

# Picton Sewage Treatment Plant - Outfall Consent Annual Compliance Report - July 2018 to June 2019

Prepared for Marlborough District Council  
Prepared by Beca Limited

21 October 2019



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## Revision History

Revision N°	Prepared By	Description	Date
A	Kevin Joeng	Draft for Client Review	16/10/2019
B	Kevin Joeng	Final (incorporated client comments)	21/10/2019

## Document Acceptance

Action	Name	Signed	Date
Prepared by	Kevin Joeng		21/10/2019
Reviewed by	Sarah Burgess		21/10/2019
Approved by	Graeme Jenner		21/10/2019
on behalf of	Beca Limited		

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# 1 Consent Compliance Summary

Condition	Requirement	Observation	Compliance
<b>Consent U100802 – Coastal Permit (Discharge to Seawater)</b>			
3	Submission of Annual Monitoring Report.	Annual Monitoring Report submitted.	Met
10	Maximum treated effluent flow rate of 400 l/s discharged through outfall.	Instantaneous flow exceeded 400 l/s on rare occasions. These events lasted fewer than 5 minutes. Effluent flow rates averaged over an hour were well below the 400 l/s limit.	Met
12	No effluent effects should be observable in mixing zone.	The quality of the treated effluent is unlikely to cause any outfall effects in the mixing zone. Dilution is expected to further reduce effluent effects after reasonable mixing.	Met
13	No undesirable biological growths as part of the discharge.	Annual dive inspection showed significant growth around outfall structure. Water blasting to remove growth in the near future is recommended.	Not met
14	Effluent quality monitoring must be carried out for the required parameters at the frequency and method outlined in Table 3-1.	Effluent quality monitoring was carried out to the required frequency.	Met
15	Quality of the effluent discharged must meet the required standards set out by the consent (Table 3-3).	All parameters which had a consent limit requirement were compliant, except for the 90 <sup>th</sup> percentile Faecal Coliform concentration. Although ammoniacal nitrogen concentrations do not have a limit, a large spike in ammoniacal nitrogen was recorded in the Jan 2019 sample.	Partially met
17	Benthic surveys carried out at 5-year intervals.	No benthic survey required for this monitoring period. Next benthic survey due for late 2019.	Not required
18	Assessment of shellfish quality in Picton Harbour against MOH reference criteria for food (2005) ANZFS 2002 for faecal coliforms and trace metals.	All shellfish samples were taken from the required locations. Samples taken from Westshore and Picton Wharf were higher in Faecal Coliforms than samples taken further away from the harbour.	Met
<b>Consent U100802 – Coastal Permit (Outfall Pipeline)</b>			
3	Inspection of outfall and diffuser.	Inspection carried out on 13 February 2019. Outfall structure found to be in good condition, except for heavy marine growth which will require cleaning. Anodes are 55% wasted.	Met



## 2 Introduction

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### 2.1 Background

The Picton Sewage Treatment Plant (STP) is located off Gravesend Place, west of the Picton town centre. Treated effluent from the STP is discharged via an approximately 150m long pipeline into Picton Harbour. Marlborough District Council (MDC) was granted a consent (U100802) in June 2011 to construct and operate a new outfall located on the western side of the harbour, north of the entrance to the Port Marlborough log yard. This new outfall replaced an under-capacity, above-ground pipeline with a short outfall which was located at Kaipupu Point.

After commissioning of the new harbour outfall on 12 December 2012, the above-ground pipeline to Kaipupu Point and the submarine portion of the decommissioned pipeline were removed.

A copy of Consent U100802 is included in **Appendix A**.

Drawing 6513000-C-K47 (in **Appendix B**) shows the outfall location and consented discharge mixing zone. A map showing the shellfish gathering sites that are required to be monitored under the consent is attached in **Appendix C**.

### 2.2 Purpose of this Report

Under Condition 3 of Consent U100802, MDC is required to submit an Annual Monitoring Report to the Team Leader Compliance, Marlborough District Council, on or before 31 August in each year of the consent. This report assesses the compliance of the STP with Consent U100802 for the period from 1 July 2018 to 30 June 2019. Note that Consent U100802 has been subdivided into conditions relating to the outfall discharge and conditions related to the outfall pipeline structure.

Consent conditions which do not have on-going monitoring requirements are not covered in this report. Only those conditions that have a numerical or qualitative monitoring requirement are assessed. For clarity, text from the relevant consent conditions and standards are quoted in *italics*, with other commentary in normal font.

### 2.3 Consent U960798

MDC was also granted Consent U960798 in February 1997 for land use activities. Compliance with the conditions of Consent U960798 was assessed in a separate report entitled *Picton Sewage Treatment Plant Consent Compliance Report – Discharge to Land – June 2018 to May 2019* dated October 2019.

## 3 Consent U100802 – Coastal Permit (Discharge to Seawater)

### 3.1 Condition 3 – Annual Monitoring Report

*The applicant must provide to the Team Leader, Compliance, Marlborough District Council, on or before 31 August in each year of the term of this consent, an Annual Monitoring Report (AMR) which must contain the following:*

- a. An analysis of the extent to which the applicant has, in exercising these consents, complied with consent conditions and the extent and cause of any non-compliance, in each case with a summary of the environmental effects arising from the operation of the pipeline, surge chamber and outfall/diffuser, during the preceding 12 month period from 1 July to 30 June inclusive (the reporting period).*
- b. An identification and discussion of any operational difficulties, changes or improvements made to the Picton Sewage Treatment Plant and other operating processes, which may cause any material difference in environmental outcomes from the previous reporting period.*
- c. An identification of any maintenance works needed, proposed or undertaken to ensure compliance with these conditions of consent.*
- d. An identification of any improvements or changes required and the timetable for implementation.*
- e. A summary of all the effluent monitoring data collected pursuant to this consent during the reporting period.*
- f. A summary of all receiving environment monitoring data collected pursuant to this consent during the reporting period.*
- g. An analysis of the data summarised under Condition 3 (e and f) above in terms of consent compliance and environmental effects during the reporting period.*
- h. A comparison of results with previous years and a discussion of any trends during the reporting period.*
- i. Any complaints received in regard to the discharge of treated effluent from the outfall.*

It is considered that the requirements of Condition 3 are fulfilled by the submission of this report.

No operational difficulties at the Picton STP were noted in the reporting period, nor were any maintenance works required to comply with the conditions of this consent.

No complaints regarding the discharge of treated effluent from the outfall were recorded during this monitoring period.

### 3.2 Condition 10 – Maximum Flow

*The discharge of treated effluent through the outfall, as authorised by this consent, must not exceed a maximum flow rate of 400 litres per second.*

The highest total daily discharge volume through the outfall was 9,710 m<sup>3</sup>, measured on 27 November 2018. Over a 24-hour period, this corresponds to an average flow rate of 112 L/s. Instantaneous flow data collected at 5-minute intervals on 27 November 2018 show that the 400 L/s limit was exceeded three times, with the flow rate reaching 556 L/s on one occasion. However, as these periods of high flow are transient, (lasting fewer than 5 minutes) and occur infrequently, such exceedances are not considered to be a major concern from an environmental effects perspective.

Construction of Stages 2 and 3 of MDC's upgrades to the Picton/Waikawa Sewerage System were completed and commissioned in mid-2018. This work included the upgrading of the Dublin Street, Fisherman's Wharf and Surrey Street Pump Stations. Stage 4 of the upgrade (including upgrading work at the Beach Road and Waikawa Wharf pump stations), is still underway.

Now that the new Dublin Street Pump Station Bypass Treatment Facility is operational, both treated flows from the STP and screened and disinfected wet weather flows from the pump station upgrade are discharged through the outfall. The maximum flow rate of these combined flows is limited to 400 L/s under Condition 10.

### 3.3 Condition 12 – Effluent Effects in Mixing Zone

*The discharge of treated effluent through the outfall must not cause any of the following effects outside the mixing zone described in Condition 11:*

- a. *The natural temperature of the receiving water shall not be changed by more than 3 degrees Celsius;*
- b. *Any conspicuous change in colour or clarity of the receiving water such that visual clarity is reduced by more than 33% as per the Water Quality Guidelines No. 2 (Ministry for the Environment, 1994);*
- c. *Any significant adverse effects on aquatic life; and*
- d. *The concentration of dissolved oxygen on the receiving water shall be greater than 80% of the saturation concentration.*

The receiving water has not been specifically monitored for the effects noted in a – d above. However, the high effluent quality (see Section 2.6), coupled with the verified initial dilution after discharge (i.e. >200:1 at average flows), indicates that there is little potential for adverse effects, after reasonable mixing, on natural water temperature, colour or clarity, aquatic life or dissolved oxygen concentrations.

No visual effects from the discharge have been observed in surface waters surrounding the outfall.

The outfall mixing zone required by this consent is shown in Drawing 6513000-C-K47 (see **Appendix B**).

### 3.4 Condition 13 – No Undesirable Biological Growths

*There shall be no undesirable biological growths as part of the discharge.*

The receiving water has not been specifically monitored for undesirable biological growths. However, the Annual Outfall Inspection Report (Marine Services NZ Limited, 2018) (see **Appendix D**) identified considerable marine growth on the anodes, discharge duckbill valves and pipe clamps. It was recommended that a water jet clean be carried out on the pipeline in the near future to ensure ongoing maximum outfall function.

These marine growths cannot be described as "undesirable" ie they are not a result of the quality of the discharge. Marine growths such as barnacles would be expected to populate any fixed structure in the harbour (including the outfall structure). However, as an action is required to remove the growths to maintain the outfall function, full compliance with the Condition was not met for this monitoring period.

### 3.5 Condition 14 – Effluent Quality Monitoring

The consent holder must carry out effluent monitoring at the outlet of the Picton Sewage Treatment Plant using the sampling method and frequency shown below. Samples will be analysed for the following parameters:

Table 3-1 Effluent Quality Sampling

Parameter	Reported As	Frequency	Sampling Method
Carbonaceous Biochemical Oxygen Demand (cBOD <sub>5</sub> )	g/m <sup>3</sup>	Monthly	24 Hour Composite
Total Suspended Solids (TSS)	g/m <sup>3</sup>	Monthly	24 Hour Composite
pH		Monthly	Grab
Ammoniacal Nitrogen	g/m <sup>3</sup>	Monthly	Grab
Faecal coliforms and Enterococci	Number/100mls	Monthly	Grab
Dissolved Reactive Phosphorous (DRP)	g/m <sup>3</sup>	Quarterly	Grab
Copper, Lead, Mercury and Zinc	g/m <sup>3</sup>	Quarterly	Grab
Arsenic, Cadmium, Chromium and Nickel	g/m <sup>3</sup>	Annually	Grab
Semi-Volatile Organic Compounds (SVOC)	g/m <sup>3</sup>	Annually	Grab

For all parameters requiring monthly sampling, 24-hour composite and grab effluent samples were taken every month over the monitoring period. All quarterly samples were taken and analysed for the required parameters. The annual 24-hour composite sample was taken on January 2019 and was analysed for all the required parameters. As sampling and analysis of the effluent was complete, compliance with Condition 14 has been fulfilled.

Results from the effluent quality sampling for parameters without consent limits are summarised in Table 3-2.

Table 3-2 Effluent Sampling Results for Parameters without Consent Limits

Parameter	Unit	Statistical Basis	Results of Analysis
Ammoniacal Nitrogen	g/m <sup>3</sup>	Annual Median	1.23
Arsenic	g/m <sup>3</sup>	Single measurement	0.003
Cadmium	g/m <sup>3</sup>	Single measurement	0.0001
Chromium	g/m <sup>3</sup>	Single measurement	0.0006
Nickel	g/m <sup>3</sup>	Single measurement	0.0007
Semi-Volatile Organic Compounds (SVOC)	g/m <sup>3</sup>	Single measurement	See results in <b>Appendix E</b>

As no consent limits are applicable for effluent trace metal concentrations (arsenic, cadmium, chromium and nickel), Figure 3-1 presents the 2018/2019 concentrations compared with the historical monitoring results. Concentrations remain low and are consistent with the monitoring results from previous years.



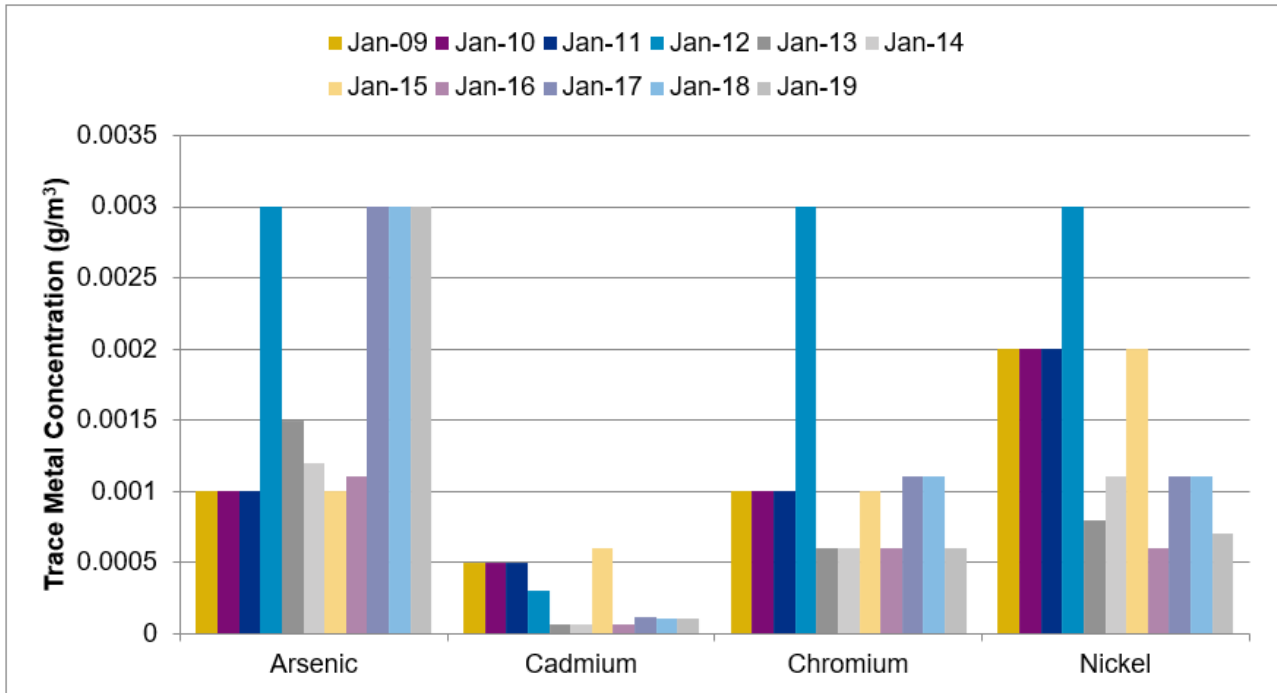


Figure 3-1 Effluent Trace Metal Concentrations

Figure 3-2 is a graph of effluent ammoniacal nitrogen concentrations for the period 2018/2019. Immediately obvious from the graph is the spike in ammoniacal nitrogen concentration recorded on 7 January 2019, measured at 20 g/m<sup>3</sup>. By comparison, effluent sampling results obtained from the other months only ranged between 0.11 – 4.5 g/m<sup>3</sup>. A similar occurrence was observed in January 2015, when an ammonia concentration of 18 g/m<sup>3</sup> was recorded. The 2015 spike was thought to have been caused by increased BOD load from the summer tourist season, due to the drop in DO (dissolved oxygen) concentrations at around the same time. This is because DO concentrations may drop during high influent BOD loads, and nitrification (the process which converts ammonia to nitrates) relies on DO values being higher than 2 ppm.

As reported previously, higher influent loads, particularly during the summer period will require particular attention by the STP operators to ensure treatment conditions remain optimal. However, significant initial dilutions after discharge are likely to bring the high initial concentration below marine guideline limits for ammonia.

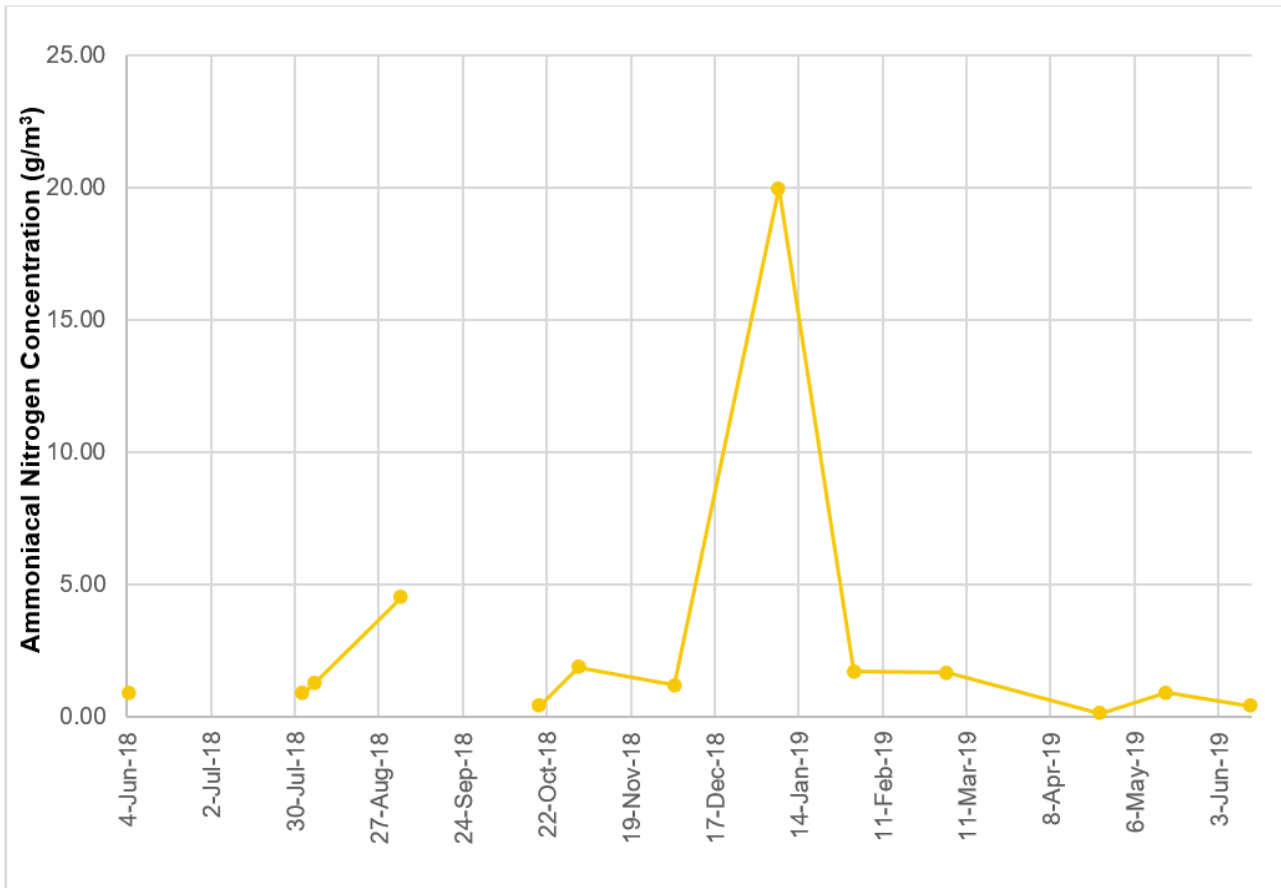


Figure 3-2 Ammoniacal Nitrogen Concentrations

### 3.6 Condition 15 – Effluent Quality Consent Limits

The effluent discharged from the Picton Sewage Treatment Plant must meet the following standards (see Table 3-3)

Table 3-3 Test Parameters, Consent Limits and Monitoring Results (2017/18)

Parameter	Reported as	Statistical Basis	Consent Limit	Results of Analysis
cBOD	g/m <sup>3</sup>	Annual Median	30	3.00
TSS	g/m <sup>3</sup>	Annual Median	40	8.00
pH		Range	6.0 – 8.5	7.60 – 6.50
Faecal Coliforms <sup>1</sup>	Number/100mls	Annual Geometric Mean	700	603.1
	Number/100mls	Annual 90 <sup>th</sup> percentile	4,300	14,640

<sup>1</sup> Back-calculated from shellfish gathering guideline values in Section F2 of Ministry for Environment (2003) Bacteriological Water Quality Guidelines for Marine and Freshwater Recreational Areas (2003) of 14 MPN/100ml times a dilution factor of 50:1 and 43 MPN/100ml times a dilution factor of 100:1.

Parameter	Reported as	Statistical Basis	Consent Limit	Results of Analysis
<i>Enterococci</i>	<i>Number/100mls</i>	<i>Annual Geometric Mean</i>	500	277.5
<i>Dissolved Reactive Phosphorous</i>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	20	3.55
<i>Copper</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	0.065	0.01615
<i>Lead</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	0.22	0.0006
<i>Mercury</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	0.052	0.00008
<i>Zinc</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	0.75	0.0405

See the final column ("Results of Analysis") in Table 3-3 for the results of the effluent monitoring for the reporting period. As can be seen from the table, all except one of the measured values fall within the consent limits. The 90<sup>th</sup> percentile faecal coliforms concentration exceeded the 4,300 cfu/100mL limit, due to two high measurements taken in January 2019 and June 2019 (which were both 16,000 cfu/100mL).

Table 3-4 below shows the results of monitoring the concentrations of dissolved reactive phosphorus (DRP) in the effluent for 2018/2019 compared with the eight-sample rolling median. The rolling median has remained stable since granting of the consent in 2010, and is well below the consent limit, as depicted by Figure 3-3.

Table 3-4 Effluent Dissolved Reactive Phosphorus Concentrations (2018/2019)

Date	Concentration (g/m <sup>3</sup> )	8 Sample Rolling Median (g/m <sup>3</sup> )
August 2018	3	3.25
October 2018	4.4	3.5
January 2019	4.1	3.5
April 2019	1.73	3.25
<b>Consent Limit</b>	<b>20</b>	<b>20</b>

<sup>2</sup> Back-calculated from 95<sup>th</sup> percentile level of ecosystem protection guideline values in Table 3.4.1 of the Australian and New Zealand Guidelines for Marine and Freshwater Quality (ANZECC, 2000) times a dilution factor of 50:1.

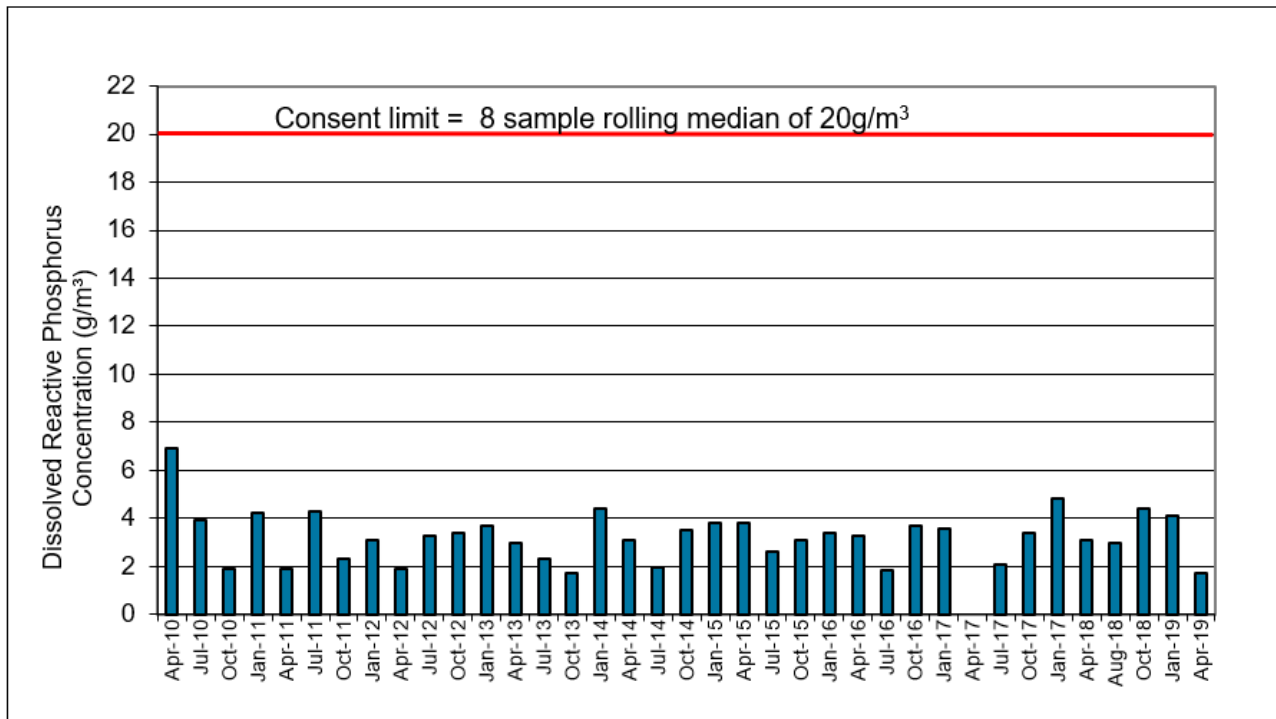


Figure 3-3 Effluent Dissolved Reactive Phosphorus Concentrations (2010 - 18)

Tables 3-5 to 3-8 show the concentrations and rolling medians for effluent metals (copper, zinc, lead and mercury). These results show that effluent concentrations of these metals in 2018/2019 are well below consent limits and are consistent with results from previous years (see Figure 3-4).

Table 3-5 Effluent Copper Concentration

Date	Concentration (g/m <sup>3</sup> )	8 Sample Rolling Median (g/m <sup>3</sup> )
August 2018	0.039	0.0130
October 2018	0.021	0.01615
January 2019	0.0098	0.01615
April 2019	0.0111	0.01615
<b>Consent Limit</b>	<b>0.065</b>	<b>0.065</b>

Table 3-6 Effluent Zinc Concentration

Date	Concentration (g/m <sup>3</sup> )	8 Sample Rolling Median (g/m <sup>3</sup> )
August 2018	0.056	0.0388
October 2018	0.035	0.03875
January 2019	0.035	0.0385
April 2019	0.041	0.0405
<b>Consent Limit</b>	<b>0.75</b>	<b>0.75</b>

Table 3-7 Effluent Lead Concentration

Date	Concentration (g/m <sup>3</sup> )	8 Sample Rolling Median (g/m <sup>3</sup> )
August 2018	0.0009	0.0005
October 2018	0.00070	0.0006
January 2019	0.0004	0.0006
April 2019	0.0003	0.0006
<b>Consent Limit</b>	<b>0.22</b>	<b>0.22</b>



Table 3-8 Effluent Mercury Concentration

Date	Concentration (g/m <sup>3</sup> )	8 Sample Rolling Median (g/m <sup>3</sup> )
August 2018	0.00008	0.0001
October 2018	0.00008	0.00008
January 2019	0.00008	0.00008
April 2019	0.00008	0.00008
<b>Consent Limit</b>	<b>0.02</b>	<b>0.02</b>

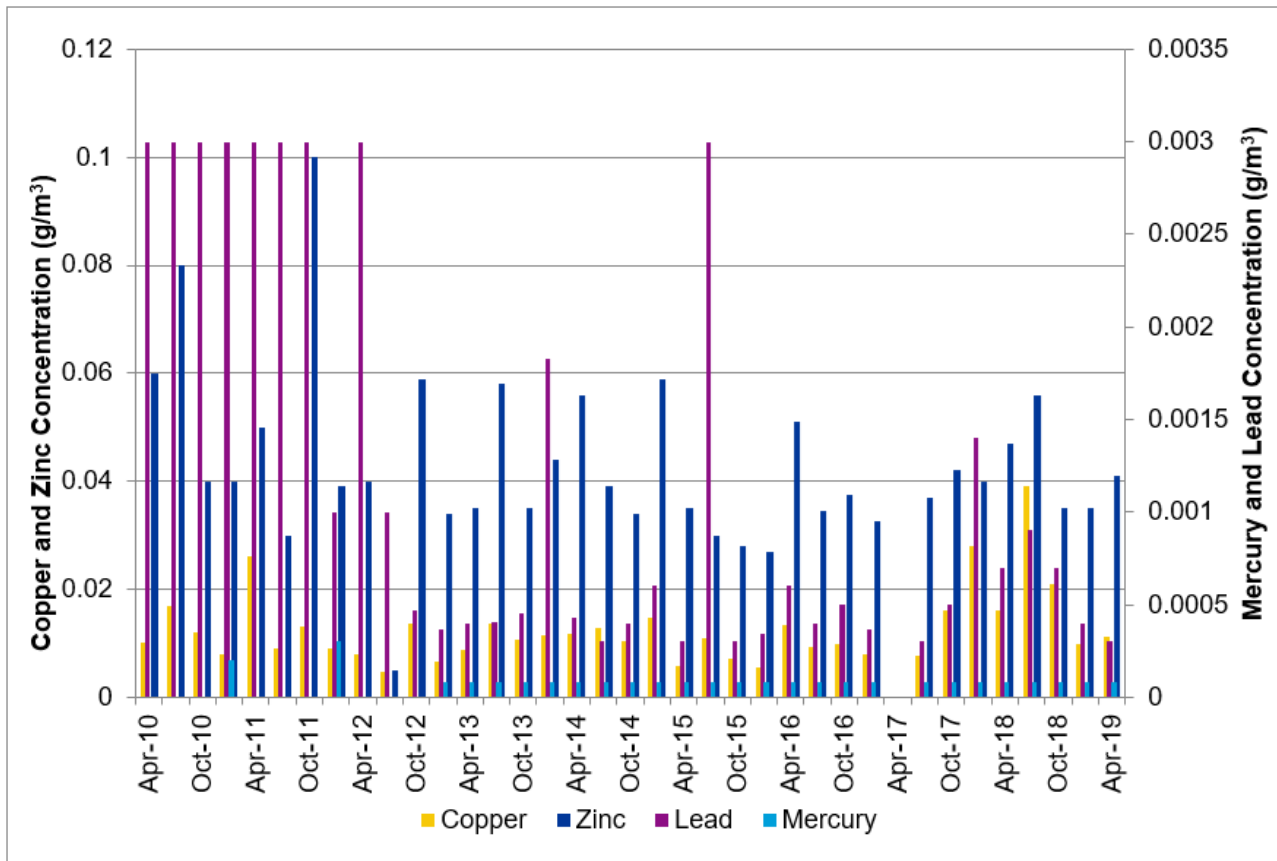


Figure 3-4 Three-Monthly Effluent Copper, Zinc, Lead and Mercury Concentrations

### 3.7 Condition 17 – Benthic Survey

The consent holder must carry out a survey of benthic ecology and sediments in the vicinity of the diffuser prior to the commissioning of the outfall, followed by a survey 2 years after commissioning and thereafter at 5 yearly intervals for the duration of the consent. Monitoring must be carried out in accordance with the following:

- Samples must be collected from a minimum of four locations to include sites close to the outfall, at the mixing zone boundary, outside the mixing zone and a control site.
- Four replicate samples must be collected at each sampling location from cores driven approximately 100mm into the sediment.
- All samples must be sieved to 0.5mm for identification and enumeration of benthic infaunal taxa (including mean density, species richness ( $j$ ) and Shannon Weiner diversity ( $H$ ) indices calculated for each location).

- d) *Infaunal community changes at each location between survey must be assessed.*
- e) *Prior to chemical analyses, all core samples must be examined to determine texture, colour (black indicating an anoxic layer) and odour (“rotten egg” smell indicating anaerobic conditions). Photographs shall be taken of each core to document the relative degree of enrichment.*
- f) *All samples must be analysed for Total Kjeldahl nitrogen, particle grain size percentage of organic content (as either ash free dry weight or total organic carbon), total organic carbon and trace metals (mercury, chromium, copper, lead and zinc).*
- g) *Sediment chemistry changes at each location between surveys must be assessed.*
- h) *Summarise the data collected as required under this condition (including graphical presentation and statistical summations of data) and analyse the information in regard to meeting the provisions of section 107(1)(g) of the Resource Management Act 1991. Specifically, whether or not the discharge is causing significant adverse effects on aquatic life.*
- i) *Highlight and discuss the environmental trends in the results.*
- j) *Compare results obtained during the survey with results obtained during previous surveys and provide an interpretation of any significant differences, changes or trends.*

A post-commissioning benthic survey was carried out by Cawthron on 25 November 2014 in accordance with Condition 17. This report, titled “*Benthic Survey for the Relocated Picton Wastewater Treatment Plant Outfall 2014*” (Cawthron Institute, 2015) can be found in **Appendix F**.

This report noted that there has been little change in the benthic environment, in the vicinity of the outfall since commissioning two years prior. It was concluded that the operation of the Picton STP is not causing significant adverse effects on seabed habitat or aquatic life at any of the stations sampled and is therefore meeting the requirements.

The next benthic survey will be carried out in late -2019, five years after the post commissioning survey, in accordance with consent requirements. Results from this upcoming survey shall be discussed in the 2019/2020 annual monitoring report.

### 3.8 Condition 18 – Shellfish Quality

*The consent holder must carry out annual monitoring of shellfish quality in Picton Harbour in accordance with the following programme:*

- a) *Samples of the blue mussel (*Mytilus edulis galloprovincialis*) shall be collected from the following shoreline locations: Mabel Island, Kaipupu Point, Bobs Bay, Westshore and Picton Wharf. Note: these shellfish gathering locations were agreed with the Picton Sewage Consultative Working Group and the Senior Public Health Protection Officer, Nelson/Marlborough District Health Board and used by NIWA Ltd during the preparation of the Quantitative Microbial Risk Assessment for the consenting of the new Picton outfall (June 2009).*
- b) *All samples must be analysed for Faecal coliforms and trace metals (copper, mercury and zinc).*
- c) *Results of analysis of samples must be assessed against the following standards: Faecal coliforms (Ministry of Health (MOH) Reference Criteria for Food (2005); and trace metals (Australia New Zealand Food Standards Code (ANZFSC) 2002).*

The results of shellfish quality monitoring are shown in Table 3-8.

Table 3-9 Shellfish Monitoring Standards and 2018/19 Sample Results

Source	Faecal Coliforms (MPN/100g)	Copper (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
<b>Standard</b>				
ANZFSC/MOH*	230	-	0.5	-
Median International Standard for Trace Elements in Shellfish (MIS)	-	30	0.5	40
<b>Results</b>				
Mabel Island	20	0.72	0.01	36
Kaipupu Point	18	0.83	0.01	27
Bob's Bay	18	0.90	0.01	26
Westshore	170	0.78	0.01	33
Picton Wharf	330	1.38	0.01	25

\*: Means MPN/100g in a minimum of 12 shellfish.

Shellfish monitoring was carried out at all of the required locations (see map in **Appendix C**) on 15 February 2019. All shellfish samples collected on this date were below the limits set by the ANZFSC/MOH and MIS standards, except for the Picton Wharf sample which exceeded the ANZFSC/MOH faecal coliform limit.

Note that Condition 18 of the consent does not require the shellfish samples to comply with these standards. These results show that the shellfish samples taken close to the outfall (Westshore) and at the wharf have higher concentrations of faecal coliforms compared to shellfish samples at more remote sites. This suggests that indicating that activities at Westshore which include the outfall discharge, as well as port activities, have an influence on shellfish quality. The sampling results remain useful in advising the public where, or where not, to gather shellfish in the harbour.

### 3.9 Conclusions

This assessment is based solely on the physical, chemical and microbiological monitoring as required by Consent U100802. While monitoring of effluent and the receiving environment is only carried at specific times, it is assumed that the results from this monitoring are generally representative of effluent and water quality at other times, unless specifically stated otherwise.

Effluent quality has been good since the commissioning of the Picton STP in September 1999. Effluent quality monitoring in 2018/19 shows that the treated effluent was within the limits set by the conditions in Consent U100802. No outfall effects from the discharge have been observed, within or outside the outfall mixing zone specified by the consent. However, the dive survey has found that there is significant biological growth around the outfall, which will require cleaning in the near future to ensure ongoing performance of the diffusers.

All final effluent samples were taken at the required frequency. Effluent quality was within the limits set by Condition 15, except for the 90<sup>th</sup> percentile faecal coliform concentration. Ammoniacal nitrogen concentrations were also high for a January 2019 sample (likely due to high summer influent loads), but there is no limit set by the consent.

The Cawthron post-commissioning benthic ecology survey carried out in 2014 showed that the operation of the Picton STP has not caused adverse effects on the seabed habitats, or aquatic life at the stations sampled. The next benthic survey is scheduled to be carried out in late-2019.

Shellfish samples were taken at the required locations and were analysed for the required parameters. When assessed against the ANZFSC/MOH standards, the sample obtained from Picton Wharf was found to exceed the limit for faecal coliforms. It is understood that shellfish collection near the wharf and outfall is prohibited, so the public health risks are limited. Shellfish obtained from all other locations were below the limits set by the ANZFSC/MOH and MIS standards.



## 4 Consent U100802 – Coastal Permit (Outfall Pipeline)

### 4.1 Condition 10 – Inspection of Outfall and Diffuser

*At yearly intervals following the commissioning of the outfall and diffuser, the consent holder must submit to the Resource Consents Manager at Marlborough District Council, a report detailing the findings of a visual inspection of the diffuser structure, to include at least the following matters:*

- a) The date and time of the inspection*
- b) The condition of the outfall diffuser structure*
- c) A description of any maintenance work and, if required, a programme for completion of the maintenance work.*

Marine Services NZ Limited (previously N-Viro Mooring Systems Ltd) carried out an inspection of the outfall on 13 February 2019 (see **Appendix D**).

This inspection found the following:

- Heavy marine growth around anodes, duckbill outlet valves and pipe clamps.
- All sacrificial anodes at the diffuser pipeline and main pipeline (from the trust block to the burial area) are active but are at over 55% wastage.
- All discharge duckbill outlets are clear of fouling allowing uninhibited flows.
- All pipe clamps in good condition with no corrosion.
- Random checks on bolt and nut tightness found that they were to the correct tension, but some nuts were missing.
- A Christmas tree and a road sign barrier were found in the seabed and removed.
- The thrust block was found to be in good condition with no debris surrounding it.

### 4.2 Conclusions

The outfall inspection has found that the outfall structure is in good condition overall. Some action will need to be taken to clear the marine growth around the structure, and to check for and replace missing nuts. The anode is at 55% wastage and will require replacement in the future. Council should consider putting in larger replacement anodes in the 2-3 years' time. Compliance with Condition 10 has been met.



Appendix A – Resource Consent U100802

## **U100802**

### **Coastal Permit – Discharge to Seawater**

1. This consent shall be exercised in a manner which is consistent with the proposal and methodologies described in the documents, information and analysis provided by the Applicant in support of this application and held on Council file U100802.
2. This consent shall expire on 1 June 2046.
3. The applicant shall provide to the Team Leader, Compliance, Marlborough District Council, on or before 31 August in each year of the term of this consent, an Annual Monitoring Report (AMR) which must contain the following:
  - a) An analysis of the extent to which the applicant has, in exercising these consents, complied with consent conditions and the extent and cause of any non-compliance, in each case with a summary of the environmental effects arising from the operation of the pipeline, surge chamber and outfall/diffuser, during the preceding 12 month period from 1 July to 30 June inclusive (the reporting period).
  - b) An identification and discussion of any operational difficulties, changes or improvements made to the Picton Sewage Treatment Plant and other operating processes, which may cause any material difference in environmental outcomes from the previous reporting period.
  - c) An identification of any maintenance works needed, proposed or undertaken to ensure compliance with these conditions of consent.
  - d) An identification of any improvements or changes required and the timetable for implementation.
  - e) A summary of all the effluent monitoring data collected pursuant to this consent during the reporting period.
  - f) A summary of all receiving environment monitoring data collected pursuant to this consent during the reporting period.
  - g) An analysis of the data summarised under Condition 3 (e and f) above in terms of consent compliance and environmental effects during the reporting period.
  - h) A comparison of results with previous years and a discussion of any trends during the reporting period.
  - i) Any complaints received in regard to the discharge of treated effluent from the outfall.
- 4) Any laboratory carrying out analysis required under these conditions shall be accredited for those analyses to NZS/ISO/IEC 17025 or equivalent, or to any other comparable standard approved by the consent authority.
- 5) The consent authority may review any conditions of this consent in September or October of any year for the life of the consent, for any of the following purposes:
  - a) To deal with any adverse effect on the environment which may arise from the exercise of this consent;
  - b) To require the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment;
  - c) To address any matters raised in the AMR required by Condition 3; and
  - d) To comply with the relevant requirements of a Marlborough District Council resource management plan.

6. The consent holder shall be responsible for all costs associated with the monitoring required by these consent conditions as required by section 36 of the Resource Management Act 1991 and the Marlborough District Council's Schedule of Fees.
7. The consent holder shall be responsible for all costs incurred by the consent authority associated with the review of requested changes to any management plan which forms part of this consent.
8. Following the commissioning of the new landline, surge chamber, outfall pipeline and diffuser structure, the consent holder shall be required to apply the conditions that follow in exercising this consent.
9. The consent holder shall provide for a backup power supply for the UV disinfection system at the Picton Sewage Treatment Plant in case of a power outage.
10. The discharge of treated effluent through the outfall, as authorised by this consent, shall not exceed a maximum flow rate of 400 litres per second.
11. The mixing zone for the discharge to Picton Harbour from the outfall shall be as shown in Drawing 6513000-C-K47.
12. The discharge of treated effluent through the outfall shall not cause any of the following effects outside the mixing zone described in Condition 11:
  - a. The natural temperature of the receiving water shall not be changed by more than 3 degrees Celsius;
  - b. Any conspicuous change in colour or clarity of the receiving water such that visual clarity is reduced by more than 33% as per the *Water Quality Guidelines No. 2* (Ministry for the Environment, 1994);
  - c. Any significant adverse effects on aquatic life; and
  - d. The concentration of dissolved oxygen on the receiving water shall be greater than 80% of the saturation concentration.
13. There shall be no undesirable biological growths as a result of the discharge.
14. The consent holder shall carry out effluent monitoring at the outlet of the Picton Sewage Treatment Plant using the sampling method and frequency shown below. Samples will be analysed for the following parameters:

Parameter	Reported as	Frequency	Sampling Method
Carbonaceous Biochemical Oxygen Demand	g/m <sup>3</sup>	Monthly	24 Hour Composite
Total Suspended Solids	g/m <sup>3</sup>	Monthly	24 Hour Composite
pH	No units	Monthly	Grab
Ammoniacal Nitrogen	g/m <sup>3</sup>	Monthly	Grab
Faecal Coliforms and Enterococci	Number/100mls	Monthly	Grab
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	Quarterly	Grab



Copper, Lead, Mercury and Zinc	g/m <sup>3</sup>	Quarterly	Grab
Arsenic, Cadmium, Chromium and Nickel	g/m <sup>3</sup>	Annually	Grab
Semi-Volatile Organic Compounds	g/m <sup>3</sup>	Annually	Grab

15. The effluent discharged from the Picton Sewage Treatment Plant shall meet the following standards:

Parameter	Reported as	Statistical Basis	Consent Limit
Carbonaceous Biochemical Oxygen Demand	g/m <sup>3</sup>	Annual Median	30
Total Suspended Solids	g/m <sup>3</sup>	Annual Median	40
pH	No Units	Range	6.0-8.5
Faecal Coliforms <sub>1</sub>	Number/100mls	Annual Geometric Mean	700 MPN
	Number/100mls	Annual 90 <sup>th</sup> Percentile	4,300
Enterococci	Number/100mls	Annual Geometric Mean	500
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	Rolling median of last 8 samples	20
Copper, <sub>2</sub>	g/m <sup>3</sup>	Rolling median of last 8 samples	0.065
Lead, <sub>2</sub>	g/m <sup>3</sup>	Rolling median of last 8 samples	0.22
Mercury, <sub>2</sub>	g/m <sup>3</sup>	Rolling median of last 8 samples	0.02
Zinc, <sub>2</sub>	g/m <sup>3</sup>	Rolling median of last 8 samples	0.75

<sub>1</sub> Back-calculated from shellfish gathering guideline values in Section F2 of Ministry for Environment (2003) *Bacteriological Water Quality Guidelines for Marine and Freshwater Recreational Areas* (2003) of 14 MPN/100ml times a dilution factor of 50:1 and 43 MPN/100ml times a dilution factor of 100:1

<sub>2</sub> Back-calculated from 95<sup>th</sup> percentile level of ecosystem protection guideline values in Table 3.4.1 of the *Australian and New Zealand Guidelines for Marine and Freshwater Quality* (ANZECC, 2000) times a dilution factor of 50:1.

16. The consent holder shall carry out a one-off study within 12 months of the commissioning of the outfall to validate the predicted initial dilution of the diffuser.
17. The consent holder shall carry out a survey of benthic ecology and sediments in the vicinity of the diffuser prior to the commissioning of the outfall, followed by a survey 2 years after commissioning and thereafter at 5 yearly intervals for the duration of the consent. Monitoring will be carried out in accordance with the following:
- Samples shall be collected from a minimum of four locations to include sites close to the outfall, at the mixing zone boundary, outside the mixing zone and a control site.

- b) Four replicate samples shall be collected at each sampling location from cores given approximately 100mm into the sediment.
  - c) All samples shall be sieved to 0.5mm for identification and enumeration of benthic infaunal taxa (including mean density, species richness(j), and Shannon Weiner diversity(H) indices calculated for each location).
  - d) Infaunal community changes at each location between surveys shall be assessed.
  - e) Prior to chemical analysis, all core samples shall be examined to determine texture, colour (black indicating an anoxic layer) and odour (“rotten egg” smell indicating anaerobic conditions). Photographs shall be taken of each core to document the relative degree of enrichment.
  - f) All samples shall be analysed for Total Kjeldahl Nitrogen, particle grain size, percentage of organic content (ash free dry weight), total organic carbon and trace metals (mercury, chromium, copper, lead and zinc).
  - g) Sediment chemistry changes at each location between surveys shall be assessed.
  - h) Summarise the data collected as required under this Condition (including graphical presentation and statistical summations of data) and analyse the information in regard to meeting the ecological provisions of section 107(1)(g) of the Resource Management Act 1991. Specifically, whether or not the discharge is causing significant adverse effects on aquatic life.
  - i) Highlight and discuss environmental trends in the results.
  - j) Compare results obtained during the survey with results obtained during previous surveys and provide an interpretation of any significant differences, changes or trends.
18. The consent holder shall carry out annual monitoring of shellfish quality in Picton Harbour in accordance with the following programme:
- a) Samples of the blue mussel (*Mytilus edulis galloprovincialis*) shall be collected from the following shoreline locations: Mabel Island, Kaipupu Point, Bobs Bay, Westshore and Picton Wharf. *Note: these shellfish gathering locations were agreed with the Picton Sewage Consultative Working Group and the Senior Public Health Protection Officer, Nelson/Marlborough District Health Board and used by NIWA Ltd during the preparation of the Quantitative Microbial Risk Assessment for the new Picton outfall (June 2009).*
  - b) All samples shall be analysed for Faecal coliforms and trace metals (copper, mercury and zinc).
  - c) Results of analysis of samples shall be assessed against the following standards: Faecal coliforms (*Ministry of Health Reference Criteria For Food 2005*); and trace metals (*Australia New Zealand Food Standards Code 2002*).

## **Coastal Permit – Outfall Pipeline**

1. This resource consent shall expire on 1 June 2046.
2. Except insofar as required to comply with other conditions of this consent, the outfall pipeline and diffuser structure shall be constructed and maintained to accord with the Application for Resource Consent U100802 received by Council 21 December 2010.
3. Not later than one month prior to the commencement of site works, the consent holder shall submit to the Resource Consents Manager, Marlborough District Council, a construction management plan detailing the construction methodology and the measures which will be taken to avoid, remedy and mitigate adverse environmental effects arising from the construction phase. At minimum, the plan shall address all of the matters set out in the draft plan submitted as Appendix I to the resource consent application U100802. No works shall commence until the plan has been approved in writing by the Resource Consents Manager.
4. Following the approval of the construction management plan referred to in condition 2 above, all work associated with this resource consent shall be undertaken in accordance with that approved plan.
5. Not later than one week prior to the commencement of site works, the consent holder shall give the Resource Consents Manager, Marlborough District Council, written notice of the start date of works on the development site.
6. Following construction, the consent holder shall ensure that the outfall pipeline, diffuser structure and all associated structures are at all times maintained in a structurally sound condition and efficient working order.
7. Prior to the first use of the outfall pipeline, the consent holder shall erect and maintain a marker sign on the shoreline as close as possible to the diffuser location, marked with the words “Treated Wastewater Outfall”. The sign shall be sufficiently clear to enable passing boat users to read the sign at a distance of 50 metres.
8. As soon as practicable following completion of the structures, the consent holder shall notify the Harbourmaster and Resource Consents Manager at Marlborough District Council and the Director of Maritime Safety of the precise location and extent of the outfall pipeline and diffuser, together with appropriate coordinates.
9. Within three months of the commissioning of the outfall and diffuser, the consent holder shall provide the Resource Consents Manager at Marlborough District Council with certification from a suitably experienced chartered professional engineer to confirm that the structures have been designed and constructed in accordance with generally accepted best engineering practice.
10. At yearly intervals following the commissioning of the outfall and diffuser, the consent holder shall submit to the Resource Consents Manager at Marlborough District Council, a report detailing the findings of a visual inspection of the diffuser structure, to include at least the following matters:
  - a. The date and time of the inspection.
  - b. The condition of the outfall diffuser structure.
  - c. A description of any maintenance work and if required programme for completion of the maintenance work.

11. The consent holder shall ensure that any maintenance or repairs identified by the yearly inspection referred to above, or identified at any other time, are carried out as soon as practicable. The consent holder shall provide written confirmation to the Resource Consents Manager that the repairs have been undertaken within 1 month of the completion of those repairs.

#### **Land Use Consent – Surge Chamber and Pipeline**

1. Except insofar as required to comply with other conditions of this consent, the activity must be undertaken in accordance with the Application for Resource Consent U100802 received by Council 21 December 2010.
2. Not later than one month prior to the commencement of site works, the consent holder shall submit to the Resource Consents Manager, Marlborough District Council, a construction management plan detailing the construction methodology and the measures which will be taken to avoid, remedy and mitigate adverse environmental effects arising from the construction phase. At minimum, the plan shall address all of the matters set out in the draft plan submitted as Appendix I to the resource consent application U100802. No works shall commence until the plan has been approved in writing by the Resource Consents Manager.
3. Following the approval of the construction management plan referred to in condition 2 above, all work associated with this resource consent shall be undertaken in accordance with that approved plan.
4. Not later than one week prior to the commencement of site works, the consent holder shall give the Resource Consents Manager, Marlborough District Council, written notice of the start date of works on the development site.

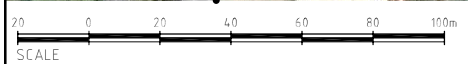
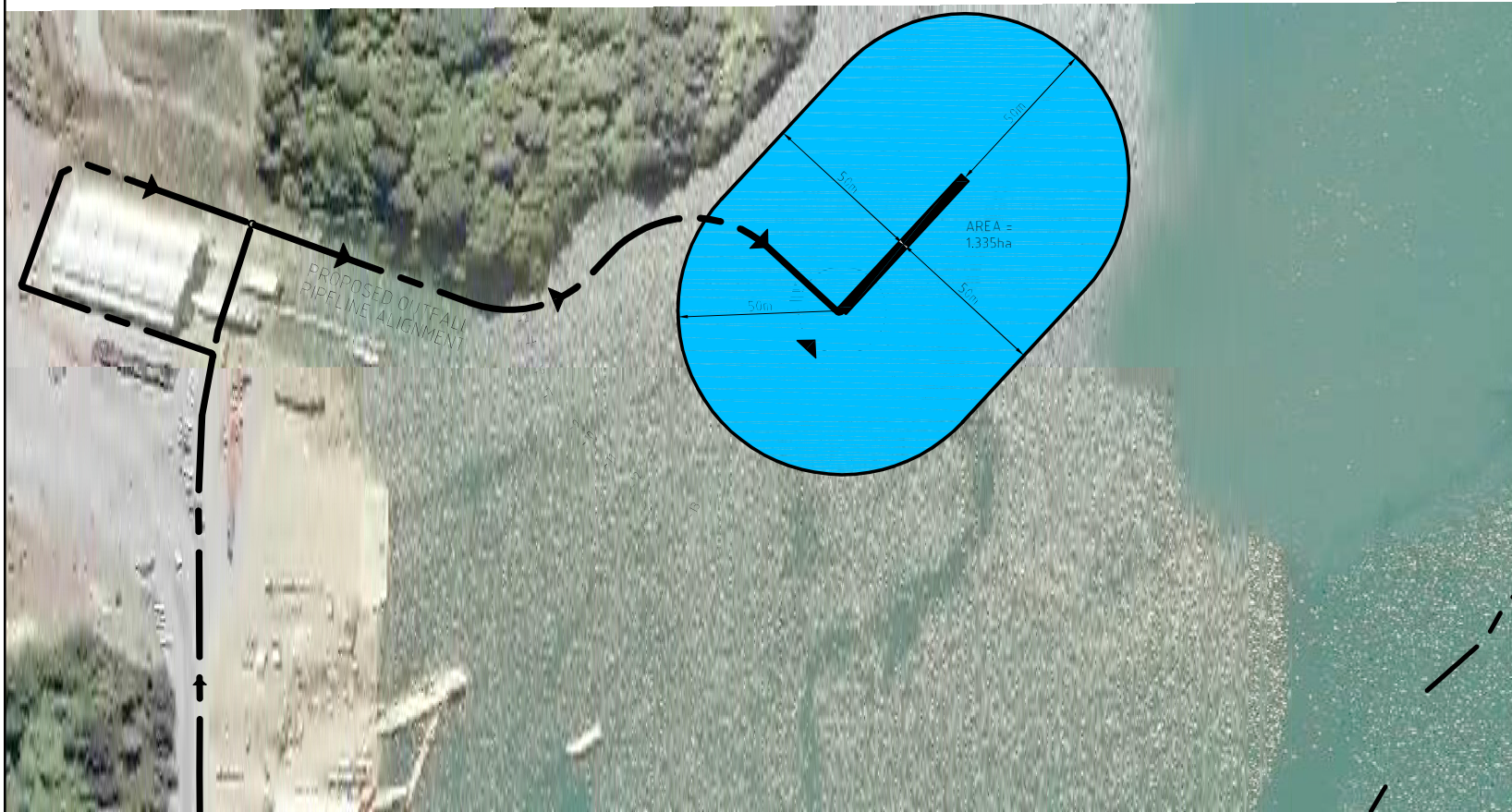
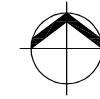
#### **Land Use Consent – Removal of Existing Pipeline**

1. Except insofar as required to comply with other conditions of this consent, the activity must be undertaken in accordance with the Application for Resource Consent U100802 received by Council 21 December 2010.
2. Not later than one month prior to the commencement of site works, the consent holder shall submit to the Resource Consents Manager, Marlborough District Council, a management plan detailing the deconstruction methodology and the measures which will be taken to avoid, remedy and mitigate adverse environmental effects arising from the deconstruction phase. At minimum, the plan shall address all of the matters set out in the draft plan submitted as Appendix I to the resource consent application U100802. No works shall commence until the plan has been approved in writing by the Resource Consents Manager.
3. Following the approval of the management plan referred to in condition 2 above, all work associated with this resource consent shall be undertaken in accordance with that approved plan.
4. Not later than one week prior to the commencement of site works, the consent holder shall give the Resource Consents Manager, Marlborough District Council, written notice of the start date of works on the development site.
5. The consent holder shall ensure that the works authorised by this consent are carried out within 6 months following the commissioning of the new outfall pipeline and diffuser structure.

6. The consent holder shall ensure that all constituent materials of the existing pipeline and support structures are removed from the site and disposed of at a cleanfill or sealed landfill, as appropriate to the nature of the material. In no circumstances shall any material be disposed of in the coastal marine area or on public conservation land. Following removal of the pipeline, the land beneath it shall be remediated to as natural an appearance as practicable.
7. Within one month of the removal of the pipeline and support structures, the consent holder shall provide the Resource Consents Manager at Marlborough District Council with written and photographic confirmation that condition 6 above has been complied with.

# B

Appendix B – Mixing Zone Drawing



**FOR INFORMATION**  
**NOT FOR CONSTRUCTION**

				Client:		Project:		Title:	
						PSTP OUTFALL AEE		PROPOSED OUTFALL MIXING ZONE	
A		CAL			24.03.10	Approved for Construction *		Discipline	
FOR INFORMATION		By	Chk	Appd	Date				
No.	Revision	Scale as drawn (A4)		Designed	GJW	24.03.10	Date: * Refer to Revision 1 for Original Signatures	CIVIL	
		1:2000		Drawn	CAL	24.03.10		Drawing No.	6513000-C-K47
						Dwg Check		Rev.	A

DO NOT SCALE

IF IN DOUBT ASK



# C

## Appendix C – Shellfish Sampling Locations



Figure 3 - Map Showing Shellfish Monitoring Sites.

# D

## Appendix D – Outfall Inspection Report

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**Diving Inspection Report**  
**Picton Sewerage Pipeline – February 2019**  
**Work Order Number: WO045641**

12<sup>th</sup> February 2019:

- Emailed Harbour Master details of Inspection starting on the 13.02.2019
- Worksafe Permit lodged and copied Harbour Masters office

13<sup>th</sup> February 2018:

- Mobilise Work vessel 'Soundz Image' and SSBA:- Surface Supplied Breathing Apparatus
- Contact Picton Harbour Radio and the Harbour Master to notify them of pending Diving Operations
- Contact Ferry Operators for Arrival/Departure times to enable us to dive in between berthing
- JSA done at the office prior to departure
- Carried out Pre-Start meeting on site

**Diver carried out inspection of Diffuser pipeline**

- All the anodes are active but showing over 55% wastage plus some now have heavy marine growth as photos show
- All discharge Duckbill Ports are clear of fouling and uninhibited but all so have marine growth on the outside. Divers observed clear water discharging
- All clamps are in good condition with no sign of corrosion but again an increase of marine growth.
- As per the last inspection a random check on the tightness of the nuts & bolts was carried out: – found to be under correct tension but there are some nuts missing
- Seabed condition two articles of rubbish removed, one Christmas tree lodged under the pipe plus a road sign barrier – nothing else covering or near the pipeline.
- A random check on the tightness of the flange bolts was carried out - they were found to be all tight

Page 2/.

**Diver carried out inspection of the main pipeline from the Thrust Block back to the burial area inshore**

- The Thrust Block is in good condition with no debris around it
- All anodes are active - they were found to be approximately 55% wasted
- All clamps are in good condition with no sign of corrosion but now have considerable marine growth.

Note:

- The 'Notification of Pipeline' Sign has been re-made and is ready to be re-instated once the decision on best location has been made. To put it back on the hill side will mean it will be hidden by the growth of the native bush. To put in either close to shore or on shore attached to a rail pile will ensure it is visible.
- We do recommend a water jet clean to remove marine growth in the near future.

Thank you for contracting MSNZ Ltd to carry out this project

# E

## Appendix E – SVOC Lab Results



## Certificate of Analysis

Page 1 of 4

<b>Client:</b>	Marlborough District Council	<b>Lab No:</b>	2110979	SPv1
<b>Contact:</b>	C Hutchison C/- Marlborough District Council PO Box 443 Blenheim 7240	<b>Date Received:</b>	18-Jan-2019	
		<b>Date Reported:</b>	31-Jan-2019	
		<b>Quote No:</b>	50185	
		<b>Order No:</b>	51493 Chu	
		<b>Client Reference:</b>	Picton Sewage, Consent, Annual	
		<b>Submitted By:</b>	Joe Larrington	

### Sample Type: Aqueous

<b>Sample Name:</b>	20190721 - 24 Hr Sampling Outlet -Effluent LOC1038 17-Jan-2019 1:32 pm	20190721 - Grab Samples Outlet -Effluent LOC1038 18-Jan-2019 2:15 pm			
<b>Lab Number:</b>	2110979.1	2110979.2			

#### Individual Tests

pH	pH Units	7.6	-	-	-	-
Total Suspended Solids	g/m <sup>3</sup>	17	-	-	-	-
Total Recoverable Mercury	g/m <sup>3</sup>	< 0.00008	-	-	-	-
Total Ammoniacal-N	g/m <sup>3</sup>	20	-	-	-	-
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	4.1	-	-	-	-
Carbonaceous Biochemical Oxygen Demand (cBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	< 2 #1	-	-	-	-
Faecal Coliforms	MPN / 100mL	-	> 16,000	-	-	-
Enterococci	MPN / 100mL	-	> 24,200	-	-	-

#### Heavy metals total recoverable, trace As,Cd,Cr,Cu,Ni,Pb,Zn

Total Recoverable Arsenic	g/m <sup>3</sup>	< 0.003	-	-	-	-
Total Recoverable Cadmium	g/m <sup>3</sup>	< 0.00006	-	-	-	-
Total Recoverable Chromium	g/m <sup>3</sup>	< 0.0006	-	-	-	-
Total Recoverable Copper	g/m <sup>3</sup>	0.0098	-	-	-	-
Total Recoverable Lead	g/m <sup>3</sup>	0.00039	-	-	-	-
Total Recoverable Nickel	g/m <sup>3</sup>	0.0007	-	-	-	-
Total Recoverable Zinc	g/m <sup>3</sup>	0.035	-	-	-	-

#### Haloethers in SVOC Water Samples by GC-MS

Bis(2-chloroethoxy) methane	g/m <sup>3</sup>	< 0.005	-	-	-	-
Bis(2-chloroethyl)ether	g/m <sup>3</sup>	< 0.005	-	-	-	-
Bis(2-chloroisopropyl)ether	g/m <sup>3</sup>	< 0.005	-	-	-	-
4-Bromophenyl phenyl ether	g/m <sup>3</sup>	< 0.005	-	-	-	-
4-Chlorophenyl phenyl ether	g/m <sup>3</sup>	< 0.005	-	-	-	-

#### Nitrogen containing compounds in SVOC Water Samples by GC-MS

2,4-Dinitrotoluene	g/m <sup>3</sup>	< 0.010	-	-	-	-
2,6-Dinitrotoluene	g/m <sup>3</sup>	< 0.010	-	-	-	-
Nitrobenzene	g/m <sup>3</sup>	< 0.005	-	-	-	-
N-Nitrosodi-n-propylamine	g/m <sup>3</sup>	< 0.010	-	-	-	-
N-Nitrosodiphenylamine + Diphenylamine*	g/m <sup>3</sup>	< 0.010	-	-	-	-

#### Organochlorine Pesticides in SVOC Water Samples by GC-MS

Aldrin	g/m <sup>3</sup>	< 0.005	-	-	-	-
alpha-BHC	g/m <sup>3</sup>	< 0.005	-	-	-	-
beta-BHC	g/m <sup>3</sup>	< 0.005	-	-	-	-
delta-BHC	g/m <sup>3</sup>	< 0.005	-	-	-	-





Sample Type: Aqueous						
<b>Sample Name:</b>		20190721 - 24 Hr Sampling Outlet -Effluent LOC1038 17-Jan-2019 1:32 pm	20190721 - Grab Samples Outlet -Effluent LOC1038 18-Jan-2019 2:15 pm			
<b>Lab Number:</b>		2110979.1	2110979.2			
Organochlorine Pesticides in SVOC Water Samples by GC-MS						
gamma-BHC (Lindane)	g/m <sup>3</sup>	< 0.005	-	-	-	-
4,4'-DDD	g/m <sup>3</sup>	< 0.005	-	-	-	-
4,4'-DDE	g/m <sup>3</sup>	< 0.005	-	-	-	-
4,4'-DDT	g/m <sup>3</sup>	< 0.010	-	-	-	-
Dieldrin	g/m <sup>3</sup>	< 0.005	-	-	-	-
Endosulfan I	g/m <sup>3</sup>	< 0.010	-	-	-	-
Endosulfan II	g/m <sup>3</sup>	< 0.010	-	-	-	-
Endosulfan sulfate	g/m <sup>3</sup>	< 0.010	-	-	-	-
Endrin	g/m <sup>3</sup>	< 0.010	-	-	-	-
Endrin ketone	g/m <sup>3</sup>	< 0.010	-	-	-	-
Heptachlor	g/m <sup>3</sup>	< 0.005	-	-	-	-
Heptachlor epoxide	g/m <sup>3</sup>	< 0.005	-	-	-	-
Hexachlorobenzene	g/m <sup>3</sup>	< 0.005	-	-	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS						
Acenaphthene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Acenaphthylene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Anthracene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Benzo[a]anthracene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Benzo[a]pyrene (BAP)	g/m <sup>3</sup>	< 0.003	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Benzo[g,h,i]perylene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Benzo[k]fluoranthene	g/m <sup>3</sup>	< 0.003	-	-	-	-
1&2-Chloronaphthalene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Chrysene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Dibenzo[a,h]anthracene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Fluoranthene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Fluorene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Indeno(1,2,3-c,d)pyrene	g/m <sup>3</sup>	< 0.003	-	-	-	-
2-Methylnaphthalene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Naphthalene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Phenanthrene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Pyrene	g/m <sup>3</sup>	< 0.003	-	-	-	-
Phenols in SVOC Water Samples by GC-MS						
4-Chloro-3-methylphenol	g/m <sup>3</sup>	< 0.010	-	-	-	-
2-Chlorophenol	g/m <sup>3</sup>	< 0.005	-	-	-	-
2,4-Dichlorophenol	g/m <sup>3</sup>	< 0.005	-	-	-	-
2,4-Dimethylphenol	g/m <sup>3</sup>	< 0.005	-	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m <sup>3</sup>	< 0.010	-	-	-	-
2-Methylphenol (o-Cresol)	g/m <sup>3</sup>	< 0.005	-	-	-	-
2-Nitrophenol	g/m <sup>3</sup>	< 0.010	-	-	-	-
Pentachlorophenol (PCP)	g/m <sup>3</sup>	< 0.10	-	-	-	-
Phenol	g/m <sup>3</sup>	< 0.010	-	-	-	-
2,4,5-Trichlorophenol	g/m <sup>3</sup>	< 0.010	-	-	-	-
2,4,6-Trichlorophenol	g/m <sup>3</sup>	< 0.010	-	-	-	-
Plasticisers in SVOC Water Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	g/m <sup>3</sup>	< 0.03	-	-	-	-
Butylbenzylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-
Di(2-ethylhexyl)adipate	g/m <sup>3</sup>	< 0.005	-	-	-	-
Diethylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-
Dimethylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-
Di-n-butylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-

Sample Type: Aqueous						
<b>Sample Name:</b>		20190721 - 24 Hr Sampling Outlet -Effluent LOC1038 17-Jan-2019 1:32 pm	20190721 - Grab Samples Outlet -Effluent LOC1038 18-Jan-2019 2:15 pm			
<b>Lab Number:</b>		2110979.1	2110979.2			
Plasticisers in SVOC Water Samples by GC-MS						
Di-n-octylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-
Other Halogenated compounds in SVOC Water Samples by GC-MS						
1,2-Dichlorobenzene	g/m <sup>3</sup>	< 0.010	-	-	-	-
1,3-Dichlorobenzene	g/m <sup>3</sup>	< 0.010	-	-	-	-
1,4-Dichlorobenzene	g/m <sup>3</sup>	< 0.010	-	-	-	-
Hexachlorobutadiene	g/m <sup>3</sup>	< 0.010	-	-	-	-
Hexachloroethane	g/m <sup>3</sup>	< 0.010	-	-	-	-
1,2,4-Trichlorobenzene	g/m <sup>3</sup>	< 0.005	-	-	-	-
Other compounds in SVOC Water Samples by GC-MS						
Benzyl alcohol	g/m <sup>3</sup>	< 0.05	-	-	-	-
Carbazole	g/m <sup>3</sup>	< 0.005	-	-	-	-
Dibenzofuran	g/m <sup>3</sup>	< 0.005	-	-	-	-
Isophorone	g/m <sup>3</sup>	< 0.005	-	-	-	-

### Analyst's Comments

#1 Due to a short term technical difficulty, we were unable to commence the Biochemical oxygen demand analyses on the day that they arrived at the laboratory. The analyses were performed, as soon as possible, on the frozen samples.

## Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Heavy metals total recoverable, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric/Hydrochloric acid extraction, ICP-MS, trace level. APHA 3125 B 22 <sup>nd</sup> ed. 2012.	0.00005 - 0.0010 g/m <sup>3</sup>	1
Semivolatile Organic Compounds Screening in Water by GC-MS	Liquid/Liquid extraction, GPC cleanup (if required), GC-MS FS analysis	-	1
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1
Total Recoverable Extraction	Nitric/Hydrochloric acid extraction, 85°C, 2.75 hours. US EPA 1638.	-	1
pH	pH meter. APHA 4500-H <sup>+</sup> B 23 <sup>rd</sup> ed. 2017. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) 23 <sup>rd</sup> ed. 2017.	3 g/m <sup>3</sup>	1
Total Recoverable Mercury	Total recoverable extraction, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m <sup>3</sup>	1
Total Ammoniacal-N	Phenol/hypochlorite colourimetry. Flow injection analyser. (NH <sub>4</sub> -N = NH <sub>4</sub> <sup>+</sup> -N + NH <sub>3</sub> -N). APHA 4500-NH <sub>3</sub> H (modified) 23 <sup>rd</sup> ed. 2017.	0.010 g/m <sup>3</sup>	1
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) 23 <sup>rd</sup> ed. 2017.	0.004 g/m <sup>3</sup>	1
Carbonaceous Biochemical Oxygen Demand (cBOD <sub>5</sub> )	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. APHA 5210 B (modified) 23 <sup>rd</sup> ed. 2017.	2 g O <sub>2</sub> /m <sup>3</sup>	1
Thermotolerant (Faecal) Coliforms	MPN count in LT Broth at 35°C for 48 hours, EC Broth at 44.5°C for 24 hours. Analysed at Hill Laboratories - Microbiology; Grovetown Park, State Highway 1, Blenheim. APHA 9221 B & E 23 <sup>rd</sup> ed. 2017.	2 MPN / 100mL	2
Enterococci	MPN count using Enterolert, Incubated at 41°C for 24 hours. Analysed at Hill Laboratories - Microbiology; Grovetown Park, State Highway 1, Blenheim. MIMM 12.4, APHA 9230 D 23 <sup>rd</sup> ed. 2017.	1 MPN / 100mL	2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

A handwritten signature in blue ink, appearing to be 'Ara Heron', written over a horizontal line.

Ara Heron BSc (Tech)  
Client Services Manager - Environmental

# F

## Appendix F – Benthic Survey



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