastewater discharge parameters

Parameter	Discharge rate (L/s)
Minimum	6.9
Maximum	19.7
Average	16.7
Median	16.7

Another important consent condition requires that as far as practicable, discharge to the Kahouri Stream be minimised and discharges to land be maximised. This means that even at times when adequate dilution is present in the Kahouri Stream, wastewater shall be irrigated to land, unless the land is saturated, and consequently is incapable of accepting the discharge.

Figure 8 shows that irrigation only occurred over the summer months (February to April) and that all of the wastewater was discharged to water in the winter months. It was noted in the previous monitoring report that some improvement was required from the consent holder following the 2014-2015 period, so that there was an increase in the proportion of wastewater irrigated to land. Figure 9 presents a summary of the proportion of wastewater irrigated to land since November 2011. It shows a slight decrease in the proportion of wastewater irrigated to land from the 2014-2015 period

indicating that this is an area that needs attention. This will be even more important as plant throughput is predicted to increase in the future.

Figure 8 also shows a clear relationship with monthly rainfall (from the rainfall recorder located at Cloten Rd, Stratford) and the volume of wastewater generated, and very little relationship between the volume of wastewater generated and the throughput at the plant. This is confirmed by Figure 10. This indicates that there a significant proportion of the wastewater is sourced from stormwater, most likely through runoff from unroofed areas of the yard, and also runoff from the wormfarm. It is also likely that shallow groundwater is entering the treatment ponds, as has been observed from time to time in the second pond. It is suggested that the consent holder continues to examine this stormwater ingress, with a view to undertaking further steps to minimise it.

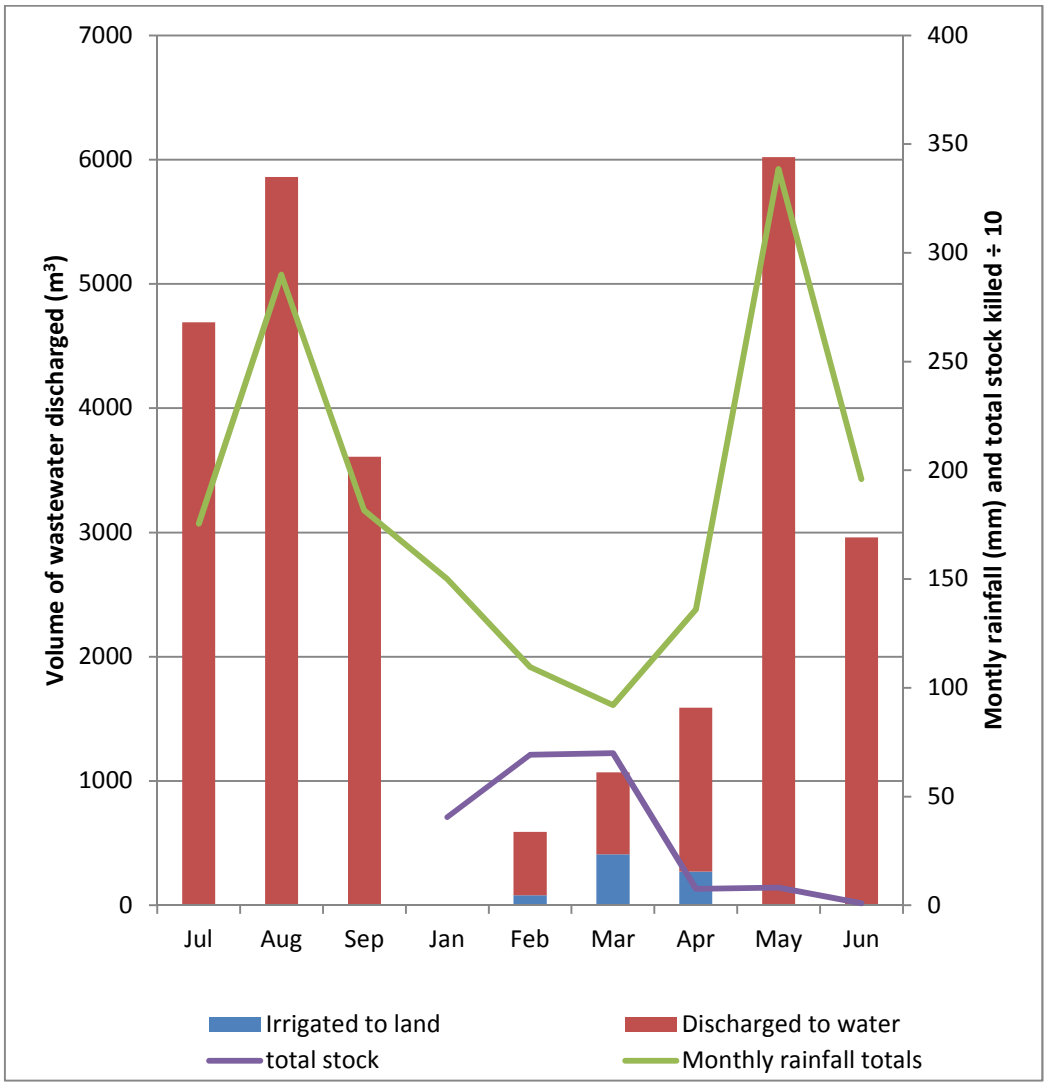

Figure 8 The volume of wastewater irrigated to land and discharged to water, compared with the monthly rainfall totals

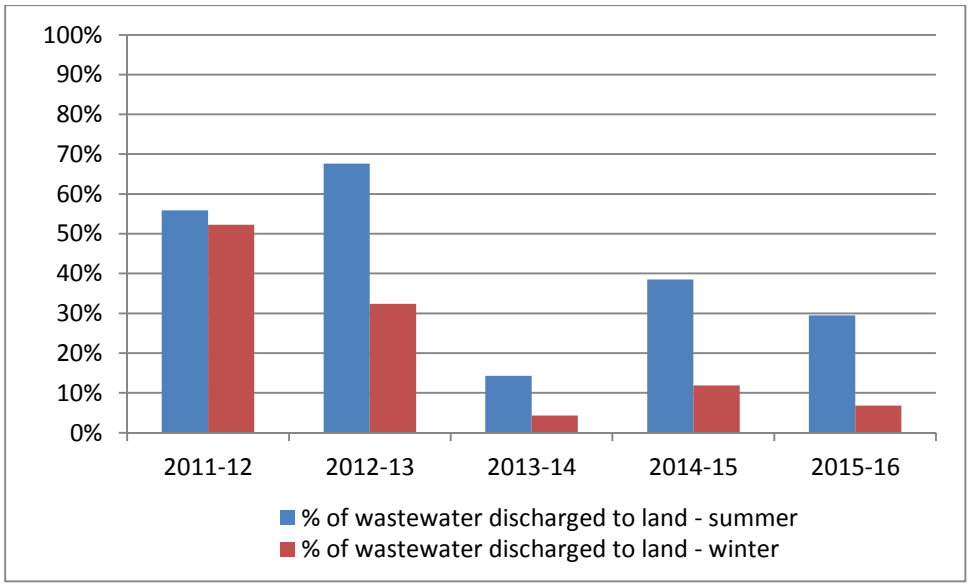

Figure 9 The proportion of wastewater irrigated to land over summer and winter since November 2011

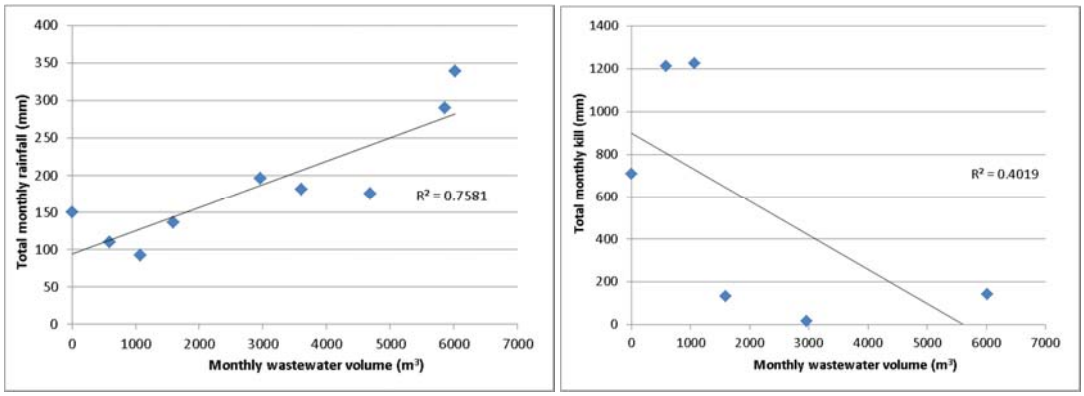

Figure 10 Monthly wastewater volume compared with monthly total kill and total monthly rainfall, including the R^2 value. The closer the R^2 value is to 1, the stronger the relationship

2.1.3.4 Provision of management/contingency plans

Various consents held by the Company include requirements for the preparation of contingency or management plans. Some of these plans are required to be revised every few years. The consent that licenses the irrigation of wastewater to land requires the provision of a Wastewater Irrigation Management Plan, and that this plan be reviewed every two years. The Company has a contingency plan, which is intended to meet the requirements of resource consent 4055-3 (special condition 3) and resource consent 6570-1 (special condition 5). The most recent version of this plan was received in November 2013[1] from a previous consent holder.

[1] Contingency plan for Taranaki Abattoir Co. Ltd & Stratford By-Products Ltd, November 2013. Document #1283945

2.1.4 Results of receiving environment monitoring

The activity of discharging treated wastewater directly to the Kahouri Stream began in December 2011, under a consent issued in the same year. This consent places restrictions on how this discharge may affect water quality of the Kahouri Stream. Specifically, this discharge is not to give rise to the following effects in the Kahouri Stream, beyond a mixing zone of 50 m:

a) a level of filtered carbonaceous BOD5 of more than 2.00 g m^3;
b) a level of unionised ammonia of greater than 0.025 g m;
c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
d) any conspicuous change in the colour or visual clarity;
e) any emission of objectionable odour;
f) the rendering of fresh water unsuitable for consumption by farm animals;
g) any significant adverse effects on aquatic life; and
h) the generation of undesirable heterotrophic growths [sewage fungus].

Furthermore, after allowing for reasonable mixing, within a mixing zone extending 50 m downstream of the discharge point, the discharge is not to give rise to either of the following effects in the receiving waters of the Kahouri Stream:

a) an increase in suspended solids concentration in excess of 5 g m^3, when the stream turbidity as measured upstream of the discharge point is equal or less than 5 NTU [nephelometric turbidity units]; or
b) an increase in turbidity of more than 50% when the stream turbidity as measured upstream of the discharge point is greater than 5 NTU.

Table 7 Sample results for some parameters from the Kahouri Stream upstream and downstream of the wastewater discharge.

Parameter	Summary of previous results since 1 July 2011								2015-2016			
	N		Median		Minimum		Maximum		19-Aug-15		20-May-16	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
Filtered Carbonaceous BOD (g/m^3)	6	5	0.85	0.9	0.25	0.25	2.1	2.2	1.5	1.2	0.25	0.25
Un-ionised ammonia (mg/m^3)	6	8	0.76	1.38	0.4	0.18	1.24	6.19	0.09	0.07	0.49	2.38
Suspended solids (g/m^3)	6	8	12	7	3	2	100	100	200	240	8	12
Turbidity (NTU)	6	8	7.6	4.9	2.7	1.4	56.0	64.0	110	150	6.6	9.1
Approximate dilution (estimated using DRP conc)	-	5	-	200:1	-	150:1	-	319:1	590:1		-125:1	

Table 7 presents the results of the sampling undertaken in relation to the discharge of wastewater to the Kahouri Stream, and some results are also displayed graphically (Figure 11). Table 7 shows that the discharge complied with both the unionised ammonia restriction, and also the turbidity/suspended solids restriction. The sample collected on 19 August 2015 was collected when the stream flow was high and it was

raining heavily. This is evident by the suspended solids and turbidity results for the upstream site, which indicated that the stream was dirty at the time of sampling.

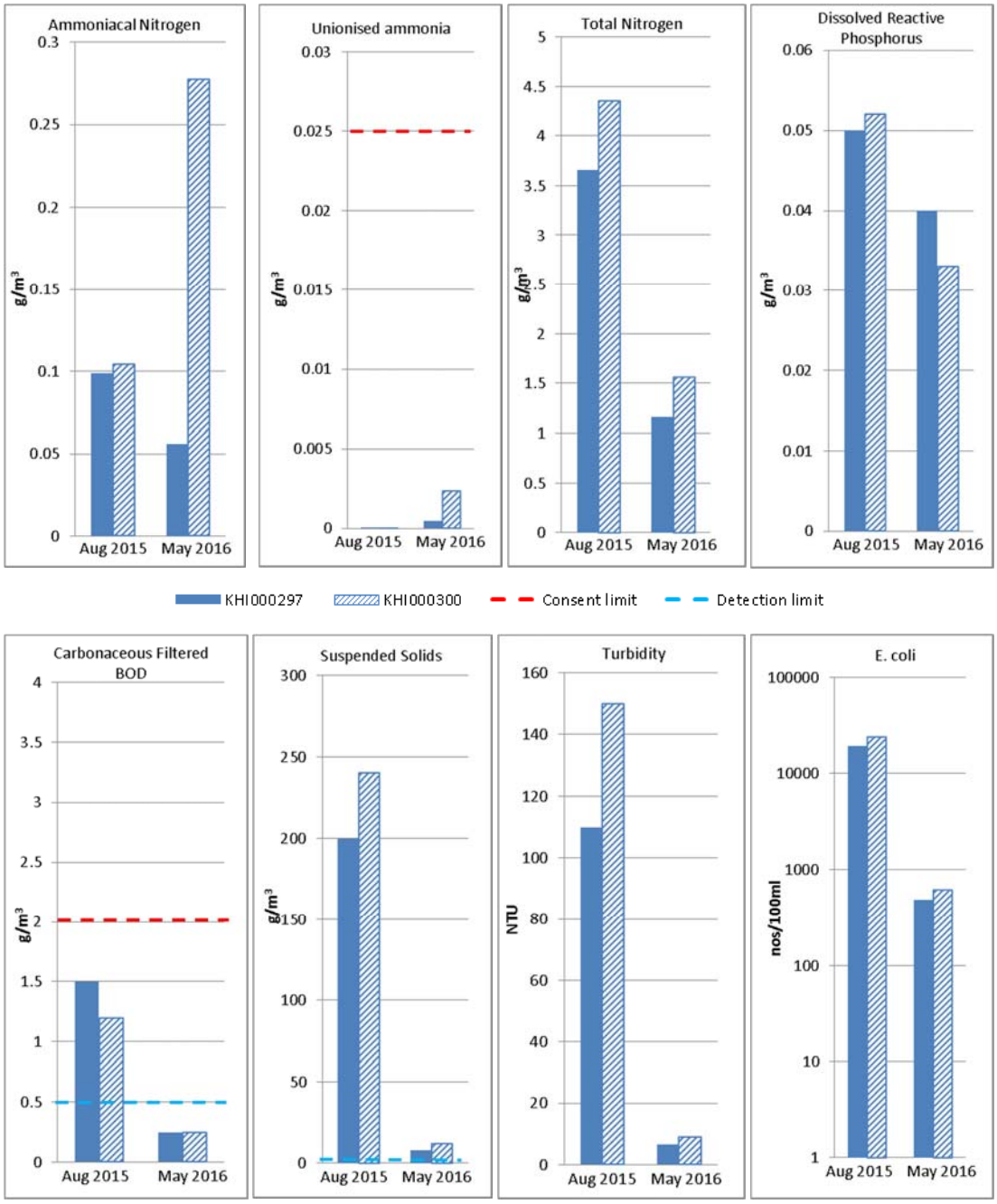

Figure 11 Sample results from the Kahouri Stream upstream and downstream of the site's wastewater discharge.

In terms of impacts on water quality, Figure 11 shows that there was some influence from wastewater discharged into the Kahouri Stream by the Company. In general, there was little difference between the upstream and downstream sites for filtered carbonaceous BOD, E. coli or DRP and minor differences in suspended sediment and turbidity relative to upstream levels at the time of sampling. This indicates that at this time the discharge was meeting the requirements of the consent relating to instream effects. However, there was a noticeable increase in ammoniacal nitrogen for the May 16 2016 sample at the downstream site and relatively small increases in total nitrogen for both sampling dates.

2.1.4.1 Water chemistry – Synoptic survey

One additional survey was undertaken on 8 June 2016, in an attempt to quantify the impacts of any potential diffuse discharge(s) from the site, sourced from (for example) the irrigation of effluent to land or by burial of poor quality product that was not suitable for rendering. Sites K1, K3, T1 and T3 were sampled (Figure 3).

The results indicate that there is very little influence on the Kahouri Stream, with very little change in the parameters tested from the upstream site (K1) to the downstream site (K3). In fact, on this sampling occasion no parameter tested increased in a downstream direction (Figure 12).

In contrast, the unnamed tributary shows large increases in total nitrogen, unionised ammonia and ammonical nitrogen from upstream to downstream (Figure 12). There is no indication that these increases are due to a point source discharge, as there is no concurrent increase in faecal coliform or suspended solids concentration, which would be expected of a point source discharge. Therefore, it indicates the presence of a diffuse discharge(s), which is most likely related to the excessive irrigation of wastewater, resulting in too much nitrogen being applied to land, and/or the burial of poor quality product too close to the stream. These activities could contaminate the shallow groundwater, which could flow to the unnamed tributary.

For the 2014-2015 period no irrigation occurred in this area but it can take some time for the effects of contaminated groundwater to fully manifest in surface water, due to the slow rate that groundwater is replaced by clean water. For the 2013-2014 period there was both excessive irrigation and the burying of material too close to the stream and these actions may still be resulting in groundwater contamination.

The unionised ammonia concentration at site T2 was well below 0.025 g/m^3, indicating that there was little to no toxic impacts on the stream. Also, the concentration of total nitrogen (0.41-1.44 g/m^3) was within the range and of concentrations recorded downstream in the Patea River at Skinner Road in the 2015-2016 monitoring period though ammoniacal nitrogen did exceed the Patea River at Skinner Road concentrations (TRC, 2016).

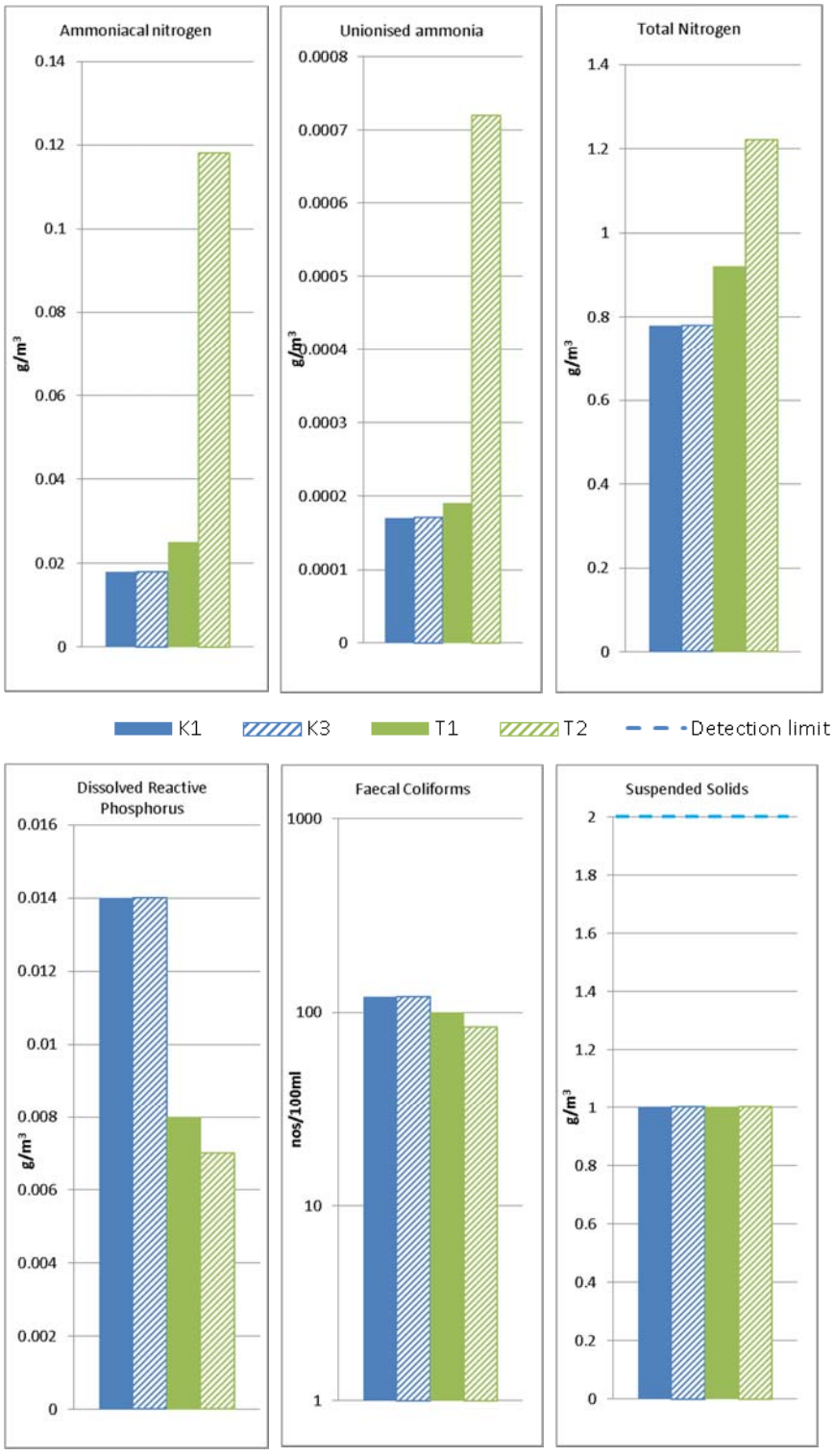

Figure 12 Water quality sampling results for the three synoptic surveys completed

2.1.4.2 Biological monitoring

Spring and summer macroinvertebrate surveys were undertaken for the purpose of monitoring the health of the macroinvertebrate communities of the Kahouri Stream in relation to wastewater management at the site, primarily the discharge of treated wastewater to the stream.

The Council's standard 'kick-sampling' technique was used to collect streambed macroinvertebrates from three sites in the Kahouri Stream on 13 October 2015 and 14 April 2016. Samples were sorted and identified to provide the number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may be the more appropriate index if non-organic impacts are occurring. EPT taxa quantifies the number of mayflies, stoneflies and caddisflies present in the sample, and this can also be expressed as a proportion of the total number of taxa (%EPT).

Significant differences in either MCI or $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of discharges being monitored.

It should be noted that special condition 13 of the relevant consent (7662-1) includes the following statement:

"The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index [SQMCI], overall composition of the community [including %EPT] and Macroinvertebrate Community Index [MCI]. Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition."

The analysis of results was undertaken with this statement in mind.

During the spring survey the three sites sampled in the Kahouri Stream recorded little variation in taxa richness, and although there was some variation in the MCI scores, the $SQMCI_S$ scores were similar, and both index scores were higher than their respective medians. In addition, these sites were largely dominated by the same taxa, with very few significant differences in individual taxon abundance between sites. The results of this survey also did not differ markedly from that recorded in the baseline survey, suggesting little change in communities since the discharge of wastewater commenced. The MCI and $SQMCI_S$ scores were all significantly higher than the median score recorded at site C. This also indicates a lack of organic enrichment at these sites. Overall, this survey indicates that there was no clear deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities appear subtle and largely natural, and not related to any discharge from the abattoir site. This was supported by the absence of sewage fungus, as determined by microscopic inspection of the samples.

Overall, the Kahouri Stream was in good condition, and with regards to the statement in the consent, an examination of the MCI, $SQMCI_S$ scores and the %EPT found no indication of a significant adverse effect caused by the discharge, and as such, there was no breach of condition 13 of consent 7662-1.

During the summer survey the three sites sampled in the Kahouri Stream recorded no significant variation in taxa richness, MCI scores and the $SQMCI_S$ scores. In addition, these sites were largely dominated by the same taxa, with very few significant differences in individual taxon abundance between sites. The results of this survey also did not differ markedly from that recorded in the baseline survey, suggesting little change in communities since the discharge of wastewater commenced.

Overall, this survey indicates that there was no clear deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities appear subtle and largely natural, and not related to any discharge from the abattoir site. This was supported by the absence of sewage fungus, as determined by microscopic inspection of the samples.

Overall, the Kahouri Stream was in good to very good condition, and with regards to the statement in the consent, an examination of the MCI, $SQMCI_S$ scores and the %EPT found no indication of a significant adverse effect caused by the discharge, and as such, there was no breach of condition 13 of consent 7662-1 by Ample Group Ltd.

A copy of the reports which discusses these surveys is included 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 consent holder During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses 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 (IR) 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 2015-2016 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans. This continues to the improvement noted over the last few years (Table 8), but may also reflect the reduced throughput at the plant in this time. In addition, the closure of the rendering plant has also reduced the potential for odour at the plant, although it should be noted that if paunch waste continues to be processed at the wormfarm and if production increases as planned, this paunch may become a significant source of odour.

In the previous report, it was noted that the consent holder required additional riparian planting as the area that has been fenced is larger than originally estimated and riparian planting is a requirement of consent (5221-2). Appropriate plants have been planted out in June 2016 but a further inspection is required to evaluate whether the Company has completely planted out all the fenced margins.

Table 8 Summary of unauthorised incidents in the last fifteen monitoring years

Monitoring year	Total number of unauthorised incidents	Number of incidents related to objectionable odours	Number of non-odour related incidents	Comments
2015-2016	0	0	0	No recorded incidents
2014-2015	0	0	0	No recorded incidents
2013-2014	2	2	0	Two odour complaints, one of which was associated with confirmed offensive odour beyond the boundary. However due to the consent condition terminology, it was not deemed non-compliant
2012-2013	4	2	2	Two odour complaints, neither of which was substantiated. Two incidents relating to implementation and compliance with new consent conditions – resolved
2011-2012	1	1	0	One odour related incident that did not note any non-compliance
2010-2011	0	0	0	No recorded incidents
2009-2010	3	1	2	No substantiated discharges of objectionable odour, one incident relating to 'sewage fungus' in the Kahouri Stream and one technical non-compliance incident.
2008-2009	3	3	0	One substantiated incident relating to objectionable odour.
2007-2008	5	4	1	No substantiated discharges of objectionable odour, one complaint regarding material being carried off site by birds.
2006-2007	5	5	0	One instance of objectionable odour, and one in which non-condensable gases were vented direct to air.
2005-2006	27	25	2	Nine instances of objectionable odour; Odours mainly sourced from cooking of off-spec product, and discharge of inadequately treated cooking gases. Tallow spill and breach of consent condition regarding BOD_5 in receiving water.
2004-2005	19	18	1	11 odours found to be objectionable; Odours mainly sourced from out of spec product; Some odours from worm farm (in summer). Tallow spill.
2003-2004	5	5	-	Odours from prolonged loading and venting of cooker, and problems with condenser/bio-filter. Receiving water quality BOD breach of consent.
2002-2003	1	1	-	Lack of water during cooking resulted in burning.
2001-2002	4	3	1	Odours due to worm farm paunch being moved. Two odour complaints were unsubstantiated.
2000-2001	3	1	2	Odour from out of spec product. Discharge of untreated effluent to stream due to blocked pipe; BOD exceeded in receiving water

3. Discussion

3.1 Discussion of site performance

In general, the Company's facilities were managed in well. It should be noted that the number of animals processed by the abattoir was significantly reduced on previous years, but it is anticipated that plant throughput should increase significantly during the next monitoring year. In terms of compliance with conditions on the air discharge consent, the most concerning issue in previous years was the processing of soft offal outside of the timeframe as defined by the consent. However, over more recent monitoring periods, compliance in this regard has improved markedly and in the 2015-2016 period no odour complaints were received.

The majority of wastewater was discharged to the Kahouri Stream, and biological and water quality sampling has found that the discharge has complied with all conditions relating to instream effects. In addition, the quality of the discharge has met the requirements of the consent. However, review of the data indicates that the discharge rate has been higher than was signalled during the consent renewal process and this has the potential to result in a dilution rate less than that required by consent. Although this was not verified by water quality sampling, it is a matter that the consent holder will need to pay close attention to.

Inspections undertaken while wastewater was being irrigated to land indicated that the day to day management of the irrigation was done well. In addition, a review of the irrigation records indicates that there has been an improvement in the amount of nitrogen applied to land, with no paddocks receiving more than the consented limit. Irrigation only occurred on the area east of Mountain Road. Of the four paddocks that received wastewater only one experienced an application depth that some stage exceeded the limit of 24 mm, with the maximum rate recorded being 25.4 mm. Although this is not strictly compliant with the consent, inspections did not note any impacts from this elevated application rate, and overall it is an improvement from that reported in the previous period, which recorded a maximum 15 day application rate of 50.3 and the monitoring year before that which recorded a maximum 15 day application rate of 289 mm.

The discharge records also indicated that the vast majority of wastewater was discharged to the Kahouri Stream. The consent holder needs to make improvements regarding this with more wastewater being irrigated to pasture. This is a consent requirement. Furthermore, if the consent holder could intercept more ground and surface water before it reaches the wastewater ponds this would reduce the total volume of wastewater that would need to be disposed of.

Compliance with the four resource consents held was generally satisfactory. Housekeeping was found to be good through most of the plant during inspections, with the yards kept clean and tidy, with all contaminants contained within the wastewater catchment (as opposed to the stormwater catchment).

The spreading of biosolids on land, with regular addition of lime and trace minerals, has been successful. The current consent holder no longer disposes of blood onsite. The worm farm has the potential to cause some odours to occur off site and this area needs to be managed carefully to reduce the likelihood of this particularly during the summer months. An offensive odour was noted during the final inspection in close proximity to

the wormfarm but this would not have occurred past the boundary and therefore was compliant. This area also needs to be managed, so as to prevent birds from accessing material, and carrying it off site. The Company notifies the Council when disturbance in the worm farm area is planned, as the disturbance has the potential to increase the discharge of odour. It is noted that with an increase in plant throughput, there may be an increase in the volume of paunch processed on the wormfarm. This will need to be carefully managed to reduce the potential for odour.

Council has a Wastewater Management Plan (2010), as required by consent 5221-2 and a contingency plan (2013), as required by consent 4055-3. Both plans are out of date and need to be reviewed by the Company as they both refer to a previous consent holder and the Company may wish to operate differently.

Recent personal changes at the site mean there has been a significant loss of experience onsite. It will be important for the Company to ensure all new staff are fully trained and aware of all the requirements of the various resource consents and plans in regards to their own specific roles at the abattoir.

3.2 Environmental effects of exercise of consents

The discharge of wastewater to the Kahouri Stream has not caused any recorded impact on the macroinvertebrate communities of this stream, and the impact on water quality was minimal. There were increases recorded for most parameters tested, but these increases would have been short-lived, and at no time did the discharge result in a breach of consent conditions. Discharges to the Kahouri Stream should occur during high flow conditions to allow adequate dilution and assimilation of the discharge.

The irrigation of wastewater was undertaken with no significant adverse effects on the environment. There was an improvement with regards to the application of nitrogen to land, and the land that experienced excessive application of nitrogen in the past (the cut and carry paddocks) did not receive any wastewater. However, water quality monitoring continued to indicate an increase in ammoniacal nitrogen in the unnamed tributary as it flows through these cut and carry paddocks. This increase is not such that could have a lethal impact on the stream biota, but may result in increased algal growth and less healthy macroinvertebrate fauna.

In relation to air emissions, there were no incidents related to odours beyond the site boundary. The fact that the rendering plant has closed is likely to reduce the number of odour complaints related to the site, but it is noted that there may be an increase in the volume of paunch to be processed on site, and this may result in the generation of odour. Although odour was noted during some inspections, there was no odour noted that was considered likely to cause off-site effects.

The abstraction of water was undertaken entirely within consent conditions. The maximum daily abstraction rate did not exceed the consent limit at any time.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 9 to Table 14.

Table 9 Summary of performance for consent 7662-1

Purpose: ***To discharge treated wastewater directly into the Kahouri Stream***.		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes
2. Notification prior to any changes to processes	Council notified	N/A
3. Prohibits the consent to be exercised while consent 0108-4 is current	Inspections	Yes
4. Install flow meter	Inspections	Yes
5. Meter verification documentation submitted	Liaising with consent holder	Yes
6. Install staff gauge in Kahouri Stream	Inspections	Yes
7. Maintain staff gauge rating curve	Inspections	Yes
8. Minimise clean water entering treatment system	Inspections	Yes
9. Manage worm bed to minimise discharge to treatment system	Inspections	Yes
10. Prohibits the operation of aerators and stirrer while discharge occurs	Inspections	Yes
11. Discharge shall only occur when flow rates are 330 L/s or greater	Review of records, inspections	No
12. Minimum dilution ratio of 1 part wastewater to 100 parts receiving water	Review of records, water quality sampling	No
13. Effects on receiving water beyond the 50 m mixing zone	Water quality sampling, inspections	Yes
14. Suspended solids and turbidity limits	Water quality sampling	Yes
15. Safe site access	Inspections	Yes
16. At least 200 mm of freeboard available	Inspections	Yes
17. Install and maintain a permanent marker within the aerobic pond	Inspections	Yes
18. Preference given to discharge to land	Inspections, review of records	No
19. Manage wastewater treatment system to maximise quality	Inspections	Yes

Purpose: ***To discharge treated wastewater directly into the Kahouri Stream***.		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
20. Total BOD limit	Discharge quality sampling	Yes
21. Install and maintain a tap on the wastewater line	Inspections	Yes
22. Monitor and record the discharge	Liaison with consent holder, review of records	Yes – But improvement needed
23. Riparian management plan	Liaison with consent holder, inspections	Yes
24. Notification of environmental incidents	Liaison with consent holder, inspections	N/A
25. Lapse of consent	Consent exercised within lapse period	N/A
26. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**Good**
Overall assessment of administrative performance in respect of this consent		**Good**

N/A = not applicable

Table 10 Summary of performance for consent 6570-1

Purpose: ***To discharge of degenerating raw product onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes
2. Exercise of consent shall be undertaken in accordance with application documentation	Inspections	Yes
3. Notification prior to exercise of consent	Council notified	Yes
4. Notification prior to burials	Council notified	N/A
5. Supply burial management plan	Contingency plan received	Yes
6. Only raw material to be disposed of in burial pits	Inspections	Yes
7. Emergency circumstances discharges to land	Inspections	Yes
8. No contaminants to enter surface water	Inspections and water quality sampling	Yes
9. Prohibits adverse effects on groundwater	Inspections	Yes

Purpose: ***To discharge of degenerating raw product onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. Consent holder to maintain and keep records	Request by Council for data	Yes
11. Discharge to be covered within four hours	Inspections	Yes
12. Minimum of 800mm of compacted soil to be placed on discharge wastes	Inspections	Yes
13. Site contoured	Inspections	Yes
14. Pasture re-established	Inspections	Yes
15. Lapse of consent	Consent exercised within lapse period	N/A
16. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 11 Summary of performance for consent 5221-2

Purpose: ***To discharge treated wastewater from a treatment system onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream***.		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes
2. Notification prior to any changes to processes	Council notified	N/A
3. Install flow meter	Inspections	Yes
4. Meter verification documentation submitted	Liaising with consent holder	Yes
5. Follow wastewater irrigation management plan	Inspections	Yes
6. Update wastewater irrigation management plan	Liaising with consent holder	No
7. Review wastewater irrigation management plan	Liaising with consent holder	No
8. Designate a person to manage the irrigation system	Liaising with consent holder, inspections	Yes
9. Operation of aerator and stirrer	Inspections	Yes

Purpose: ***To discharge treated wastewater from a treatment system onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream***.		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
10. Restrictions on nitrogen levels	Liaising with consent holder, inspections	Yes
11. Wastewater irrigation management plan submitted prior to nitrogen loading	Liaising with consent holder, inspections	Yes
12. Wastewater application must not exceed 24 mm	Review of records	No
13. Sodium absorption ratio shall not exceed 15	Irrigated wastewater quality sampling	Yes
14. Prohibits discharge to water from irrigation	Inspections	Yes
15. Restrictions on the wastewater discharge spray zone	Inspections	Yes
16. Prohibits discharge beyond the boundary of the property	Inspections	Yes
17. Preference given to discharge to land	Inspections, review of records	No
18. Application of pond solids to avoid discharge to water	Inspections	Yes
19. Daily discharge records	Review of records	Yes – Some data concerning pump on/off times missing/wrong
20. Notification of any environmental incidents	Liaising with consent holder, inspections	Yes
21. Notification information	Liaising with consent holder, inspections	Yes
22. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**Good** **Good**

N/A = not applicable

Table 12 Summary of performance for consent **7660-1**

Purpose***: To discharge uncontaminated stormwater to land, in association with meat processing, rendering and associated activities.***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
2. Prevent discharge from contamination	Inspections	Yes
3. Constituents of the discharge	Inspections, water quality sampling	Yes
4. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 13 Summary of performance for consent 4055-3.

Purpose: ***To discharge emissions to air, in association with meat processing, rendering and associated activities***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes
2. Consent holder to maintain a contingency plan	Inspections	Yes
3. Submit contingency plan	Liaising with consent holder	Yes
4. Notification of any changes to plant processes	Liaising with consent holder	Yes
5. Prohibits fish being received or processed onsite	Inspections	Yes
6. Only offal from purpose killed animals shall be received and processed onsite	Inspections	Yes
7. Prohibits putrescible materials to be stored onsite	Inspections	Yes
8. Emissions must be extracted to the biofilter	Inspections	Yes
9. Discharge temperature must not exceed 35°C	Data review, inspections	Yes
10. Calibration of the temperature detector	Liaising with consent holder	Yes
11. Record the non-condensable gas line	Liaising with consent holder, inspections	Yes
12. Minimise emissions	Inspections	Yes
13. Prohibits objectionable or offensive odour beyond the boundary of the site to the extent where this odour causes an adverse effect	Inspections	Yes

Purpose: *To discharge emissions to air, in association with meat processing, rendering and associated activities*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
14. Prohibits objectionable or offensive dust beyond the boundary of the site	Inspections	Yes
15. Consent holder to notify Council of any adverse environmental incidents.	Liaising with consent holder, inspections	Yes
16. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

Table 14 Summary of performance for consent 5176-1

Purpose: *To take water from the Kahouri Stream for stock and yard washing purposes.*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Best practicable option	Inspections	Yes
2. Abstraction limits	Data review	Yes
3. Flow metre shall be installed and maintained	Inspections	Yes
4. Abstraction records	Data review	Yes
5. Minimum flow in Kahouri Stream	Inspections	Yes
6. Intake screened	Inspections	Yes
7. Optional review of consent	Not exercised	N/A
Overall assessment of environmental performance and compliance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

N/A = not applicable

During the year, the Company demonstrated a good level of both environmental and administrative performance with the resource consents as defined in Section 1.1.4. During the year under review there were no incidents recorded that related to the companies activities. The previous monitoring report indicated that the previous consent holder needed to give a higher priority to consent compliance, and the results of the monitoring undertaken in the 2015-16 period indicates that this has occurred. It should be noted that the previous report related to when the consents were held by Gold International Meat Processors Limited. The consents were transferred to the Company in January 18 2016.

3.4 Recommendations from the 2014-2015 Annual Report

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

1. THAT monitoring of consented activities at Gold International Meat Processors Limited abattoir and rendering plant in the 2015-2016 year be amended from that undertaken in 2014-2015 period, by reducing the sampling of irrigated wastewater and sampling associated with the discharge of wastewater to the Kahouri Stream.

2. THAT the option for a review of resource consents in June 2016, as provided for by conditions of these consents, not be exercised, on the grounds that the consents are adequate to deal with the activities currently undertaken.

These recommendations were adopted in the 2015-2016 period.

3.5 Alterations to monitoring programmes for 2016-2017

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

- the extent of information made available by previous authorities;
- its relevance under the RMA;
- its obligations to monitor emissions/discharges and effects under the RMA; and
- to report to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

It is proposed that for 2016-2017 monitoring is maintained at the same level as the 2015-2016 year.

Although it is recommended that monitoring continue to be on a limited scale compared with previous years, if an increase in throughput at the plant sees an increase in the amount of nitrogen applied to land, it may be necessary to increase sampling of the irrigated wastewater, wastewater to the Kahouri Stream, and to expand the current synoptic survey to include sites east of Mountain Road. Previously, sampling of irrigated wastewater was on six occasions instead of four and wastewater and receiving environment sampling to the Kahouri Stream was on three occasions instead of two.

3.6 Exercise of optional review of consent

Resource consents 5221-2, 7662-1 and 4055-3 provide for an optional review of the consent in June of any year. Conditions of these consents allow the Council to review the consent, if there are grounds. For consent 5221-2, these grounds are as follows:

a. Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to water quality issues; and

b. To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges from the site.

For consent 7662-1, these grounds are as follows:

a. Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to water quality issues;
b. to take into account any Act of Parliament, regulation, national policy statement [including the National Policy Statement for Freshwater Management 2011], regional policy statement or regional rule which relates to limiting, recording, mitigating, setting or amending any limits or other criteria relating to nutrients, ecological health or other water quality parameters; and
c. To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges from the site.

In considering whether to initiate a review of consent 7662-1, the Council will take into account any views received from the Department of Conservation and Fish and Game New Zealand (Taranaki Region).

For consent 4055-3, these grounds are as follows:

a. Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site; and
b. To determine any measures that may be appropriate to comply with condition 1 of this consent and which are necessary to address any adverse effects of odour from the site.

For all consents, there is reference to condition 1, which relates to the consent holder adopting the best practicable option to prevent or minimise any adverse effects on the environment from the exercise of these consents.

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

A recommendation to this effect is presented in Section 4 of this report. However, it should be noted that the consent holder may initiate the review process, to ensure the consents adequately cover change in processes, especially with regard to wastewater management.

4. Recommendations

1. THAT monitoring of consented activities at Ample Group Ltd in the 2016-2017 year continue at the same level as in 2015-2016.

2. THAT the option for a review of resource consents in June 2017, as provided for by conditions of consents 5221-2, 7662-1 and 4055-3, not be exercised, on the grounds that the consents are adequate to deal with the activities currently 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.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m^3s^{-1}).
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$g/m^2/day$	grams/$metre^2$/day.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.

L/s	Litres per second.
m^2	Square Metres.
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.

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

For further information on analytical methods, contact the Council's laboratory.

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Appendix I

Resource consents held by Ample Group 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:	Gold International Meat Processors Limited PO Box 12 Inglewood 4347
Decision Date:	07 November 2011
Commencement Date:	07 November 2011

Conditions of Consent

Consent Granted:	To discharge emissions to air, namely odour and dust, in association with meat processing, rendering and associated activities including waste treatment and disposal activities
Expiry Date:	01 June 2028
Review Date(s):	June of any year
Site Location:	3326 Mountain Road and 17 Monmouth Extension, Stratford
Legal Description:	Sec 62 Manganui Dist Blk XIII Huiroa SD, Pt Sec 12 Blk XIII Huiroa SD and Pt Sec 2-4 Blk I Ngaere SD
Grid Reference (NZTM)	1709506E-5647939, 1709815E-5647783N, 1709874E-5647570N, 1709423E-5647438N and between 1709871E-5647776N, 1710911E-5647381N, 1710905E-5647127N, 1710301E-5647038N, 1710241E-5647326N, 1710019E-5647280N

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

General conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. On-site operations shall be undertaken in accordance with the *Contingency Plan for Taranaki Abattoir Co. (1992) Ltd and Stratford By Products Ltd*, submitted with the application (which details the management procedures to be undertaken on site to mitigate adverse odour effects), or any subsequent reviews.

   Note: Where there may be inconsistencies between the information provided within the Plan and conditions of this consent, the conditions apply.

3. The consent holder shall update and submit to the Taranaki Regional Council, the *Contingency Plan for Taranaki Abattoir Co. (1992) Ltd and Stratford By Products Ltd* every two years so that, to the satisfaction of the Chief Executive of the Taranaki Regional Council, the Plan details how discharges to air from the site will be managed to ensure compliance with conditions 13 and 14 of this consent. The Plan shall include but not necessarily be limited to:

   a) A description of the environmental effects being managed;

   b) The identification of key personnel responsible for managing and implementing the management system for mitigating adverse effects;

   c) A description of the activities on site and describe the main potential sources of odour emissions;

   d) A description of storage and treatment procedures(including specification of storage times and preservative dosing concentrations) for ensuring that only high quality raw material is processed;

   e) The identification and description of the odour and dust mitigation measures in place;

   f) The identification and description of relevant operating procedures and parameters that need to be controlled to minimise emissions;

   g) A description of contingency procedures for addressing emergency situations at the plant (such as equipment failure or spillage of raw material or chemicals) which could result in a discharge to air of odorous emissions that are offensive and objectionable beyond the boundary of the plant;

h) A description of monitoring and maintenance procedures for managing the odour mitigation measures including record keeping of control parameters and maintenance checks; and

i) Details of staff training proposed to enable staff to appropriately manage the odour mitigation measures.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to undertaking any alterations to the plant, operations or processes which may significantly change the nature or quantity of contaminants discharged to air from the site. Any such change shall then only occur following receipt of any necessary approvals under the Resource Management Act 1991.

Process control

5. No fish or fish parts shall be received or processed on site.

6. Only offal derived from purpose killed animals shall be received and processed on site.

7. No putrescible materials shall be stored or left in any manner on site which causes them to putrefy and create an odour nuisance.

8. Emissions produced during and on the release of all rendering cooks shall be extracted to the biofilter for treatment prior to discharge.

9. The inlet temperature of the extracted air at the duct ahead of the biofilter shall not exceed 35°C for more than 15 minutes continuously at any one time.

10. The consent holder shall calibrate the temperature detector and recorder on the non-condensable gas line on a yearly basis. The calibration results shall be provided to the Chief Executive, Taranaki Regional Council.

11. The consent holder shall maintain the temperature detector and recorder on the non-condensable gas line so that it is in effective working order at all times.

12. The consent holder shall minimise the emissions and impacts of contaminants discharged into air from the site by the proper and effective operation, supervision, maintenance and control of all equipment and processes.

Odour

13. There shall be no objectionable or offensive odour to the extent that it causes an adverse effect at or beyond the boundary of the site.

Notes: For the purposes of this condition:

- The site is defined as Sec 62 Manganui Dist Blk XIII Huiroa SD (Consent holder's site), and Pt Sec 12 Blk XIII Huiroa SD and Pt Secs 2-4 Blk I Ngaere SD (Gilbert Farms' site); and
- Assessment under this condition shall be in accordance with the *Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.*

Dust

14. The discharges authorised by this consent shall not give rise to suspended or deposited dust at or beyond the boundary of the site that, in the opinion of at least one enforcement officer of the Taranaki Regional Council, is offensive or objectionable. For the purpose of this condition, discharges in excess of the following limits are deemed to be offensive or objectionable:

    a) dust deposition rate of 0.13 $g/m^2/day$; and/or

    b) suspended dust level of 3 mg/m^3.

    Note: For the purposes of this condition the site is defined as Sec 62 Manganui Dist Blk XIII Huiroa SD

Incident notification

15. Any incident related to this consent that results, or could result, in an adverse effect on the environment shall be notified to the Taranaki Regional Council as soon as practicable, together with the reasons for the incident, and measures taken to mitigate the effects of the incident and prevent a recurrence.

    Note: For notification purposes, at the grant date of this consent, the Taranaki Regional Council's phone number is 0800 736 222 (24 hour service).

Review

16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June in any year for any of the following purposes:

    a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to odour discharges from the site; and

    b) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects of odour from the site.

Transferred at Stratford on 13 October 2014

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Water Permit

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

Name of Consent Holder:	Ample Group Limited PO Box 193 Stratford 4352
Decision Date:	7 July 2016
Commencement Date:	7 July 2016

Conditions of Consent

Consent Granted:	To take water from the Kahouri Stream for stock and yard washing purposes
Expiry Date:	1 June 2034
Review Date(s):	June 2019 and every 3 years thereafter
Site Location:	3396 Mountain Road, Stratford
Grid Reference (NZTM)	1709640E-5647873N
Catchment:	Patea
Tributary:	Kahouri

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. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water from the Kahouri Stream, including, but not limited to, the efficient and conservative use of water.

2. The rate of taking shall not exceed 3.25 litres per second, and the volume taken in any 24 hour period ending at midnight (New Zealand Standard Time) shall not exceed 178 cubic metres.

3. Before 1 September 2016 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 ± 5%. Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

   Note: Water meters and dataloggers 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 and dataloggers have a limited lifespan.

4. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording 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 ± 5%.

   The documentation shall be provided:

   a) within 30 days of the installation of a water meter or datalogger;

   b) 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

   c) 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 and a maintenance report provided to the Chief Executive, Taranaki Regional Council within 30 days of the work occurring.

6. Any water meter or datalogger shall be accessible to Taranaki Regional Council officers at all reasonable times for inspection and/or data retrieval. In addition the data logger shall be designed and installed so that Taranaki Regional Council officers can readily verify that it is accurately recording the required information.

7. The records of water taken:

   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.

8. No taking shall occur when the flow in the Kahouri Stream immediately downstream of the intake point is less than 55 litres per second.

9. The consent holder shall ensure that the intake is screened to avoid fish (in all stages of their life-cycle) entering the intake or being trapped against the screen.

10. A staff gauge shall be installed and a low flow rating curve established and maintained that determines the flow in the Kahouri Stream immediately downstream of the take site. The cost of the installation, and the establishment and maintenance of the rating shall be met by the consent holder.

11. This consent shall lapse on 30 September 2021, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2019 and at 3 yearly intervals 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 7 July 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Ample Group Limited 3396 Mountain Road RD 24 Stratford 4394
Decision Date:	7 November 2011
Commencement Date:	7 November 2011

Conditions of Consent

Consent Granted:	To discharge treated wastewater, pond solids from a wastewater treatment system, vermicast and blood onto and into land
Expiry Date:	1 June 2028
Review Date(s):	June of any year
Site Location:	3326 Mountain Road and 17 Monmouth Road Extension, Stratford
Legal Description:	Sec 62 Manganui Dist Blk XIII Huiroa SD, Pt Sec 12 Blk XIII Huiroa SD and pt Sec 2-4 Blk I Ngaere SD
Grid Reference (NZTM)	Between 1709506E-5647939, 1709815E-5647783N, 1709874E-5647570N, 1709423E-5647438N and between 1709871E-5647776N, 1710911E-5647381N, 1710905E-5647127N, 1710301E-5647038N, 1710241E-5647326N, 1710019E-5647280N
Catchment:	Patea
Tributary:	Kahouri

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

Management plan

5. The consent shall be exercised in accordance with the procedures set out in the Wastewater Irrigation Management Plan (submitted as further information to the application). In the case of any contradiction between the Plan and the conditions of this resource consent, the conditions of this resource consent shall prevail.

6. Within one month of the grant date of this consent, the consent holder shall amend and re-submit the Wastewater Irrigation Management Plan described in condition 5 of this consent so that, to the satisfaction of the Chief Executive, Taranaki Regional Council, the Plan details how the discharge will be managed to ensure that the conditions of this consent will be met. The Plan shall be amended to include, but not necessarily be limited to, the following details:

    a) how the irrigation areas will be identified [e.g. paddock numbering system or large land areas broken down into 1 ha lots and numbered] and a plan/drawing showing the location and extent of each identified area. This system shall be used for record keeping purposes under condition 19;
    b) the surface area of each irrigation area identified under clause a) above;
    c) identification of the location and extent of irrigation main lines and hydrant locations on an aerial plan/drawing; and
    d) the surface area of land required for a range of wastewater discharge volume scenarios, or a calculation which shows how the required land area will be worked out each time irrigation is initiated, to ensure that condition 10 will be met.

7. The Wastewater Irrigation Management Plan described in condition 5 of this consent shall be subject to review by the consent holder every two years from the commencement of consent, or upon two months notice by either the consent holder or the Taranaki Regional Council so that, to the satisfaction of the Chief Executive Taranaki Regional Council, the Plan details how discharges to land will be managed to ensure that the conditions of this consent are complied with. The Plan shall include but not necessarily be limited to:

    a) the results of investigating the practicalities of increasing the land area available for irrigation and/or increasing wastewater application loading rates through implementing cut and carry areas, including the provision of supporting evidence for the outcome of the investigation;
    b) designated application areas and buffer zones for streams and the property boundaries;
    c) selection of appropriate irrigation methods for different types of terrain;
    d) application rate and duration;
    e) application frequency and nitrogen loading rate;
    f) farm management and operator training;
    g) soil and herbage management;
    h) prevention of runoff and ponding;
    i) minimisation and control of offsite odour and spray drift effects;
    j) operational control and maintenance of the spray irrigation system;
    k) monitoring of the effluent [physicochemical];
    l) monitoring of soils and herbage [physicochemical];
    m) monitoring of groundwater beneath and beyond the irrigated area [physicochemical] (if required in accordance with condition 11 of this consent);
    n) monitoring of local water supplies and remediation;
    o) mitigation measures, including riparian planting and fencing;

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

General conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approvals under the Resource Management Act 1991.

Pre-activity requirements

3. Before exercising this consent the consent holder shall install, and thereafter maintain, a flow meter. The flow meter shall measure the volume of the discharge to land to an accuracy of ± 5%.

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

   A single flow meter may be installed for the purposes of meeting this condition and condition 4 of consent 7662-1 provided that the records submitted in accordance with condition 19 of this consent and condition 22 of consent 7662-1 clearly differentiate between the two receiving environments.

Flow meter certification

4. The consent holder shall provide the Chief Executive, Taranaki Regional Council with documentation from a suitably qualified person certifying that the flow meter:

   a) has been installed and/or maintained in accordance with the manufacturers' specifications; and/or

   b) has been tested and shown to be operating to an accuracy of ± 5%.

   The documentation shall be provided:

   (i) within 30 days of the installation of a flow meter;

   (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the flow meter may not be functioning as required by this consent; and

   (iii) no less frequently than once every five years.

p) reporting monitoring data;
q) monitoring of the tributaries draining the property;
r) procedures for responding to complaints;
s) notification to the council of non-compliance with the conditions of this consent;
t) procedures for recording maintenance and repairs;
u) procedures for draining and flushing the irrigation mainlines and laterals to prevent anaerobic conditions.

The objective of the plan shall be to minimise discharges to the Kahouri Stream under consent 7662-1 and maximise discharges to land.

A copy of the reviewed Plan shall be provided to the Department of Conservation and Fish and Game New Zealand (Taranaki Region), and the Taranaki Regional Council will take into account any comments received (within a two week timeframe from when the Plan was provided).

Note: For ease of assessment, the consent holder shall highlight the areas of the reviewed Plan where changes have been made from the previous Plan.

8. The consent holder shall designate a person with the necessary qualifications and/or experience to manage the wastewater irrigation system. This person shall be regularly trained on the content and implementation of the Wastewater Irrigation Management Plan, and shall be advised immediately of any revision or additions to the wastewater irrigation management plan.

Application restrictions

9. The aerator and stirrer shall be operated within the final pond of the wastewater treatment system while wastewater is being irrigated to land.

10. Over any 12 month period the Total Nitrogen applied to any hectare of land as a result of the wastewater, pond solids, blood and/or vermicast discharges and any other nitrogen inputs [e.g. urea] shall be no more than:

    a) 200 kg for areas used for grazing; and

    b) 600 kg for areas used for cut and carry, subject to condition 11 below.

11. Prior to applying a Total Nitrogen loading that exceeds 200 kg/ha/year in accordance with condition 10 (b) above, the consent holder shall amend and re-submit the Wastewater Irrigation Management Plan described in condition 5 so that, to the satisfaction of the Chief Executive, Taranaki Regional Council, the Plan details how the discharge will be managed to ensure that the conditions of this consent will be met. The Plan shall be amended to include, but not necessarily be limited to, procedures for monitoring and reporting on soil and groundwater quality.

12. The wastewater application depth within any area of irrigation shall not exceed 24 mm over any 15 day period.

13. The sodium absorption ratio [SAR] of the wastewater shall not exceed 15.

14. There shall be no discharge to water as a result of irrigating wastewater to land. In order to ensure there is no such discharge:

    a) no irrigation shall occur closer than 25 m to any surface water body;
    b) the discharge shall not result in surface ponding that remains for more than three hours after the discharge has ceased;
    c) the discharge shall not occur on land with a slope that is likely to result in runoff; and
    d) notwithstanding condition 12, the discharge shall not occur at a rate at which it cannot be assimilated by the soil/pasture system.

15. The extent of the wastewater discharge spray zone shall be at least:

    a) 25 metres away from the bank of any surface waterbody;
    b) 50 metres away from any bore, well or spring used for water supply;
    c) 150 metres away from any dwellinghouse situated off the site, unless the written approval of the owner/occupier has been obtained to allow the discharge at a closer distance; and
    d) 15 metres from State Highway 3.

16. No discharges, including spray drift, shall occur at or beyond the boundary of any property on which the discharge is occurring.

17. As far as practicable, discharges to the Kahouri Stream shall be minimised and discharges to land under consent 5221-2 maximised. This means that even at times when 1:100 dilution can be achieved in the Kahouri Stream, discharges shall be irrigated to land unless the land is saturated and consequently is incapable of accepting the discharge.

18. The application of pond solids, vermicast and/or blood to land shall be undertaken in a manner which avoids a discharge to surface water.

Records

19. The consent holder shall record the following information on a daily basis in association with irrigating the wastewater to land:

    a) the date and pumping hours;
    b) the volume of discharge [as measured in association with the flow meter required under condition 3];
    c) the surface area of land irrigated;
    d) the location[s] irrigated, using the system identified and approved under the Wastewater Irrigation Management Plan;
    e) the application depth over the location[s] irrigated; and
    f) the volume of Total Nitrogen applied over the location[s] irrigated [kg/ha] on any day, and a running total for each irrigation location for each calendar year.

    This record shall be in an electronic format and submitted to the Taranaki Regional Council. The record format and frequency that the records are to be submitted is to be undertaken as advised by the Chief Executive, Taranaki Regional Council.

    In addition, the consent holder will record the date, time and volume of other materials discharged to the irrigation area, including pond solids, blood and/or vermicast discharges and any other nitrogen inputs [e.g. urea], and will provide such records to the Chief Executive, Taranaki Regional Council, by 1 June of each year.

Incident notification

20. Any incident related to this consent that results, or could result, in an adverse effect on the environment shall be notified to the Taranaki Regional Council as soon as practicable, together with the reasons for the incident, and measures taken to mitigate the effects of the incident and prevent a recurrence.

21. Note: For notification purposes, at the grant date of this consent, the Taranaki Regional Council's phone number is 0800 736 222 [24 hour service].

Review

22. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June in any year for any of the following purposes:

    a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to water quality issues; and

    b) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges from the site.

Transferred at Stratford on 18 January 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Ample Group Limited 3396 Mountain Road RD 24 Stratford 4394
Decision Date:	24 March 2005
Commencement Date:	24 March 2005

Conditions of Consent

Consent Granted:	To discharge degenerating raw product onto and into land in the vicinity of an unnamed tributary of the Kahouri Stream in the Patea catchment
Expiry Date:	1 June 2022
Review Date(s):	June 2016
Site Location:	3396 Mountain Road, Stratford
Legal Description:	Sec 62 Manganui Dist Blk XIII Huiroa SD
Grid Reference (NZTM)	1709720E-5647640N
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

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

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

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

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3576. In the case of any contradiction between the documentation submitted in support of application 3576 and the conditions of this consent, the conditions of this consent shall prevail.

3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to the exercise of this consent.

4. The consent holder shall notify the Chief Executive, Taranaki Regional Council as soon as practicable in advance of all burials.

5. By 1 June 2005, the consent holder shall provide a waste burial management plan, to the approval of the Chief Executive, Taranaki Regional Council, outlining the management of the system, which shall demonstrate the ability of the consent holder to comply with consent conditions and shall address the following matters:

   a) nature of wastes discharged;
   b) discharge control;
   c) waste cover;
   d) addition of hydrated lime to stabilise the wastes;
   e) minimisation and control of odour effects offsite;
   f) stormwater control;
   g) site re-instatement and after care (including maintaining the integrity of the cover material);
   h) site contouring;
   i) procedures for responding to complaints;
   j) notification to the Council of non-compliance with the conditions of this consent.

6. Only raw degenerating material shall be disposed of to the burial pit(s).

7. Raw degenerating material shall only be discharged onto and into land at the site in an emergency situation and only after other options, such as diversion to an alternative

site, have been pursued to the satisfaction of the Chief Executive, Taranaki Regional Council.

8. The exercise of this consent, including the design and management of the burial site and system, shall not lead to or be liable to lead to contaminants entering a surface water body.

9. No adverse effects shall occur to groundwater in the vicinity of the discharge, as a result of this consent

10. The consent holder shall keep records of quantities and types of wastes discharged, and the dates of exercising this consent and shall make such records available to the Chief Executive, Taranaki Regional Council upon request.

11. The discharged material shall be covered within a period of four hours or less so as to avoid the generation of offensive offsite odours.

12. At the completion of the disposal operation a low permeability, clean, compacted soil cover with a minimum thickness of 800 millimetres shall be placed over the discharged wastes.

13. The cover material and surrounding land shall be contoured such that all stormwater is directed away from the disposal area to the satisfaction of the Chief Executive, Taranaki Regional Council.

14. The disposal area shall be rehabilitated and pasture re-established to the satisfaction of the Chief Executive, Taranaki Regional Council.

15. This consent shall lapse on the expiry of five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

16. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2005 and / or 2006 and / or 2007 and / or 2008 and / or 2010 and / or June 2016, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 18 January 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Ample Group Limited 3396 Mountain Road RD 24 Stratford 4394
Decision Date:	7 November 2011
Commencement Date:	7 November 2011

Conditions of Consent

Consent Granted:	To discharge uncontaminated stormwater from a site used for meat processing and rendering onto and into land in a manner where it may enter the Kahouri Stream
Expiry Date:	1 June 2028
Review Date(s):	June 2016, June 2022
Site Location:	3326 Mountain Road, Stratford
Legal Description:	Sec 62 Manganui Dist Blk XIII Huiroa SD
Grid Reference (NZTM)	Between 1709729E-5647762N, 1709817E-5647767N, 1709834E-5647703N and 1709781E-5647688N
Catchment:	Patea
Tributary:	Kahouri

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

General condition

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

Water quality

2. Stormwater discharged under this consent shall be prevented from becoming contaminated from onsite processes, including by ensuring that contaminants from the rendering and/or abattoir processes do not enter the 'clean' areas of the site [being areas which do not discharge to the wastewater treatment system].

3. Constituents of the discharge shall meet the following standards shown in the following table:

Constituent	Standard
pH	Within the range of 6.0 to 9.0
Suspended solids	Concentration not greater than 100 gm^{-3}
Total recoverable oil and grease	Concentration not greater than 15 gm^{-3}

This condition shall apply before entry of the uncontaminated stormwater into a stormwater pipe and/or into or onto land at a designated sampling point[s] approved by the Chief Executive, Taranaki Regional Council.

Review dates

4. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2016 and/or 2022 for any of the following purposes:

   a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to water quality issues; and

   b) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges from the site.

Transferred at Stratford on 18 January 2016

For and on behalf of
Taranaki Regional Council

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A D McLay
Director - Resource Management

Discharge Permit

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

Name of Consent Holder:	Ample Group Limited 3396 Mountain Road RD 24 Stratford 4394
Decision Date:	7 November 2011
Commencement Date:	7 November 2011

Conditions of Consent

Consent Granted:	To discharge treated wastewater directly into the Kahouri Stream
Expiry Date:	1 June 2028
Review Date(s):	June of any year
Site Location:	3326 Mountain Road, Stratford
Legal Description:	Sec 62 Manganui Dist Blk XIII Huiroa SD
Grid Reference (NZTM)	1709705E-5647806N
Catchment:	Patea
Tributary:	Kahouri

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

General conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.

2. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approvals under the Resource Management Act 1991.

Pre-activity requirements

3. This consent shall not be exercised while consent 0108-4 (which authorises the discharge of wastewater to an unnamed tributary of the Kahouri Stream) is still current.

   Note: this condition does not apply during the testing phase of commissioning the system that will be used for discharging under this consent.

4. Before exercising this consent the consent holder shall install, and thereafter maintain, a flow meter. The flow meter shall measure the volume of the discharge to the Kahouri Stream to an accuracy of ± 5%.

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

   A single flow meter may be installed for the purposes of meeting this condition and condition 3 of consent 5221-2 provided that the records submitted in accordance with condition 22 of this consent and condition 19 of consent 5221-2 clearly differentiate between the two receiving environments.

Flow meter certification

5. The consent holder shall provide the Chief Executive, Taranaki Regional Council with documentation from a suitably qualified person certifying that the flow meter :

   a) has been installed and/or maintained in accordance with the manufacturers' specifications; and/or

   b) has been tested and shown to be operating to an accuracy of ± 5%.

The documentation shall be provided:

(i) within 30 days of the installation of a flow meter;

(ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the flow meter may not be functioning as required by this consent; and

(iii) no less frequently than once every five years.

Staff gauge installation and flow curve establishment

6. The consent holder shall ensure that a staff gauge is installed and maintained to effectively display the water level in the Kahouri Stream at or around the point of discharge to an accuracy of 0.005 m.

7. The consent holder shall, as soon as practicable, ensure that sufficient stream flow measurements are undertaken to maintain a 'rating curve' that accurately translates the water level, as displayed on the staff gauge referenced in condition 6, to stream flow at or around the point of discharge.

Note: Work required by conditions 6 and 7 will be undertaken by the Taranaki Regional Council and all reasonable costs will be recovered from the consent holder through the annual compliance monitoring programme that is in place for the activity.

Minimisation of wastewater

8. All uncontaminated stormwater shall be prevented from entering the wastewater treatment ponds as far as practicable.

9. The worm bed area shall be managed to minimise leachate discharges to the pond treatment system as far as practicable (e.g. by covering the worm beds and/or vegetating land surfaces between worm bed rows) to the satisfaction of the Chief Executive, Taranaki Regional Council.

Discharges to the Kahouri Stream (at all times)

10. The aerator and stirrer shall not be operated within the wastewater treatment system while discharging to the Kahouri Stream.

11. Notwithstanding conditions 12 and 18 below, discharges to the Kahouri Stream shall only occur when stream flows are 330 L/s or greater.

12. A minimum dilution ratio of 1 part wastewater to 100 parts receiving water shall be maintained at all times in the receiving waters of the Kahouri Stream at the point of discharge.

13. Discharges into the Kahouri Stream shall not give rise to the following effects in the Kahouri Stream, beyond a mixing zone of 50 m:

    a) a level of filtered carbonaceous BOD_5 of more than 2.00 gm^{-3};
    b) a level of unionised ammonia of greater than 0.025 gm^{-3};
    c) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    d) any conspicuous change in the colour or visual clarity;
    e) any emission of objectionable odour;
    f) the rendering of fresh water unsuitable for consumption by farm animals;
    g) any significant adverse effects on aquatic life; and
    h) the generation of undesirable heterotrophic growths (sewage fungus).

    Note: The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index (SQMCI), overall composition of the community (including %EPT) and Macroinvertebrate Community Index (MCI) . Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition.

14. After allowing for reasonable mixing, within a mixing zone extending 50 m downstream of the discharge point, the discharge shall not give rise to either of the following effects in the receiving waters of the Kahouri Stream:

    a) an increase in suspended solids concentration in excess of 5 gm^{-3}, when the stream turbidity as measured upstream of the discharge point is equal or less than 5 NTU (nephelometric turbidity units); or

    b) an increase in turbidity of more than 50% when the stream turbidity as measured upstream of the discharge point is greater than 5 NTU (nephelometric turbidity units).

15. The consent holder shall establish and maintain a safe access way to the Kahouri Stream to enable water quality samples to be taken at the compliance point stated in conditions 13 and 14 above, and at a suitable control site upstream, the location of which is to be advised by the Chief Executive, Taranaki Regional Council.

Discharges to the Kahouri Stream after hours

16. At least 200 mm (426 m^3) of freeboard must be made available within the aerobic pond at 5 pm of each working/operational day.

17. The consent holder shall install and maintain a permanent marker within the aerobic pond to show the level where the wastewater should be at or below in order to achieve the required freeboard stated under condition 16 above.

Restrictions on times of discharge

18. As far as practicable, discharges to the Kahouri Stream shall be minimised and discharges to land under consent 5221-2 maximised. This means that even at times when 1:100 dilution can be achieved in the Kahouri Stream, discharges shall be irrigated to land unless the land is saturated and consequently is incapable of accepting the discharge.

    Note: This condition to minimise discharges to water does not apply to discharges outside of operational hours. Notwithstanding this, a 1:100 dilution must be met at all times, including outside of operational hours, in accordance with condition 12.

Treated wastewater quality

19. The wastewater treatment system shall be managed to maximise the quality of the wastewater discharged to the Kahouri Stream.

20. After treatment in the wastewater treatment system, the discharge shall not have a concentration of total carbonaceous BOD5 greater than 110 gm-3.

    This condition shall apply before the discharge enters the Kahouri Stream at a designated sampling point(s) approved by the Chief Executive, Taranaki Regional Council.

21. The consent holder shall install a tap on the wastewater line, between the aerobic pond and the discharge point, to allow for the taking of samples in association with condition 20 above.

Records

22. The consent holder shall monitor and record the following information on a daily basis in association with discharging wastewater to the Kahouri Stream:

    a) the date, the time, pumping hours and the rate of discharge for when discharges are manually initiated and halted, or the date or dates (when over a weekend) and the rate of discharge for automated discharges after hours;

    b) the volume of discharge (as measured in association with the flow meter required under condition 4); and

    c) the staff gauge reading, stream flow rate and dilution ratio (wastewater : receiving water) for when discharges are manually initiated and halted (i.e. not including automated discharges after hours). The stream flow rate shall be based on the rating curve established under condition 7.

    This record shall be in an electronic format and submitted to the Taranaki Regional Council. The record format and frequency that the records are to be submitted is to be undertaken as advised by the Chief Executive, Taranaki Regional Council.

    Note: if the discharge rate is varied on any day, then the records shall record the above information for each discharge event.

Mitigation

23. For the mitigation purposes of this consent and consent 0108-4, the consent holder shall undertake the following:

    a) ensure that Taranaki Regional Council riparian management plan LM10/73 is reviewed by a Taranaki Regional Council Land Management Officer within one month of the grant date of this consent;

    b) complete riparian planting and fencing on both sides of all watercourses on the site in accordance with the riparian management plan reviewed under clause (a) above by 30 September 2013; and

    c) maintain the areas of riparian planting and fencing undertaken in accordance with clause (b) above for the duration of this consent, by ensuring the ongoing replacement of plants which do not survive, the eradication of weeds until the plants are well established, and the exclusion of stock from the planted areas.

Incident notification

24. Any incident related to this consent that results, or could result, in an adverse effect on the environment shall be notified to the Taranaki Regional Council as soon as practicable, together with the reasons for the incident, and measures taken to mitigate the effects of the incident and prevent a recurrence.

    Note: For notification purposes, at the grant date of this consent, the Taranaki Regional Council's phone number is 0800 736 222 (24 hour service).

Lapse and review dates

25. This consent shall lapse on 7 November 2016, unless the consent is given effect to before the end of that period.

26. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June in any year for any of the following purposes:

    a) Ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, and in particular to address any more than minor adverse effects relating to water quality issues;

    b) to take into account any Act of Parliament, regulation, national policy statement (including the National Policy Statement for Freshwater Management 2011), regional policy statement or regional rule which relates to limiting, recording, mitigating, setting or amending any limits or other criteria relating to nutrients, ecological health or other water quality parameters; and

c) To determine any measures that may be appropriate to comply with condition 1 of this consent, and which are necessary to address any adverse effects relating to the wastewater discharges from the site.

In considering whether to initiate a review, the Taranaki Regional Council will take into account any views received from the Department of Conservation and Fish and Game New Zealand (Taranaki Region).

Transferred at Stratford on 18 January 2016

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Appendix II

Biomonitoring reports

To	Darin Sutherland, Job Manager
From	Bart Jansma, Scientific Officer
Document	1704021
Report No	BJ282
Date	23 June 2016

Biomonitoring of the Kahouri Stream in relation to Gold International Meat Processors, October 2015.

Introduction

This was the first of two biomonitoring surveys scheduled for the 2015-2016 year for the Gold International Meat Processors site. This survey was performed to monitor the health of the macroinvertebrate community of the Kahouri Stream in relation to wastewater management at the Gold International Meat Processors site. Wastewater from the site is directed to a two pond treatment system, and is either irrigated to land when soil conditions allow, or discharged to the Kahouri Stream at a time of high flow and adequate dilution. The Kahouri Stream was monitored to determine whether the direct discharge of wastewater during high flows has affected the macroinvertebrate communities of the stream.

The results of surveys previously conducted in relation to this site are discussed in the references at the end of this report. Included is a baseline survey of the Kahouri Stream, undertaken in September 2011.

It should be noted that the relevant consent (7662-1) includes the following statement:

"The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index [SQMCI], overall composition of the community [including %EPT] and Macroinvertebrate Community Index [MCI]. Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition."

This report will undertake the examination of results as stipulated by this consent.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from three established sites in the Kahouri Stream (Table 1, Figure 1) on 13 October 2015. 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 found in each sample were recorded as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Table 1 Biomonitoring sites in the Kahouri Stream sampled in relation to Gold International Meat Processors' abattoir.

Site number	Site code	Location
1	KHI000297	Kahouri Stream, 150 m u/s of abattoir and SH3
2	KHI000300	Kahouri Stream, SH3, approx. 95m downstream of discharge point
3	KHI000305	Kahouri Stream, 85 m d/s of site 2

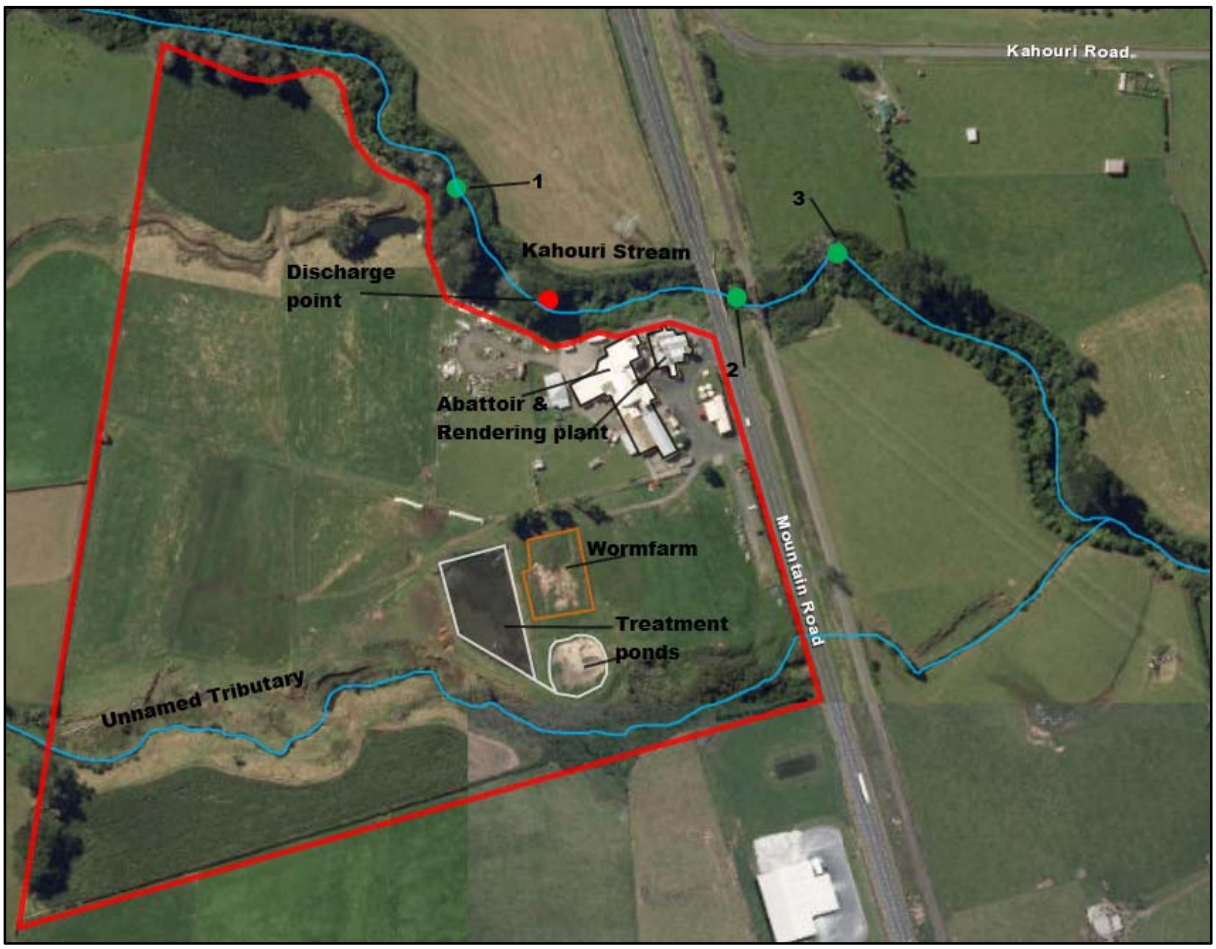

Figure 1 Gold International Meat Processors site layout and biomonitoring sites, in relation to the discharge point

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value.

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams is possible if results are related to physical habitat (good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

A semi-quantitative MCI value ($SQMCI_s$) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the $SQMCI_s$ is not multiplied by a scaling factor of 20, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200.

In addition to assessing these indices, the numbers of Ephemopterans (mayflies), Plecopterans (stoneflies) and Trichopterans (caddisflies) in the community were taken into account when considering any differences between communities. These are referred to as EPT taxa.

Sub-samples of periphyton (algae and other micro flora) taken from the macroinvertebrate samples were scanned under 40-400x magnification to determine the presence or absence of any mats, plumes or dense growths of bacteria, fungi or protozoa ('undesirable biological growths') at a microscopic level. The presence of masses of these organisms can be an indicator of organic enrichment within a stream.

Results and discussion

At the time of this mid-morning survey the Kahouri Stream had a moderate flow, reflecting the relatively short period of recession, with the last flood event of three times the median flow occurring only ten days prior to the sampling date. The relatively steep gradient resulted in a swift flow at all three sites. This flow was uncoloured but cloudy, relatively typical for this stream, due to the naturally occurring high iron oxide content. The stream bed material at all sites comprised predominantly boulders, cobbles and coarse gravels, with smaller proportions of fine gravels and sand.

Periphyton was present as a slippery film at all sites, with no site supporting any filamentous algae, owing primarily to the partial or complete shading enjoyed by these sites. Patchy growths of moss were present at these sites also.

No sewage fungus was observed on the bed of the stream, and the absence of sewage fungus was confirmed through microscopic examination.

Company records indicate that prior to this survey, the last time wastewater was discharged to the Kahouri Stream was on 11 September 2015, 32 days prior to this survey. On this day, 1090m^3 of wastewater was discharged to the Kahouri Stream.

Macroinvertebrate communities

Previous surveys performed in the vicinity of the abattoir have indicated that the macroinvertebrate communities of the Kahouri Stream are generally in good condition with relatively high numbers of taxa and MCI values. Results of previous surveys performed in the vicinity of this site are summarised in Table 2, together with current results and the full results are shown in Table 3.

Table 2 Summary of the numbers of taxa, MCI and $SQMCI_S$ values recorded previously in the Kahouri Stream, together with current results. Included for reference are summary statistics for site C (KHI000307), which is located 50m downstream of the unnamed tributary, approximately 300m downstream of site 3.

Site	Number of previous surveys	Numbers of taxa			MCI values			$SQMCI_S$ values			
		Median	Range	Current Survey	Median	Range	Current Survey	N	Median	Range	Current Survey
C	25	27	17-35	-	108	96-120	-	13	4.8	3.5-6.8	-
1	28	25	17-35	18	115	106-130	134	19	6.8	5.5-7.4	7.4
2	9	22	13-28	18	116	108-123	119	6	7.2	6.9-7.7	7.6
3	6	24	19-27	25	113	109-114	120	6	7.1	6.7-7.6	7.3

Table 3 Macroinvertebrate fauna of the Kahouri Stream, current survey

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KHI000297	KHI000300	KHI000305
	Sample Number		FWB15275	FWB15276	FWB15277
ANNELIDA (WORMS)	Oligochaeta	1	-	-	R
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	C	A
	Coloburiscus	7	XA	VA	XA
	Deleatidium	8	XA	XA	XA
	Nesameletus	9	A	A	C
	Zephlebia group	7	-	C	A
PLECOPTERA (STONEFLIES)	*Acroperla*	5	-	C	C
	Zelandobius	5	R	-	R
	Zelandoperla	8	R	R	R
COLEOPTERA (BEETLES)	Elmidae	6	A	A	A
	Hydraenidae	8	R	R	R
	Ptilodactylidae	8	R	-	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	C	C
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	C	C	A
	Costachorema	7	R	C	R
	Hydropsyche (Orthopsyche)	9	-	-	R
	Beraeoptera	8	A	R	C
	Confluens	5	C	R	C
	Olinga	9	R	-	-
	Pycnocentria	7	-	-	R
	Pycnocentrodes	5	R	-	R
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	A	A
	Eriopterini	5	R	-	-
	Chironomus	1	-	R	-
	Maoridiamesa	3	-	C	-
	Orthocladiinae	2	-	R	C
	Polypedilum	3	-	-	R
	Tanyderidae	4	-	-	R
ACARINA (MITES)	Acarina	5	-	-	R
		No of taxa	18	18	25
		MCI	134	119	120
		SQMCIs	7.4	7.6	7.3
		EPT (taxa)	12	11	15
		%EPT (taxa)	67	61	60
'Tolerant' taxa	'Moderately sensitive' taxa		'Highly sensitive' taxa		

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

Site 1 (KHI000297)

A below average community richness of 18 macroinvertebrate taxa was found at site 1, upstream of the abattoir site. This was seven taxa fewer than the median number of taxa from previous surveys at this site (Table 2) and three taxa less than that recorded in the previous survey (Figure 2). The community was characterised by three 'highly sensitive' taxa (*Deleatidium* and *Nesameletus* mayflies and *Beraeoptera* caddisfly) and four 'moderately sensitive' taxa (*Austroclima* and *Coloburiscus* mayflies, elmid beetles and *Aphrophila* cranefly) (Table 3). This is similar to that recorded in most previous surveys.

The very high proportion of 'sensitive' taxa (94% of total richness) in the community resulted in a MCI score of 134 units, which was 19 units higher than the long term median of past surveys' scores at this site, and the highest recorded at this site to date (Table 2, Table 3, Figure 2). The dominance (numerically) of sensitive taxa, particularly mayflies, accounted for the high $SQMCI_s$ value (7.4 units), a very good result, 0.6 unit higher than the median and equal to the highest score recorded at this site (Table 2). There were twelve EPT taxa in the community, comprising 67% of the taxa recorded. This indicates good preceding water quality.

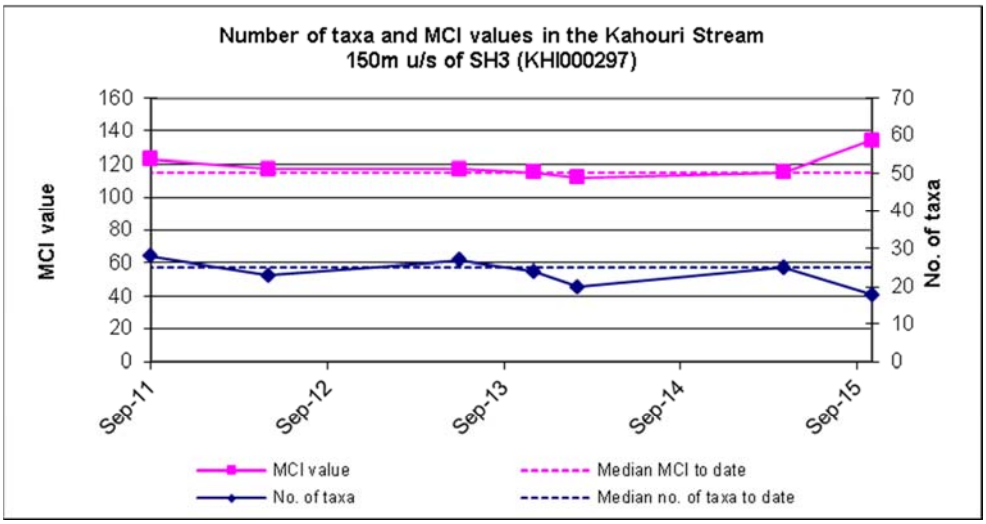

Figure 2 Number of taxa and MCI values in the Kahouri Stream at site 1 (KHI000297) since September 2011.

Site 2 (KHI000300)

This site was sampled for the sixth time since the discharge of wastewater began upstream. Located at State Highway 3, approximately 95m downstream of the discharge point, this site would be expected to show the greatest impact (if any) of the discharge of wastewater to the Kahouri Stream. A slightly reduced community richness of 18 taxa was recorded at this site, equal to that recorded at site 1 in the current survey, but three taxa fewer than the median richness for this site (Table 2). The community was characterised by two 'highly sensitive' taxa (*Deleatidium* and *Nesameletus* mayflies) and three 'moderately sensitive' taxa (*Coloburiscus* mayflies, elmid beetles and *Aphrophila* cranefly). No 'tolerant' taxa were recorded in abundance during this survey. The community comprised 77% 'sensitive' taxa,

resulting in a MCI score of 119 units, a significant reduction from that recorded at site 1 (Stark, 1998), but three units higher than the median for this site (Table 2, Figure 3). The reduction in MCI score between sites 1 and 2 was related primarily to taxa present as rarities at one site not being present at the other, which is not a significant change from a community perspective.

There was little difference in $SQMCI_S$ score compared with site 1 upstream, with site 2 recording 7.6, 0.2 unit higher than that recorded upstream (Table 2). This lack of change reflects the similarities in dominant taxa, and the fact that there were only four significant changes in individual taxon abundance. Similarly, %EPT was similar to that recorded at site 1 (61%).

The difference in MCI score between sites 1 and 2 reflected subtle changes in community composition. The similarity in %EPT and $SQMCI_S$ scores reflect that the communities of site 1 and 2 were very similar, indicating no impact from the discharge of wastewater between the two sites.

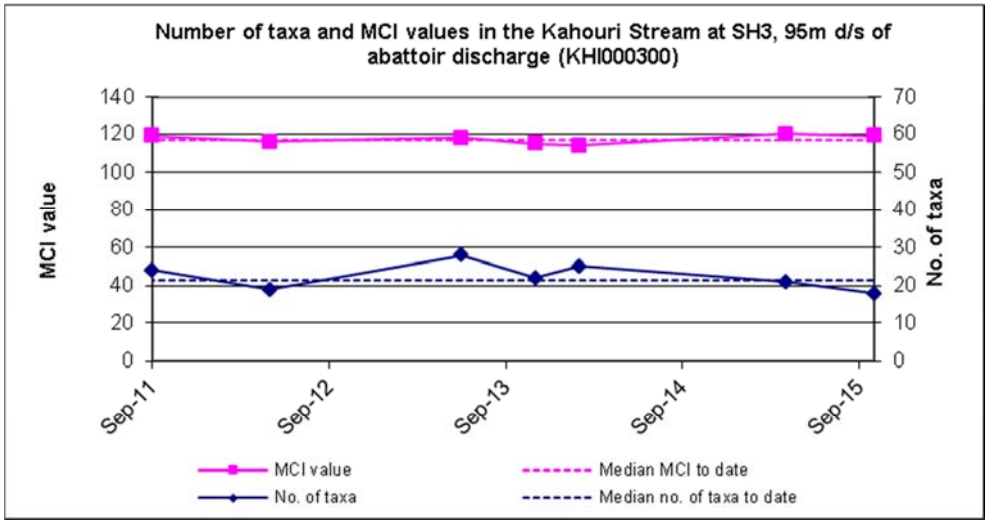

Figure 3 Number of taxa and MCI values in the Kahouri Stream at site 2 (KHI000300) since September 2011.

Site 3

Site 3 is located another 85m downstream of site 2, and is situated amongst a rapid dominated by large boulders. This is the seventh time that this site has been sampled. Twenty-five taxa were recorded at this site, higher than that recorded at sites 1 and 2 upstream but similar to the median for this site (Table 2). As with sites 1 and 2, 'highly sensitive' *Deleatidium* mayflies were recorded in extreme abundance. Other taxa recorded in abundance included, five 'moderately sensitive taxa (*Austroclima*, *Coloburiscus* and *Zephlebia* mayflies, elmid beetles and *Aphrophila* cranefly) and one 'tolerant' taxon (net-spinning caddisfly *Hydropsyche-Aoteapsyche*).

The high proportion of sensitive taxa in the community (80%), resulted in an MCI score of 120 units (Figure 4), significantly less than that recorded at site 1 (Stark, 1998), but similar to that recorded at site 2. It was also seven units higher than the median for this site and the highest score recorded at this site to date. Overall, the difference in MCI score between this site and that recorded at site 1 is similar to that recorded in the baseline survey, indicating

no impact from the discharge of wastewater upstream. The $SQMCI_S$ score was similar to that recorded upstream (7.3 units), reflecting the similar community compositions. This result is also significantly higher than the median $SQMCI_S$ score recorded at site C downstream, also reflecting a lack of organic enrichment at site 3. Furthermore, there was little difference in %EPT with that recorded at site 1.

Overall, this survey indicates that there was no clear deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities are subtle and appear largely natural, and not related to any discharge from the abattoir site.

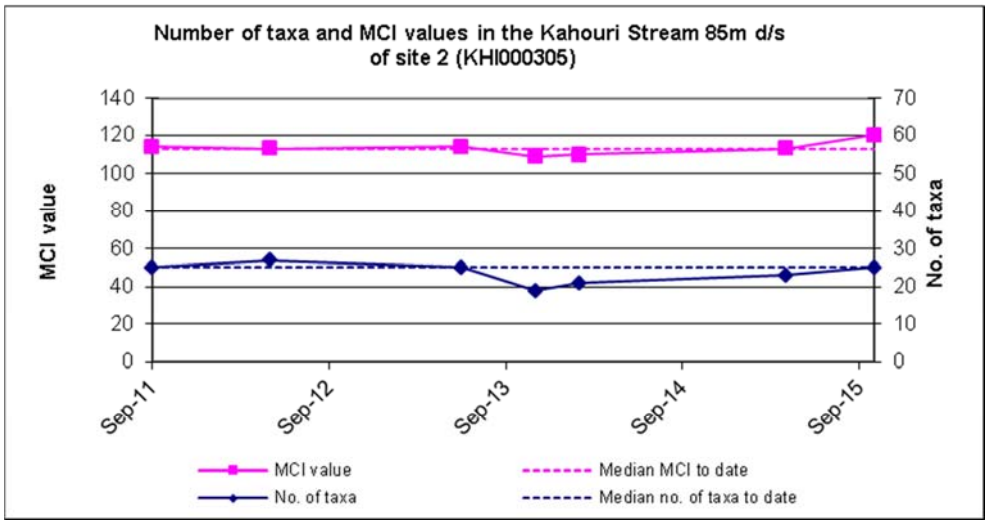

Figure 4 Number of taxa and MCI values in the Kahouri Stream at site 3 (KHI000305) since September 2011.

Summary and conclusions

The Council's standard 'kick-sampling' technique was used to collect streambed macroinvertebrates from three sites in the Kahouri Stream in relation to the Gold International Meat Processors abattoir on 13 October 2015. This survey was performed to monitor the health of the macroinvertebrate community of the Kahouri Stream in relation to wastewater management at the site. Since late 2011, wastewater has been irrigated to land when soil conditions allow, or discharged to the Kahouri Stream at a time of high flow and adequate dilution. Samples were sorted and identified to provide the number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may be the more appropriate index if non-organic impacts are occurring. EPT taxa quantifies the number of mayflies, stoneflies and caddisflies present in the sample, and this can also be expressed as a proportion of the total number of taxa (%EPT).

Significant differences in either MCI or $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of discharges being monitored.

It should be noted that special condition13 of the relevant consent (7662-1) includes the following statement:

"The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index [SQMCI], overall composition of the community [including %EPT] and Macroinvertebrate Community Index [MCI]. Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition."

The analysis of results was undertaken with this statement in mind.

During this spring survey, the three sites sampled in the Kahouri Stream recorded little variation in taxa richness, and although there was some variation in the MCI scores, the $SQMCI_S$ scores were similar, and both index scores were higher than their respective medians. In addition, these sites were largely dominated by the same taxa, with very few significant differences in individual taxon abundance between sites. The results of this survey also did not differ markedly from that recorded in the baseline survey, suggesting little change in communities since the discharge of wastewater commenced. The MCI and $SQMCI_S$ scores were all significantly higher than the median score recorded at site C. This also indicates a lack of organic enrichment at these sites. Overall, this survey indicates that there was no clear deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities appear subtle and largely natural, and not related to any discharge from the abattoir site. This was supported by the absence of sewage fungus, as determined by microscopic inspection of the samples.

Overall, the Kahouri Stream was in good condition, and with regards to the statement in the consent, an examination of the MCI, $SQMCI_S$ scores and the %EPT found no indication of a significant adverse effect caused by the discharge, and as such, there was no breach of condition 13 of consent 7662-1.

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From	Darin Sutherland, Scientific Officer
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Date	July 2016

Biomonitoring of the Kahouri Stream in relation to Ample Group Ltd meat processors, April 2016

Introduction

This was the second of two biomonitoring surveys scheduled for the 2015-2016 year for the Ample Group Ltd site. This survey was performed to monitor the health of the macroinvertebrate community of the Kahouri Stream in relation to wastewater management at the Ample Group Ltd site. Wastewater from the site is directed to a two pond treatment system, and is either irrigated to land when soil conditions allow, or discharged to the Kahouri Stream at a time of high flow and adequate dilution. The Kahouri Stream was monitored to determine whether the direct discharge of wastewater during high flows has affected the macroinvertebrate communities of the stream.

The results of surveys previously conducted in relation to this site are discussed in the references at the end of this report. Included is a baseline survey of the Kahouri Stream, undertaken in September 2011.

It should be noted that the relevant consent (7662-1) includes the following statement:

"The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index [SQMCI], overall composition of the community [including %EPT] and Macroinvertebrate Community Index [MCI]. Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition."

This report will undertake the examination of results as stipulated by this consent.

Methods

The standard '400 ml kick-sampling' technique was used to collect streambed macroinvertebrates from three established sites in the Kahouri Stream (Table 1 and Figure 1) on 14 April 2016. 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 1.

Table 1 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+

Table 2 Biomonitoring sites in the Kahouri Stream sampled in relation to Gold International Meat Processors' abattoir.

Site number	Site code	Location
1	KHI000297	Kahouri Stream, 150 m u/s of abattoir and SH3
2	KHI000300	Kahouri Stream, SH3, approx. 95m downstream of discharge point
3	KHI000305	Kahouri Stream, 85 m d/s of site 2

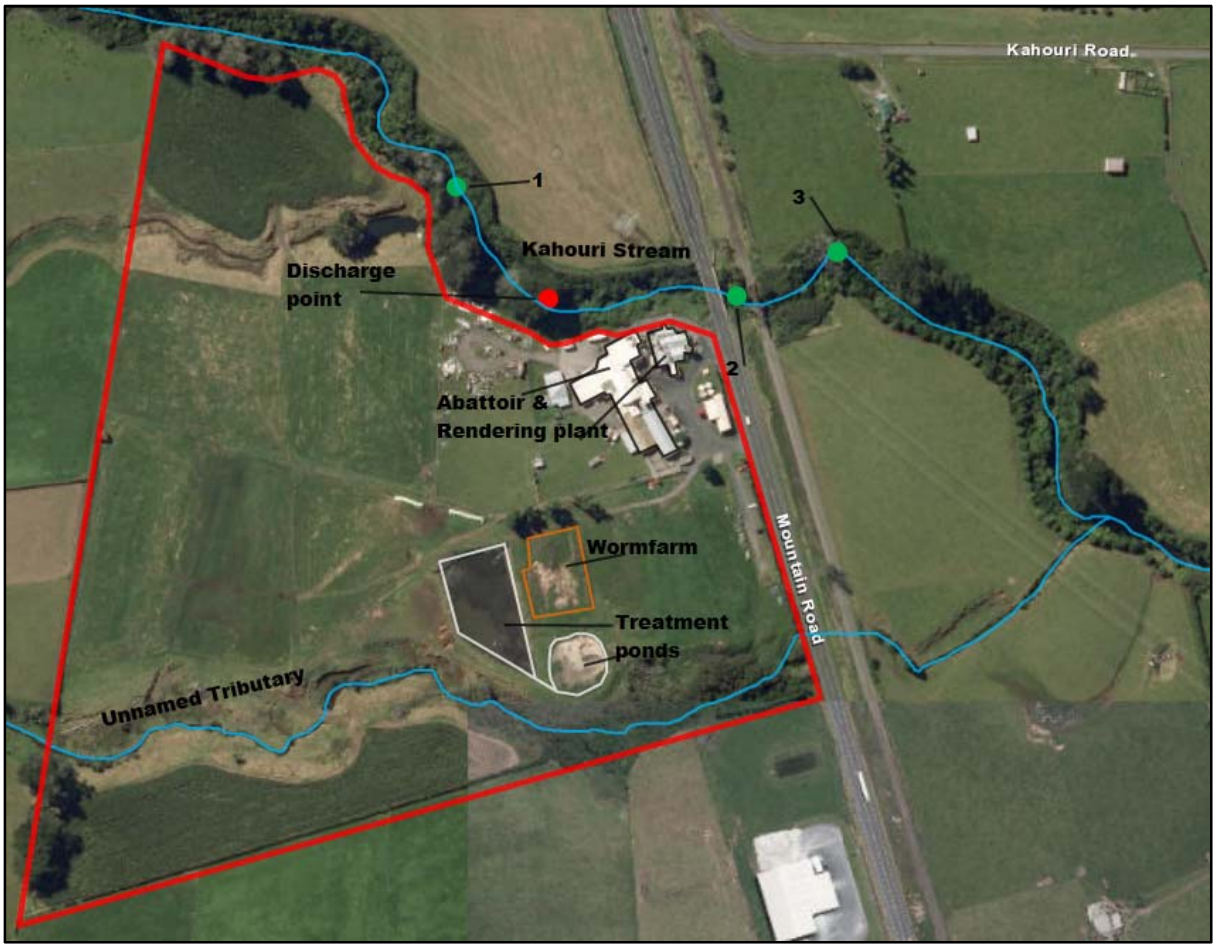

Figure 1 Ample Group Ltd meat processors site layout and biomonitoring sites, in relation to the discharge point

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were

assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. Averaging the scores assigned to the taxa found at a site, and multiplying the average by a scaling factor of 20 produces a Macroinvertebrate Community Index (MCI) value. A difference of 10.83 units or more in MCI values is considered significantly different (Stark 1998).

Table 3 Macroinverbrate health based on MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2013) from Stark's classification (Stark, 1985 and Boothroyd and Stark, 2000)

Grading	MCI
Excellent	>140
Very Good	120-140
Good	100-119
Fair	80-99
Poor	60-79
Very Poor	<60

The MCI was designed as a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. MCI results can also reflect the effects of warm temperatures, slow current speeds and low dissolved oxygen levels, because the taxa capable of tolerating these conditions generally have low sensitivity scores. Usually more 'sensitive' communities (with higher MCI values) inhabit less polluted waterways. The use of this index in non-stony streams is possible if results are related to physical habitat (good quality muddy/weedy sites tend to produce lower MCI values than good quality stony sites).

A semi-quantitative MCI value ($SQMCI_s$) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the $SQMCI_s$ is not multiplied by a scaling factor of 20, therefore $SQMCI_s$ values range from 1 to 10, while MCI values range from 20 to 200. A difference of 0.83 units or more in $SQMCI_s$ values is considered significantly different (Stark 1998).

In addition to assessing these indices, the numbers of Ephemopterans (mayflies), Plecopterans (stoneflies) and Trichopterans (caddisflies) in the community were taken into account when considering any differences between communities. These are referred to as EPT taxa.

Sub-samples of periphyton (algae and other micro flora) taken from the macroinvertebrate samples were scanned under 40-400x magnification to determine the presence or absence of any mats, plumes or dense growths of bacteria, fungi or protozoa ('undesirable biological growths') at a microscopic level. The presence of masses of these organisms can be an indicator of organic enrichment within a stream.

Results

Site habitat characteristics and hydrology

This summer survey was performed under moderate flow conditions (approximately two thirds of median flow), 12 days after a fresh in excess of 3 times median flow and 13 days after a fresh of 7 times median flow (flow gauge at the Patea River at Skinner Road). The survey followed an average rainfall period with two significant river freshes recorded over the preceding month and a minor fresh recorded just two days prior to sampling. Water temperature was 12.8°C at all three sites**. S**ites had moderate, swift flows with brown, cloudy water which was relatively typical for this stream, due to the naturally occurring high iron oxide content.

Substrate comprised predominantly boulders, cobbles and coarse gravels, with smaller proportions of fine gravels and sand. Periphyton was present as a slippery film at all sites, with no site supporting any filamentous algae, owing primarily to the partial or complete shading enjoyed by these sites. Site 1 had patchy moss and leaves with overhanging vegetation partially shading the streambed. Sites 2 and 3 both had patchy moss, leaves and wood with overhanging vegetation partially shading the streambed.

No sewage fungus was observed on the bed of the stream, and the absence of sewage fungus was confirmed through microscopic examination.

Company records indicate that prior to this survey, the last time wastewater was discharged to the Kahouri Stream was on 13 April 2016, one day prior to this survey. On this day, 450m^3 of wastewater was discharged to the Kahouri Stream.

Macroinvertebrate communities

Previous surveys performed in the vicinity of the abattoir have indicated that the macroinvertebrate communities of the Kahouri Stream are generally in good condition with relatively high numbers of taxa and MCI values. Results of previous surveys performed in the vicinity of this site are summarised in Table 2, together with current results and the full results are shown in Table 3.

Table 4 Summary of the numbers of taxa, MCI and SQMCI$_S$ values recorded previously in the Kahouri Stream, together with current results. Included for reference are summary statistics for site C (KHI000307), which is located 50m downstream of the unnamed tributary, approximately 300m downstream of site 3.

Site	Number of previous surveys	Numbers of taxa			MCI values			SQMCI$_S$ values			
		Median	Range	Current Survey	Median	Range	Current Survey	N	Median	Range	Current Survey
C	25	27	17-35	-	108	96-120	-	13	4.8	3.5-6.8	-
1	29	25	17-35	21	115	106-134	124	20	6.8	5.5-7.4	6.7
2	10	22	13-28	25	117	108-123	119	7	7.2	6.9-7.7	6.2
3	7	25	19-27	21	113	109-120	121	7	7.1	6.7-7.6	6.9

Table 5 Macroinvertebrate fauna of the Kahouri Stream, current survey

Taxa List	Site Number	MCI score	1	2	3
	Site Code		KHI000297	KHI000300	KHI000305
	Sample Number		FWB16196	FWB16197	FWB16198
ANNELIDA (WORMS)	Oligochaeta	1	C	C	R
	Lumbricidae	5	-	-	R
CRUSTACEA	*Paranephrops*	5	-	R	-
EPHEMEROPTERA (MAYFLIES)	*Austroclima*	7	A	C	C
	Coloburiscus	7	VA	VA	VA
	Deleatidium	8	A	A	VA
	Ichthybotus	8	-	R	-
	Nesameletus	9	A	A	C
	Zephlebia group	7	A	A	A
PLECOPTERA (STONEFLIES)	*Zelandobius*	5	-	R	-
	Zelandoperla	8	C	R	R
COLEOPTERA (BEETLES)	Elmidae	6	A	VA	A
	Hydraenidae	8	R	R	C
	Ptilodactylidae	8	R	R	R
MEGALOPTERA (DOBSONFLIES)	*Archichauliodes*	7	C	A	A
TRICHOPTERA (CADDISFLIES)	*Hydropsyche (Aoteapsyche)*	4	A	A	A
	Costachorema	7	R	-	-
	Hydrobiosis	5	R	R	R
	Hydropsyche (Orthopsyche)	9	R	R	R
	Beraeoptera	8	A	C	R
	Confluens	5	C	-	-
	Pycnocentria	7	-	R	C
	Pycnocentrodes	5	R	-	-
DIPTERA (TRUE FLIES)	*Aphrophila*	5	A	VA	A
	Orthocladiinae	2	-	R	R
	Polypedilum	3	-	C	C
	Tanypodinae	5	-	R	-
	Empididae	3	R	R	-
	Austrosimulium	3	R	-	R
	Tanyderidae	4	-	R	-
		No of taxa	21	25	21
		MCI	124	119	121
		SQMCIs	6.7	6.2	6.9
		EPT (taxa)	13	13	11
		%EPT (taxa)	62	52	52

'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa

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

Site 1 (KHI000297)

A moderate macroinvertebrate community richness of 21 taxa was found at site 1 at the time of this summer survey. This was four taxa lower than the historical median for this site and three taxa higher than the previous survey on October 2015 (Table 4 and Figure 2).

The MCI score of 124 units indicated a community of 'very good' biological health which was not significantly different (Stark, 1998) to the historical median MCI score (115 units) and the preceding survey score (134 units). The score was also not significantly different from the median score recorded from other similar ringplain streams arising within the National Park at that altitude (MCI score of 119 units) (TRC, 2015) (Table 4 and Figure 2).

The $SQMCI_S$ score of 6.7 units was not significantly different (Stark, 1998) to the historical median $SQMCI_S$ score of 6.8 units and to the previous survey (7.4 units) (Stark, 1998) (Table 4).

The community was characterised by one 'very abundant' taxon ['moderately sensitive' *Coloburiscus* mayflies] and seven 'abundant' taxa ['tolerant' caddisfly (*Hydropsyche/Aoteapsyche*), 'moderately sensitive' mayflies (*Austroclima*) and *Zephlebia* group, elmid beetles and cranefly (*Aphrophila*), and 'highly sensitive' mayflies (*Deleatidium* and *Nesameletus*) and caddisfly (*Beraeoptera*)]. The community comprised 62% EPT taxa which was slightly lower than the previous survey (67%) but was still a high percentage and good result indicating good preceding water quality (Table 5).

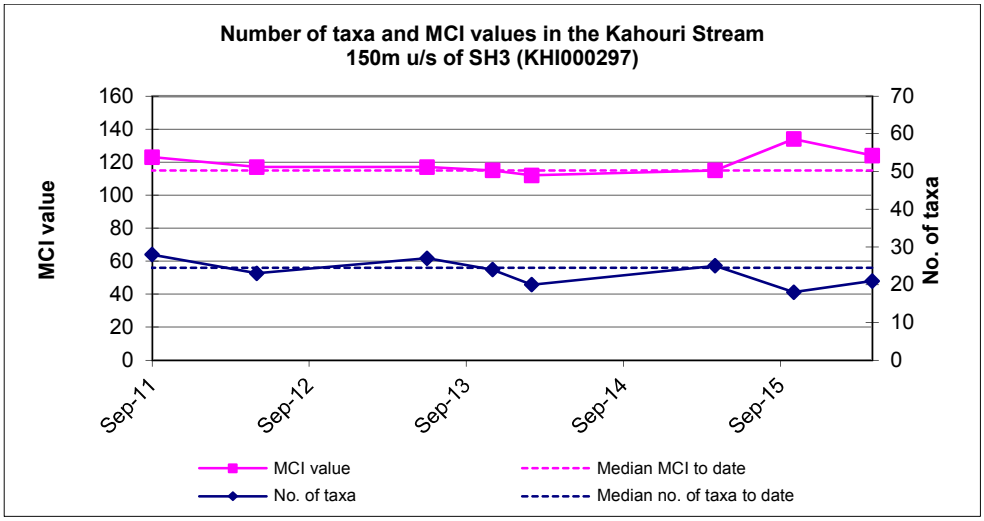

Figure 2 Number of taxa and MCI values in the Kahouri Stream at site 1 (KHI000297) since September 2011.

Site 2 (KHI000300)

This site was sampled for the seventh time since the discharge of wastewater began upstream. Located at State Highway 3, approximately 95m downstream of the discharge point, this site would be expected to show the greatest impact (if any) of the discharge of wastewater to the Kahouri Stream.

A moderately high macroinvertebrate community richness of 25 taxa was found at site 2 ('primary impact' site) at the time of this summer survey. This was three taxa lower than the

historical median for this site and seven taxa higher than the previous survey on October 2015 (Table 4 and Figure 3).

The MCI score of 119 units indicated a community of 'good' biological health which was not significantly different (Stark, 1998) to the historical median MCI score (117 units) and was the same score as the preceding survey (119 units). The score was also the same as the median score recorded from other similar ringplain streams arising within the National Park at that altitude (MCI score of 119 units) (TRC, 2015) (Table 4 and Figure 3). Importantly, there was no significant difference between the 'primary impact' score and the 'control' site score of 124 units.

The $SQMCI_S$ score of 6.2 units was significantly lower (Stark, 1998) than the historical median $SQMCI_S$ score of 7.2 units and to the previous survey (7.4 units) but was not significantly different to the upstream 'control' site score of 6.7 units (Stark, 1998) (Table 4).

The community was characterised by three 'very abundant' taxa ['moderately sensitive' *Coloburiscus* mayflies, elmid beetles and cranefly (*Aphrophila*] and five 'abundant' taxa ['tolerant' caddisfly (*Hydropsyche/Aoteapsyche*), 'moderately sensitive' mayfly *Zephlebia* group), dobsonfly (*Archichauliodes*), and 'highly sensitive' mayflies (*Deleatidium* and *Nesameletus*)]. The community comprised 52% EPT taxa which was slightly lower than the previous survey (61%) but was still a high percentage and good result indicating good preceding water quality (Table 5).

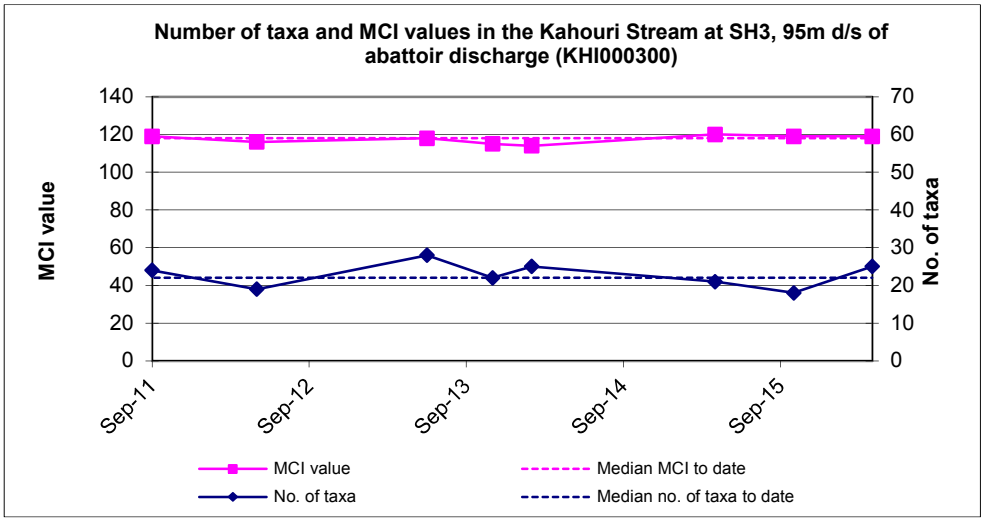

Figure 3 Number of taxa and MCI values in the Kahouri Stream at site 2 (KHI000300) since September 2011.

Site 3

A moderate macroinvertebrate community richness of 21 taxa was found at site 3 ('secondary impact' site) at the time of this summer survey. This was four taxa lower than the historical median for this site and the previous survey on October 2015 (Table 4 and Figure 4).

The MCI score of 121 units indicated a community of 'very good' biological health which was not significantly different (Stark, 1998) to the historical median MCI score (113 units) and the preceding survey score (120 units). The score was also not significantly different from the median score recorded from other similar ringplain streams arising within the National Park at that altitude (MCI score of 119 units) (TRC, 2015) (Table 4 and Figure 4). There was no

significant difference between the 'secondary impact' score and the 'control' or 'primary impact' site scores of 124 and 119 units respectively.

The $SQMCI_S$ score of 6.9 units was not significantly different (Stark, 1998) to the historical median $SQMCI_S$ score of 7.1 units and to the previous survey (7.3 units) but was not significantly different to the upstream 'control' site score of 6.7 units or 'primary impact' site score of 6.2 units (Stark, 1998) (Stark, 1998) (Table 4).

The community was characterised by one 'very abundant' taxon ['moderately sensitive' mayfly (*Coloburiscus*) and 'highly sensitive mayfly (*Deleatidium*)] and five 'abundant' taxa ['tolerant' caddisfly (*Hydropsyche/Aoteapsyche*), 'moderately sensitive' mayfly (*Zephlebia* group), elmid beetles, dobsonfly (*Archichauliodes*) and cranefly (*Aphrophila*)]. The community comprised 52% EPT taxa which was slightly lower than the previous survey (60%) but was still a high percentage and good result indicating good preceding water quality (Table 5).

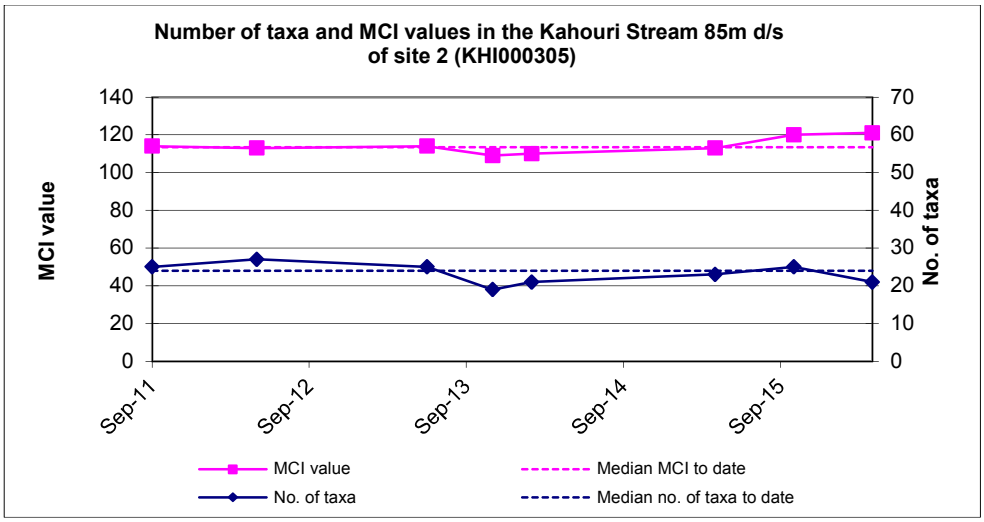

Figure 4 Number of taxa and MCI values in the Kahouri Stream at site 3 (KHI000305) since September 2011.

Discussion and conclusions

The Kahour Stream sites had moderate macroinvertebrate community richnesses with very little variation between sites (0-4 taxa) and difference between the current result and historical medians (3-4 taxa). This indicates that there was no evidence of toxic discharges negatively affecting macroinvertebrate communities. Taxa richness is the most robust index when ascertaining whether a macroinvertebrate community has been exposed to toxic discharges. Macroinvertebrates when exposed to toxic chemicals may die or deliberately drift downstream thus potentially lowering taxa richness at a site.

MCI scores indicated that the macroinvertebrate communities present were in 'very good' to 'good' health with no significant difference among sites and historical medians or compared with the preceding survey in October 2015. The $SQMCI_S$ scores were congruent with MCI scores and indicated that the sites were all in 'excellent' health (Stark and Maxted) but were all lower than the spring survey scores. Typically, higher results are recorded in spring conditions compared with summer conditions due to cooler water temperatures and lower periphyton biomass. The lack of sewage fungus at any of the sites also indicates that little nutrient enrichment downstream of the discharge had been occurring.

Overall, this survey indicates that there was no significant deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities are subtle and appear largely natural, and not related to any discharge from the abattoir site.

Summary

The Council's standard 'kick-sampling' technique was used to collect streambed macroinvertebrates from three sites in the Kahouri Stream in relation to the Ample Group Ltd (formerly Gold International Meat Processors) abattoir on 14 April 2016. This survey was performed to monitor the health of the macroinvertebrate community of the Kahouri Stream in relation to wastewater management at the site. Since late 2011, wastewater has been irrigated to land when soil conditions allow, or discharged to the Kahouri Stream at a time of high flow and adequate dilution. Samples were sorted and identified to provide the number of taxa (richness), MCI and $SQMCI_S$ scores for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may be the more appropriate index if non-organic impacts are occurring. EPT taxa quantifies the number of mayflies, stoneflies and caddisflies present in the sample, and this can also be expressed as a proportion of the total number of taxa (%EPT).

Significant differences in either MCI or $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of discharges being monitored.

It should be noted that special condition13 of the relevant consent (7662-1) includes the following statement:

"The difference in macroinvertebrate community between the upstream control site and the potential impact site immediately below the mixing zone will be examined in order to determine if the discharge has resulted in a 'significant adverse effect on aquatic life'. This will include examining any change in the Semi-Quantitative Macroinvertebrate Community Index [SQMCI], overall composition of the community [including %EPT] and Macroinvertebrate Community Index [MCI]. Should this examination identify a significant adverse effect caused by the discharge, this will constitute a breach of this condition."

The analysis of results was undertaken with this statement in mind.

During this summer survey, the three sites sampled in the Kahouri Stream recorded no significant variation in taxa richness, MCI scores and the $SQMCI_S$ scores. In addition, these sites were largely dominated by the same taxa, with very few significant differences in individual taxon abundance between sites. The results of this survey also did not differ markedly from that recorded in the baseline survey, suggesting little change in communities since the discharge of wastewater commenced.

Overall, this survey indicates that there was no clear deterioration in community health in a downstream direction, and any changes to the macroinvertebrate communities appear subtle and largely natural, and not related to any discharge from the abattoir site. This was supported by the absence of sewage fungus, as determined by microscopic inspection of the samples.

Overall, the Kahouri Stream was in good to very good condition, and with regards to the statement in the consent, an examination of the MCI, $SQMCI_S$ scores and the %EPT found no indication of a significant adverse effect caused by the discharge, and as such, there was no breach of condition 13 of consent 7662-1 by Ample Group Ltd.

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