NAPIER WASTEWATER TREATMENT PLANT

Independent Evaluation of Performance
July 2018

Prepared for:

Napier City Council
Private Bag 6010
Napier 4142

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BASIS OF REPORT

This report has been prepared by SLR Consulting NZ Limited with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Napier City Council (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
710.10415-R01	10 July 2018	Peter Cupitt	Paul Delaney	Lisa Hack

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1 Executive Summary

Approval for the discharge of treated effluent into Hawke Bay, and the associated environmental conditions, was provided by Hawkes Bay Regional Council via the 2012 Resource Consent Coastal Permit (RCCP) (No. CD090514W). The RCCP has 37 conditions which describe requirements for effluent quality and environmental monitoring at the Napier Wastewater Treatment Plant (WWTP).

Conditions 1 to 5 relate to maximum discharge via the ocean outfall, and diffusion. ***All conditions relating to flow rates have been complied with.***

Conditions 6 to 16 describe the approved treatment methods, concentration and load limits for discharge, and toxicity effects. ***All conditions relating to treatment capability are complied with, apart from the annualised average loading rate of biochemical oxygen demand (BOD_5) on the filter media of the Biological Trickling Filter (BTF). Although the loading rate has exceeded the theoretical limit set in condition 6, the treated effluent has consistently complied with BOD_5 requirements.***

Conditions 17 to 28 outline requirements for monitoring environmental performance of the WWTP. ***All conditions relating to monitoring performance have been met. There are two outlying pH measurements taken 300m from the diffuser which are considered erroneous, and one pH measurement taken in April 2017 which was 0.1 below the threshold at all sites which may have been a result of an influx of floodwaters.***

The remaining conditions 29 to 37 relate various matters including signage at the ocean diffuser advising that 'shellfish unfit for human consumption', the appointment of a contact person at the WWTP, preparation of management plans, availability of records and reporting, complaints procedures, and the continuation of liaison through the Kaitiaki Liaison Group (KLG). ***Conditions 29 to 37 have been complied with.***

2 Background and Purpose of Report

Napier City Wastewater Treatment Plant (WWTP) discharges via a marine outfall 1.5km into Hawke Bay. Approval for marine discharge was granted by Hawkes Bay Regional Council via the 2012 Resource Consent Coastal Permit (RCCP) (No. CD090514W). The RCCP has 37 conditions which describe requirements for effluent quality and environmental monitoring at the Napier Wastewater Treatment Plant (WWTP).

The RCCP relates to major improvements at the WWTP which were commissioned in 2014, and include the addition of a biological trickling filter plant (BTF).

This report addresses Condition 11ii) of the RCCP, which requires an evaluation of performance of the plant each 3 years following commissioning of the biological trickling filter plant. This evaluation shall include, but not necessarily limited to, a summary of monitoring results, a report on non-compliances, an evaluation of information indicating trends (including favourable environmental outcomes or any emerging adverse effects); and an opportunity for public response.

3 Scope of Study and Methods

3.1 Terms of Reference for Review

The scope of activities for the SLR review is as follows:

a. Source testing and analysis data, reports and photographs related to the operation and performance of the WWTP since commissioning;

b. Summarise compliance conditions and limitations specified in the RCCP consent no. CD090514W;

c. Provide commentary regarding the extent of compliance to conditions (where required);

d. Collate and tabulate existing performance based on the testing results;

e. Graphically represent the treated effluent quality relative to the RCCP limitation condition for all specified chemical and biological analytes;

f. Note any non-compliances;

g. Note any adverse or favourable environmental trends;

h. Collate the results into a concise clear report suitable for public exhibition; and

i. Identify potential mitigation options to ameliorate adverse environmental effects supplementary to the report.

3.2 Information Reviewed

This study has included a desktop review of the following information made available by Napier Council:

(1) R.J.Hill Laboratories – treated effluent biological and chemical analyte concentrations for October 2014, October 2015, July 2016, April 2017;

(2) Compliance monitoring reports prepared by Hawkes Bay Regional Council since beginning of consent;

(3) Benthic sediment testing results 300m, 500m and 1km from the outfall diffuser midpoint;

(4) Biological and chemical analyte concentrations of the raw wastewater, WWTP biofilm and treated effluent;

(5) Annual performance monitoring reports;

(6) Aquatic toxicology reports; and

(7) Engineering design drawings for the ocean outfall and diffuser prepared for Napier City Council by Stephen Fitzmaurice, Consulting Engineers.

4 Napier City WWTP

Wastewater Treatment Plant configuration prior to 2014

Napier City's wastewater collection, treatment and disposal system is limited to the city's boundaries. Meeanee, Jervoistown, residential Awatoto, parts of Bay View and Poraiti are not included in the system. Wastewater in the serviced area is collected by gravity sewers and 44 pump stations.

Wastewater enters through the head works area and moves to the main pump station. This structure is comprised of four wet wells below ground and a large dry well where the mechanical pumps are housed. An above ground structure houses the electrical and process control equipment which runs the pump station.

Wastewater is pumped to the Milliscreen Plant where it passes through 1mm screens. Screen material is dewatered and disposed of at the Omarunui Landfill. Prior to commissioning of the BTF in 2014 the screened effluent was discharged directly into Hawke Bay via a 1.5 km marine outfall, which was constructed in 1973.

2014 Improvements

The Biological Trickling Filter (BTF) plant was built alongside the existing milliscreening plant in 2014. The WWTP upgrade provides a secondary treatment process that includes grit removal followed by biological treatment. It was designed to allow for further treatment stages to be added in future if required.

Wastewater is pumped to the two Biological Trickling Filters. These filters are 26m diameter concrete tanks that are 11m high. Timber flooring inside each tank supports 14 layers of welded plastic modules on which bacteria grow and feed on the effluent, transforming it into a non-offensive bacterial biomass. Sprinklers on top of each tank distribute screened wastewater onto the plastic filter media.

Both BTF tanks have aluminium dome roofs to contain odours. Air is recirculated within each BTF by a fan which draws air from underneath the timber floor to the top of the tank. The tanks are also fitted with extraction fans that extract air to the nearby bark bio-filters, which act as odour treatment beds.

As the final stage in the process, the treated water leaves the BTFs and flows through one of two Rakahore channels (an open channel filled with rocks) which provide spiritual cleansing before discharge via the marine outfall into Hawke Bay. An overflow basin has been constructed south of the Rakahore Channels for the purpose of containment during an emergency.

The WWTP was designed to receive trade waste from industry in a separate building housing rotating screens specifically designed for trade waste flows. This building also houses the domestic grit classifier equipment.

However, trade waste from the Pandora Industrial Estate is presently not received separately due to closure of that sewer line. This results in trade wastes from the Pandora Industrial Estate presently passing through the BTF.

As a proportion of the average daily discharge flows around 76% of the wastewater stream is from residential and non-separated light industry wastewater sources and 24% classified as separated industrial wastewater (NCC 2009).

5 Environmental License

Approval for the discharge of treated effluent into Hawke Bay, and the associated environmental conditions, has been provided by Hawkes Bay Regional Council via Resource Consent Coastal Permit (RCCP) No. CD090514W, dated 6th December 2012. The RCCP describes requirements for effluent quality and environmental monitoring in relation to improvements at the Napier Wastewater Treatment Works that became operational in 2014.

The RCCP has 37 conditions, structured broadly as indicated in the following table:

- Activity Definition – Conditions 1 to 5 – describe scope of authorised activities including an annual average discharge not exceeding 32,000m^3/d and a maximum flow rate of 1400L/s, and discharge via an ocean outfall with diffuser that effects a dilution rate of 100:1.
- Wastewater treatment and standards – Conditions 6 to 16 – describe the approved treatment methods, concentration and load limits for discharge, and toxicity effects.
- Monitoring – Conditions 17 to 28 – outline requirements for monitoring environmental performance of the WWTP
- Administrative – Conditions 29, 30 – require signage at the ocean diffuser advising that 'shellfish unfit for human consumption', and requirements for appointment of an WWTP contact person.
- Reporting – Conditions 31 to 36 – details requirements for the preparation of management plans, availability of records and reporting, and complaints procedures.
- Kaitiaki Liaison Group (KLG) – Condition 37 – requirement to continue liaison through the KLG.

A full copy of the RCCP is provided in Appendix A of this report.

The findings from an evaluation of performance of the WWTP against the RCCP conditions are provided in the Section 6 of this report.

6 Detailed Findings

6.1 General

Napier City Council is required to comply with the RCCP from 31 August 2014, being the date for commissioning of the BTF. Therefore, the analysis of WWTP performance is from September 2014 onwards.

Until 25 August 2015 it was not possible to totalize the various flows coming to the wastewater treatment plant, as required to assess combined wastewater loads in accordance with Conditions 7 and 8 of the RCCP. The loads assessment is therefore based on flow data from 25 August 2015 onwards.

6.2 Condition 3 – Flow Rates

6.2.1 Condition

'The combined domestic (including non-separable industrial) and industrial discharge shall not exceed an annual average volume of 32,000m^3/d and a maximum flow rate of 1,400L/s'.

6.2.2 Source of Data

Data has been provided by Napier City Council in an excel spreadsheet entitled 'All DATA – Wastewater monitoring results'. The data is for the combined wastewater discharge prior to discharge into Hawke Bay.

6.2.3 Analysis of Data

Maximum flow rates for the combined domestic (including non-separable industrial) and industrial discharge are shown on **Figure 1.** Generally the flow rate fluctuated between 200L/s and 500L/s, which is well below the license condition requirements for a maximum flow rate of 1400L/s. There have been two recorded events with higher discharge rates of 1022L/s on 24 September 2015 and 1110 L/s on 4 April 2017. However, these higher discharge events still remain within the license condition.

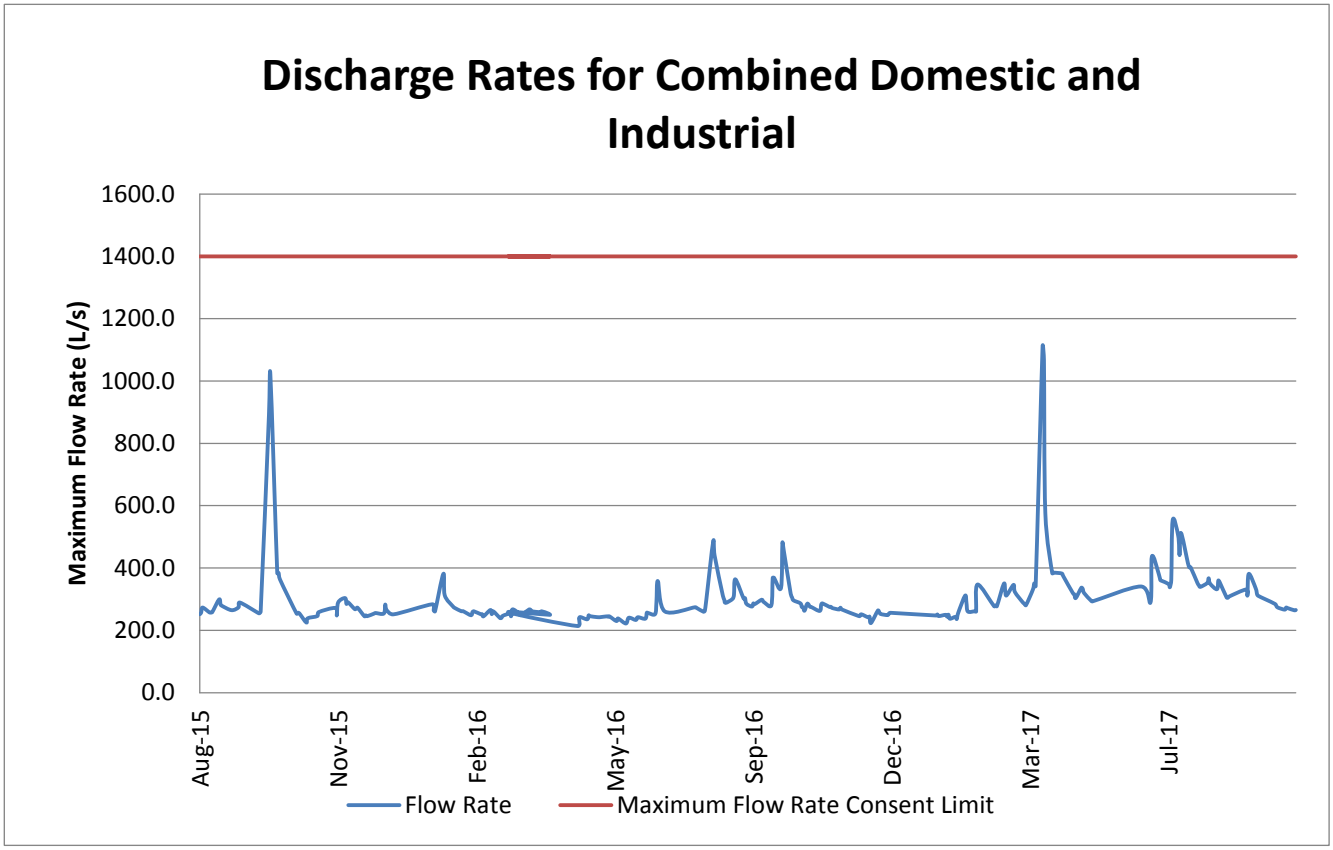


Figure 1 Maximum Discharges of Combined Effluent from WWTP

Condition 3 also limits Annual Average Volume to 32,000m^3/day. The average annual discharges in the 12 months from to 4/8/15 to 3/8/16 was 23,757m3/day, from 4/8/16 to 2/8/17 was 28,462m3/day, and for part of the year from 3/8/17 to 4/10/17 was 26,617m3/day. The data suggest an overall upward trend in peak flow rates at the WWTP. The annual average flow volume of discharge, and underlying data, are graphed as per **Figure 2**.

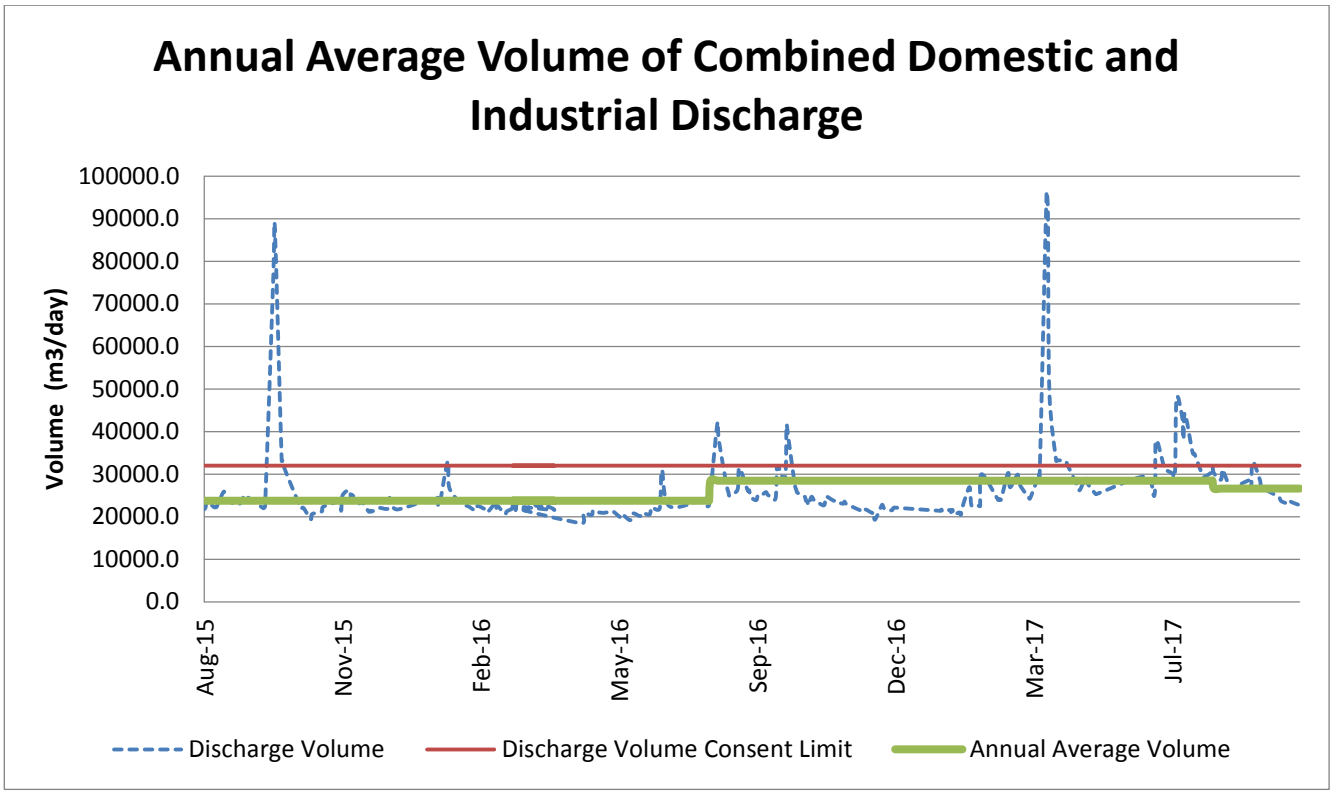


Figure 2 Annual Average discharge Volumes (Combined flows)

6.2.4 Compliance

Complies

Discharge flow rates and volumes were within the RCCP limits from August 2015 to August 2018. It is noted that flow records were unavailable between commissioning in 2014 and August 2015. Flowrates since August 2015 have been generally trending upwards.

6.3 Condition 5 – Marine Outfall Diffuser

6.3.1 Condition

'All wastewater shall pass through an ocean outfall diffuser which has been designed to achieve a minimum average dilution over the boil of not less than 100:1 in slack water'.

6.3.2 Information Sources

Design drawings for the marine outfall were provided by Napier City Council.

A compliance report from HBRC dated 19 February 2018 states that, "*the diffuser has been designed to achieve a minimum average dilution of 100:1.*"

6.3.3 Analysis of Data:

Design drawings for the marine outfall have been provided by Napier City Council, but there is not adequate detail to verify that the design would achieve a 100:1 dilution rate. However, it is understood that the design was peer reviewed and approved prior to construction and has been previously accepted by HBRC as complying.

6.3.4 Compliance:

Complies

The outfall design was accepted as complying by HBRC.

6.4 Condition 6 – Treatment Process and BTF Loading

6.4.1 Condition:

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

From a date no later than 31 August 2014 all domestic and non-separable industrial wastewater shall be treated:

a) Treated to remove kuparu (human waste in an unaltered state) from the flow, with the wastewater being treated in a biological trickling filter, filled with structured media, with an annual average daily loading of carbonaceous biochemical oxygen demand (5 day test) ($cBOD_5$) that shall not exceed 0.6kg per cubic meter of media per day
b) The plant shall include milliscreening, and grit removal prior to the BTF
c) Prior to discharge the effluent shall be pass through a Papatuanuku channel.

6.4.2 Source of Data:

Data has been provided by Napier City Council in an excel spreadsheet entitled 'All DATA – Wastewater monitoring results'. The data is for the combined wastewater discharge, including both treated domestic and industrial wastewaters, prior to discharge into Hawke Bay.

6.4.3 Analysis of Data:

The treatment process includes pre-treatments of 1mm milliscreening and grit removal, a BTF facility, and a Papatuanuku channel. These treatments have been effective in limiting kuparu from the effluent prior to marine discharge into Hawke Bay.

Carbonaceous Biochemical Oxygen Demand ($cBOD_5$) is a measure of the level of bio-degradable organic matter in wastewater, and is measured by how much oxygen the microbes present would use over 5 days as they consume the organic matter.

The raw $cBOD_5$ concentrations, daily volumes, and $cBOD_5$ loading rates per m^3 of filter media (assuming 8,700m^3 of filter media in the BTF's) are shown in **Table 1** below. From the sampling data there is considerable fluctuation in the $cBOD_5$ loading rates which vary between 0.17 and 1.89 kg/m^3/day. The annualised averages across the monitoring period all exceed the RCCP criteria of 0.6kg of $cBOD_5$ per m^3 of filter media per day.

Table 1 $cBOD_5$ Loading Rates on BTF Media

Sampling Date	$cBOD_5$ Raw (g/m3)	Daily Wastewater Volume (m3)	Daily $cBOD_5$ Loading (kg/m3/day)	Annual Average Daily Loading (kg/m3/day)	Exceedance Criteria for annual average (kg/m3/day)
13-8-15	87	16846	0.17	0.76	0.6
14-10-15	284	19170	0.63		
26-1-16	482	16598	0.92		
5-5-16	669	16066	1.24		
30-6-16	291	25740	0.86		
13-10-16	219	21109	0.51	0.93	
25-1-17	394	15596	0.71		
5-4-17	195	84415	1.89		
5-7-17	217	24007	0.60		
23-11-17	394	19001	0.86	0.86 (part year)	

A comparison of upstream and downstream $cBOD_5$ during 2015, 2016 and 2017 is shown on **Figure 3**, and indicates that notwithstanding these higher application rates to the filter media in the BTF, the cBOD5 concentrations in treated wastewater are well below the average and maximum limits in the RCCP.

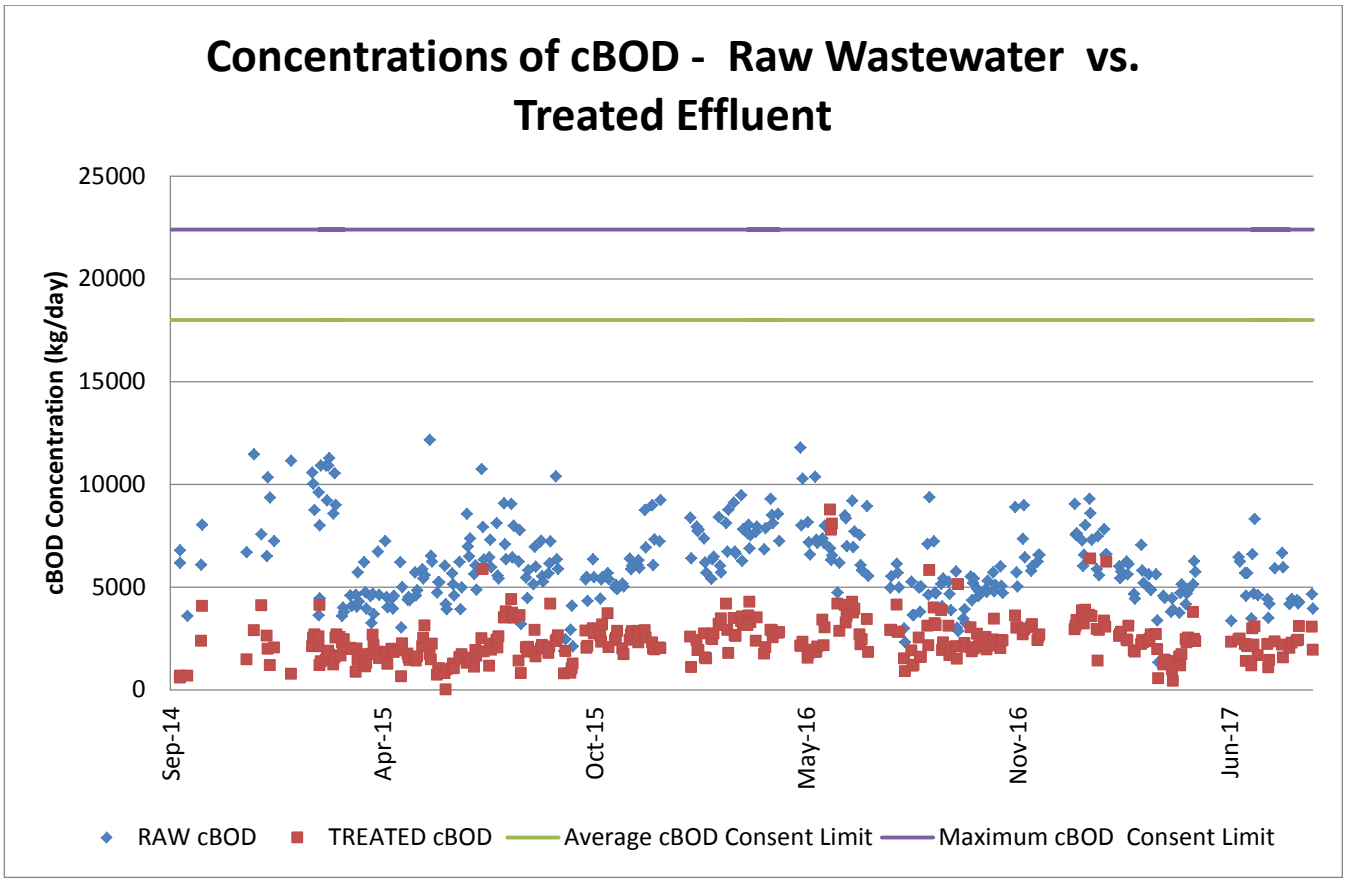


Figure 3 Raw and Treated cBOD5 concentrations

6.4.4 Compliance:

The treatment process complies with the RCCP requirements in parts a), b), and c) of Condition 6.

There is a non-compliance in the BOD_5 loading rate, with the annual average loading rates on the BTF filter media consistently exceeding the RCCP limit of 0.6kg/m3/day. A contributing factor for the exceedance may be that due to a blockage the Pandora Industrial effluent trunk main has been out of commission since early 2016, and the industrial effluent is passing through the BTFs, and hence increasing the load rate on the BTF filter media. It is recommended that the BTF loading rates be monitored closely to see if they are reduced when the Pandora Industrial effluent trunk main is rectified.

Some of the variability in the BTF loading rates is likely due to infiltration of groundwater into sewers, or stormwater connections to sewers, and this is not unusual.

It is noted that, notwithstanding the higher loading rates, the concentrations of BOD_5 in the BTF effluent are well below the maximum concentrations identified in the RCCP, which indicates that the BTF is performing adequately in reducing biological oxygen demand. A detailed review of the loading rates may be justified to examine the case for a performance based review of limits. There may also be an opportunity to reduce the BOD_5 loading within the wastewater collection system, by means of chemical dosing or pre-treating the influent, or by treating septicity if this is an issue within parts of the sewage transport system.

6.5 Condition 7 – Concentrations in Combined Wastewater

6.5.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

Maximum concentrations and loads in the final combined wastewater shall not exceed:

Table 2 Analyte Consent Limits for Concentrations & Loads

Analyte	Maximum Concentration (g/m3)	Maximum Load (kg/day)
Total Ammonia-N	91	2912
Cadmium (Cd)	0.55	17.6
Chrome (Cr III)	2.74	87.7
Chrome Hexavalent (Cr VI)	0.44	14.1
Copper (Cu)	0.13	4.16
Lead (Pb)	0.44	14.1
Mercury (Hg)	0.04	1.3
Nickel (Ni)	7	224
Zinc (Zn)	1.5	48

*Loads based on average annual flow – 32,000m3/day

Any single exceedance will result in non-compliance.

6.5.2 Source of Data

Data has been provided by Napier City Council in an excel spreadsheet entitled 'All DATA – Wastewater monitoring results'. The data is for the combined wastewater discharge, including both treated domestic and industrial wastewaters, prior to discharge into Hawke Bay.

6.5.3 Analysis of Data

Mean and maximum values recorded during the reporting period are shown in the **Table 3** below.

Table 3 Combined Wastewater Analytes – Concentrations and Loads – Monitored vs Limits

Analyte	Concentrations (g/m3)			Loads (kg/day)		
	Monitored Mean	Monitored Maximum	HBRC Condition Limit	Monitored Mean	Monitored Maximum	HBRC Condition Limit
Total Ammonia-N	36.4	74	91	1165	2368	2912
Cadmium (Cd)	0.00016	0.00087	0.55	0.0052	0.028	17.6
Chrome (Cr III)	0.050	0.260	2.74	1.61	8.32	87.7
Chrome	0.0075	0.28	0.44	0.239	8.86	14.1

Hexavalent (Cr VI)						
Copper (Cu)	0.023	0.074	0.13	0.72	2.37	4.16
Lead (Pb)	0.0049	0.0095	0.44	0.158	0.304	14.1
Mercury (Hg)	0.00010	0.00040	0.04	0.0032	0.013	1.3
Nickel (Ni)	0.0054	0.057	7	0.17	1.82	224
Zinc (Zn)	0.26	0.53	1.5	8.24	16.96	48

All analytes are below both the concentration and load limits of the RCCP and comply with the condition.

In addition, most analytes except Total Ammonia are significantly below the concentration and load limits. There is considerable fluctuation in the recorded concentrations of Total Ammonia, which fluctuated between 10 and 74 g/m3 during the monitoring period. The maximum recorded concentration of 74 g/m3 remains below the limit of 90g/m3. Total Ammonia loads fluctuate between very low levels and up to 2500kg/day, which is less than the limit of 2912kg/day.

Linear trend lines for Ammonia concentration and load suggest that both are decreasing. However, given the limited data set, fluctuation evident in the data, and influence of other variables such as wet weather, it is too early to establish any reliable trend for Ammonia.

The monitored concentrations (g/m3) and loads (kg/day) recorded during the monitoring period, along with the relevant HBRC limits, are plotted in the figures shown on the following pages, for each analyte.

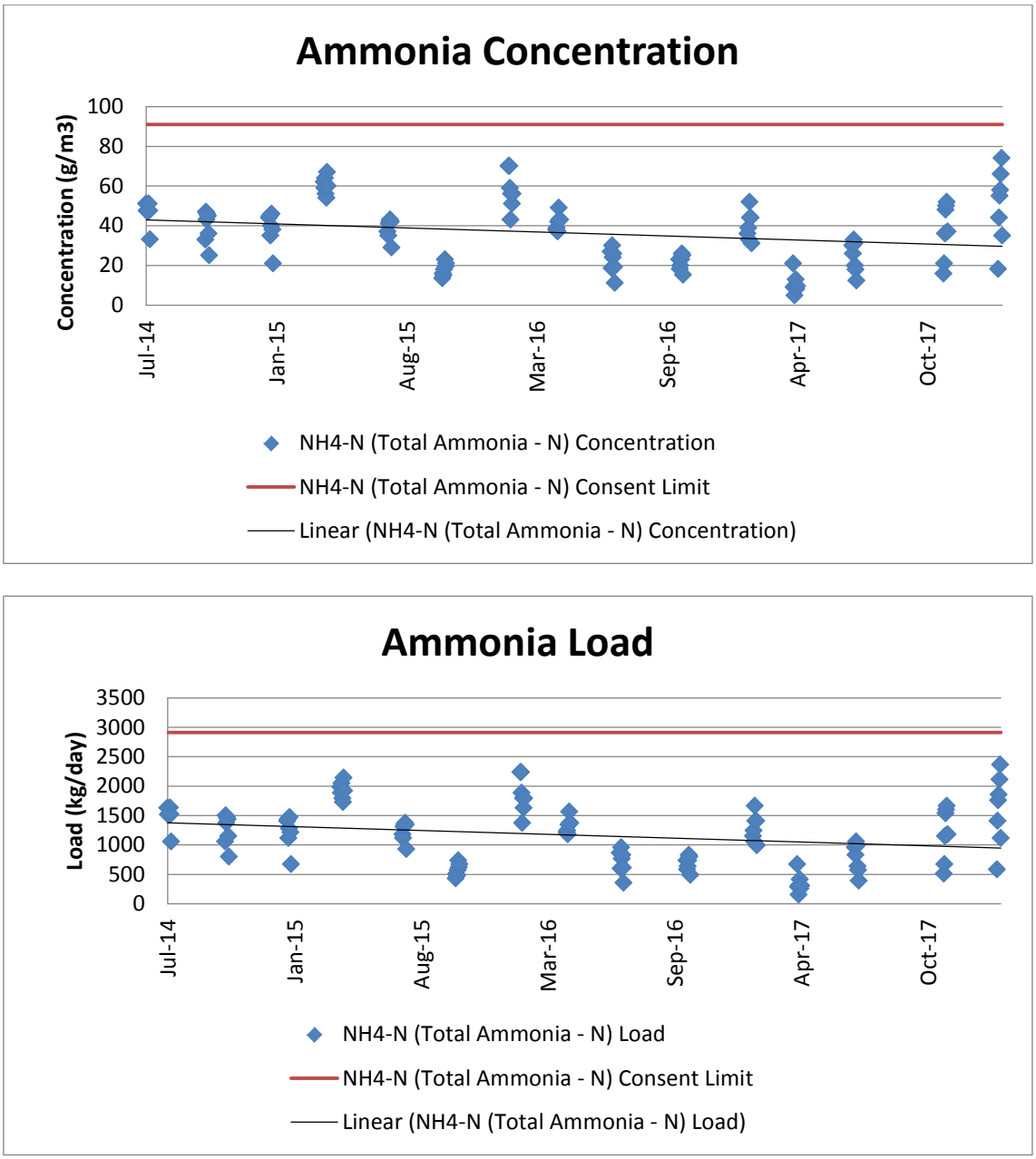


Figure 4 Graphs of Ammonia - Concentrations and Loads in Combined Wastewater

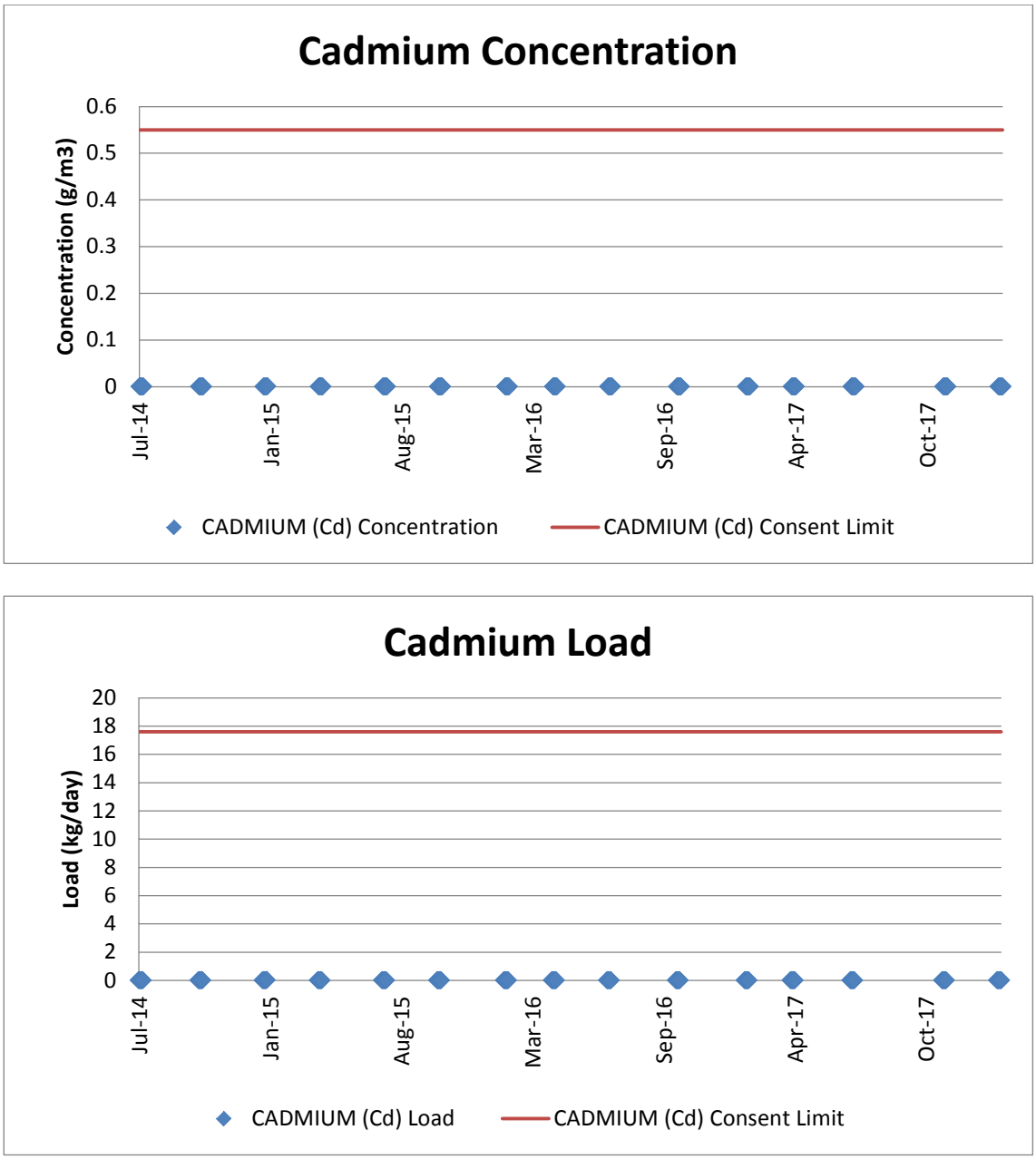


Figure 5 Graphs of Cadmium - Concentrations and Loads in Combined Wastewater

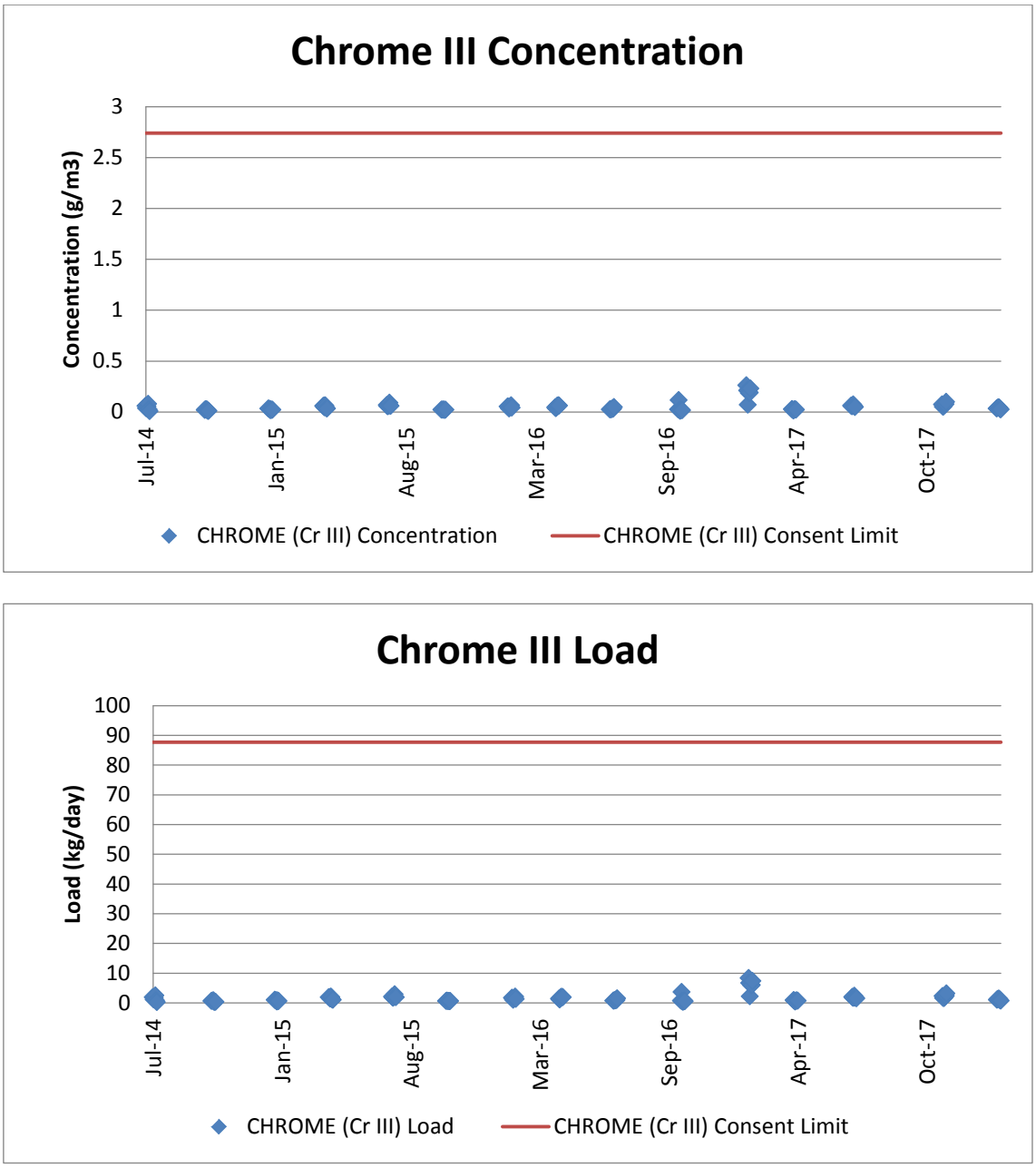


Figure 6 Graphs of Chrome III - Concentrations and Loads in Combined Wastewater

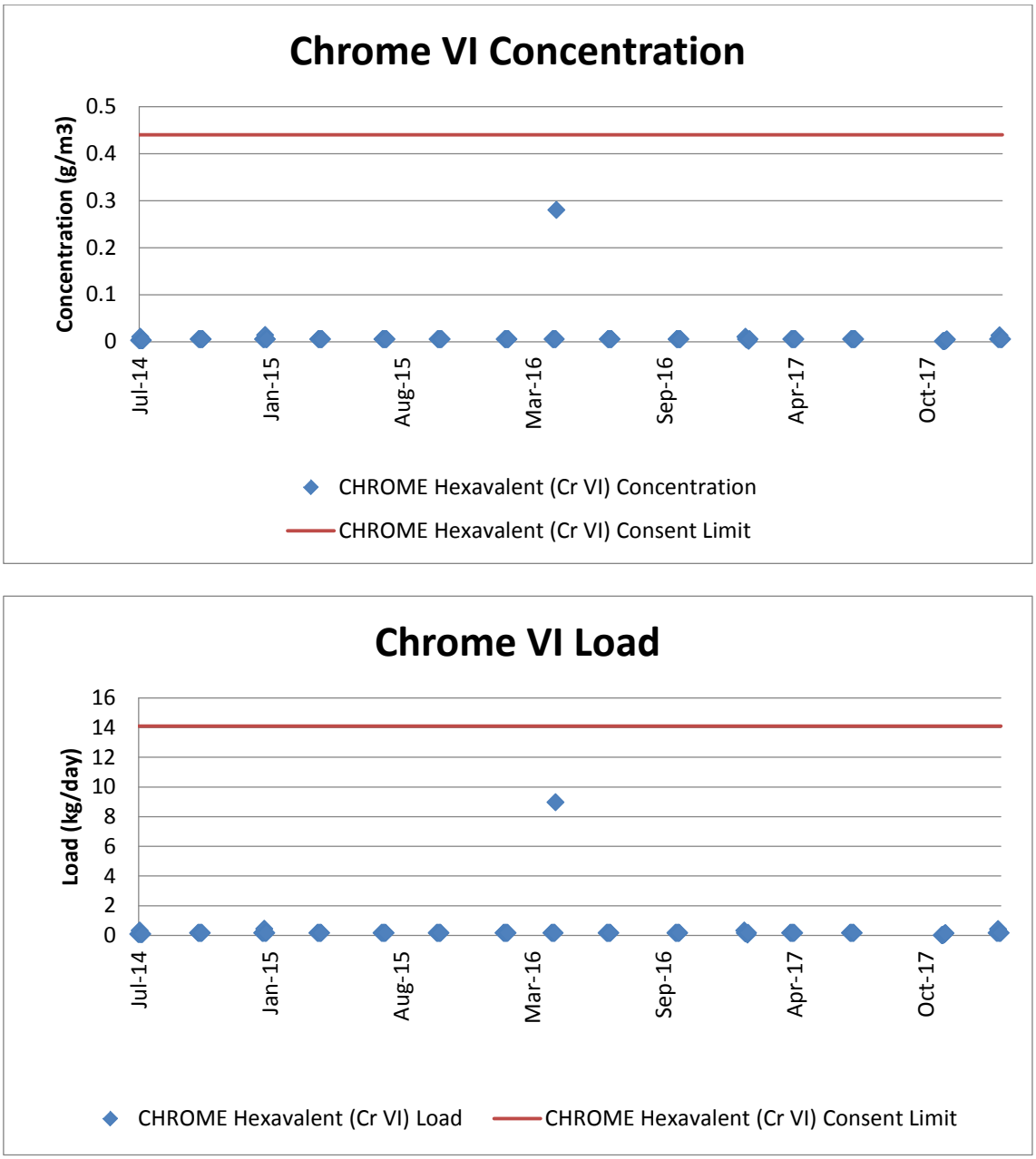
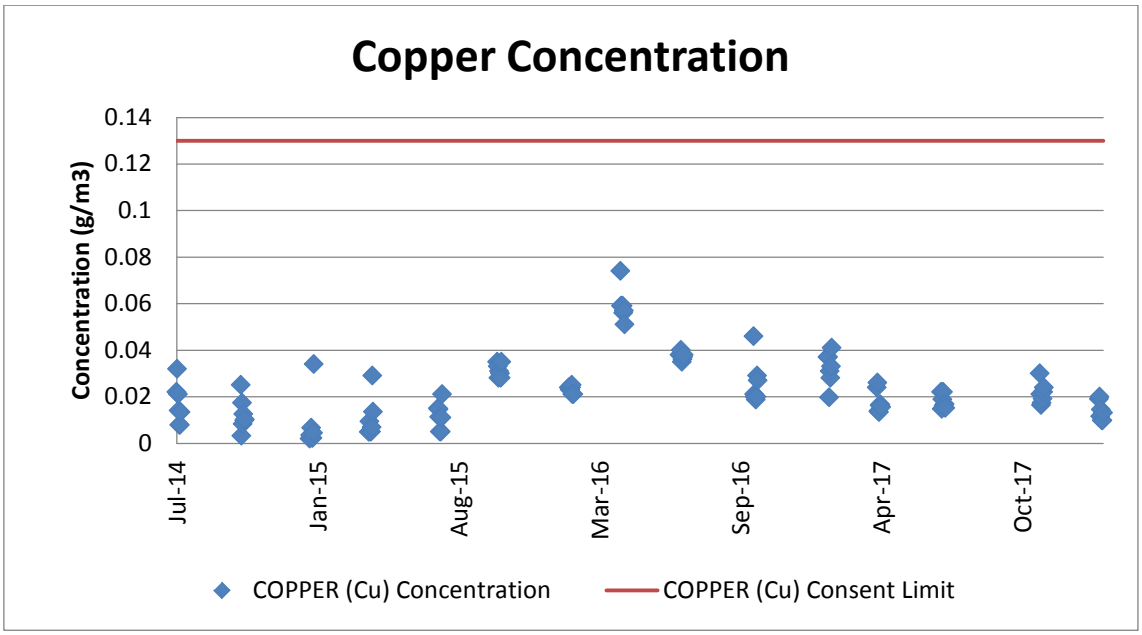


Figure 7 Graphs of Chrome VI - Concentrations and Loads in Combined Wastewater



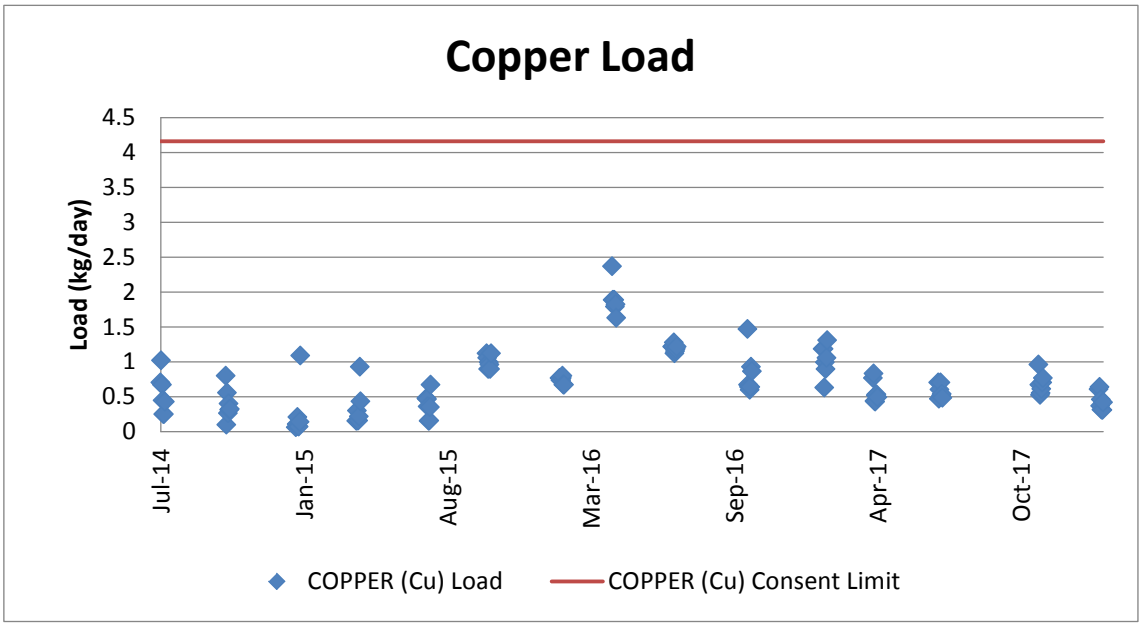


Figure 8 Graphs of Copper - Concentrations and Loads in Combined Wastewater

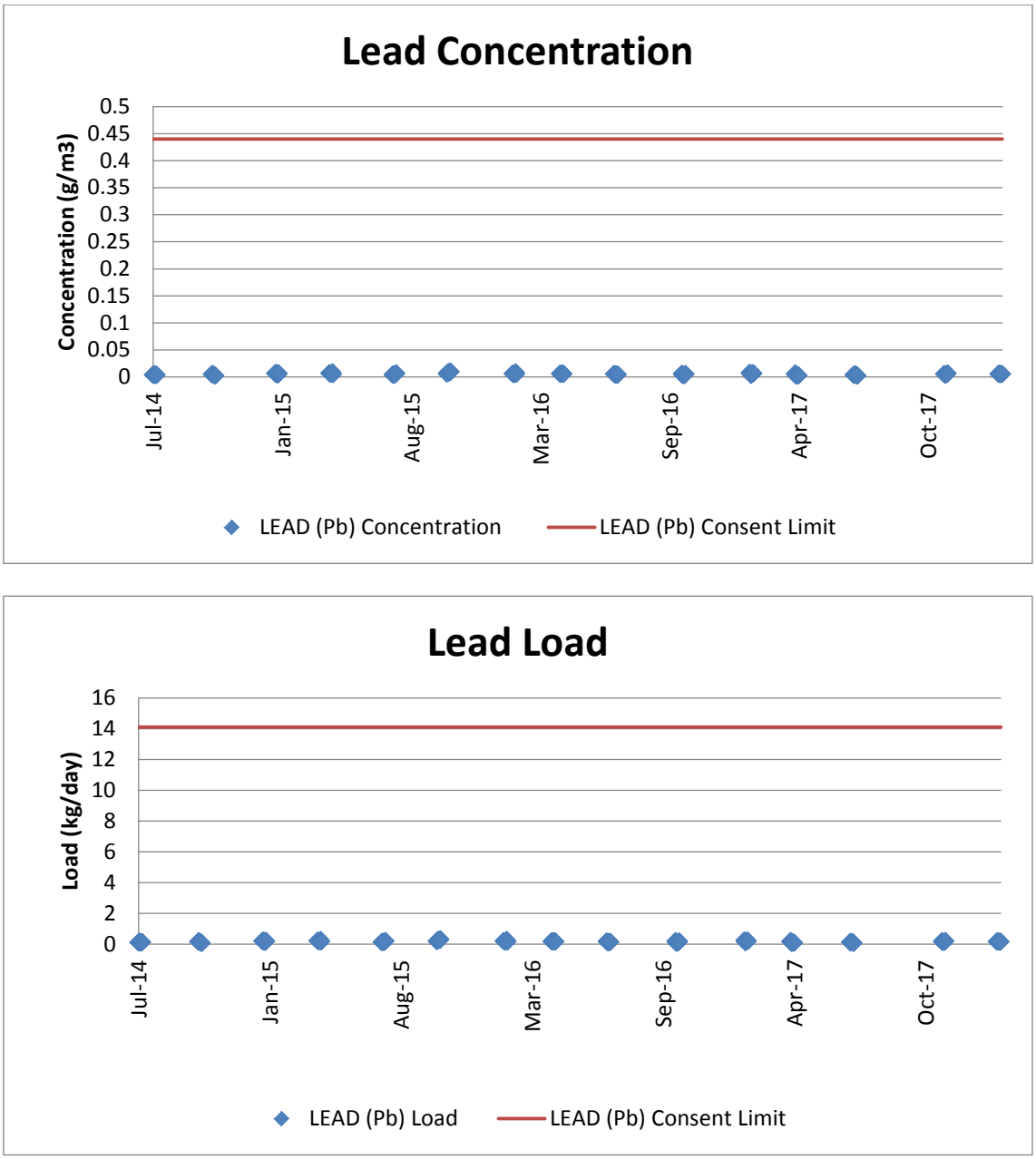


Figure 9 Graphs of Lead - Concentrations and Loads in Combined Wastewater

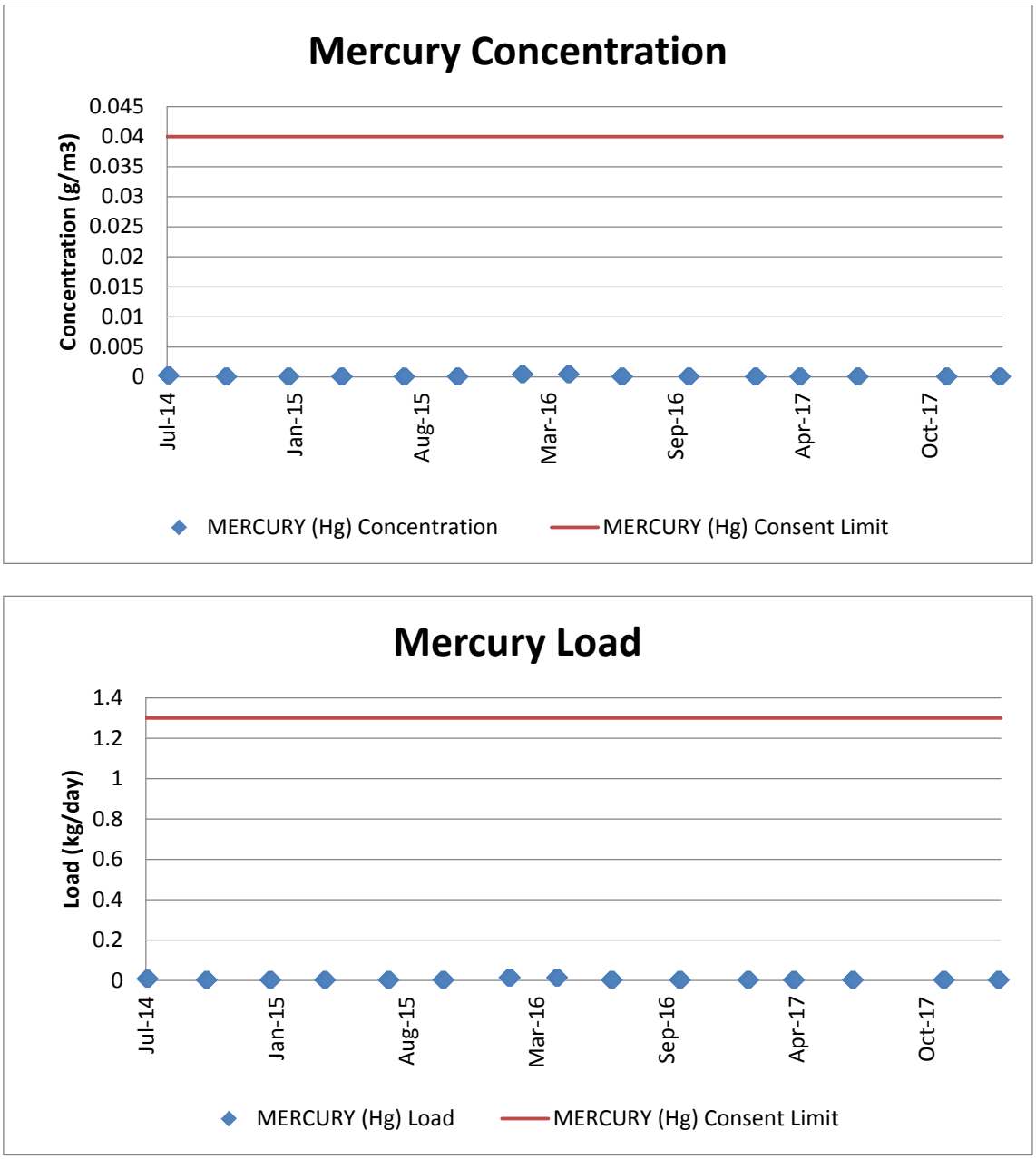


Figure 10 Graphs of Mercury - Concentrations and Loads in Combined Wastewater

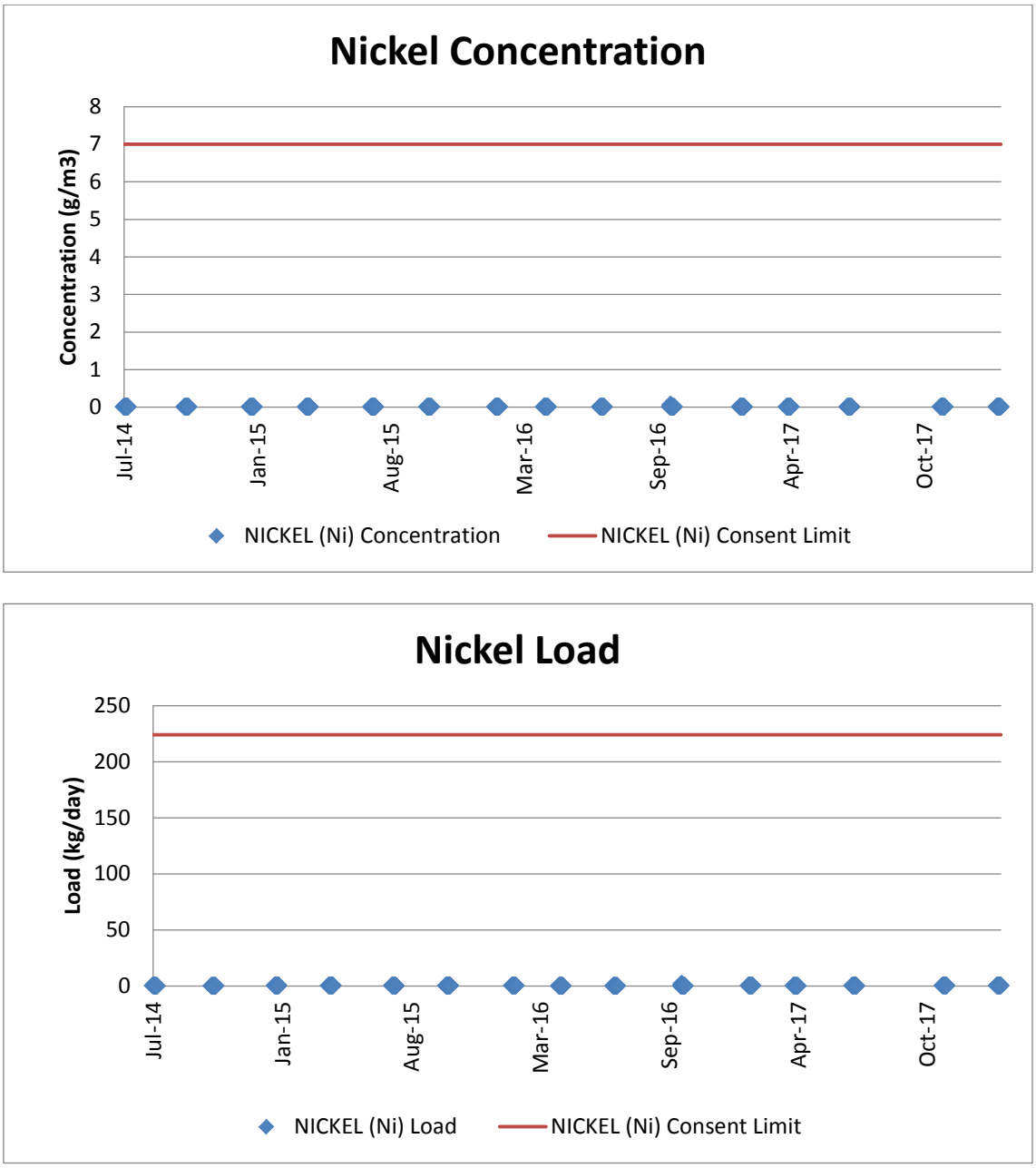


Figure 11 Graphs of Nickel - Concentrations and Loads in Combined Wastewater

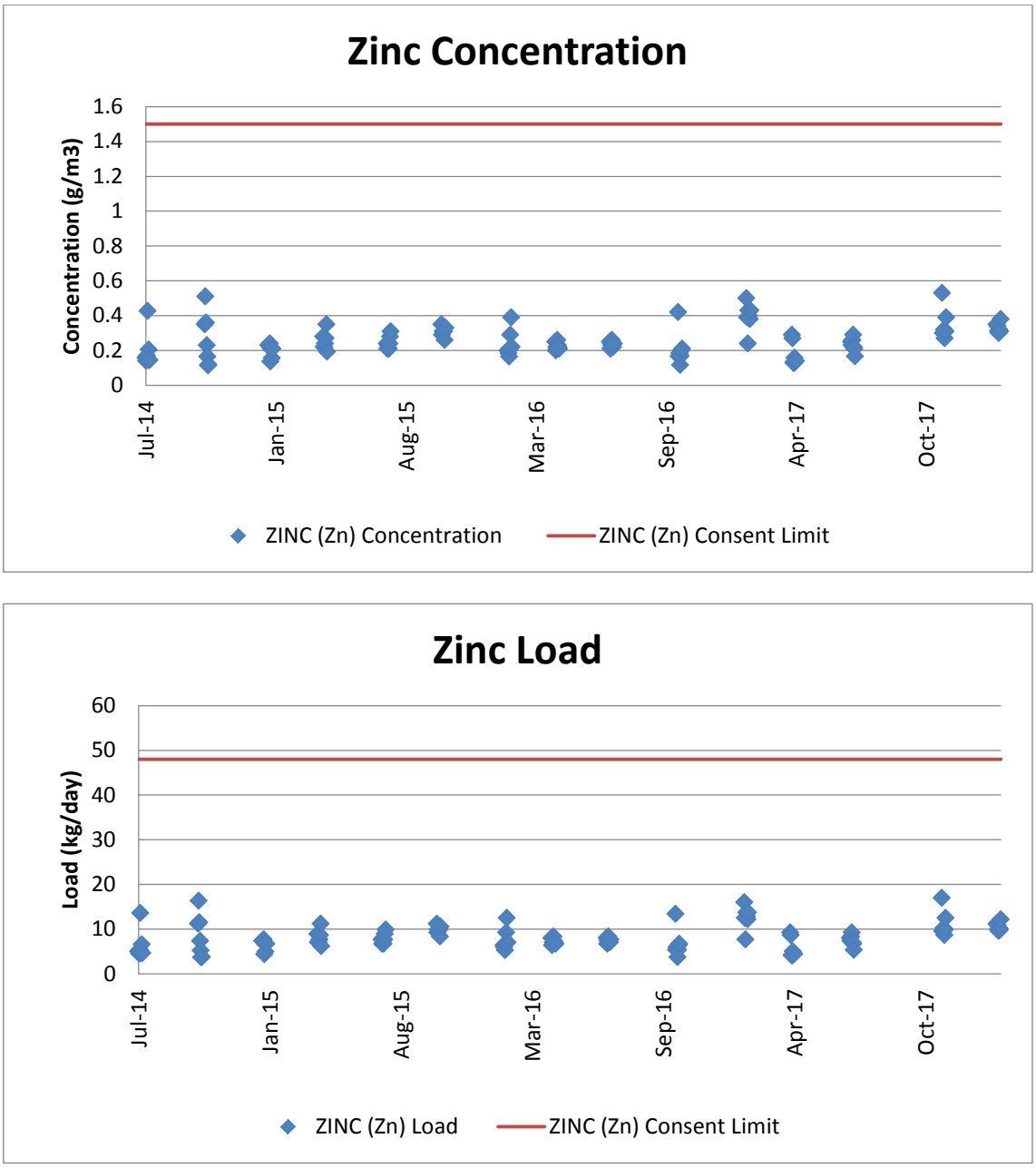


Figure 12 Graphs of Zinc - Concentrations and Loads in Combined Wastewater

6.5.4 Compliance

Complies.

All concentrations and loads during the monitoring period were below the limit criteria set in the RCCP.

If WWTP inflows continue to increase over several years then it is possible that additional measures may be required to lower the concentration and loads of effluent ammonia. However, at present no clear trends are evident across the monitoring period, and no action is warranted.

6.6 Condition 8 – Analytes in Combined Wastewater

6.6.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

In the final combined wastewater the analytes below do not exceed the trigger values:

Table 4 Analyte Average & Maximum Loads Consent Limits

Analyte	Average Load* (kg/day)	Maximum Load ** (kg/day)
cBOD	18,000	22,400
TSS	18,000	22,400
TFO&G	7,000	8,800
pH	N/A	6.5-8.5

* The average load should be based on a 12 month rolling mean
**Loads based on average annual flow of 32000m3/day

6.6.2 Source of Data

Data has been provided by Napier City Council in an excel spreadsheet entitled 'BTF Results'. The data relates to the performance of the Biological Trickling Filter (BTF), and includes the analysis of wastewater quality both upstream (untreated) and downstream (treated) of the BTF.

6.6.3 Analysis of Data

Biological Oxygen Demand - cBOD

The monitoring data indicates that both the maximum daily and 12 month rolling average loads for cBOD were well below the RCCP limits, as indicated graphically on **Figure 13** below.

During the monitoring period the maximum recorded daily load was 1090 kg/day. This is well below the daily maximum limit of 22,400kg/day.

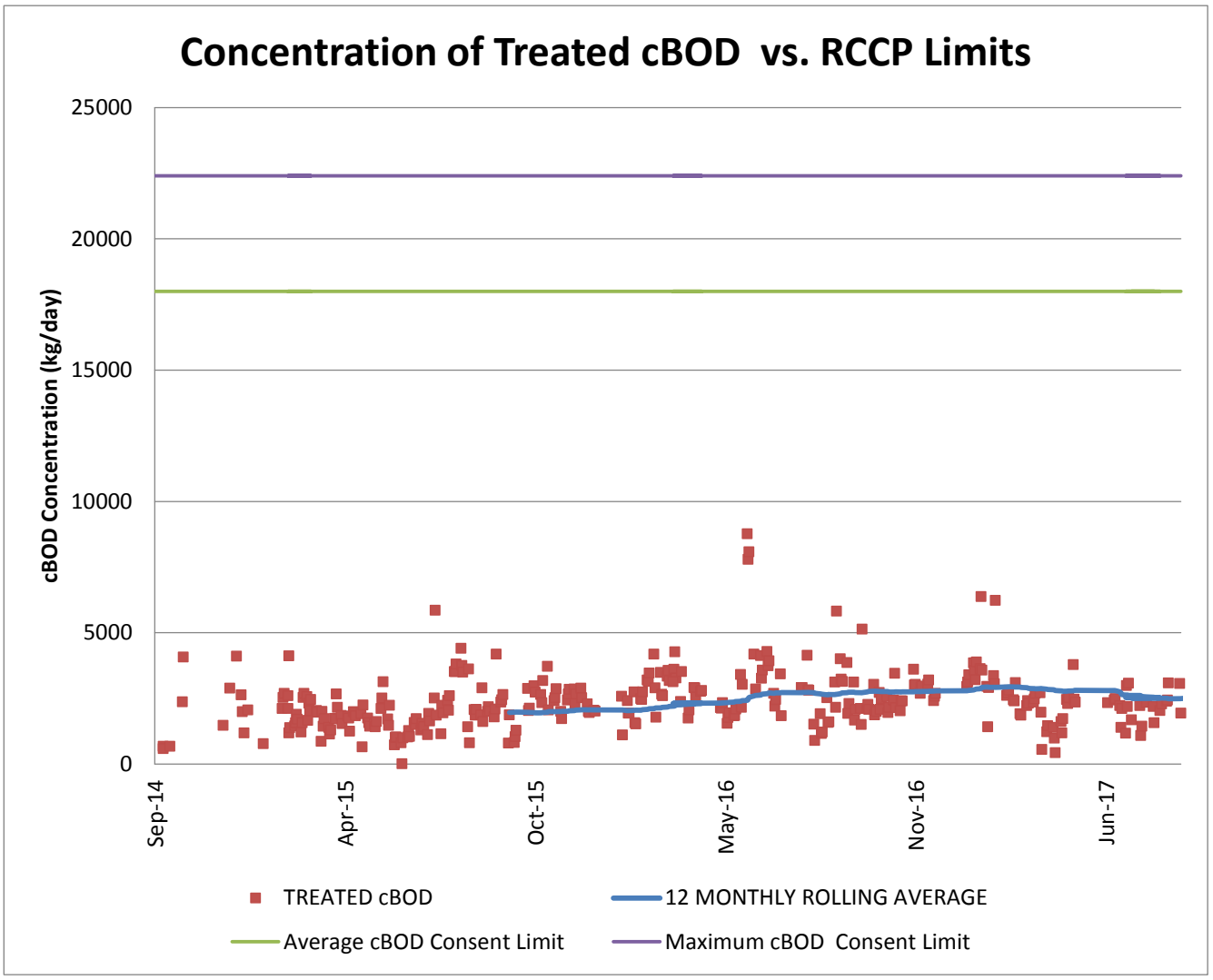


Figure 13 Daily and Rolling Average cBOD Concentration vs Limits

Total Suspended Solid (TSS)

The daily TSS loads (kg/day), and the 12 monthly rolling average TSS loads are shown on **Figure 14.**

Daily TSS data indicates that the daily TSS is generally less than half of the RCCP maximum loading of 22,400kg/day. However, there was an exceedance on 2 June 2016, with TSS recorded at 29312.

Rolling 12 monthly average TSS loadings (kg/day) vary between 4350 and 7392, and are substantially less than the RCCP limit of 18,000kg/day. The rolling average indicates an upward trend in TSS loadings.

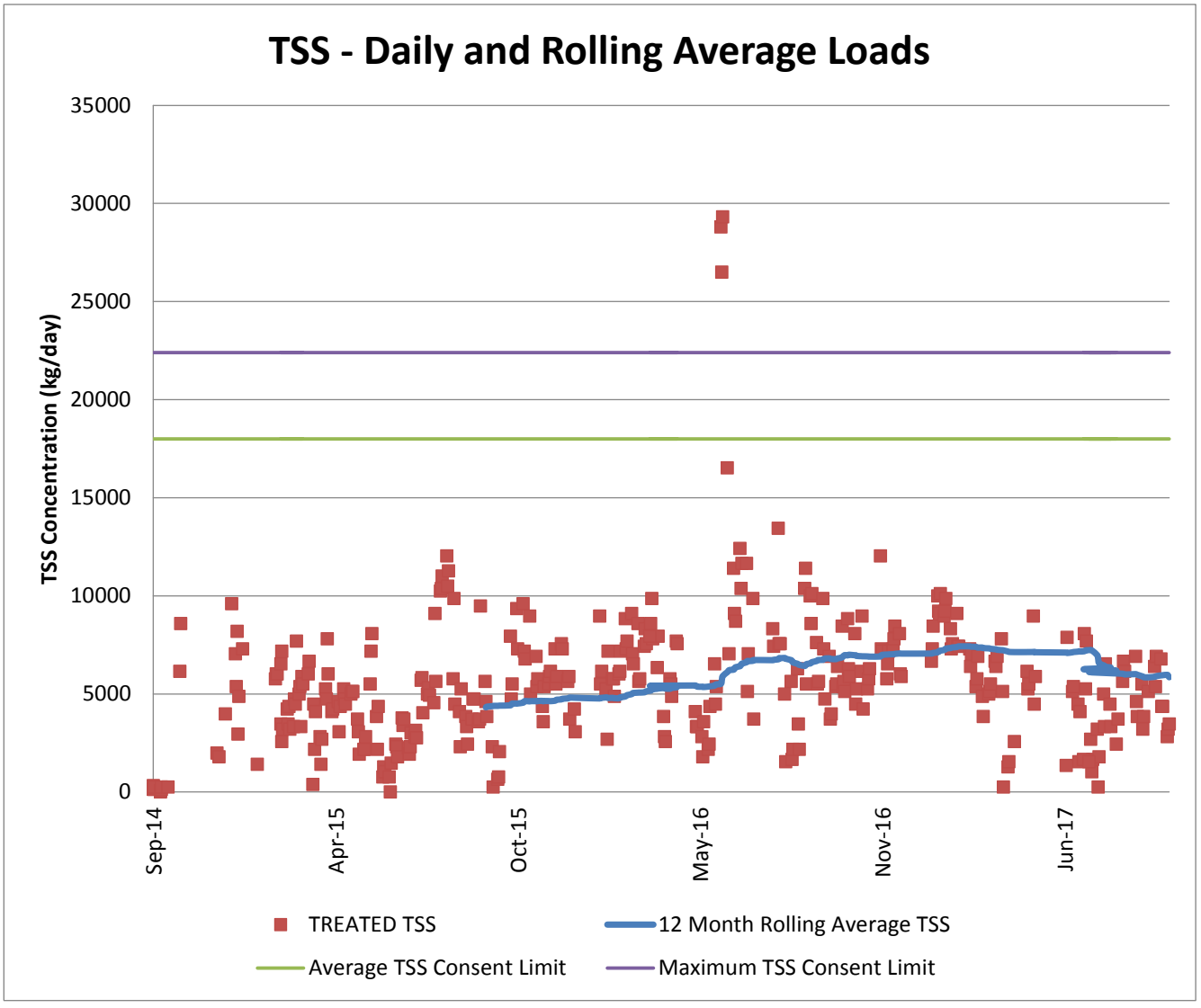


Figure 14 Daily and Rolling Average TSS vs Limits

Total fats Oil & Grease (TFO&G)

The maximum monitored load in the treated wastewater was 340kg/day which is well below the limit of 8800 kg/day.

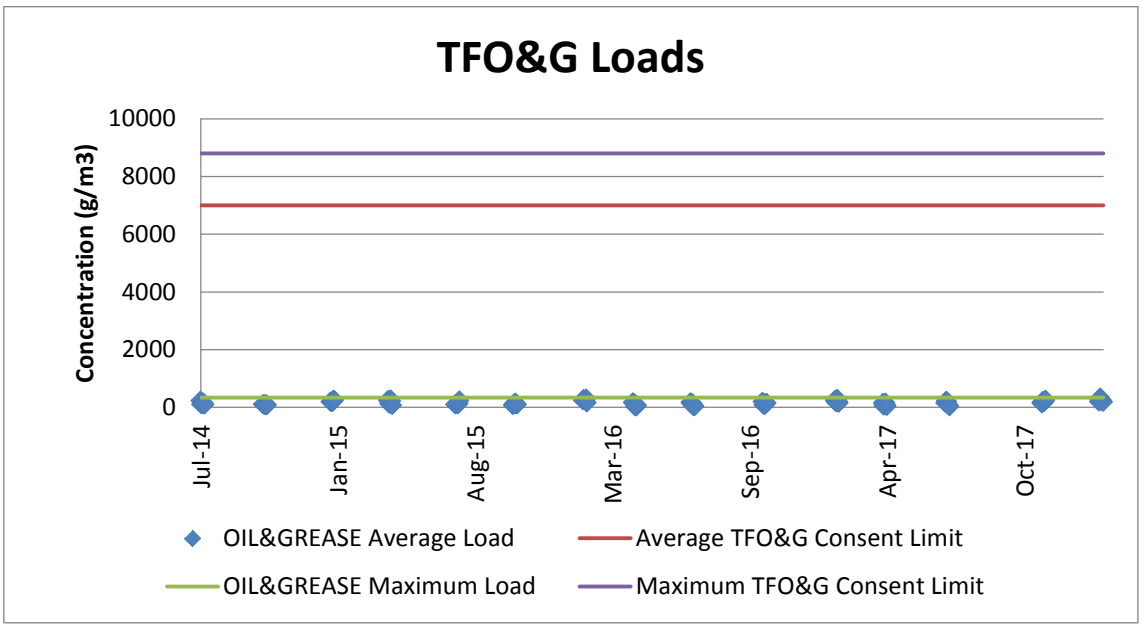


Figure 15 Quarterly Maximum and Average TFO&G vs Limits

pH:

pH has varied between 8.0 and 7.0 during the monitoring period. This complies with the RCCP limits for pH of between 6.5 and 8.5.

There is a minor downward trend in pH, from slightly alkaline (pH 7.4 to 8.0) in 2015 towards a more neutral pH of 7.4 to 6.9 in late 2017.

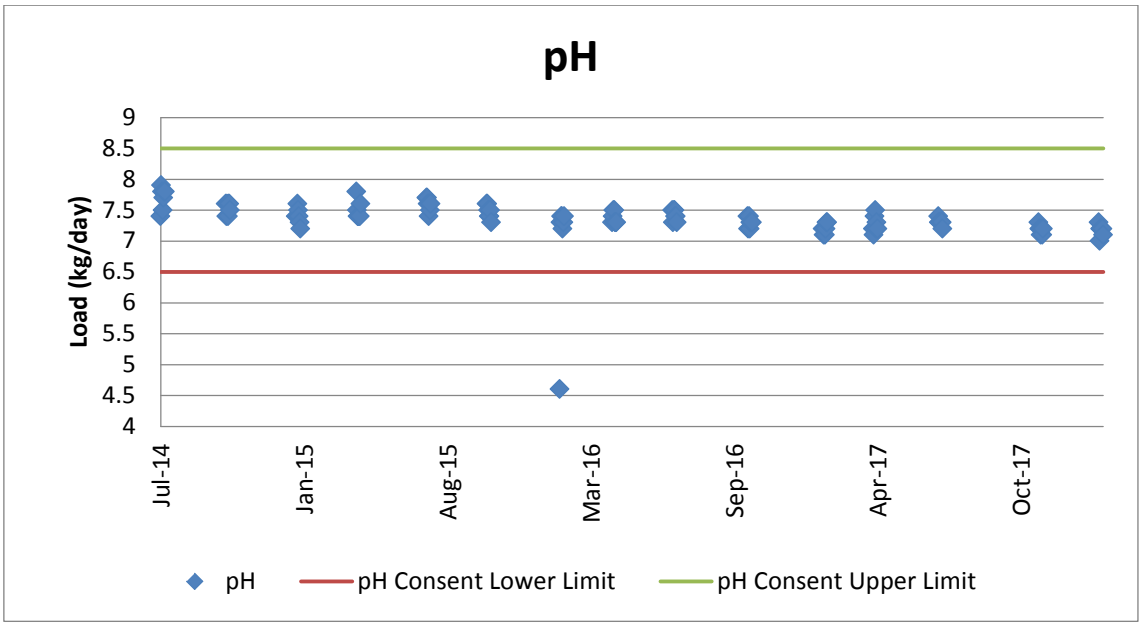


Figure 16 Quarterly Maximum and Average pH vs Limits

6.6.4 Compliance:

Complies, except three recorded exceedances of TSS on three successive days in June 2016.

The loads of CBOD, TSS, TFO&G and the pH of treated wastewater discharging into Hawke Bay are generally all within the limits imposed in the RCCP. The reason for the TSS exceedance in June 2016 is unknown.

6.7 Condition 13 – Changes in Seawater Quality around Outfall

6.7.1 Condition:

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

The discharge of wastewater shall not cause any of the following effects beyond a distance of 300m from the outfall diffuser:

i)	The production of any conspicuous materials
ii)	Any conspicuous change in colour or visual clarity
iii)	The production of any conspicuous oil or grease films, scums or foams, or floatable materials
iv)	Any emission of objectionable odour
v)	Any significant effect on aquatic life

vi)	A change in the natural temperature of the receiving water of more than 3 degrees Celsius
vii)	The dissolved oxygen to be less than 80% of the saturation concentration; or
viii)	Undesirable biological growths

6.7.2 Source of Data

Data has been provided by Napier City Council in an excel spreadsheet entitled 'All DATA – Wastewater monitoring results' which includes monitoring data of Dissolved Oxygen (DO) and Temperature. The data is for the water quality of seawater, measured in Hawke Bay, at a distance of 300m from the outfall diffuser in 5 different directions. The Dissolved Oxygen and Temperature at the five monitoring points are compared to those at a 'Control Point' which is unlikely to be affected by the outfall.

6.7.3 Analysis of Data

Dissolved Oxygen

Dissolved oxygen saturation levels were measured in seawater at five points equidistant on a circle centred on the diffuser and with a radius of 300m. These are numbered 1/300 to 5/300 in **Figure 17** below. All of the monitoring results showed saturation oxygen levels above the RCCP (minimum) limit of 80% saturation.

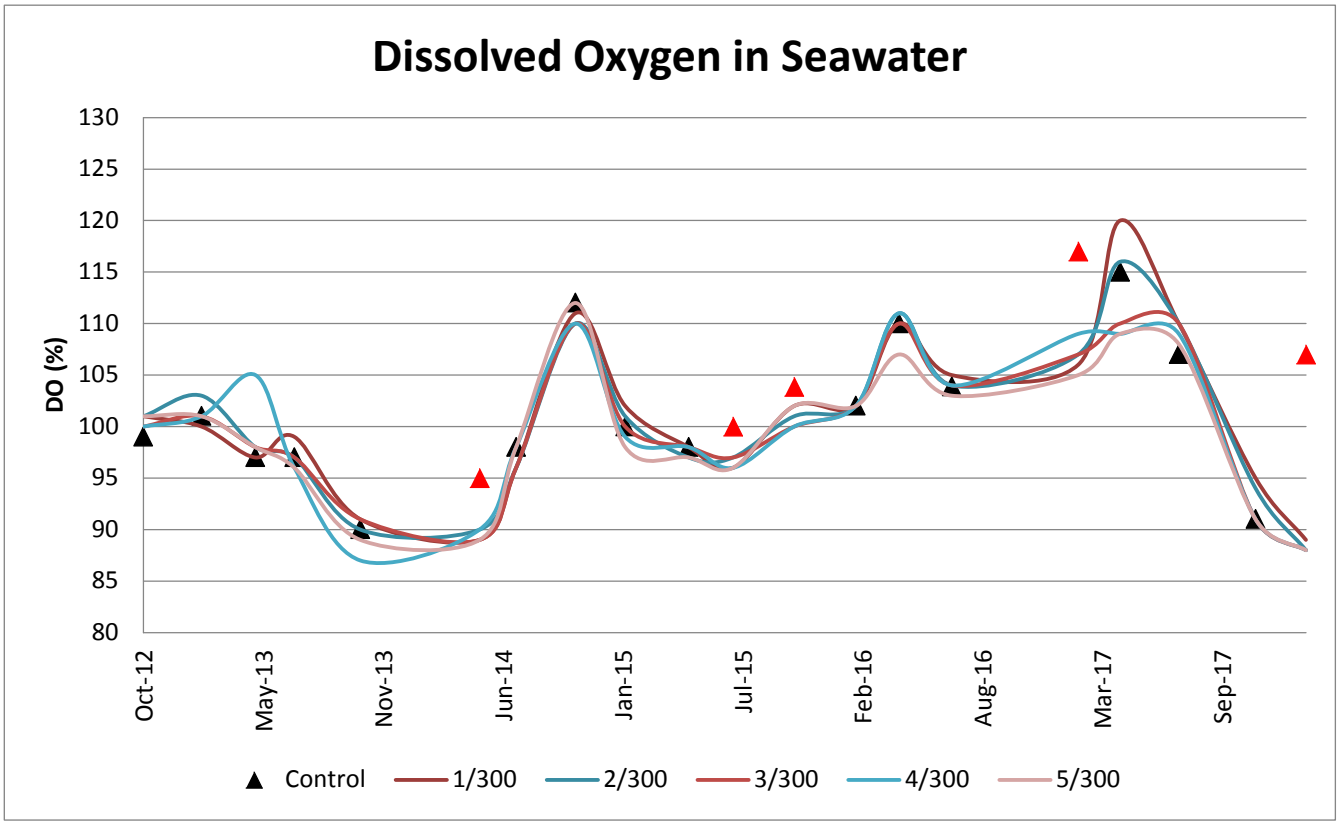


Figure 17 Dissolved Oxygen Concentration since Commissioning

Temperature

Seawater temperatures were measured in seawater at five points equidistant on a circle centred on the diffuser and with a radius of 300m. Temperatures were also measured at a reference (control) location unlikely to be affected by discharge from the diffuser. The RCCP requires a maximum change in the temperature of no more than 3 degrees Celsius between the measures locations and the control location.

The results of monitoring are shown in **Figure 18**.

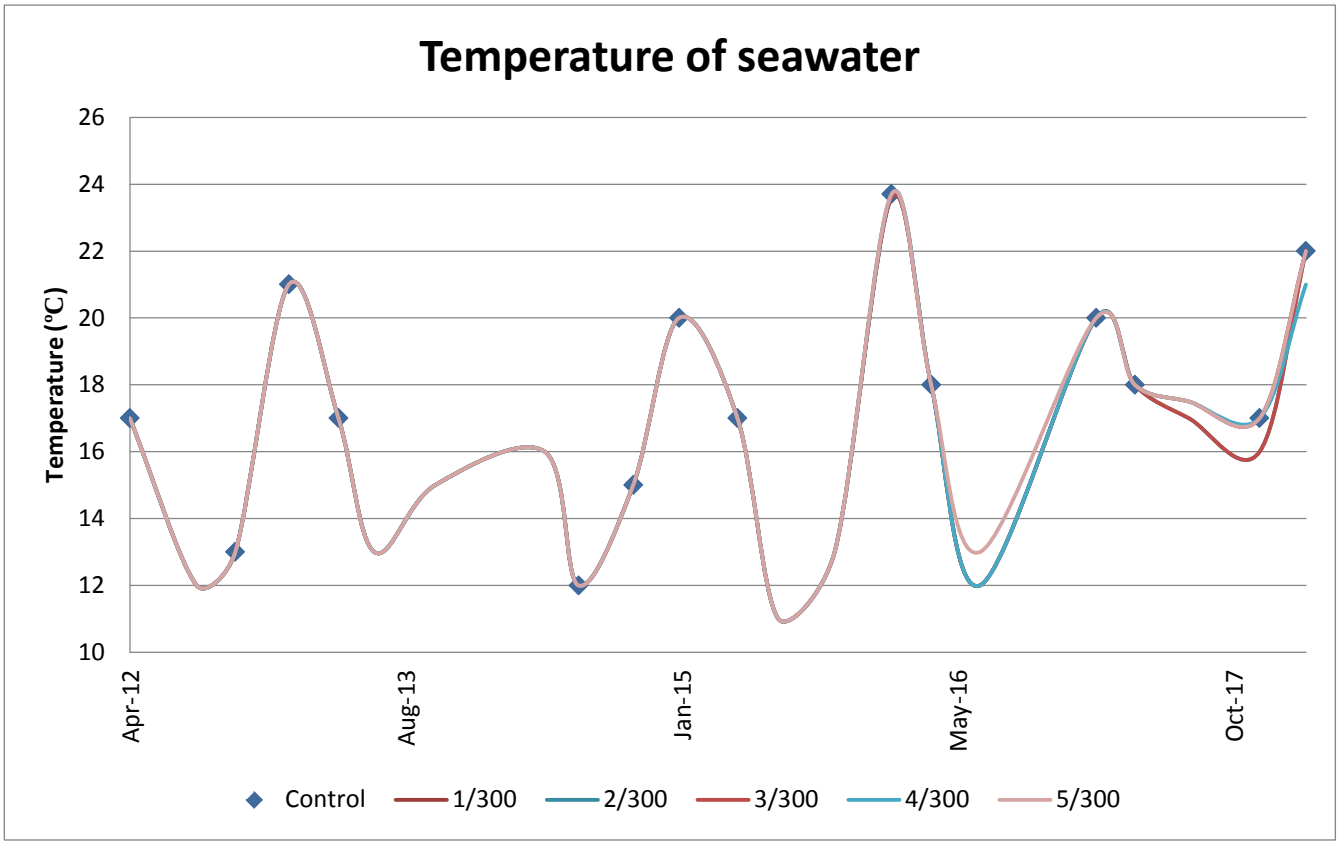


Figure 18 Temperature Recorded since Commissioning

There is less than 1 degree Celsius difference in temperatures between those at the 300m radius locations and the control location. Since this temperature difference is less than the 3 degree Celsius maximum difference in the RCCP, there is 100% compliance.

6.7.4 Compliance

Dissolved Oxygen Saturation: 100% Compliance

Temperature difference: 100% Compliance.

Other criteria: 100% compliance. On the dates of sampling there were no recorded observations indicating the presence of conspicuous suspended materials, change in colour, oil and grease, or objectionable odour

6.8 Condition 14 - Ecotoxicity

6.8.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

There shall be no environmentally significant and statistically detectable difference in toxicity between a water sample from uncontaminated water, and the final combined wastewater when diluted 200 times with the uncontaminated water.

6.8.2 Source of Data

A report on ecotoxicology was prepared for Napier City Council by NIWA in October 2015, and is titled, 'Ecotoxicology Results". Samples were taken from the NCC milliscreen on 20/10/2015, and the level of 'no toxicity' dilution determined.

The results of testing on other dates are summarised in a spreadsheet provided by Napier City Council and titled, 'ALL DATA – Wastewater monitoring results', which indicates test results as either a fail, pass or no test, for three species, being algae, bivalve (Wedge Shell) and bivalve (Blue Mussel).

6.8.3 Analysis of Data: NIWA Report

NIWA performed ecotoxicity testing on four species, including marine algae (Minutocellus polymorphus – 48 hour growth test) and 2 bivalve species; wedge shell (Macomona liliana – 96 hour survival and burial test) and blue mussel embryos (Mytilus galloprovincialis – 48 hour embryo development test).

The toxicity testing indicates that the levels of dilution at which 'no toxicity' was still observed was 71 for algae, and less than 5 for the three bivalves species. At 200 fold dilution there was no significant toxicity.

The NIWA report also notes that after application of the 200-fold dilution used for the 'no toxicity' criterion, both the total ammoniacal-N and the un-ionised sulphide concentrations would be less than their respective ANZECC (2000) trigger values.

The NCC summarised results indicate that:

- Prior to commissioning of the BTF plant in 2014 four 'Fail' results were recorded in the period from 16 April 2012 through to 29 August 2013.
- Since commissioning of the BTF in 2014 there have been no 'Fail' results on toxicity tests.

6.8.4 Compliance

Complies.

The effluent sample tested in 2015 by NIWA complied with the RCCP 'no toxicity' criterion for four species (at 200 fold dilution).

There have been no 'Fail' test results since commissioning of the BTF.

6.9 Condition 15 – Outfall Diffuser

6.9.1 Condition

'The consent holder shall inspect the diffuser at least annually, and at any other time as necessary, at which time any ports blocked by mussels or other debris which may adversely affect the functioning of the diffuser will be cleared. The number of blocked ports shall be recorded and reported to the Regional Council (Manager Compliance) in the annual report required by condition 35 of this consent.'

6.9.2 Analysis of Data

Inspections of the diffuser ports along the ocean outfall were carried out in September and October 2016, and found that a number of the diffuser ports had been blocked. Most of the ports were cleared in August and September 2017, and Napier City Council has planned further works to clear other diffusers in the 2019 financial year.

6.10 Condition 16 – Outfall Pipe and Diffuser

6.10.1 Condition

'The consent holder shall maintain the outfall pipe and diffuser in good condition in accordance with appropriate engineering practice'

6.10.2 Analysis of Data

Napier City Council has committed funds in the 2019 financial year for maintenance of diffusers and the outfall pipeline.

6.11 Condition 17 – Discharge Measurement

6.11.1 Condition

'The consent holder shall continuously monitor and record the rate of discharge and the daily volume of final combined wastewater discharged using a method with an accuracy of +/- 5%'

6.11.2 Analysis of Data

Discharge rate and total daily volumes are recorded by a flume for the domestic and non-separable inflow, and by magnetic flow meters on the industrial inflow lines. Napier City Council has scheduled calibration of these meters to confirm their accuracy during 2018.

6.12 Condition 19 – Analyte Testing on Consecutive Days

6.12.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

Quarterly samples of the combined final wastewater stream discharged on 7 consecutive days shall be tested for analytes listed in Schedule 1.

6.12.2 Source of Data

Samples were taken from the combined wastewater stream prior to discharge into the marine outfall. The results of analyte testing are summarised in a spreadsheet provided by Napier City Council and titled, 'ALL DATA – Wastewater monitoring results'.

6.12.3 Analysis of Data

Quarterly samples have been taken from 2014 through to part of 2018. The annual average concentrations of analyte samples are shown in the table below.

Table 5 Analyte Yearly Average Concentrations

Analyte:	Average Concentration of Samples during Years:				
	2014	2015	2016	2017	Part 2018
Conductivity	162.9	211.6	267.9	164.2	300.3
Total Solids	1341	2073	2089	966	2557
TOC	309	234	244	136	420
NO3-N/NO2-N	0.023	0.014	4.290	1.513	0.038
COD	1047	919	953	633	1694
TKN	66	55	63	30	94
DRP	5.1	4.6	3.0	1.6	5.2
TP	7.1	7.7	6.9	3.4	10.2
Total Phenols	0.40	0.16	0.12	0.02	0.12
Total CN	0.0031	0.0036	0.0038	0.0041	0.0029
TSS		362	7813	10788	261
cBOD5		202	236	187	256
O&G		128	56	51	76

6.12.4 Compliance

Complies. Samples have been taken in accordance with the Condition 19.

6.13 Condition 20 – Quarterly BTF Performance Monitoring

6.13.1 Condition

'At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall monitor the performance of the biological trickling filter by taking 24 hour flow proportional samples of wastewater prior to and immediately after the biological trickling filter treatment (prior to mixing with the final combined wastewater flow). These samples shall be analysed for the following:

i) Suspended Solids
ii) Oil and Grease
iii) $cBOD_5$ '

6.13.2 Source of Data

Data on the performance of the BTF has been provided by Napier City Council in the spreadsheet "BTF Results". The sampling locations are upstream and downstream of the BTF.

6.13.3 Analysis of Data

Samples of raw wastewater and BTF treated wastewater have been taken at quarterly intervals and analysed for Suspended Solids, $cBOD_5$ and Oil and Grease.

The results are presented in the following figures.

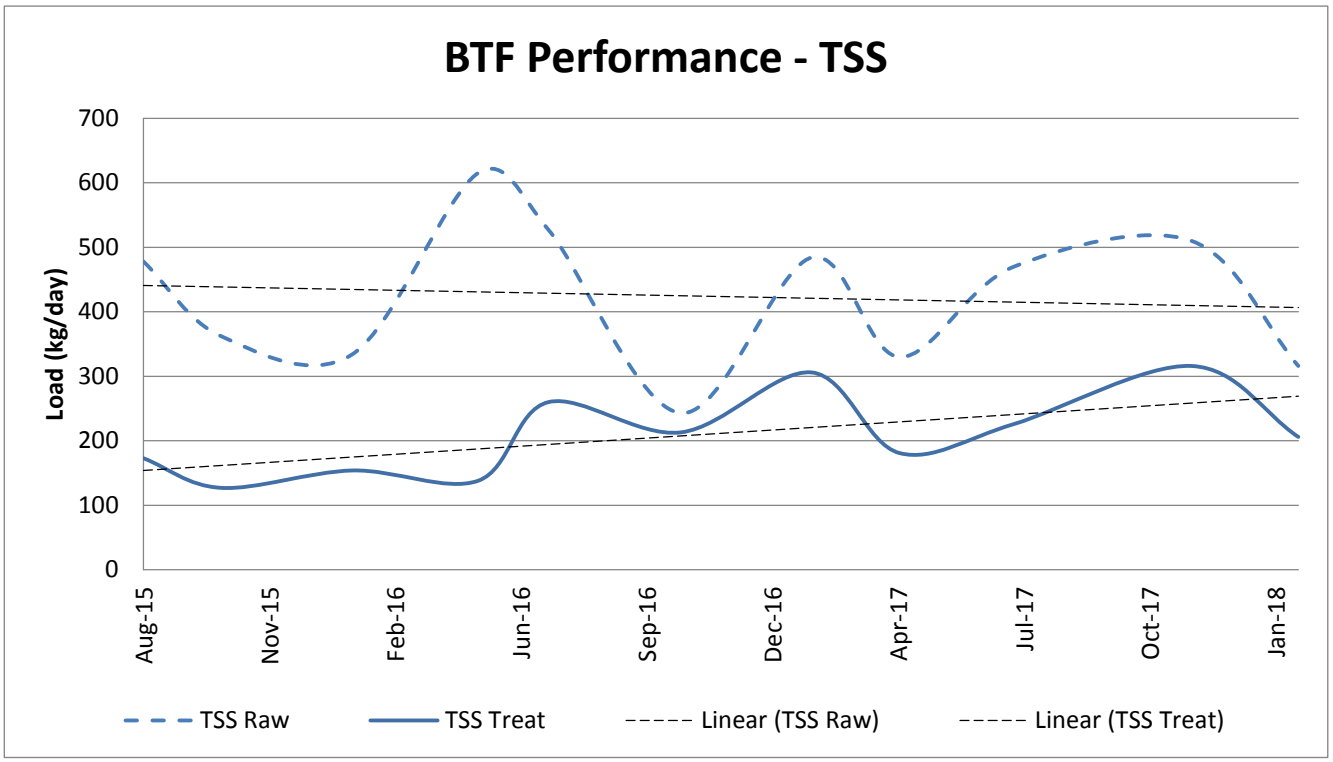


Figure 19 Quarterly BTF Performance - TSS Monitoring

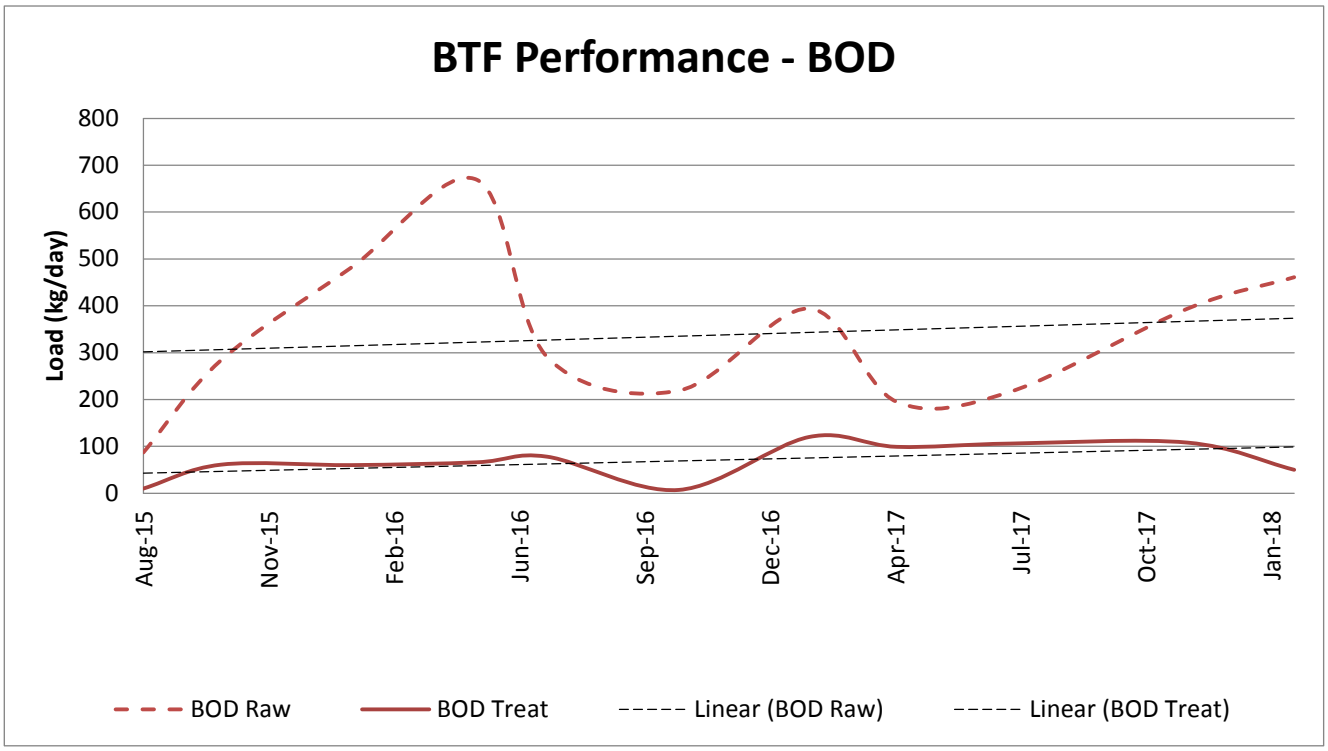


Figure 20 Quarterly BTF Performance - BOD Monitoring

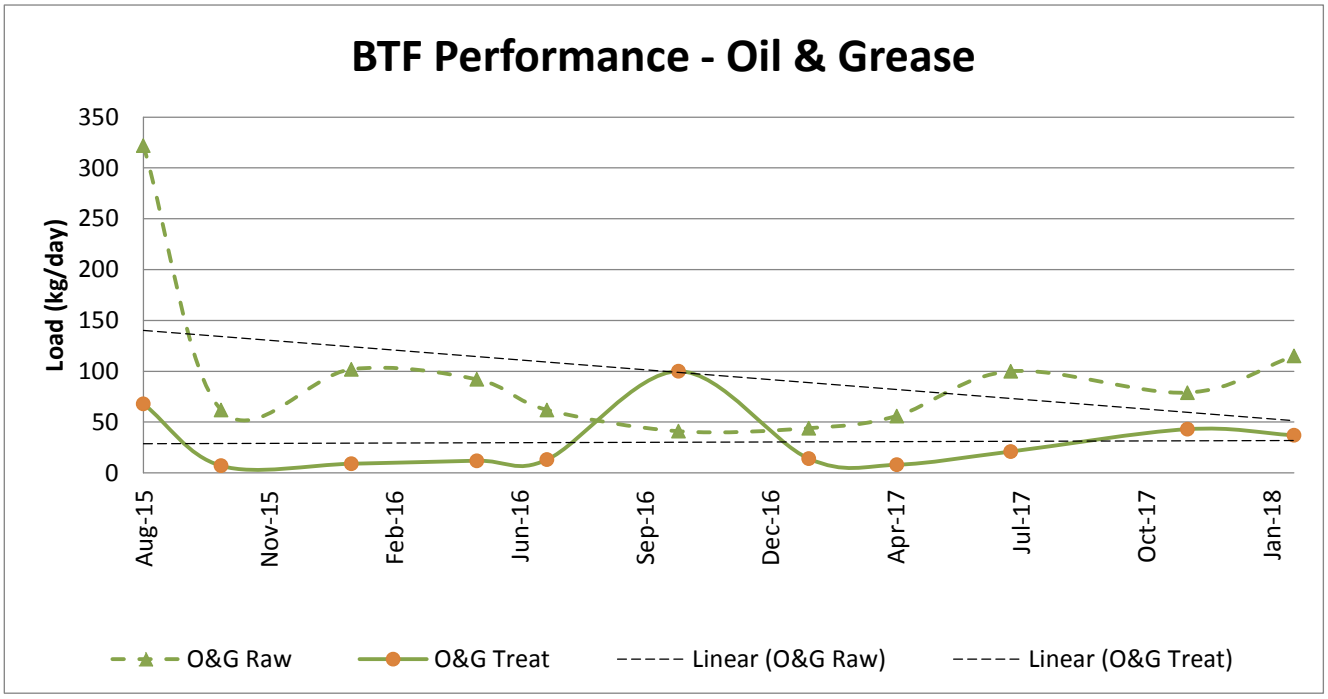


Figure 21 Quarterly BTF Performance – O&G Monitoring

6.13.4 Compliance

Complies. Samples have been taken and analysed in accordance with the condition.

A trend line of the untreated treated suspended solid loadings shows a gradual decrease whereas the treated suspended solids showing an increase. This may indicate that the removal rate of the BTF is reducing, but is inconclusive since there is considerable fluctuation in the recorded data.

The biochemical oxygen demand is trending up at a greater rate in the influent than the effluent. It is noted that while the data suggests that biological activity is currently satisfactory, there is a risk that further increases in BOD concentrations and loadings could result in a reduction in performance.

Oil and grease results in September 2016 indicate that the raw load exceeded the treated load. It is not certain if this is an anomaly or a data error. Since late 2016 there has been a steady increase in the raw and treated loads of oil and grease.

6.14 Condition 21 - Noroviruses

6.14.1 Condition

'At monthly intervals, for a minimum of 12 months after commissioning of the upgrade required by condition 6, the consent holder shall take a grab sample of the final combined wastewater flow. The samples shall be tested quantitatively for noroviruses by polymerase chain reaction (PCR).'

6.14.2 Source of Data

Information is taken from the report, 'Health risk assessment for Town Reef shellfish, Napier, prepared for Napier City Council by NIWA in February 2016.

6.14.3 Analysis of Data

Noroviruses are a group of viruses that can cause gastroenteritis. Noroviruses are found in the faeces or vomit of infected people. Shellfish are able to accumulate viruses in their gastrointestinal tracts, digestive glands and other tissues, but the rate of accumulation is dependent on the viral species and the shellfish species (ANZECC 2000). In 2014-15 Norovirus concentrations were measured on a monthly basis. The following table summarises the concentration of two genome families of Norovirus' in the BTF effluent.

Date	Genogroup I (gc per litre)	Genogroup II (gc per litre)
18/11/2014	$6.30x10^3$	$3.10x10^4$
22/12/2014	$5.00x10^4$	$1.50x10^6$
8/01/2015	$4.50x10^3$	$8.30x10^4$
10/02/2015	$3.80x10^3$	$1.10x10^6$
11/03/2015	$4.70x10^4$	$1.80x10^6$
21/04/2015	$7.80x10^3$	$3.50x10^6$

Date	Genogroup I (gc per litre)	Genogroup II (gc per litre)
13/05/2015	$3.70x10^3$	$7.70x10^6$
17/06/2015	$1.78x10^3$	$2.80x10^6$
21/07/2015	$1.90x10^3$	$1.70x10^6$
11/08/2015	$9.40x10^2$	$4.50x10^6$
16/09/2015	$5.60x10^2$	$3.40x10^6$
14/10/2015	$2.50x10^3$	$1.00x10^6$

Source: *NIWA Health Risk assessment for Town Reef shellfish, Napier (February 2016)*

The NIWA report assesses an individual's illness risk from eating raw shellfish. The risk is assessed as being 'around 5%', and that 'risks of this order are borderline for tolerability' (WHO 2003, MfE/MoH 2003). References in the NIWA report are reproduced below:

- MfE/MoH (2003) Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas. Ministry for the Environment and Ministry of Health, Wellington, New Zealand. (http://www.mfe.govt.nz/publications/water/microbiological-quality-jun03/)
- WHO (2003) Guidelines for safe recreational water environments. Volume 1, *Coastal and fresh waters*. World Health Organization, Geneva. http://www.who.int/water_sanitation_health/bathing/srwe1/en/

6.14.4 Compliance

Complies. Sampling and testing was performed as directed.

The risk of gastrointestinal illness associated with both swimming and the consumption of shellfish infected with noroviruses is noted by the NIWA report to be low in comparison to other locations in New Zealand, but nevertheless there is an ongoing risk.

6.15 Condition 22 – Faecal Coliforms and Enterococci

6.15.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

At quarterly intervals take six flow proportional flow samples of the final combined wastewater stream, (at 4 hourly intervals), and analyse for faecal coliform and enterococci.

6.15.2 Source of data

Samples taken from the combined wastewater stream have been analysed, and the results recorded by Napier City Council in a spreadsheet titled 'ALL DATA – Wastewater monitoring results '.

6.15.3 Analysis of Data

Faecal coliform and enterococci have been sampled and tested in accordance with Condition 22 of the Resource Consent. The monitored concentrations are shown on the following graphs in **Figure 22** and **Figure 23**.

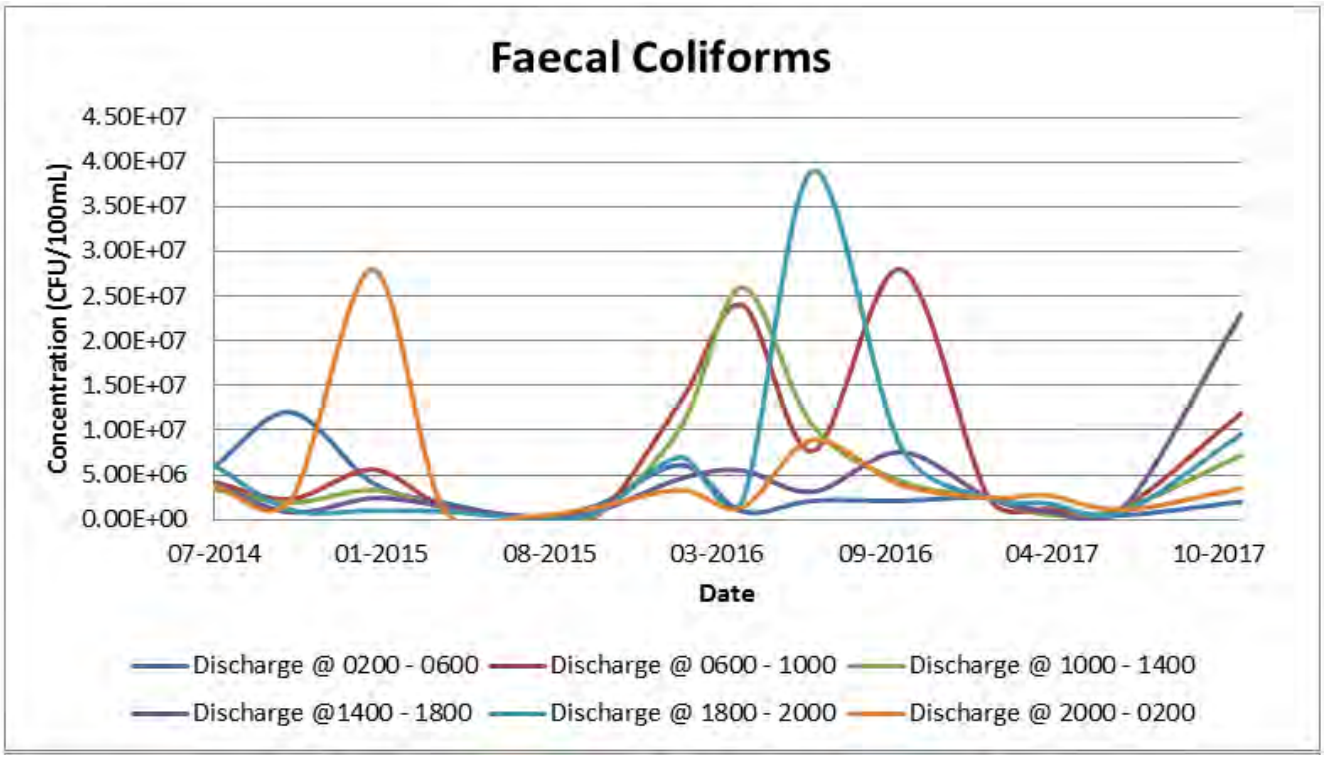


Figure 22 Quarterly Monitoring of Faecal Coliforms in Combined Wastewater since Commissioning

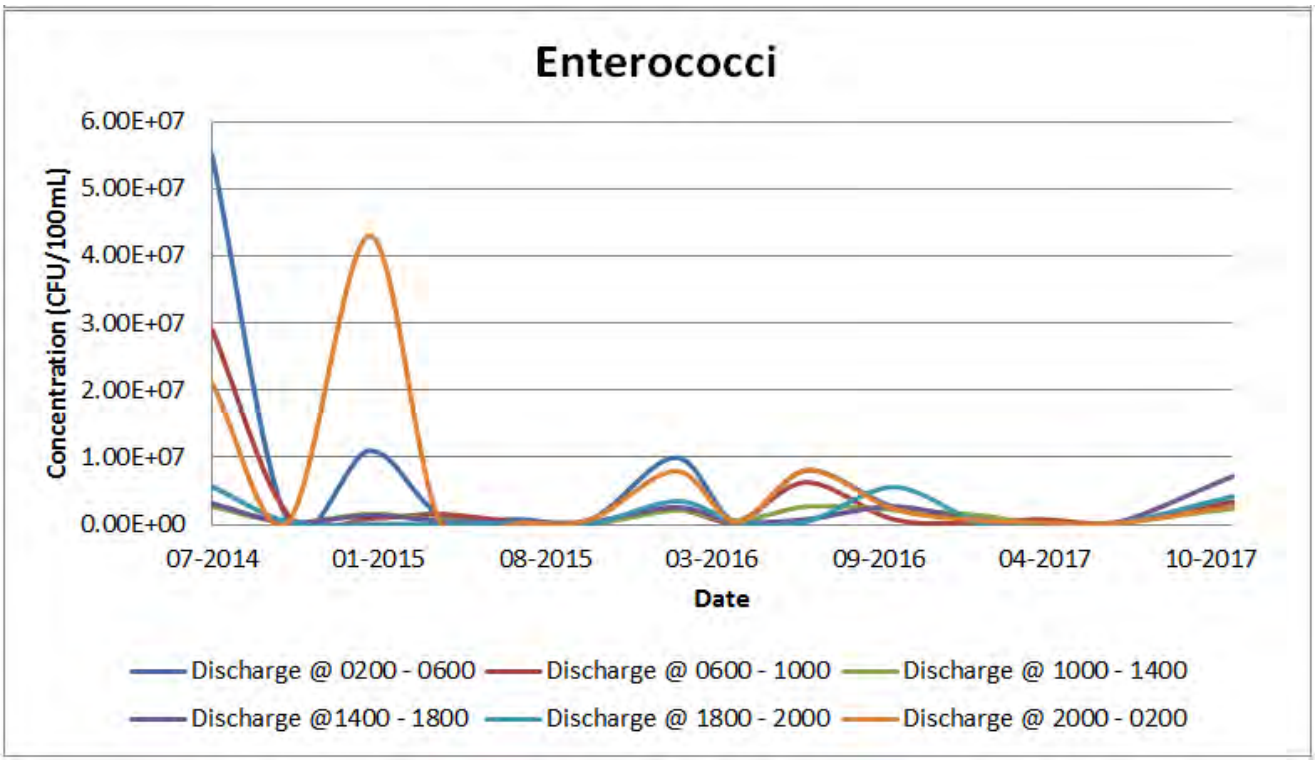


Figure 23 Quarterly Monitoring of Enterococci in Combined Wastewater since Commissioning

6.15.4 Compliance

Complies. Samples have been taken and analysed in accordance with Condition 22.

6.16 Condition 23 – Seabed Sediment Samples

6.16.1 Condition

'Twice during the year the consent holder shall take seabed sediment grab samples from four sites, being located at distances of 300m and 500m to the north, and 300m and 500m to the south of the midpoint of the outfall diffuser. Those samples shall be analysed for the analytes listed, and at the detection limits shown, in Schedule 2.'

6.16.2 Source of Data

Test results from sediment sampling has been provided on the NCC spreadsheet titled 'Sediment Analysis'.

6.16.3 Analysis of Data

Analyte concentrations in sediment samples at 300m and 500m to the north and south of the diffuser, between 2001 and 2016 are shown on the following graphs. The black line represents the date of commissioning for the BTF plant.

With regards to understanding the risk of adverse effects to the environment the Australian and New Zealand Environment Conservation Council (ANZECC) 2000 provides a framework for preserving marine water quality. The guidelines recognise the fate of the contaminants in sediments as a sink and a source of bioavailable contaminates to benthic biota and hence potentially to the aquatic food chain. This document provides upper values as a guide to assess the risk of adverse effects to the environment. The following table summarises the schedule 2 detection limits and the ANZECC trigger and upper limits for sediments in marine environments:

Analyte	Detection limit mg/kg (schedule 2)	low trigger value guidelines (mg/kg)	high value guidelines (mg/kg)
Arsenic	0.001	20	70
Cadmium	0.00005	1.5	10
Chromium	0.0005	80	370
Copper	0.0005	65	270
Mercury	0.00008	0.15	1
Nickel	0.0005	21	52
Lead	0.0001	50	220
Tin	0.0005	Not stated	Not stated
Zinc	0.001	200	410

The following graphs detail the concentration of each analyte separately at the locations specified.

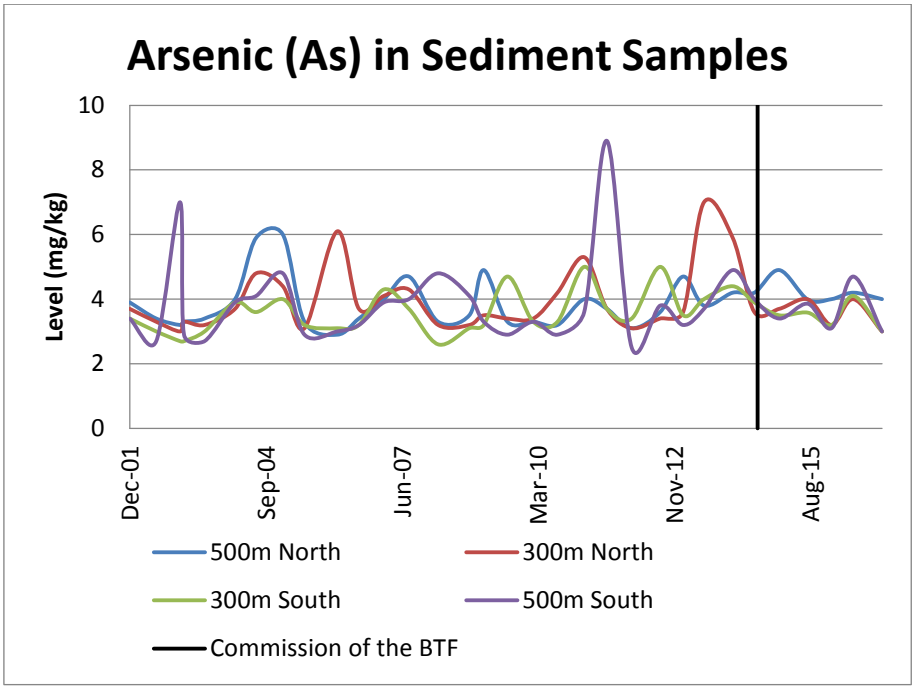


Figure 24 Bi-annual Arsenic Monitoring

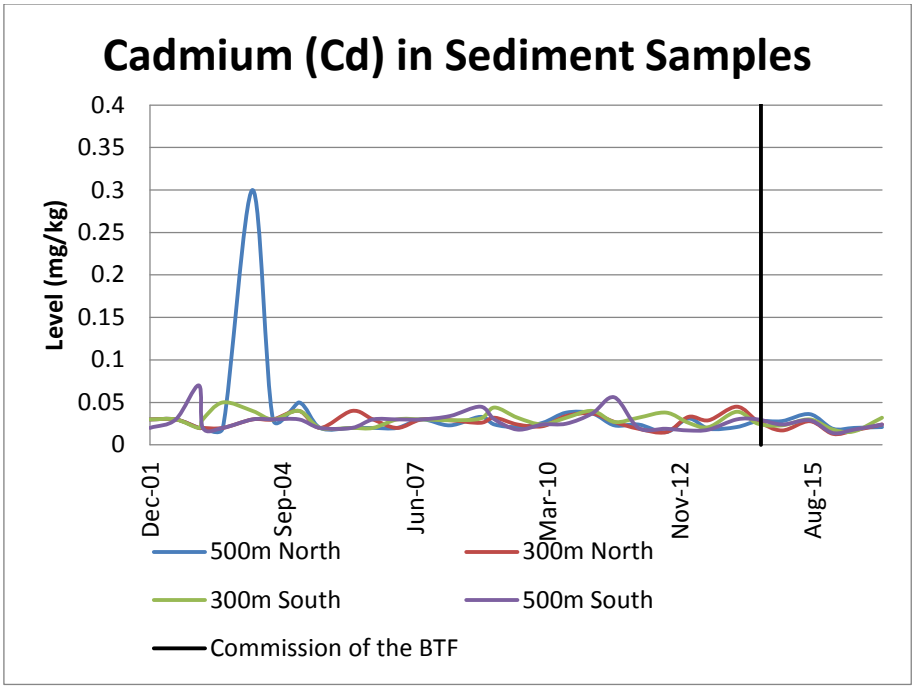


Figure 25 Bi-annual Cadmium Monitoring

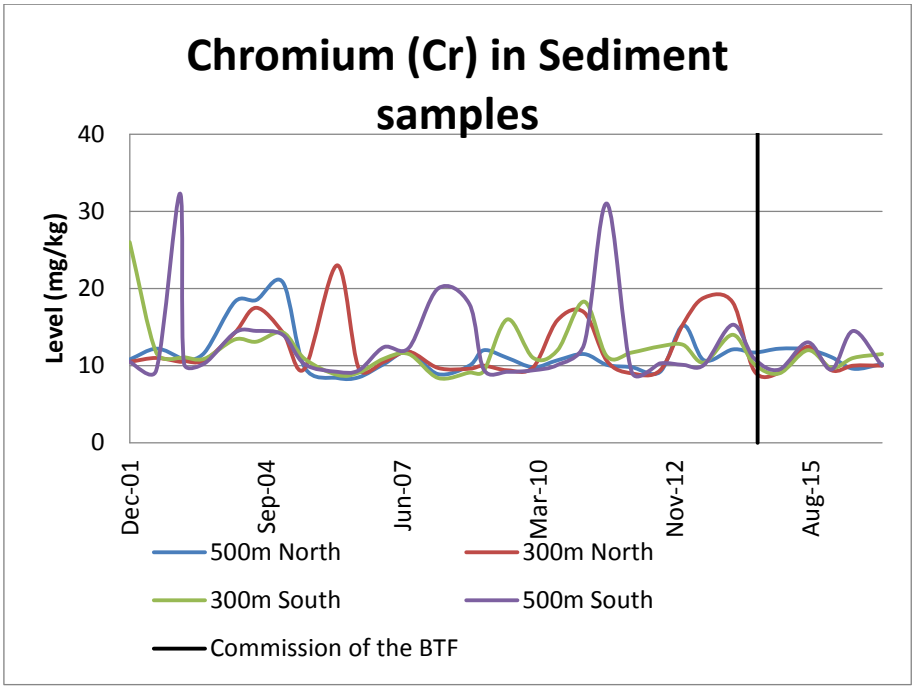


Figure 26 Bi-annual Chromium Monitoring

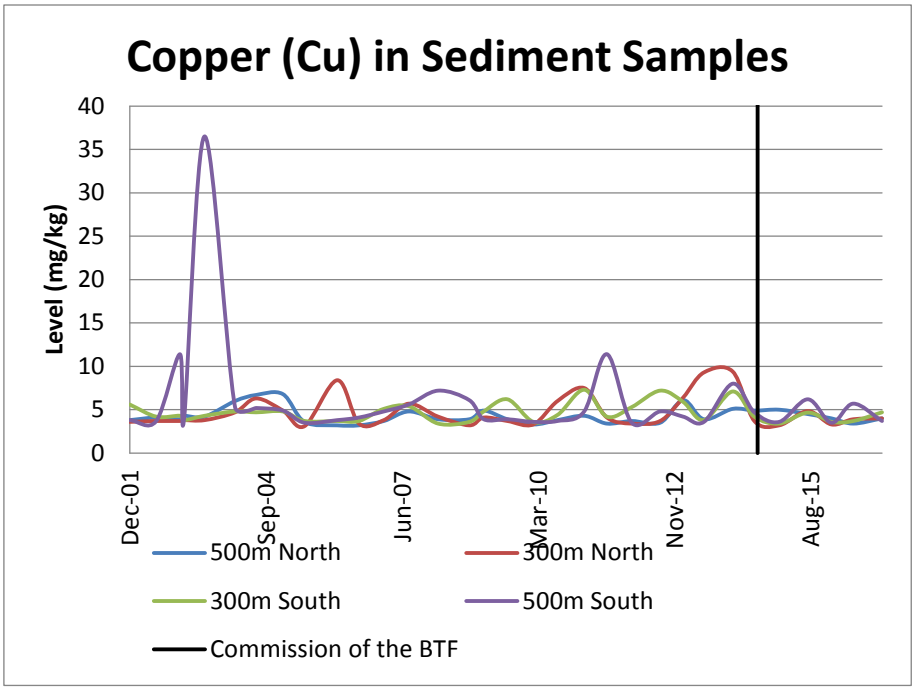


Figure 27 Bi-annual Copper Monitoring

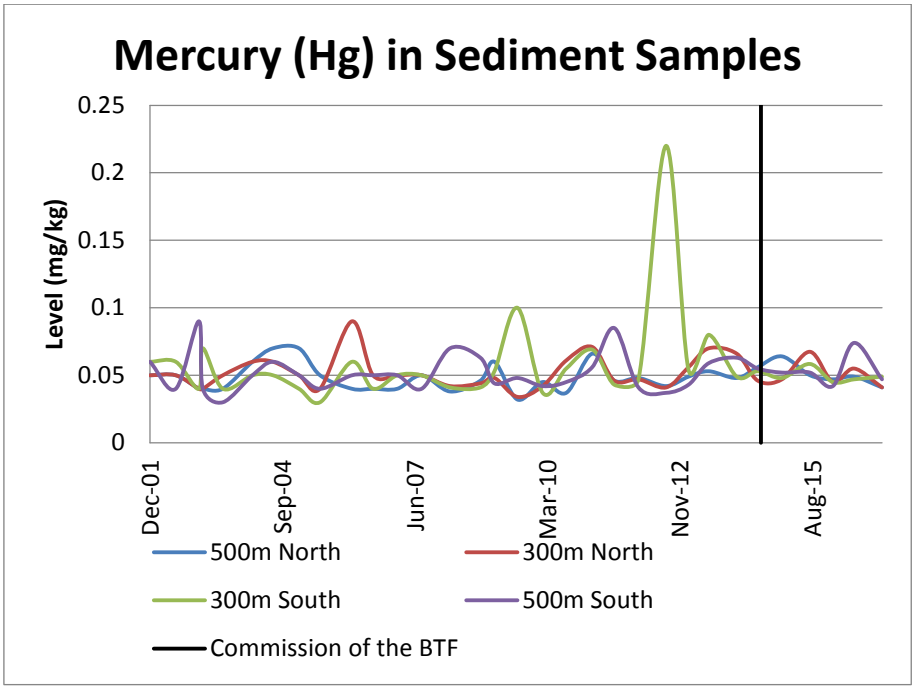


Figure 28 Bi-annual Mercury Monitoring

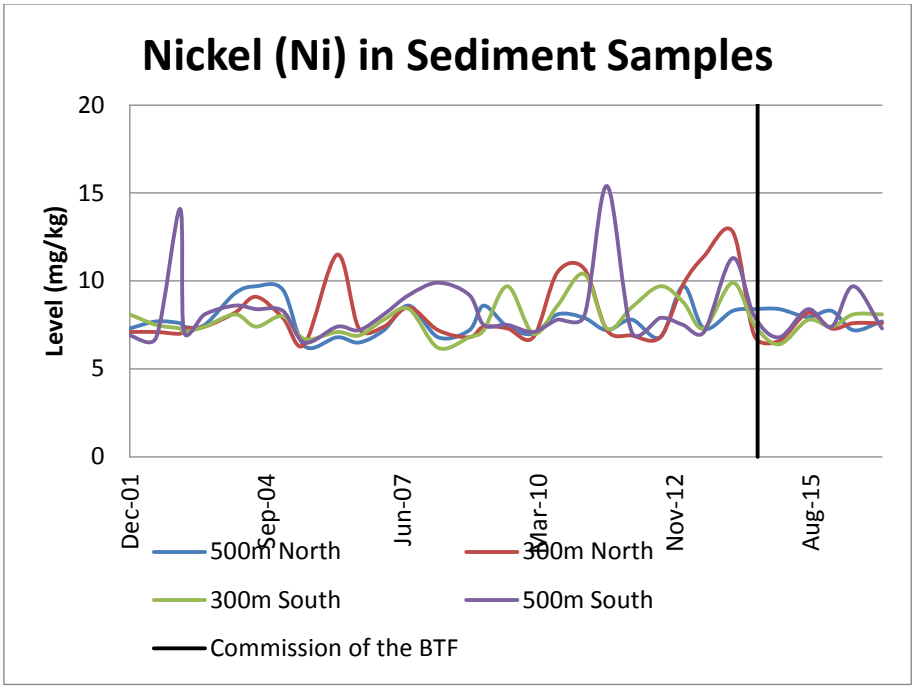


Figure 29 Bi-annual Nickel Monitoring

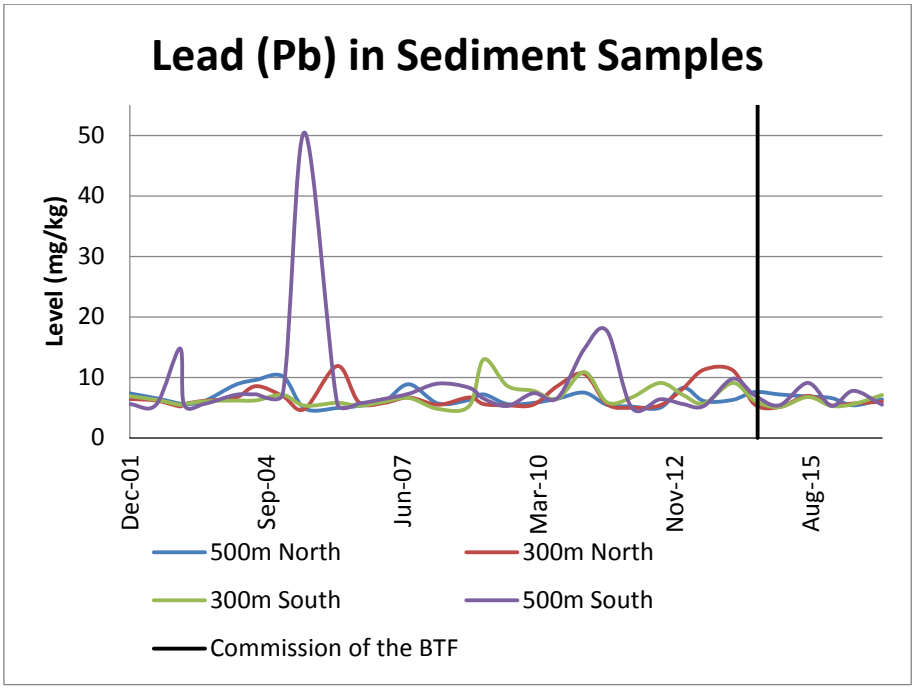


Figure 30 Bi-annual Lead Monitoring

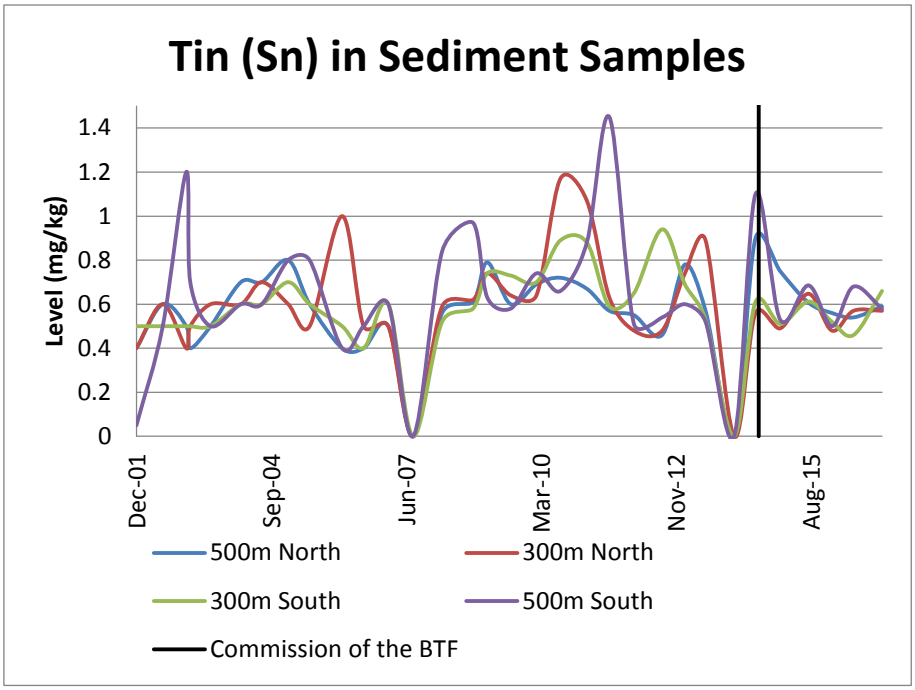


Figure 31 Bi-annual Tin Monitoring

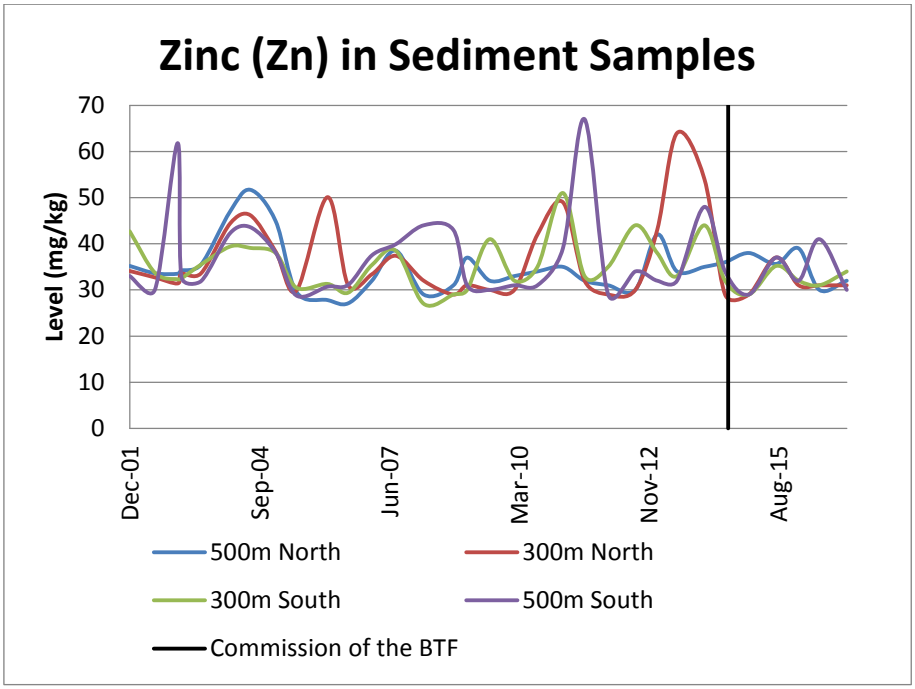


Figure 32 Bi-annual Zinc Monitoring

6.16.4 Compliance

Complies.

Samples have been taken and analysed in accordance with RCCP Condition 23.

The graphs do not indicate any significant long term trends in analyte concentrations over the monitoring period. No improvement trend is apparent since the BTF plant was commissioned. However, there have only been six sample results since the BTF was commissioned, so there is inadequate data to infer any long term trends. Also since many of these metals are resilient, even with a reduction in effluent loadings, it may take many years for any reduction to occur in the sediment concentrations. Even so, the levels of all heavy metals are below the ANZECC trigger levels (apart from Mercury which exceeded the trigger level on one occasion) and all are well below the upper limit.

6.17 Condition 24 – Quarterly Seawater Sampling

6.17.1 Condition

'At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall undertake water quality monitoring. The sampling shall be of seawater at 5 sites equally spaced around a circle of 250m radius from the centre of the diffuser. This shall be repeated at a circle of 300m and 500m radius, giving a total of 15 monitoring sites around the diffuser. On the same day a 'reference' seawater sample shall also be taken at least 1000m from the centre of the diffuser at a location unlikely to be influenced by the discharge. All samples shall be tested for faecal coliform and enterococci concentrations. Measurements of the following shall also be taken at each sampling location:

i) pH

ii) turbidity
iii) temperature
iv) dissolved oxygen (% saturation).'

6.17.2 Source of data

Test results from seawater sampling have been provided by NCC in the spreadsheet titled, 'ALL DATA – wastewater monitoring results'.

6.17.3 Analysis of Data

Water quality samples were taken fifteen locations, comprising five locations at distances of 250m, 300m and 500m from the centre of the diffuser. The five locations are equally spaced around a circle the required distance from the diffuser.

The Australian and New Zealand Environment Conservation Council (ANZECC) 2000 provide a framework for preserving marine water quality. This document provides trigger values as a guide to assess the risk of adverse effects to the environment. Faecal coliforms, measured in colony forming units, are a measure of the anaerobic bacterium from the intestines of warm blooded animals. Enterococci are lactic acid bacteria and are significantly robust and will survive in seawater. The guidelines identify trigger levels for both bathing waters and marine environments. **Table 6** below summarises the ANZECC guideline trigger values for marine environments.

Table 6 ANZECC 2000 Trigger Values – Marine Environments

Dissolved Oxygen	pH	Turbidity (NTU)	Faecal Coliforms (median content)	Enterococci (median content)
90-110%	8-8.4	1-20	1000 CFU/100ml*	230 CFU/100ml*

*The guidelines also recommend maximum concentrations for any one sample of Enterococci to be less than 450-700 CFU/100ml, and for Faecal Coliforms to be less than 4000 CFU/100 ml.

The RCCP Condition 13 limits for Temperature and Dissolved Oxygen (DO) impacts at a distance of greater than 300m from the diffuser are as per **Table 7** below.

Table 7 RCCP Limits for Temperature and Dissolved Oxygen

Temperature	Dissolved Oxygen
Change in receiving water temperature of greater than 3 degrees (measured against reference location).	Greater than 80% of saturation concentration

Faecal Coliforms

The concentration of faecal coliforms at monitoring locations since commissioning is shown in **Figure 33**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference value has been taken 1000m from the diffuser.

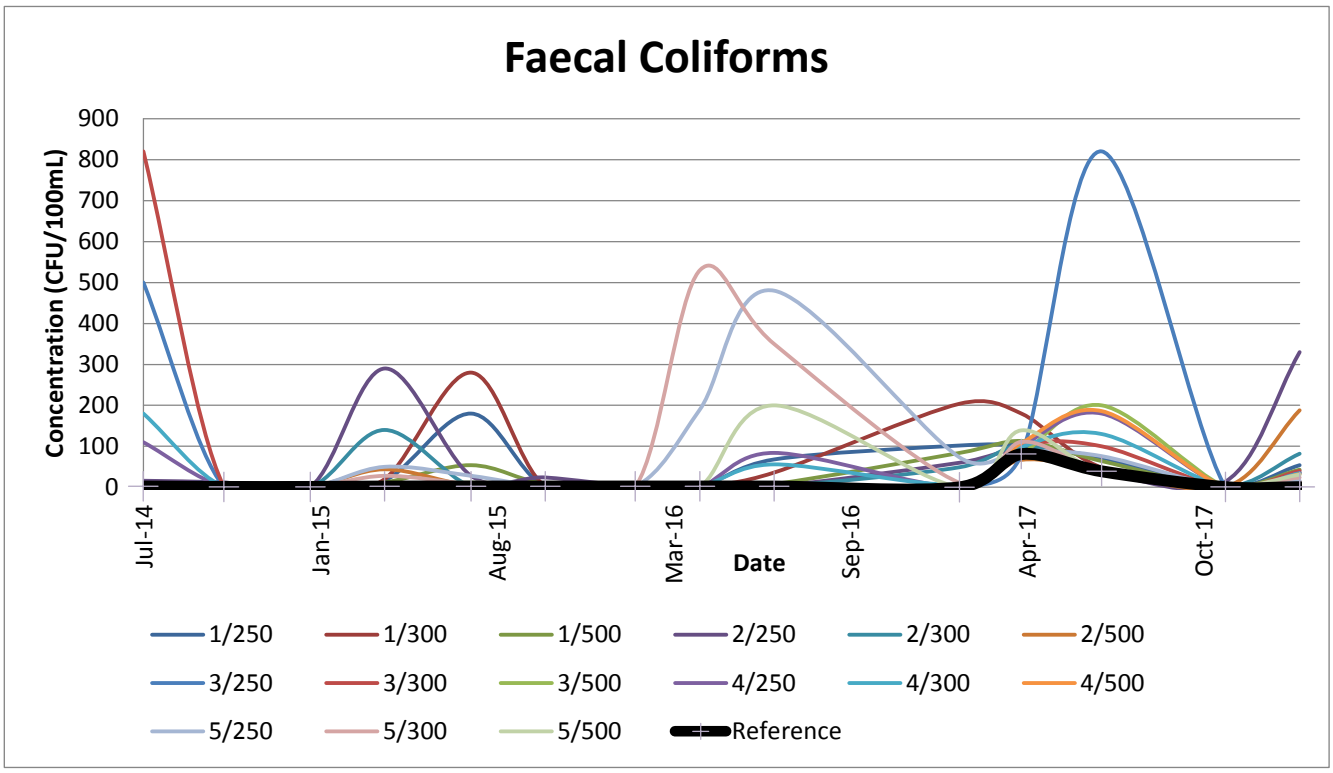


Figure 33 Quarterly Faecal Coliforms Monitoring since Commissioning

Table 8 below summarises the median values of faecal coliform samples at various distances from the diffuser, and the 80th percentile values for all distances. All the values shown are less than the ANZECC trigger value of 1000 CFU/100ml.

Table 8 Median Concentrations of Faecal Coliform at various distances

Site	250m (CFU/100ml)	300m (CFU/100ml)	500m (CFU/100ml)	80% ile (CFU/100ml)
1	10	9	8	71.2
2	20	6	2	57.8
3	2	2	2	39.2
4	2	4	2	78.4
5	22	9.5	2	75.4

Enterococci

The enterococci counts at monitoring locations since commissioning of the BTF are shown in **Figure 34**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference location is 1000m from the diffuser.

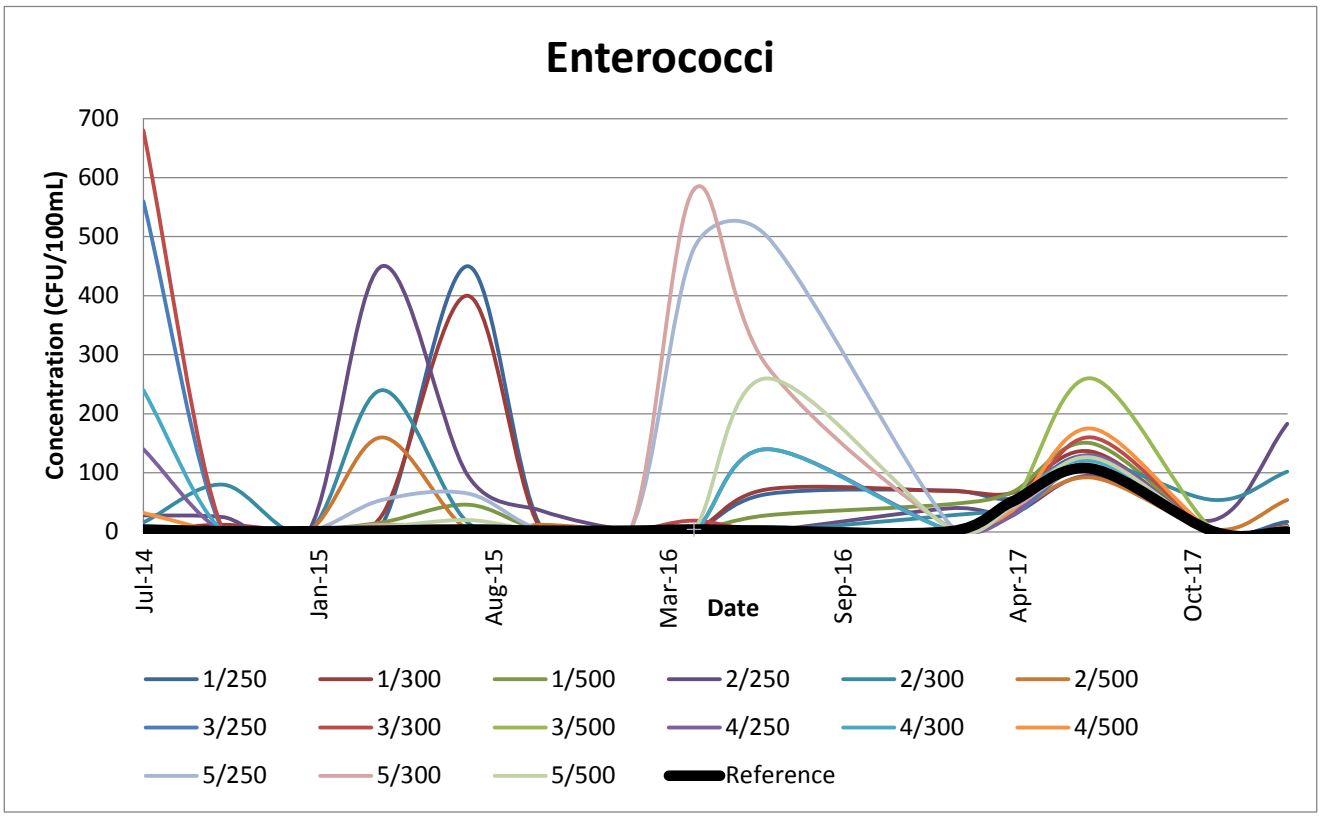


Figure 34 Quarterly Enterococci monitoring since commissioning

Table 9 summarises the median and maximum Enterococci counts at the five monitoring locations for each distance (250m, 300m and 500m) from the diffuser. All median values are less than the median trigger value of 230 CFU/100ml and all of the maximum counts do not exceed the recommended ANZECC maximum value for any one sample of 450-700 CFU/100ml.

Table 9 Median and Maximum Enterococci counts

Location	Median Values at 250m (CFU/100ml)	Median Values at 300m (CFU/100ml)	Median Values at 500m (CFU/100ml)	Maximum (all distances) (CFU/100ml)
1	11	4.5	29.5	450
2	22	4	2	450
3	2	2	2	680
4	2	2	9	240
5	6	4.5	2	580

pH

The pH at monitoring locations since commissioning is shown in **Figure 35**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference location is 1000m from the diffuser.

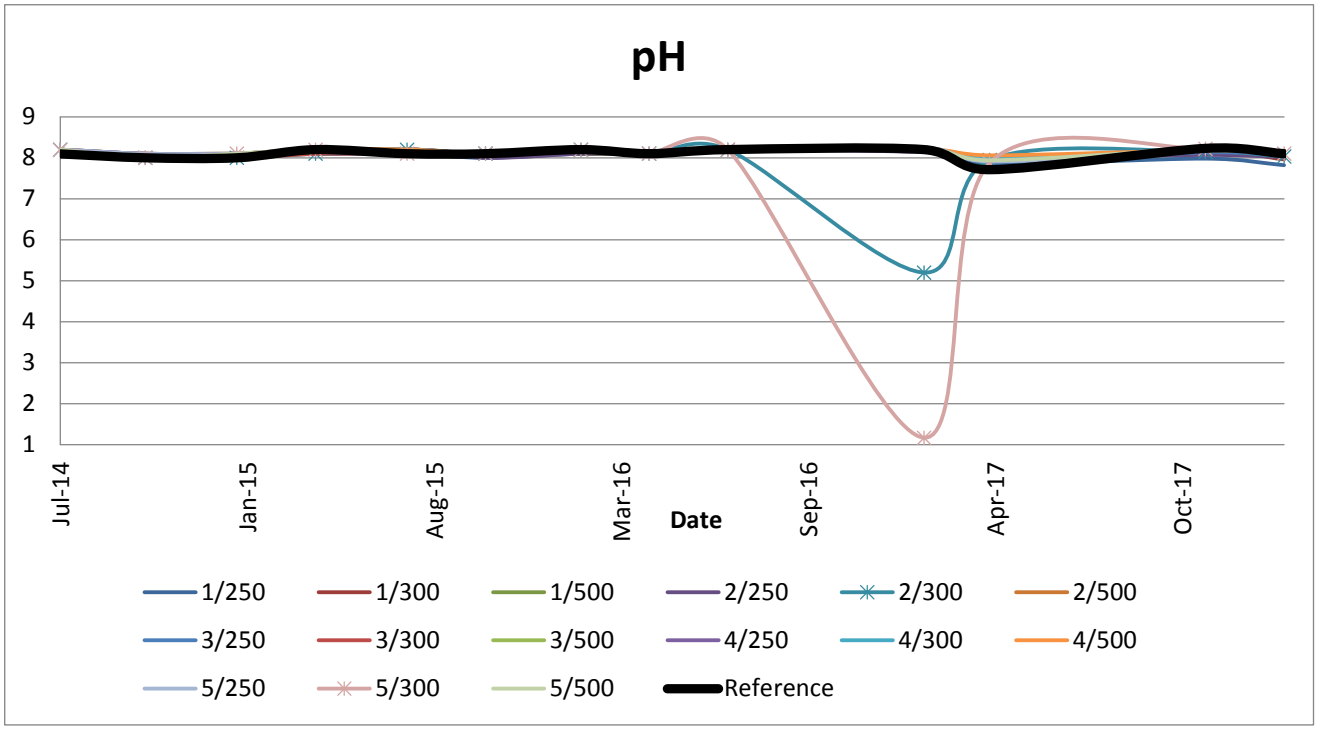


Figure 35 Quarterly pH monitoring since commissioning

The pH values comply with the ANZECC guidelines since commissioning apart from outliers.

Figure 35 includes the plotting of outlying data in January 2017 for two samples taken 300m from the diffuser, with a pH of 5 and 1. These levels appear to be errors and could have been a result of contaminated bottles. A pH of 5 is equivalent to black coffee and 1 gastric acid which would be virtually impossible in the ocean. Samples taken closer to the diffuser complied with the guidelines on this day.

Samples taken in April 2017 fell below a pH of 8 for all distances from the diffuser. This could have coincided with influx of floodwaters associated with Cyclone Cook, and increasing the percentage of fresh water with the effect of lowering the pH.

Turbidity

The turbidity at monitoring locations since commissioning is shown in **Figure 36**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference value has been taken 1000m from the diffuser.

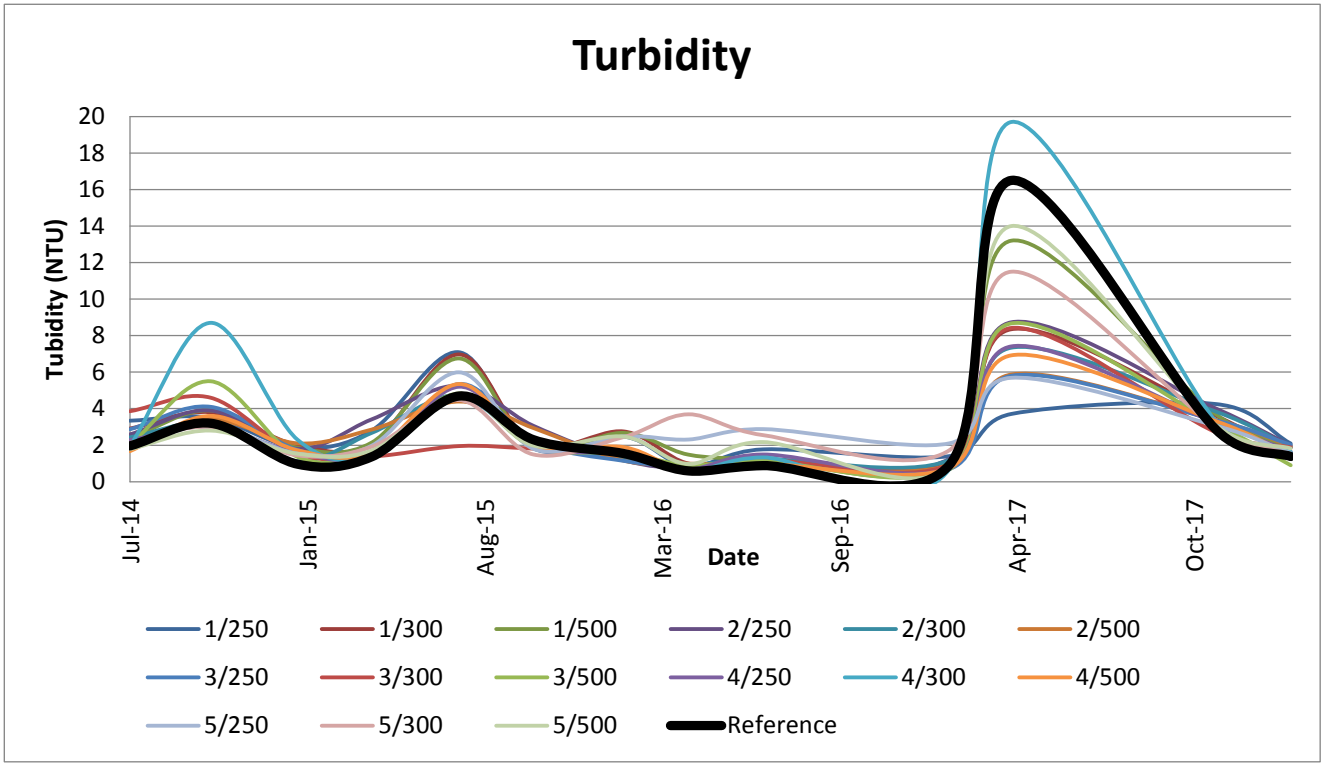


Figure 36 Quarterly Turbidity Monitoring since Commissioning

Temperature

Measured seawater temperature at monitoring locations and the reference location since commissioning are shown in **Figure 37**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference location is 1000m from the diffuser.

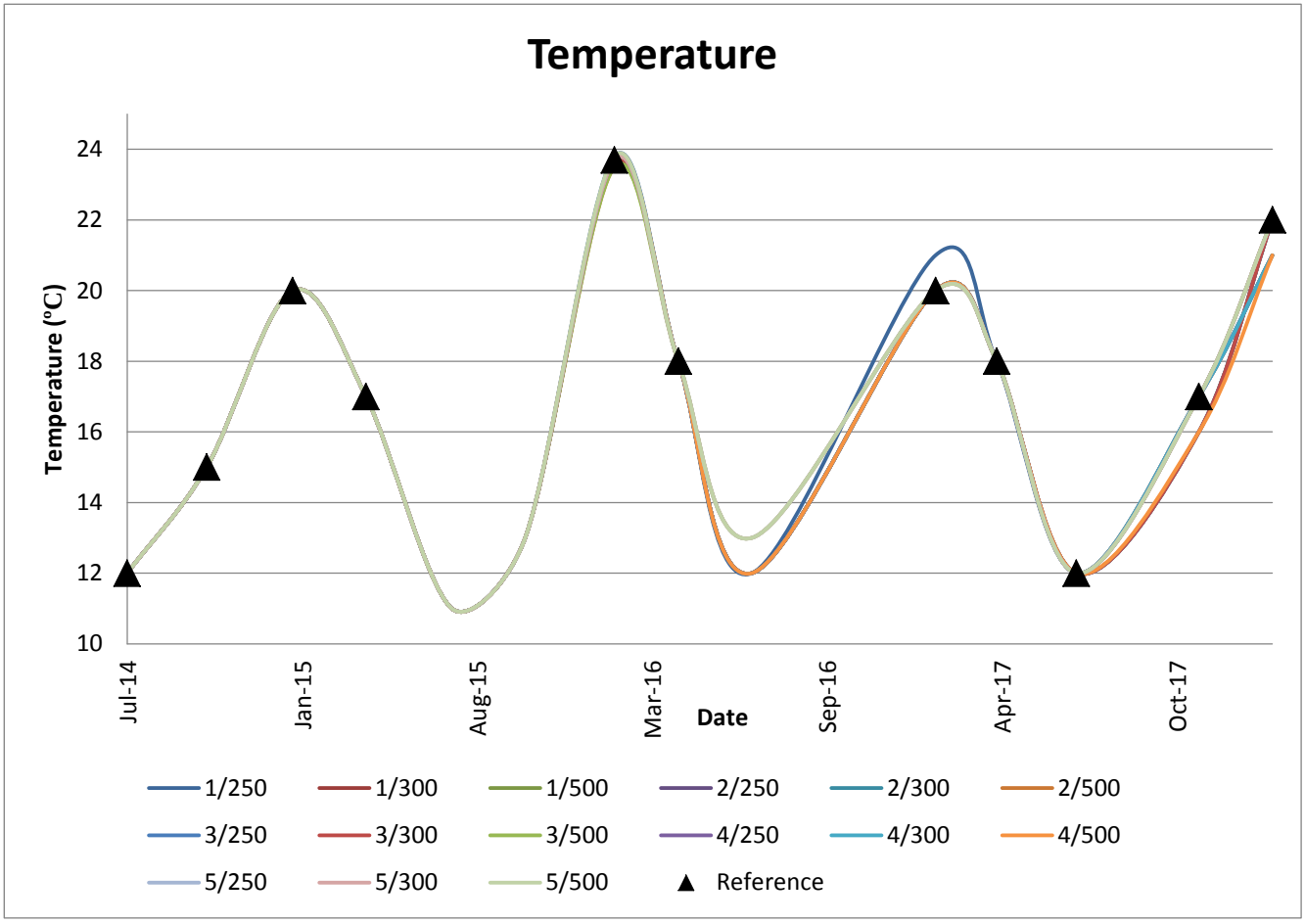


Figure 37 Quarterly Temperature Monitoring since Commissioning

Dissolved Oxygen (DO)

The concentration of dissolved oxygen, expressed as a percentage of the saturation level, at monitoring locations since commissioning is shown in **Figure 38**. The first number represents the site number and the second number the distance from the centre of the diffuser. The reference value has been taken 1000m from the diffuser.

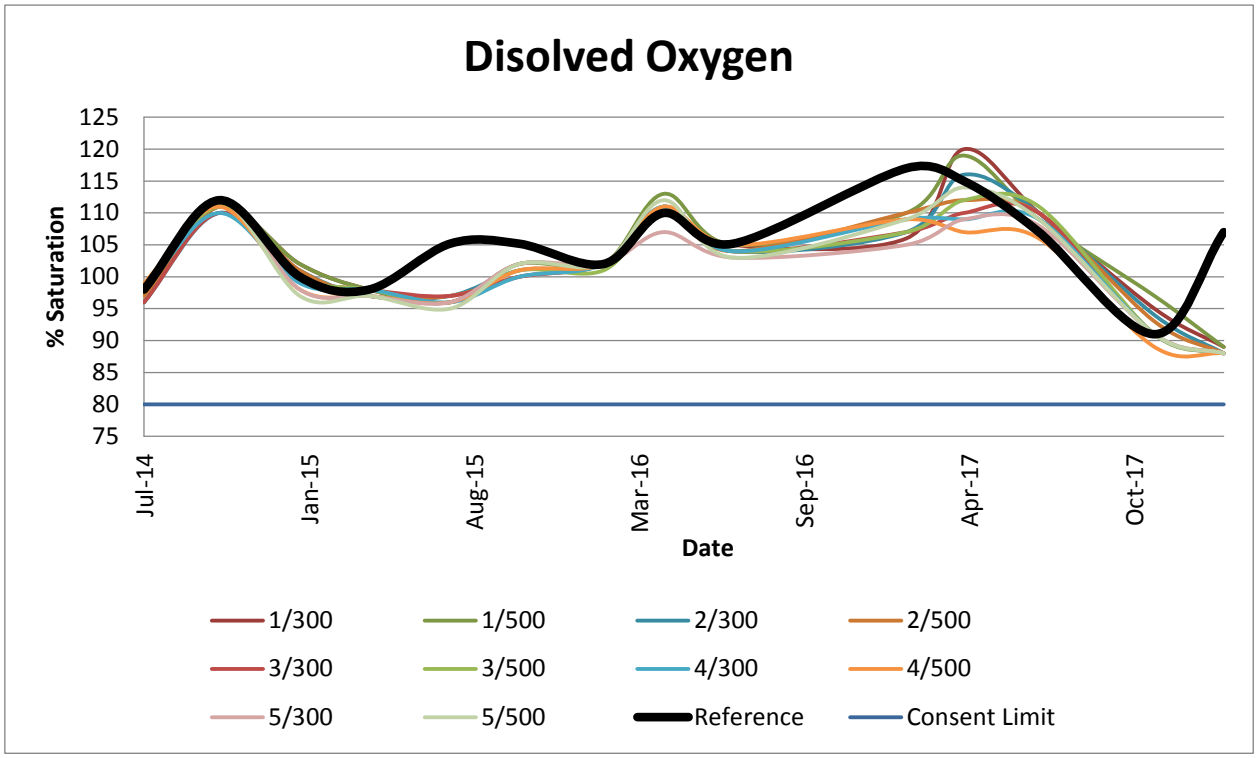


Figure 38 Quarterly Dissolved Oxygen Monitoring since Commissioning

6.17.4 Compliance

Faecal Coliforms: Complies

Enterococci : Complies

pH: Complies*

*Based on discarding of results in January and April 2017 which are likely to be erroneous. In January 2017 two samples taken 300m from the diffuser showed a pH of 5 and 1. These levels appear to be errors and would be extremely unlikely to occur in the ocean. Samples taken on the same day closer to the diffuser complied with the guidelines. Samples taken in April 2017 fell below a pH of 8 for all distances from the diffuser, and likely coincided with mixing of seawater with floodwaters, with the effect of lowering the pH.

Turbidity: Complies

Temperature: Complies

Dissolved oxygen: Complies

6.18 Condition 26 – Benthic Fauna

6.18.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

Undertake surveys designed to show the impact of discharge on benthic fauna, between late December and late February (preferably in January) with the first survey undertaken within two years of the upgrade, and every five years after. The first survey shall include an analysis of trace metal concentrations in flatfish.

6.18.2 Source of Data

EIA Ltd provided a report to Napier Council in March 2017, titles "Awatoto Coastal Sewage Outfall resource Consent CD 090514W, Condition 26 – Trace Metal Concentrations in Flounder".

6.18.3 Analysis of Data

EIA Ltd captured flounder and analysed the flesh and gut contents for concentrations of heavy metals. The concentrations in 2016 were compared to the values for the same species caught in 2001 and 2010.

The temporal analysis shown on **Figure 39** (extracted from the EIA report) shows Tin (Sn), Nickel (Ni), Lead (Pb) and Chromium (Cr) to have dropped significantly since the commissioning of the BTF whereas there was no significant change in Cadmium (Cd) and Copper (Cu).

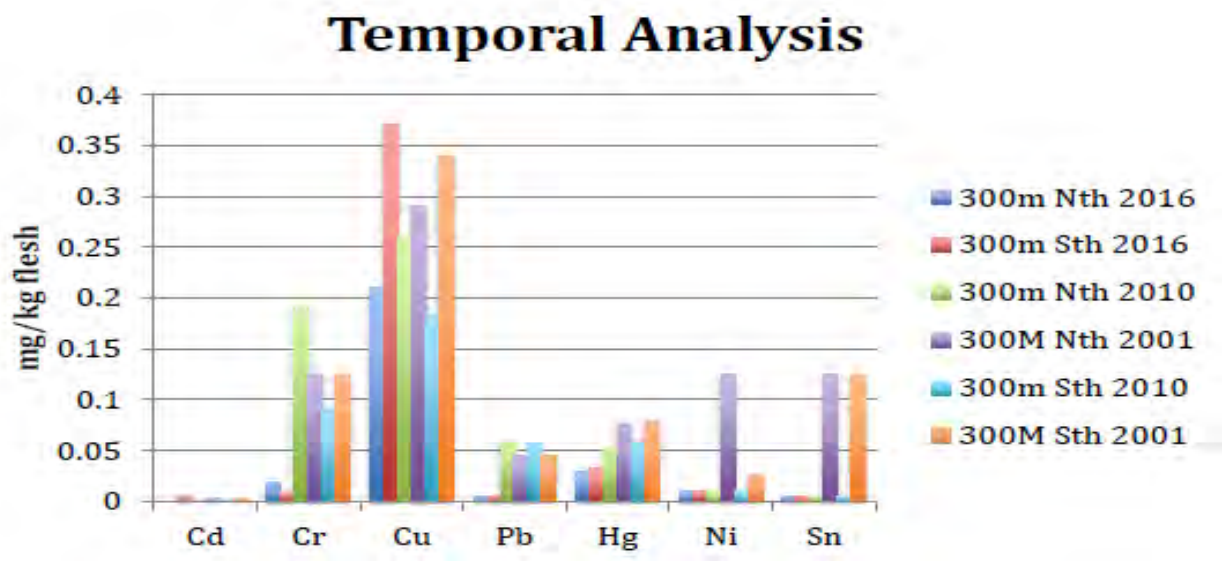


Figure 39 Comparison of Metal Concentrations in Fish Flesh in 2001, 2010 and 2016

The EIA Report concludes that the FSANZ Standard of 0.5 mg/kg for Mercury (Hg) and lead in fish flesh is not exceeded at either site. There are no FSANZ standards for chromium, copper, tin or nickel.

The graph shown in **Figure 40** (extracted from the EIA report) shows the level of Arsenic (As) to have dropped substantially since the commissioning of the BTF but no apparent trend in Zinc (Zn) levels.

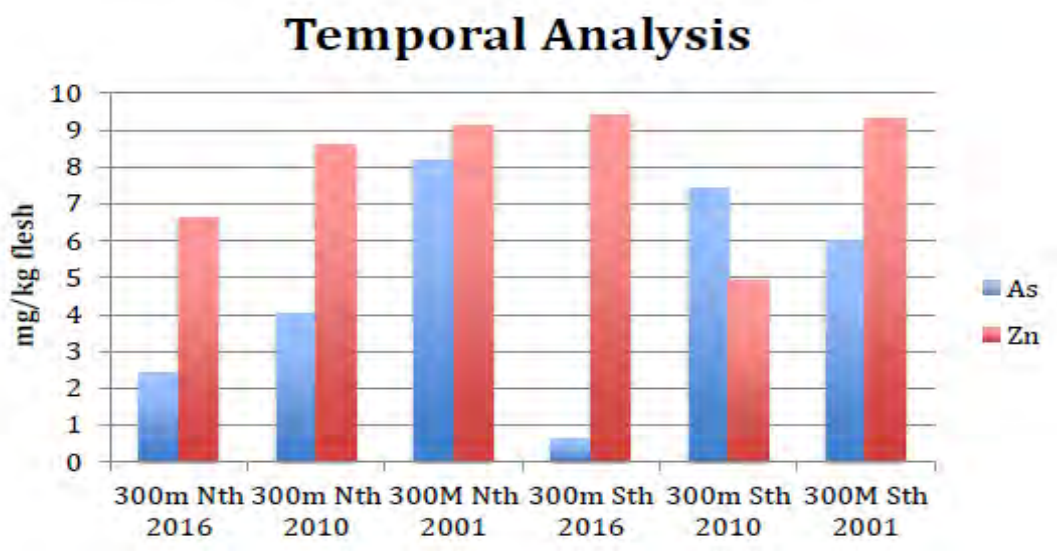


Figure 40 Comparison of Arsenic (As) and Zinc (Zn) Concentrations in Fish Flesh in 2001, 2010 and 2016

The graph below (also extracted from the EIA report) compares levels of arsenic and zinc with those at the control location in Kaipara Harbour. It shows that the Awatoto sites (300m north and south of the WWTP diffuser) have significantly higher concentrations of arsenic and zinc than those at the control location.

Figure 41 2016 Arsenic and Zinc Concentrations – 300m north and south of outfall vs Kiapara Harbour

The EIA report concludes that the flounder flesh taken near the Awatoto Outfall are compliant with the relevant food safety guidelines.

The next survey is due by 2021.

6.18.4 Compliance

Complies. A survey has been completed as per the RCCP condition.

6.19 Condition 27 – Microbial Risk Assessment

6.19.1 Condition

RCCP conditions for this condition have been paraphrased below. The full RCCP conditions can be found in Appendix A of this report.

Undertake a quantitative microbial risk assessment of the risk to shellfish growing Town Reef from pathogens within the first 2 years since commissioning.

6.19.2 Source of Data

A risk assessment was included in the report 'Health risk assessment for Town Reef shellfish, Napier', prepared for Napier City Council by NIWA in February 2016.

6.19.3 Analysis of Data

The monitoring of shellfish on Town Reef was performed in 2012 before commissioning. There was evidence of E Coli, Faecal coliforms and Noroviruses above the ANZECC guidelines for human consumption at this time.

Results from the NIWA 2016 risk assessment are discussed in this report under Condition 21 above.

6.19.4 Compliance

Complies. A quantitative microbial risk assessment has been carried out.

6.20 Condition 28

6.20.1 Condition

All effluent quality analysis other than field measurements as required by the conditions of this consent shall be undertaken by an independent laboratory accredited to IANZ.

6.20.2 Analysis of Data

EIA Limited, Cawthron Institute, Triplefin and NIWA were engaged by Napier City Council to perform the testing and are all IANZ accredited.

6.20.3 Compliance

Complies. Testing has been performed by IANZ accredited laboratories.

7 Public Feedback

Napier City Council wishes to seek community response on the performance of the Wastewater Treatment Works, and will release this draft performance evaluation report to the public for comment. This is an opportunity for the community to review the information contained in the report, and share information or concerns about the performance of the Napier Wastewater Treatment Works, and in particular any effects on the marine environment associated with the marine outfall.

All public submissions will be evaluated, and the outcomes incorporated into the final performance evaluation report, for submission to Hawkes Bay Regional Council, as required by Condition 11ii) of the RCCP.

APPENDIX A

Resource Consent Coastal Permit (RCCP)

HAWKE'S BAY
REGIONAL COUNCIL

RESOURCE CONSENT

Coastal Permit

In accordance with the provisions of section 12 of the Resource Management Act 1991, and subject to the attached conditions, the Hawke's Bay Regional Council (the Council) grants a resource consent to:

Napier City Council
Private Bag 6010
Napier 4140

to discharge domestic sewage and industrial wastewater into Hawke Bay at Awatoto via a marine outfall.

LOCATION

Address of site:	Waitangi Road, Awatoto
Legal description:	Seabed, vested in the Crown
Map reference:	Between the following approximate locations: NZTM 1938355 5615661 and NZTM 1938556 5615661

CONSENT DURATION

This consent is granted for a period of 25 years from the date of commencement.

ISSUED IN ACCORDANCE WITH DECISION NO: [2012] NZENVC
ENVIRONMENT JUDGE JA SMITH
6th December 2012

CONDITIONS

Activity Definition

1. This resource consent shall take effect upon surrender of the consent holders existing resource consent CD990400Wc.

2. The consent holder shall provide for the discharge as authorised by this resource consent generally in accordance with the drawings, specifications, statements of work techniques and other information supplied by the consent holder in support of the application. Where a conflict exists between the application and the conditions of this resource consent, the conditions shall prevail.

3. The combined domestic (including non-separable industrial) and industrial discharge shall not exceed an annual average volume of 32,000m^3/d and a maximum flow rate of 1,400 L/s.

4. Discharge of wastewater as authorised by this resource consent shall be by way of the existing outfall structure located at Awatoto between NZTM 1938355 5615661 and NZTM 1938556 5615661.

5. All wastewater discharged shall pass through an ocean outfall diffuser which has been designed to achieve a minimum average dilution over the boil of not less than 100:1 in slack water.

Wastewater treatment and standards

6. From a date no later than 31 August 2014 all domestic and non-separable industrial wastewater shall be:

   i) Treated to remove kuparu[1] from the flow, with the wastewater being treated in a biological trickling filter, filled with structured media, with an annual average daily loading of carbonaceous biochemical oxygen demand (5 day test) ($cBOD_5$) that shall not exceed 0.6 kg per cubic metre of media per day.

   ii) The proposed treatment plant required under Condition 6(i) shall involve milliscreening, followed by grit removal then treatment of the wastewater in a biological trickling filter. The design shall be undertaken by an independent chartered engineer or similarly qualified person specialising in wastewater treatment plant design. The design shall undergo a peer review by a suitably qualified independent chartered engineer or similarly qualified person specialising in wastewater treatment plant design, paid for by the consent holder. The design, together with the peer review, shall be submitted to the Hawke's Bay Regional Council for review and comment prior to the commencement of construction.

   iii) The effluent remaining after that treatment, prior to being discharged, shall pass through a Papatuanuku channel (land sourced rocks of various dimensions) placed and sized as directed by tangata whenua members of the Napier City Council Kaitiaki Liaison Group.

[1] Kuparu is human waste in an unchanged state.

7. By 31 August 2014 all discharged wastewater shall be treated to a level such that, in the final combined wastewater, the analytes listed below do not exceed the following maximum concentrations and loads:

Analyte	Maximum concentration (g/m^3)	Maximum load (kg/day)
Total Ammonia-N	91	2912
Cd	0.55	17.6
Cr III	2.74	87.7
Cr VI	0.44	14.1
Cu	0.13	4.16
Pb	0.44	14.1
Hg	0.04	1.3
Ni	7	224.0
Zn	1.5	48

#Loads are based on an average annual flow of 32,000 m^3/day

In the event that a limit is exceeded for any analyte, an additional 24 hour flow proportional sample shall be collected and tested for the analyte within 5 working days of receipt of the laboratory result. An investigation should also be undertaken into the cause of the exceedence, and the findings of this investigation report to the Regional Council (Manager Compliance) within one month of the exceedence occurring.

Compliance with these standards will be based on the results of all samples, and any single exceedence will result in non-compliance with this condition of consent.

8. By 31 August 2014 all discharged wastewater shall be treated to a level such that, in the final combined wastewater, the analytes listed below do not exceed the following trigger values:

Analyte	Average load* (kg/day)	Maximum load (kg/day)
cBOD	18,000	22,400
TSS	18,000	22,400
TFO&G	7,000	8,800
pH		6.5-8.5

#Loads are based on an average annual flow of 32,000 m^3/day
*The average load should be based on a 12 month rolling mean

If any of the trigger values are exceeded the consent holder shall provide the Regional Council (Manager Compliance) with a report detailing the reasons for the exceedence, the significance of the effect of the exceedence on the receiving environment, and the remedial action undertaken (if required) in response to the exceedence. The report shall be provided to Council within 1 month of the exceedence occurring.

9. A) Except for B) below, at all times from the commencement date of this consent, all wastewater discharged shall pass through a screen having a maximum aperture of 1 mm discharged.

B) i) For one period of up to 12 weeks, which shall occur before 31 December 2013, all wastewater discharged up to an inflow rate at the Latham Street pump station of 750L/s shall pass through a maximum aperture of 25 mm before being discharged. This single bypass period is to allow the milliscreen building to be reconfigured to allow separate screening of the industrial and domestic (and non-separable industrial) wastewater flows.

ii) Any portion of the high flow exceeding 750l/s which does not pass through the Latham Street pump station shall be managed according to the Milliscreen Bypass Management

Plan in Condition 32.

10. From a date no later than 31 August 2014 all separable industrial wastewater shall be collected separately from the balance of the waste stream and passed through a milliscreen having a maximum aperture slot width of 1 mm prior to discharge.

11. All discharged wastewater of human origin and 'non-separated' industrial wastes shall receive treatment as follows;

    i) From a date no later than 31 August 2014: treatment by a biological trickling filter.

    ii) Until such time as the comprehensive review required by condition (11(iii)) is undertaken, the consent holder shall each 3 years following the commissioning of the biological tickling filter plant undertake an evaluation of the performance of the plant which will be reported publically. This evaluation shall include but not necessarily be limited to:

        - A summary of monitoring results;
        - A report on non compliance;
        - An evaluation of any information indicating trends including both favourable environmental outcomes or any emerging adverse effects; and
        - An opportunity for public response.

    The consent holder shall submit a report to the Regional Council (Manager Compliance) on the outcome of this public evaluation and whether any changes to the operation of the plant are to be considered.

    iii) From a date no later than 31 December 2025: the consent holder shall provide a report to the Council detailing the findings of a comprehensive review of the current wastewater treatment method that considers, but is not limited to, the following:

        - Actual and potential effects of the existing wastewater discharge;
        - Changes to environmental standards and statutory requirements;
        - Technological innovations;
        - Community expectations; and
        - Community affordability.

    The report shall be submitted to the Regional Council (Manager Compliance) for review and comment.

    iv) From a date no later than 31 December 2028: additional treatment implemented to the extent required by the findings of the review process required by condition (11)(iii).

12. The design of any additional treatment required by condition 11(iii) shall be undertaken by an independent chartered engineer or similarly qualified person specialising in wastewater treatment plant design. The design shall be peer reviewed by a suitably qualified independent chartered engineer or similarly qualified person specialising in wastewater treatment plant design, paid for by the consent holder. The design, together with the peer review, shall be submitted to the Regional Council (Manager Compliance) for review and comment prior to the commencement of construction.

13. A) The discharge of wastewater as authorised by this resource consent shall not cause any of the following effects beyond a distance of 300m from the outfall diffuser:

    i) The production of any conspicuous suspended materials; or

    ii) Any conspicuous change in the colour or visual clarity; or

    iii) The production of any conspicuous oil or grease films, scums or foams, or floatable materials; or

iv) Any emission of objectionable odour; or

v) Any significant adverse effect on aquatic life; or

vi) A change in the natural temperature of the receiving water of more than 3 degrees Celsius; or

vii) The dissolved oxygen concentration to be less than 80% of the saturation concentration; or

viii) Undesirable biological growths.

B) During the single milliscreen bypass period of up to 12 weeks referred to in Condition 9 B the effects described in clauses i), ii), and iii) above may occur at a distance beyond 300m but shall be mitigated by actions detailed in the Milliscreen Bypass Management Plan required by Condition 32.

C) The flushing cycle of the biological trickling filter in the first year of operation shall occur daily between the hours of 3 am and 5 am. On four occasions during the first year of operation and yearly thereafter the flushing process shall occur later so that the discharge reaches the end of the outfall pipe during normal working hours (8 am to 5 pm) ("the monitoring discharge"). Mr W. Church is to be advised of the intended date of the monitoring discharge at least 48 hours prior to the monitoring discharge occurring. In the event that, after the first year, the optimal time of discharge is considered to be other than 3 am to 5 am, this condition may be reviewed with Mr Church and if agreed, reviewed in accordance with section 128 and/or 129 of the Resource Management Act 1991.

14. There shall be no environmentally significant and statistically detectable difference in toxicity between a water sample from uncontaminated water (from a location to be approved by Regional Council (Manager Science)), and the final combined wastewater when diluted 200 times with the uncontaminated water.

Proposed test procedures, choice of test organisms and the definition of 'no toxicity' shall be approved by the Regional Council (Manager Science) at a frequency not less than annually. However initially;

i) 'No toxicity' is defined as:

A statistically significant effect for a given test is determined by calculation of the threshold effect concentration (TEC = geometric mean of NOEC & LOEC*). Compliance with a dilution criteria is determined by comparison of the TEC value, expressed in terms of dilution, with the dilution criteria value. The TEC dilution value must be less than the dilution criteria to obtain compliance. The minimum statistical difference (MSD) should be calculated for each bioassay procedure and incorporated into the compliance testing procedure.*

**NOEC = No observable effect concentration, LOEC = Lowest observable effect concentration*

ii) Where environmental significance is defined as:

- No more than one species test showing unacceptable toxicity in any given quarter; and
- Any unacceptable toxicity shall not exceed *EC20% (chronic tests) and *LC10% (acute) tests; and

  **EC – Effective Concentration: the concentration that causes a stated effect in the specified % of test organisms*

  **LC – Lethal concentration: the concentration that kills the specified % of test organisms*
- No more than one consecutive incidence of unacceptable toxicity within any given species between quarters.

iii) The test organisms used shall be:

Test Species (*scientific name*)	Test Type, endpoint measured	Test duration
Alga *(Minutocellus polymorphus)*	Chronic, growth	48 hours
Bivalve – Wedge shell (Macomona liliana)		
Bivalve – Blue mussel embryo (Mytillus galloprovincialis)	Acute, survival	96 hours
	Chronic, development	48 hours

iv) If unacceptable toxicity occurs outside the range described in i) and ii) a toxicity identification evaluation (TIE) shall be undertaken to examine the cause of the unacceptable toxicity. The results of the TIE and remediation actions shall be supplied to the Regional Council (Manager Compliance) within 30 days of the laboratory results being received by the consent holder.

15. The consent holder shall inspect the diffuser at least annually, and at any other time as necessary, at which time any ports blocked by mussels or other debris which may adversely affect the functioning of the diffuser will be cleared. The number of blocked ports shall be recorded and reported to the Regional Council (Manager Compliance) in the annual report required by condition 35 of this consent.

16. The consent holder shall maintain the outfall pipe and diffuser in good condition in accordance with appropriate engineering practice.

Monitoring

17. The consent holder shall continuously monitor and record the rate of discharge and the daily volume of final combined wastewater discharged using a method with an accuracy of +/- 5%.

18. At quarterly intervals, with a minimum of 2 months between each sample, the consent holder shall test the toxicity, as described in condition 14.

19. At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall take 24 hour flow proportional samples of the final combined wastewater stream discharged on 7 consecutive days. These samples shall be analysed for the analytes listed, at the detection limit shown, in Schedule 1 (attached) for quarterly and annual sampling.

20. At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall monitor the performance of the biological trickling filter by taking 24 hour flow proportional samples of wastewater prior to and immediately after the biological trickling filter treatment (prior to mixing with the final combined wastewater flow). These samples shall be analysed for the following:

    i) Suspended Solids
    ii) Oil and grease
    iii) $cBOD_5$

21. At monthly intervals, for a minimum of 12 months after commissioning of the upgrade required by condition 6, the consent holder shall take a grab sample of the final combined wastewater flow. The samples shall be tested quantitatively for noroviruses by polymerase chain reaction (PCR).

22. At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall take six flow proportional samples of the final combined wastewater stream. These samples shall be analysed for faecal coliform and enterococci. The six samples shall be taken at the following times:

    i) 2 am to 6 am
    ii) 6 am to 10 am
    iii) 10 am to 2 pm
    iv) 2 pm to 6 pm
    v) 6 pm to 10 pm
    vi) 10 pm to 2 am

23. Twice during each year the consent holder shall take seabed sediment grab samples from four sites, being located at distances of 300 m and 500 m to the north and 300 m and 500 m to the south of the midpoint of the outfall diffuser. Those samples shall be analysed for the analytes listed, and at the detection limits shown, in Schedule 2 (attached).

24. At quarterly intervals, with a minimum of 2 months between each sampling run, the consent holder shall undertake water quality monitoring. The sampling shall be of seawater at 5 sites equally spaced around a circle of 250 m radius from the centre of the diffuser. This shall be repeated at a circle of 300 m and 500 m radius, giving a total of 15 monitoring sites around the diffuser. On the same day a 'reference' seawater sample shall also be taken at least 1000 m from the centre of the diffuser at a location unlikely to be influenced by the discharge. All samples collected shall be tested for faecal coliform and enterococci concentrations. Measurements of the following shall also be taken at each sampling location:

    i) pH
    ii) turbidity
    iii) temperature
    iv) dissolved oxygen (% saturation)

25. While samples are being taken in accordance with condition 24, a GPS drogue shall be placed at the centre of the diffuser to measure the surface currents for at least 30 minutes.

26. The consent holder shall undertake surveys designed to show the impact of the discharge on the benthic fauna. The design of the survey shall be agreed between the consent holder and the Regional Council (Manager Science) before the survey is undertaken. Benthic surveys shall be undertaken between late December and late February (preferably in January) with the first survey undertaken within two years of the upgrade required in condition (6), and every five years after the date of that survey. The results of such surveys are to be provided to the Regional Council within three months of the surveys being undertaken.

    The first survey undertaken in accordance with this consent shall include an analysis of trace metal concentrations in flatfish.

27. A) The consent holder shall undertake a quantitative microbial risk assessment of the risk to shellfish growing on Town Reef from pathogens occurring as a result of the consent holder's discharge.

    The results of this modelling shall be provided to the Regional Council (Manager Science) within 24 months of the commencement date of this consent.

    B) The consent holder shall monitor the pathogenic bacteria in shellfish growing on Town Reef (at or about NZTM 1937897 5622971). Monitoring shall be conducted at the following frequencies:

i) Up to three sampling occasions prior to the upgrade required in accordance with condition 6;

ii) Fortnightly samples during the milliscreen bypass period conducted in accordance with condition 9 (B), and for at least four weeks after the milliscreen bypass has concluded.

The shellfish shall be analysed for faecal coliform and *Escherichia coli* concentrations. Adenovirus/enterovirus concentrations shall also be analysed by cell culture, and the shellfish shall also be tested quantitatively for noroviruses by polymerase chain reaction (PCR).

28. All effluent quality analysis other than field measurements as required by the conditions of this consent shall be undertaken by an independent laboratory accredited to IANZ.

Administrative

29. The consent holder shall ensure that at all times clear and visible signage is placed on the buoys marking the two ends of the diffuser, incorporating the words “shellfish unfit for human consumption”.

30. The consent holder shall appoint a person to be responsible for the day-to-day operation of the wastewater treatment plant and outfall, and to act as a contact person for the Regional Council staff. The name and phone number of this contact person shall be advised to the Regional Council (Manager Compliance) within 10 working days of the commencement of this consent and within 10 days of any change.

Reporting

31. From a date no later than 20 May 2014 the consent holder shall prepare an operations and management plan for the Awatoto Wastewater Treatment Plant and submit it to the Regional Council (Manager Compliance) for review and comment. The plan shall include as a minimum:

i) A brief description of the treatment system, including a site map indicating the location of all waste streams entering the treatment system, treatment device(s), and monitoring sites;

ii) On-site responsibilities, including operation and maintenance;

iii) How the wastewater treatment system shall be managed in accordance with best wastewater engineering practice and industry standards so as to achieve compliance with Condition 6(i);

iv) Key operational matters, including daily, weekly and monthly maintenance checks;

v) Details of how the flushing cycle of the BTF plant will be managed to minimise the volume of solids discharged to Hawke Bay;

vi) Monitoring procedures covering all aspects of this permit to demonstrate compliance with the conditions;

vii) A risk assessment plan and contingency plans in the event of system malfunctions or breakdowns;

viii) Details of the procedures for ensuring that the system is sampled sufficiently to ensure

compliance with the conditions of consent;

ix) Details of how changes in wastewater composition and volume are to be managed;

x) Details of procedure for receiving and dealing with any complaints.

The consent holder shall undertake all operations in accordance with the plan. This operations and management plan shall be reviewed within 6 months of the upgrade required by condition (6) being commissioned, and annually thereafter. The plan should also be reviewed within 3 months of any further improvements to the wastewater treatment system taking place. Any amendments of the plan shall be forwarded to, and subject to certification by, the Regional Council (Manager Compliance).

32. At least three months prior to wastewater being discharged to Hawke Bay in accordance with condition 9 (B), the consent holder shall prepare a milliscreen bypass management plan and submit it for approval to the Regional Council (Manager Compliance). The plan shall be prepared in consultation with the Hawke's Bay District Health Board and include as a minimum:

i) A timetable and programme of works to be undertaken during the bypass period;

ii) Details of the mitigation measures that will be undertaken to minimise the effects of the bypass, before, during and immediately after it occurs, including but not limited to:

- 24 hour seven day a week manual raking of the 25mm screen at Latham Street in a manner and frequency so as to maximise its screening efficiency;
- Twice daily beach cleaning of any non biodegradable litter for at least the first two weeks of the milliscreen bypass. The frequency of beach cleaning can be reduced from twice daily to weekly for the remainder of the bypass period, and for four weeks after the bypass is completed, if six consecutive beach clean ups do not find any non biodegradable litter;
- Diffuser inspection, and any required maintenance of the outfall structure within one month of completion of the bypass;
- Clearance from the seabed of any gross non biodegradable litter in the vicinity of the outfall structure within one month of completion of the bypass period;

iii) Sampling and monitoring procedures to assess the effect of the bypass on Hawke Bay, and public health;

iv) Details of the public notification procedures and public education initiatives that will be followed to ensure that the public is informed of the bypass and its potential effects, and actions they can potentially take to help mitigate the effects of the bypass; and

v) Details of procedure for receiving and dealing with any complaints about the bypass.

The consent holder shall undertake all operations in accordance with the milliscreen bypass management plan.

33. The consent holder shall make available upon request all records kept in relation to the discharge, the operation of the treatment plant, sampling, testing, and analysis.

34. All records collected in accordance with the conditions of this consent shall be provided to the Regional Council (Manager Compliance) in an electronic database format to be agreed, no more than 30 days after the end of the month to which they relate.

35. Before 1 September each year, the consent holder shall provide a report to the Regional Council (Manager Compliance), prepared by a suitably qualified and experienced engineer and scientist, covering the preceding 12 month period ending 30 June. As a minimum this

report shall include the items listed below and a comparison with previous years:

i) a summary of all monitoring undertaken as required by this consent, and any additional monitoring undertaken by the consent holder to better characterise the effects of the discharge on Hawke Bay;

ii) a critical analysis of the monitoring information in terms of compliance and adverse environmental effects;

iii) an assessment of the flow data, an assessment of the expected flow increase over the next 24 months period taking into account expected population increase and ingress and infiltration;

iv) comment on any non-compliances and operational problems, and any actions undertaken to address these;

v) identification and comment on any trends in data collected, both within the annual period and compared to previous years. This shall include any trends in water quality parameters/wastewater constituents including comment on the potential environmental implications of these trends;

vi) details of any works undertaken or proposed to improve the performance of the treatment system, and the timeframe for completion of any proposed works;

vii) recommendations regarding alterations or additions to the monitoring programme;

viii) the tabulated results of the laboratory analytical monitoring; and

ix) any other issues considered important by the consent holder.

36. The consent holder shall log all complaints received. The log shall include:

i) the date and time of the complaint;

ii) the nature of the complaint;

iii) the name, telephone number, and address of the complainant;

iv) weather and sea condition information (eg. an estimate of wind speed and direction, and description of sea condition);

v) details of key operating parameters at the time of the complaint; and

vi) the remedial action taken to prevent further incidents.

Complaints shall be reported to the Regional Council (Manager Compliance) within 24 hours of receipt, and the log of complaints shall be made available to the Regional Council on request.

Kaitiaki Liaison Group

37. The consent holder shall continue to convene a Kaitiaki Liaison Group (KLG). The purpose of the KLG is to provide a forum to address tangata whenua concerns and to enable tangata whenua to exercise kaitiakitanga in relation to the exercising of the consent

ADVICE NOTES

1. For the avoidance of doubt, the 'final combined wastewater' means the domestic and non-separable industrial wastewater flow, plus the purely industrial flow.

2. Any additional treatment implemented in accordance with condition 11 may require a change

of consent conditions or potentially a new coastal permit sought.

3. All consent conditions relating to odour from the Awatoto Wastewater Treatment Plant will be contained in the consent document for the air discharge consent for that site, DP110148A.

4. To give effect to Condition 11(ii) the Annual Report required by Condition 35 may be used. The review may coincide with the Annual Plan consultation process and the method for disseminating the information and assessing public response may be through newspaper, website, Council's newspaper, public meeting, individual written response, council's regular random survey or annual plan submission or any combination of these.

5. In exercising their kaitiakitanga the KLG may contribute to the development of a Marine Cultural Health Index. At such time that this is developed the consent holder should report to the group on performance against this measure.

6. With regard to condition 32(iv), public notification procedures may include the erection of signs to notify beach users that a risk may exist as a result of the milliscreen bypass.

REASONS FOR DECISION

1. The granting of the application will enable the people and communities of Napier to provide for their wastewater management in a way that meets their social, cultural and economic needs, while safeguarding the life supporting capacity of the receiving environment, and so promote the sustainable management purpose of RMA.

2. Through the imposition of the conditions, the effects of the proposed discharge of treated effluent, after reasonable mixing, will lead to a potential improvement over the no more than minor effects of the existing discharge.

REVIEW OF CONSENT CONDITIONS BY THE COUNCIL

The Council may review conditions of this consent by serving notice of its intention to do so pursuant to section 128 and section 129 of the Resource Management Act 1991.

Times of service of notice of any review and the purpose of any review are shown below;

Times of service of notice of any review: Except for purpose 7 below, during the month of May, of any year.

Purposes of review:

1. To deal with any adverse effect on the environment which may arise from the exercise of this consent, which it is appropriate to deal with at that time, or which became evident after the date of issue.

2. To require the adoption of the best practicable option to remove or reduce any effects on the environment, including potential reduction of the mixing zone applied under condition 13A.

3. To modify any monitoring programme, including potentially reducing the frequency of monitoring if results indicate the parameters being monitored are having no more than a minor effect on the environment. Additional monitoring could also be required if there is evidence that current monitoring requirements are inappropriate or inadequate. Monitoring may also be required of emerging organic contaminants (including but not limited to

pharmaceuticals and personal care products, steroid estrogens, flame retardants and other industrial products and endocrine disrupting chemicals.

4. To modify the maximum daily loading rate (kg/m^3 of media per day) of the biological trickling filters.

5. To modify the frequency at which inspections of the diffuser are required to be undertaken.

6. To require additional monitoring or modelling to be undertaken to quantify the potential public health risk to Town Reef shellfish populations resulting from the discharge

7. (During September 2015) To change or delete the time specified in condition 13C that the daily flushing cycle of the biological trickling filter must be undertaken.

MONITORING BY THE COUNCIL

Routine inspections of the site of this consent will be undertaken by Regional Council officers at a frequency of no more than twice each year. During the proposed eight to twelve week bypass period more frequent inspections will be undertaken by Regional Council officers. The frequency of inspections during this time will vary depending on the weather conditions, sea state, and public feedback about the discharge, and will be discussed with the consent holder. The costs of these inspections and any other formal monitoring programme that may be established in consultation with the consent holder will be charged to the consent holder.

"Non routine" inspections will be made on other occasions if there is reason to believe (e.g. following a complaint from the public, or monitoring) that the consent holder is in breach of the conditions of this consent. The cost of non-routine inspections will be charged to the consent holder in the event that non-compliance with conditions is determined, or if the Consent holder is deemed not to be fulfilling the obligations specified in section 17(1) of the Resource Management Act (RMA) 1991 shown below.

Section 17(1) of the RMA states:

> *Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person, whether or not the activity is carried on in accordance with*
>
> *a) any of sections 10, 10A, 10B, and 20A; or*
>
> *b) a national environmental standard, a rule, a resource consent, or a designation.*

CONSENT HISTORY

Consent No. (Version)	Date	Event	Relevant Rule Number	Plan
CD090514W	07/11/2011	Consent initially granted	157 11.4.1	Proposed Regional Coastal Environment Plan (Version 2.3) Regional Coastal Plan (June 1999)
CD090514W	06/12/2012	Consent granted by the Environment Court. Condition 13C inserted in accordance with consent order and upgrade date pushed out to 31 August 2014	Section 279	Resource Management Act

SCHEDULE 1. ANALYTES FOR COMBINED WASTEWATER STREAM

Test/Analyte	Sampling Frequency* Quarterly	Annually	Units	Detection limit
Temperature	X	X		
pH	X	X		0.2
Conductivity		X	mS/m	0.1
Oil & Grease	X	X	g/m^{-3}	4
Total Solids		X	g/m^{-3}	10
Total Suspended Solids	X	X	g/m^{-3}	3
total organic carbon		X	g/m^{-3}	0.5
NH_4-N	X	X	g/m^{-3}	0.01
NO_3-N/NO_2-N		X	g/m^{-3}	0.002
$cBOD_5$	X	X	g/m^{-3}	1
COD		X	g/m^{-3}	6
Sulphide	X	X	g/m^{-3}	0.002
TKN		X	g/m^{-3}	0.1
DRP		X	g/m^{-3}	0.004
TP		X	g/m^{-3}	0.004
Total Phenols		X	g/m^{-3}	0.002
Total CN		X	g/m^{-3}	0.001
Zn (acid sol) **	X	X	g/m^{-3}	0.001
As (acid sol) **	X	X	g/m^{-3}	0.001
Cd (acid sol) **	X	X	g/m^{-3}	0.0005
Cr III (acid sol) **	X	X	g/m^{-3}	0.0005
Cr VI (acid sol) **	X		g/m^{-3}	0.001
Cu (acid sol) **	X	X	g/m^{-3}	0.0005
Sn (acid sol) **	X	X	g/m^{-3}	0.005
Ni (acid sol) **	X	X	g/m^{-3}	0.0005
Pb (acid sol) **	X	X	g/m^{-3}	0.0001
Hg (acid sol) **	X	X	g/m^{-3}	0.00008
VOC (inc BTEX) **		X	g/m^{-3}	To trace
SVOC **		X	g/m^{-3}	To trace
PCP **		X	g/m^{-3}	To trace
ON & OP pesticides **		X	g/m^{-3}	To trace

* One of the quarterly samples shall be the annual sample.

** The seven day 24-hour composite samples taken accordance with condition 19 shall be combined for these analyses.

SCHEDULE 2. ANALYTES FOR SEDIMENT SAMPLES

Test/Analyte	Units	Detection limit
Zn (acid sol)	mg/kg	0.001
As (acid sol)	mg/kg	0.001
Cd (acid sol)	mg/kg	0.00005
Cr (acid sol)	mg/kg	0.0005
Cu (acid sol)	mg/kg	0.0005
Sn (acid sol)	mg/kg	0.0005
Ni (acid sol)	mg/kg	0.0005
Pb (acid sol)	mg/kg	0.0001
Hg (acid sol)	mg/kg	0.00008

APPENDIX 1. CONSENT CONDITION ANALYSIS NEEDS ADJUSTING

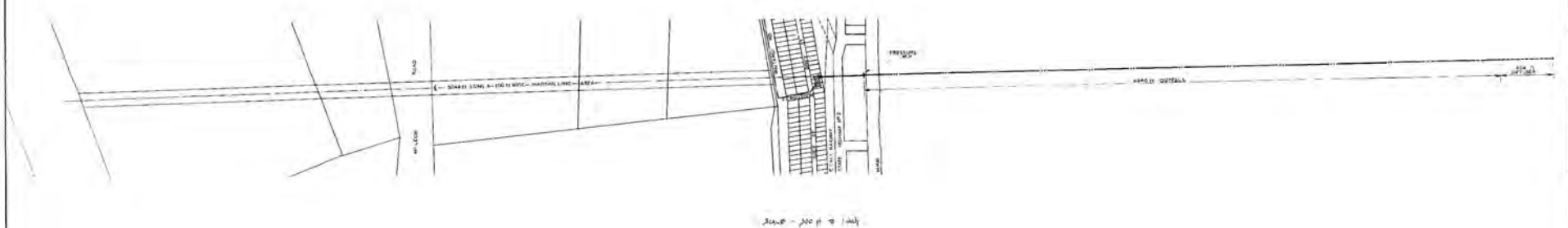
Condition no.	Reasons for condition
1	The consent holder should only exercise one consent to authorises the discharge to Hawke Bay therefore their existing consent needs to be surrendered before this one commences.
2	The effects of the proposed activity have been assessed based on the information provided by the applicant. It is important that the activity is undertaken as proposed because the effects of the activity may vary if the nature or intensity of the activity changes.
3	Rate and volume of discharge influences the effects the proposed activity may have on the environment
4	The effects of the proposed activity have been assessed based on the environment surrounding the outfall. A discharge in another location may have different effects
5	The effects of the discharge have been assessed on the basis of a 100:1 dilution being achieved. It is important that this level of dilution continues to be achieved. Lower levels of dilution may result in adverse effects on the environment.
6	i. The effectiveness of BTF plants is closely linked to their loading rate (increased loading rate results in decreased levels of removal/treatment), therefore it is important that a loading rate is specified. All pilot plant trials have been based on a loading rate of 0.6 kg, therefore limiting the average loading of the plant to this ensures that the quality of the effluent that the applicant has indicated will be produced by the plant, is achieved. The type of media installed in the tanks also have an effect on the quality of effluent produced and has therefore been specified. ii. It is important that the proposed treatment plant is appropriately designed. iii. The management of the treatment plant is important to its ongoing effective operation. iv. The papatuanuku channel has been included to address tangata whenua concerns with the discharge, therefore should be designed in consultation with them to ensure it achieves the desired outcome.
7	The inclusion of end of pipe standards for metals and ammonia should ensure that quality of the wastewater discharged to Hawke Bay provides for 95% species protection (in accordance with ANZECC 2000 guidelines). End of pipe standards allow an easy assessment of the effects of the discharge, because they cannot be influenced by other possible sources of contamination that monitoring in the receiving environment can be. The maximum concentrations and loads were recommended by Mr McCoy.
8	Trigger values for the concentration of pH, cBOD, TSS and TFO&G ensure that the monitoring results of these contaminants are compared against figures which ensure a level of protection for the environment. These loads are based on the low level of effect the discharge is currently having. Increased loads will not necessarily have an adverse effect on the environment, but nominating these trigger values ensures that any higher concentrations are investigated. These trigger values were recommended by Mr McCoy.
9	Screening the wastewater prior to discharge reduces the impact of the discharge on the environment. This condition also limits the period that the milliscreen can be bypassed for which is important as the bypass period may result in adverse effects on the environment.
10	The industrial flow must continue to be screened even after complete separation of the industrial and domestic flows is completed.
11	i. It is important that the BTF plant is required to be commissioned by a certain date because this provides certainty to submitters about when an improvement in the wastewater discharged will be achieved. ii. A 3 yearly evaluation with opportunity for public response prior to the comprehensive review will enable the consent holder to better engage the public which will better inform the timing and process for the comprehensive review. This should help allay the fears expressed by submitters that should problems arise prior to the comprehensive review 12 years is too long to wait for action. iii. Many submitters raised concerns that the proposed treatment plant did not include

	clarifiers or some other type of sedimentation. The regional council consider it appropriate to require the consent holder to undertake a comprehensive review of the wastewater treatment process approximately half way through the consent to determine whether or not additional treatment for wastewater prior to discharge is required. vi. Any additional treatment identified as necessary through the review process must be installed by a specific date to ensure that community expectations are met.
12	The design of any additional wastewater treatment installed at the Awatoto Treatment plant site must be appropriate to ensure it achieved the desired level of treatment.
13	In accordance with section 107, any discharge to the environment cannot result in the effects listed. Including this as a condition of consent ensures that the consent holder is aware of the effects it may not cause after reasonable mixing.
14	High toxicity levels can have an adverse effect on the environment. It is important that toxicity levels are assessed against a criteria that will provide a level of protection that is appropriate to the sensitivity of the species found in it.
15	Regular maintenance of the diffuser will ensure that the dilution rate in condition 5 continues to be achieved.
16	Ongoing good practice in the operation of the outfall and diffuser will assist in ensuring compliance with the rest of the conditions of this consent.
17	Allows compliance with condition 3 to be assessed.
18	Allows compliance with condition 14 to be assessed.
19	This sampling allows compliance of the discharge with conditions 7 and 8 to be assessed.
20	Sampling the wastewater stream from the BTF plant allows the performance of the plant to be assessed and understood, and potentially its operation to be adjusted to decrease the concentrations of these contaminants in the discharge.
21	The sampling will inform the Quantatative Microbial Risk Analysis (QMRA) on the risks associated with the specific post BTF wastewater discharge.
22	The performance of the BTF plant may vary during flushing cycles. Faecal coliform and enterococci concentrations are an indicator of the risk that the discharge presents to public health. Gaining an understanding of the variance in the concentrations of these parameters allows the risk to public health to be better understood.
23	Some constituents of wastewater discharges accumulate in sediments. Regular assessment of the concentrations of these constituents is important because they can bio accumulate and adversely affect other species that feed on them.
24	High concentrations of faecal coliform and enterococci in the receiving environment can have an adverse effect on public health. It is important to sample these regularly to allow any trends in concentration to be identified. Sampling at a distance of 250 m and 300 m also allows the adequacy of the mixing zone to be assessed and potentially decreased if the effects of the discharge are shown to be limited to a 250 m radius of the diffuser.
25	The direction of current at the time of sampling can have an effect on the results of that sampling.
26	A number of submitters have raised concerns about the potential effects of the BTF plant on the volume of solids that will be discharged to Hawke Bay. Benthic survey's will allow the effect of these solids to be assessed, and any adverse effect on the environment identified in a timely fashion.
27	Consumption of shellfish that is contaminated by a wastewater discharge can present a risk to public health. Regular sampling allows the effect of the discharge on shellfish to be assessed.
28	It is important that the analysis of sampling results is undertaken in accordance with industry best practice and in a manner that allows the results to be assessed with other sampling results. Use of an accredited laboratory ensures this.
29	Signs indicate the presence of a potential public health risk as a result of the discharge.
30	It is important that the consent authority knows who the primary contact for the consent is, particularly in emergencies.
31	An operations and management plan requires the consent holder to document all of the details of how the intend to manage and operate the plant. It also requires the development of contingency plans in the event of system malfunction. Having such plans in place can help avoid, remedy or mitigate any adverse effect of the activity on

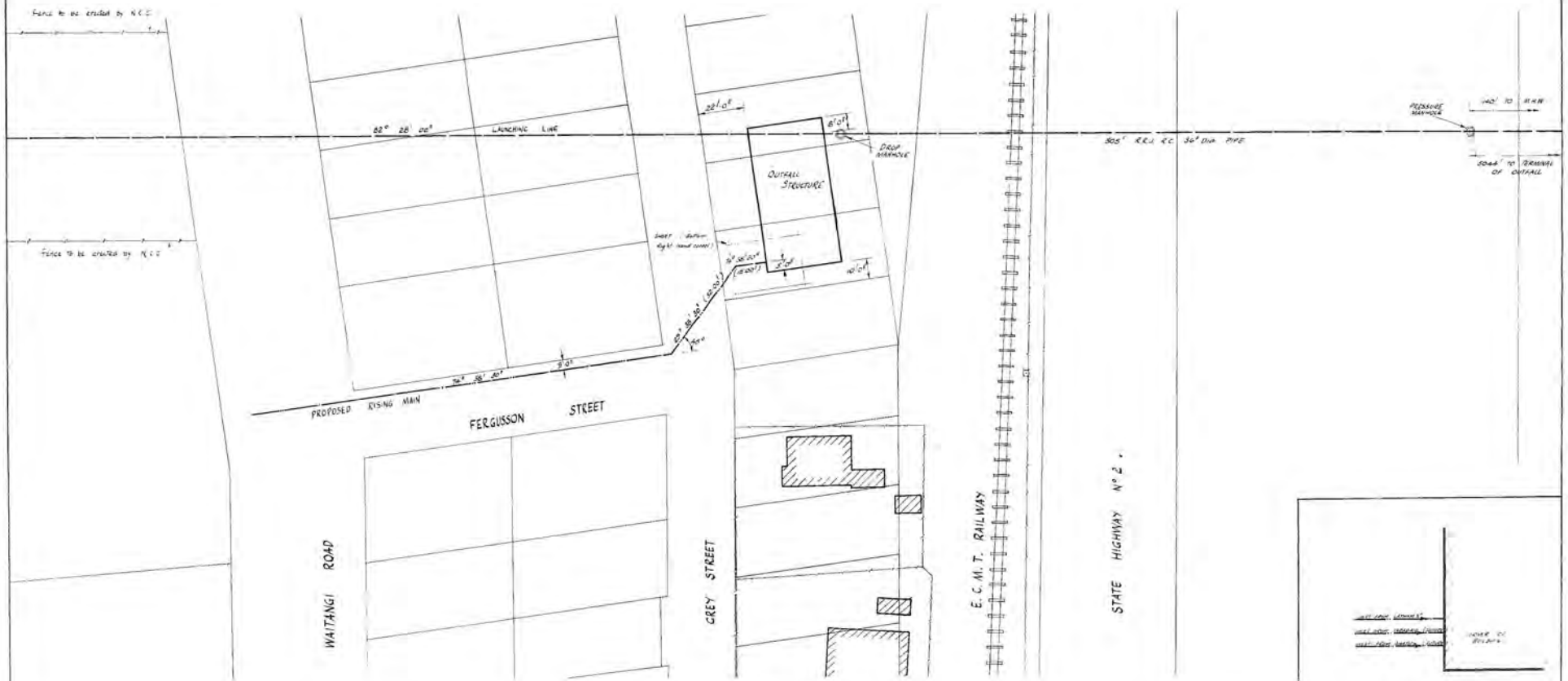
	the environment.
32	A number of submitters, including the District Health Board expressed concern about the proposed bypass of the milliscreen. The bypass will result in an increase in the risk to public health for the period of the bypass, therefore the consent holder needs to decide and document what actions they are going to undertake to minimise the risk, and how they are going to communicate effectively with the public about these risks. The plan should be developed in consultation with the District Health Board.
33	All information relating to the operation of the wastewater treatment plant may need to be made available to the Council. All information relating to the exercise of a resource consent is public information that can be requested by interested members of the public.
34	The results of monitoring undertaken need to be provided to the Regional Council in a timely manner, in a useful format, to ensure that compliance with the conditions of consent can be assessed, and any unusual monitoring results identified and followed up if necessary,
35	The requirement for an annual report ensures that the consent holder assesses the performance of the treatment plant over a 12 month period, and its effect on the receiving environment. The annual report also requires trends over time to be assessed, which ensures that the long term effect of the discharge is regularly reviewed, and necessary changes to the operation and/or design of the treatment plant made before the discharge does begin to have an long term adverse effect on the receiving environment.
36	The consent holder needs to record and take action to address complaints made by the public about the activity. The applicant notes on a number of locations in the AEE that no complaints have been received about the activity, therefore it is not having an adverse effect on the environment. Maintaining a register of complaints is therefore important.
37	One of the reasons the BTF plant has been proposed is because the form of treatment it provides addresses concerns of tangata whenua about the discharge of raw sewage to the ocean. It is therefore important that a liaison group continues to be convened to ensure that any further concerns of tangata whenua can be raised, and also gives Napier City Council a group that they can work with and discuss the design of the proposed plant, and any further modifications to it.

APPENDIX B

Marine Outfall Drawings



Scale - 300 ft to 1 inch



Scale - 20 ft to 1 inch

NOT TO SCALE

NAPIER CITY COUNCIL — CITY ENGINEER'S DEPARTMENT

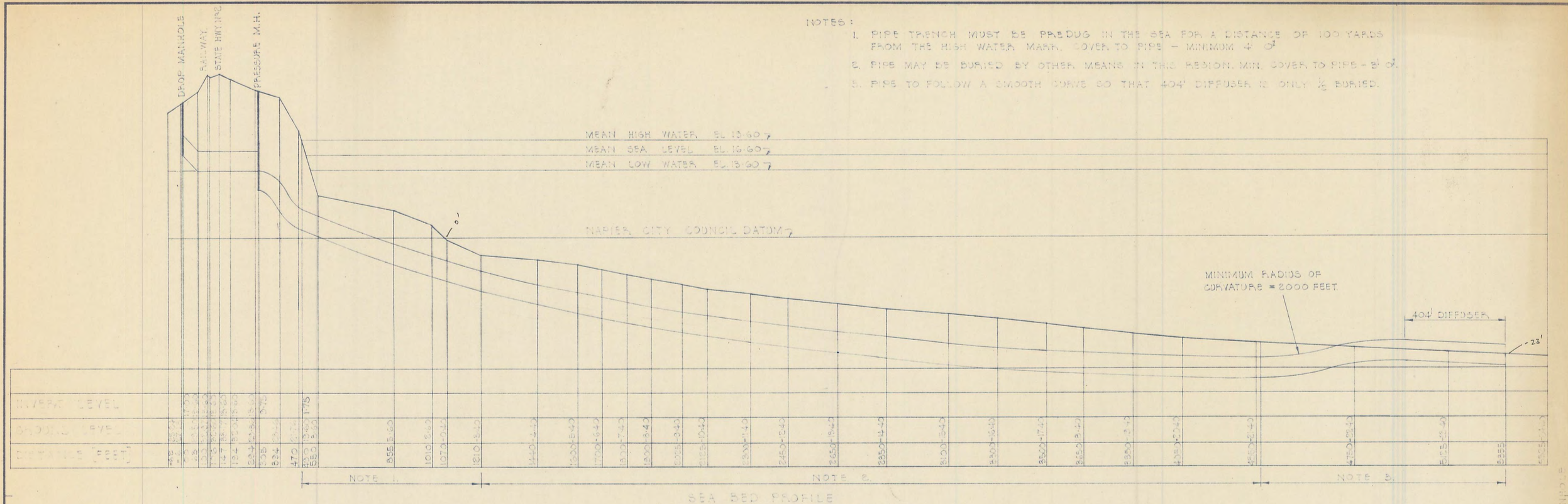
PROPOSED LAUNCHING ALIGNM OF OUTFALL & PUMPING MAIN APPROACH TO OUTFALL STRUCTURE.

SURVEYED	W.C. FOOTE	JUNE 1963
DRAWN	J.F. KNIGHT	JUNE 1963
TRACED	J.F. KNIGHT	JUNE 1963
DETAILED	J.F. KNIGHT	JUNE 1963
CHECKED		

S. 299.

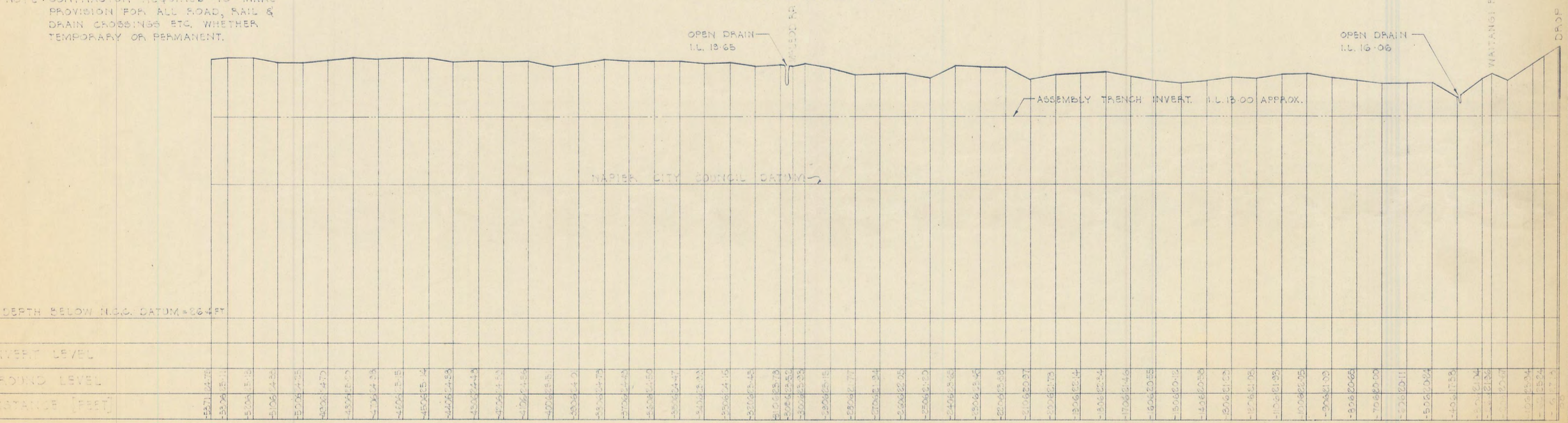
NOTES:

1. PIPE TRENCH MUST BE PREDUG IN THE SEA FOR A DISTANCE OF 100 YARDS FROM THE HIGH WATER MARK. COVER TO PIPE – MINIMUM 4' 0".
2. PIPE MAY BE BURIED BY OTHER MEANS IN THIS REGION. MIN. COVER TO PIPE – 2' 0".
3. PIPE TO FOLLOW A SMOOTH CURVE SO THAT 404' DIFFUSER IS ONLY ½ BURIED.



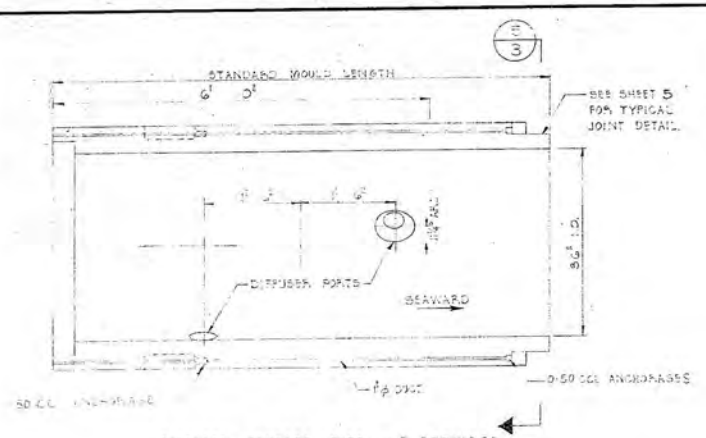
SEA BED PROFILE
SCALE: VERTICAL – 10 FEET TO 1 INCH.
HORIZONTAL – 200 FEET TO 1 INCH.

NOTE: CONTRACTOR REQUIRED TO MAKE PROVISION FOR ALL ROAD, RAIL & DRAIN CROSSINGS ETC. WHETHER TEMPORARY OR PERMANENT.



ASSEMBLY AREA PROFILE
SCALE: VERTICAL – 10 FEET TO 1 INCH
HORIZONTAL – 200 FEET TO 1 INCH

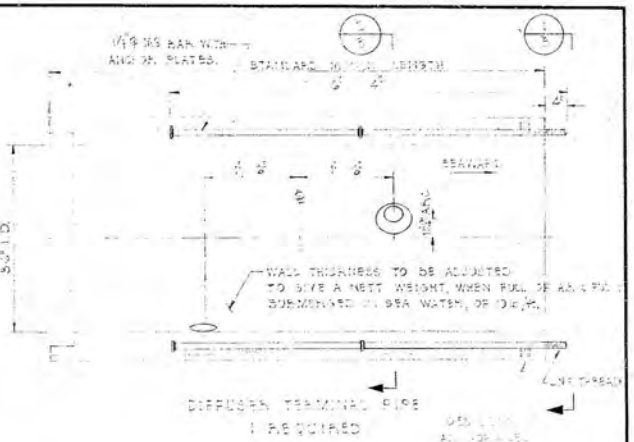
STEVEN & FITZMAURICE CONSULTING ENGINEERS CHRISTCHURCH & AUCKLAND NEW ZEALAND	CITY OF NAPIER — SUBMARINE OUTFALL	LOCATION PROFILES	Drawn A.W.H. Checked Approved Date September 1963
			Drawing number 228/2/2 sheet 2 of 7 drawings



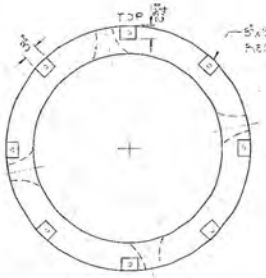
DIFFUSER COUPLER PIPE — 2 REQUIRED

NOTES:

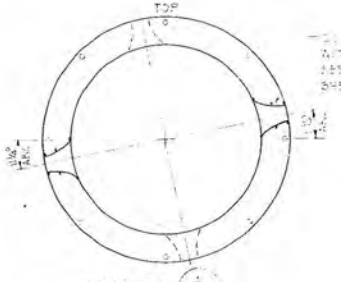
1. SEE SHEET 5 FOR JOINT DIMENSIONS AND DETAILS.
2. ALL JACKING RECESSES TO BE MORTARED UP WITH EPOXY MASTER BY INSTALLATION CONTRACTOR AFTER STRESSING IS COMPLETED.
3. DIFFUSER PORTS IN DIFFUSER PIPES ARE TO BE SET 11¼° OFF CENTRE LINE OF SPANS, TO CONTACT WITH PIPE REINFORCEMENT PERMITTED.
4. STANDARD PIPES SAME IN PHYSICAL DIMENSIONS AS COUPLER PIPES ONLY ANCHORAGES & RECESSES OMITTED.
5. ONLY ONE DIFFUSER PORT PER PIPE IS REQUIRED TO BE OPERATIONAL AND THIS PORT SHALL DISCHARGE AS NEAR TO THE HORIZONTAL AS POSSIBLE OTHER PORTS TO REMAIN PLUGGED.
6. PIPES WILL BE ALLOWED TO STRADDLE UP TO 36 PIPES.
7. FIRST STRING OF DIFFUSER PIPES SHALL HAVE ITS STRAND DUCTS DISPLACED 22½° FROM THE SECOND STRING OF DIFFUSER PIPES, SEE DETAIL BELOW IN DIFFUSER ASSEMBLY ORDER.



DIFFUSER TERMINAL PIPE
1 REQUIRED

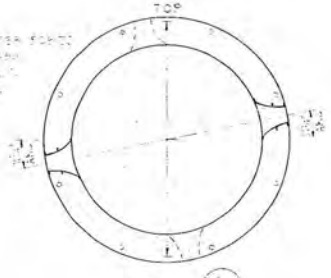


SECTION 5/3



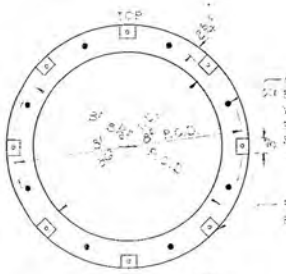
SECTION 4/3

34 RECESSES
1 COUPLER PIPE
1 TERMINAL PIPE

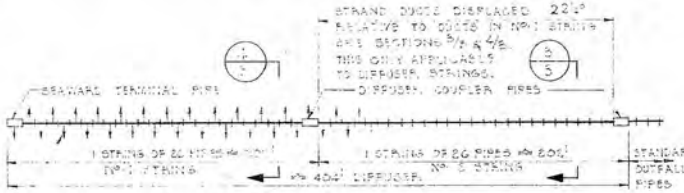


SECTION 4/3

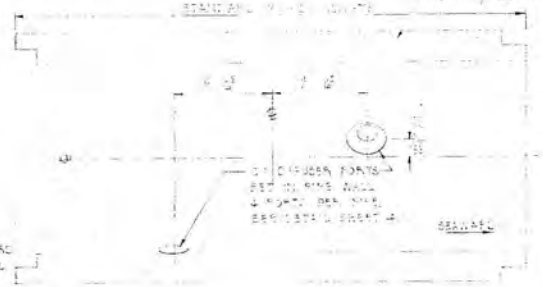
38 RECESSES
1 COUPLER PIPE
DUCTS 22½° FURTHER ON



SECTION 1/3

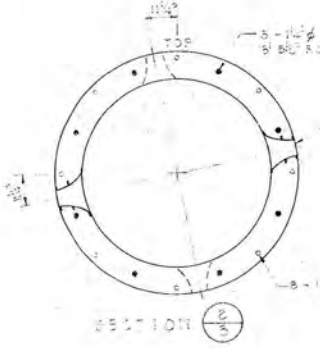


DIFFUSER ASSEMBLY ORDER.
SCALE: NO SCALE.



TYPICAL DIFFUSER PIPE

STANDARD OUTFALL PIPE SIMILAR BUT WITHOUT DIFFUSER PORTS.

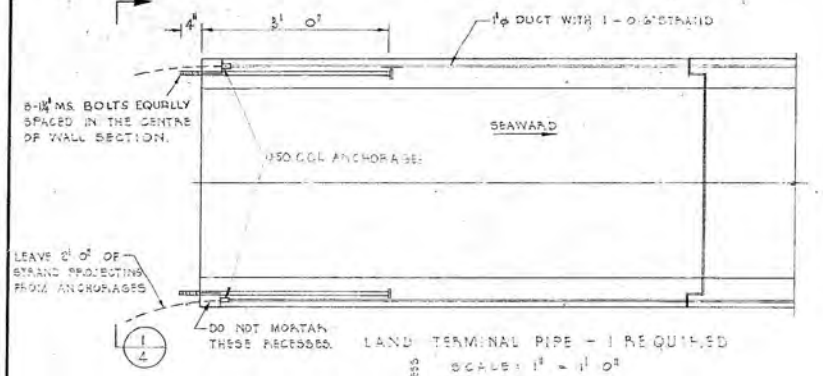


SECTION 2/3

SCALE: 1" = 1'-0"

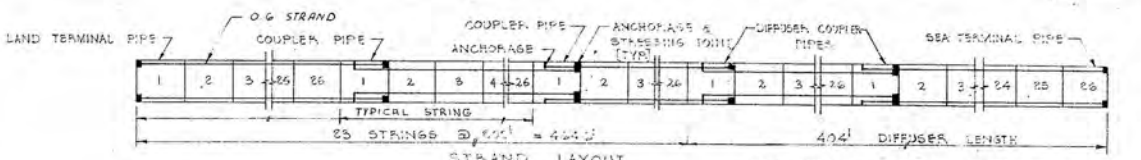
Copy of M.D. 13566 S.322/3

STEVEN & FITZMAURICE CONSULTING ENGINEERS CHRISTCHURCH & AUCKLAND NEW ZEALAND	CITY OF NAPIER — SUBMARINE OUTFALL	DIFFUSER PIPE DETAILS	Drawn A.W.H. Checked Approved Date September 1967 — Drawing No. 228/2/3 Sheet 3 of 7 Sheets



LAND TERMINAL PIPE - 1 REQUIRED

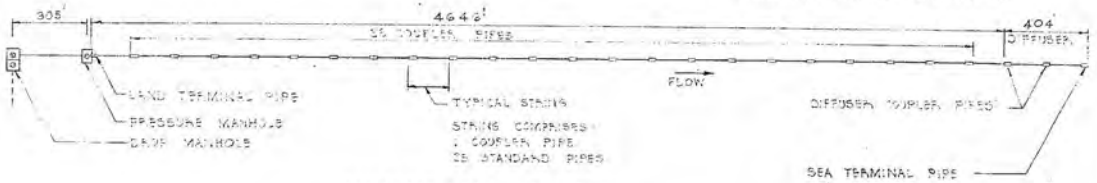
SCALE: 1" = 1' 0"



STRAND LAYOUT

NOT TO SCALE

NOTE: OUTFALL TO BE ASSEMBLED FROM LAND TERMINAL END AS SHOWN.

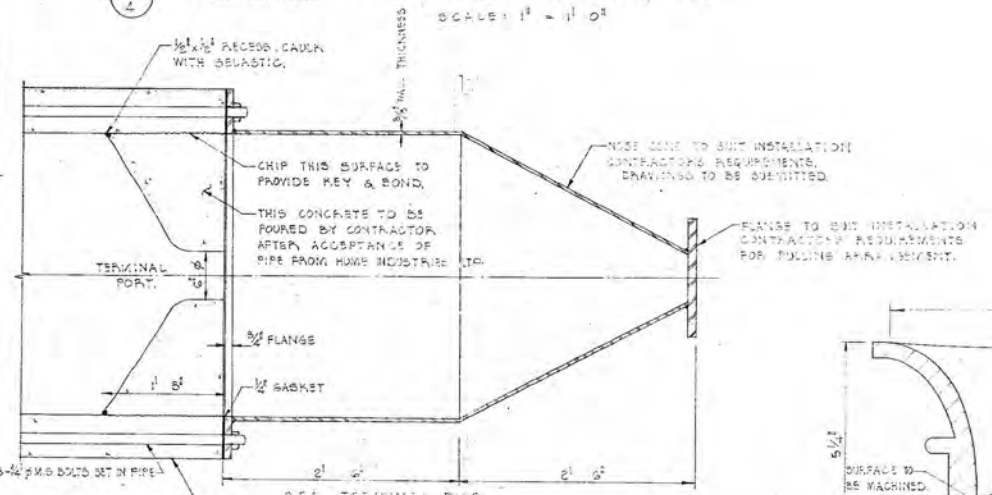


COMPLETE PIPE ARRANGEMENT

SCALE: 1 NO SCALE.

STRESSING & GROUTING NOTES.

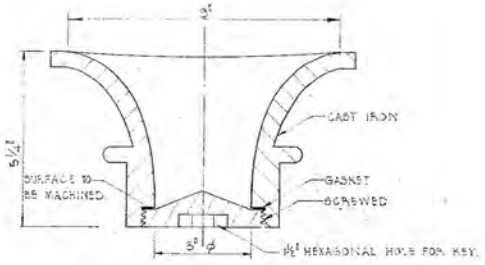
- AFTER EACH STRING OF PIPES IS ASSEMBLED IT SHALL BE STRESSED UP.
- EACH STRAND TO BE STRESSED UP TO 18,500 LBS. AND ANCHORED OFF.
- LINE MAY BE GROUTED ANYTIME AFTER STRESSING.
- EVERY PRECAUTION MUST BE TAKEN TO ENSURE THAT THE STRAND REMAINS UNGROUTED.



SEA TERMINAL PIPE WITH NOSE CONE

SCALE: ½" = 1' 0"

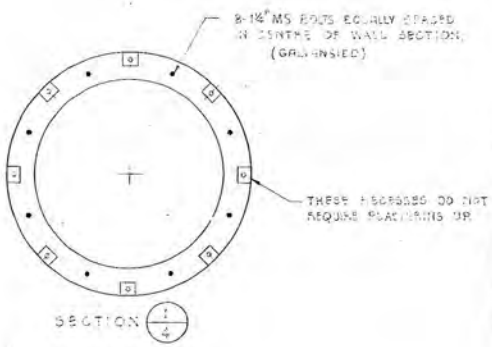
NOSE CONE TO BE FABRICATED FROM ⅜" M.S. PLATE.



DIFFUSER PORT DESIGN

SCALE: ½ FULL SIZE

DIFFUSER PORTS MUST BE SUCH THAT THEY PRESENT THE HYDRAULICS OF A ROUNDED ORIFICE AS SHOWN. THIS ARRANGEMENT MAY BE MODIFIED TO SUIT CONTRACTORS MOULD REQUIREMENTS SO LONG AS GENERAL CHARACTERISTICS ARE PRESENTED.

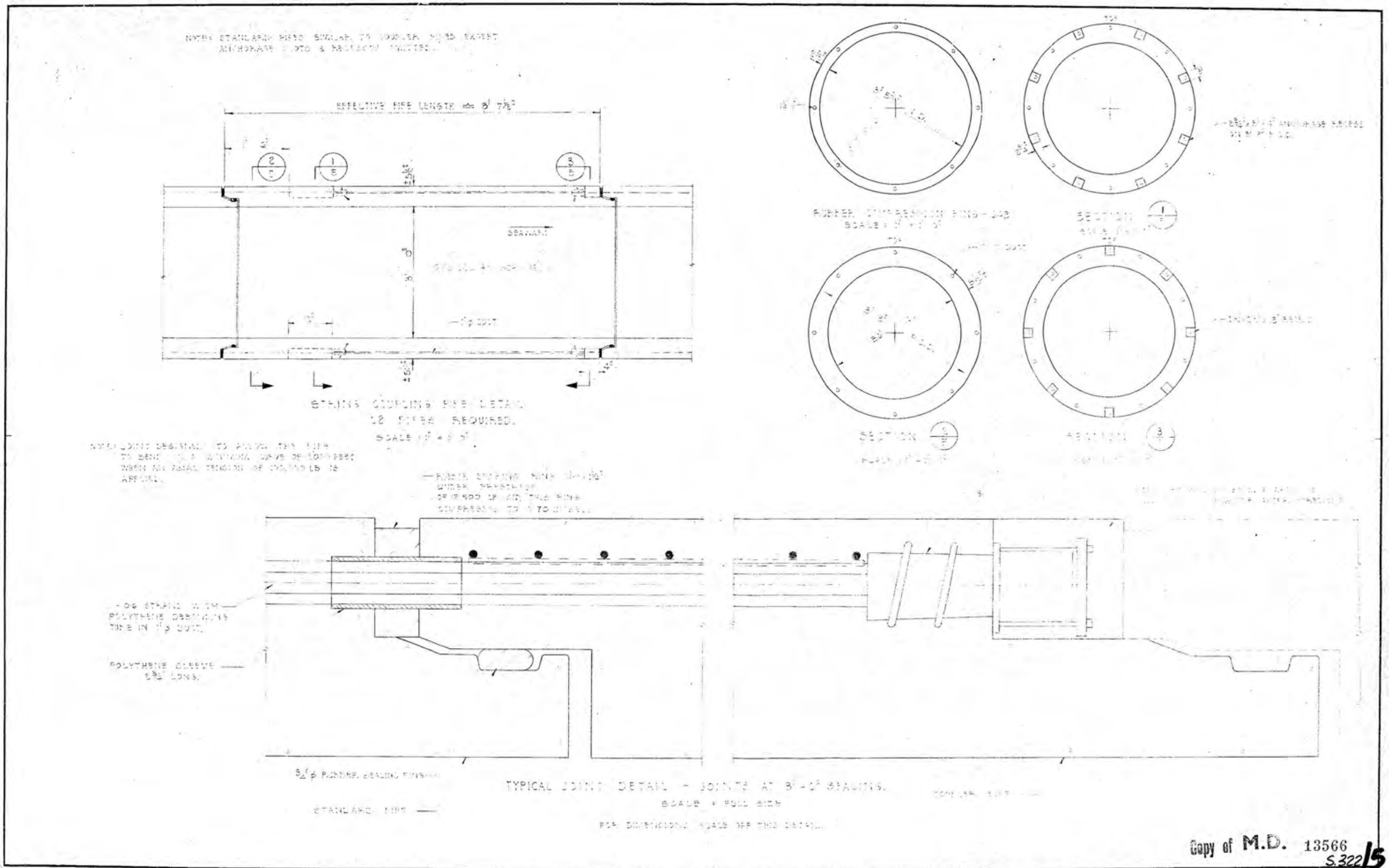


SECTION

SCALE: 1" = 1' 0"

Copy of M.D. 13566 S322/4

STEVEN & FITZMAURICE CONSULTING ENGINEERS CHRISTCHURCH & AUCKLAND NEW ZEALAND	CITY OF NAPIER — SUBMARINE OUTFALL	DIFFUSER STRING DETAILS	Drawn A.W.H. Checked Approved Date September — Drawing number 228/2/4 — sheet 4 of 7 drawings



Copy of M.D. 13566
S.322/5

STEVEN & FITZMAURICE CONSULTING ENGINEERS CHRISTCHURCH & AUCKLAND NEW ZEALAND	CITY OF NAPIER — SUBMARINE OUTFALL	JOINT DETAILS	228/2/5 5 7

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