

Report

# Picton Sewage Treatment Plant Consent Compliance Report - 1 July 2015 to 30 June 2016

**Prepared for Marlborough District Council**

**By CH2M Beca Limited**


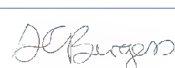

29 August 2016



## Revision History

Revision N°	Prepared By	Description	Date
A	Mollie Weston/Lisa Mace	Draft for client review	10 August 2016
B	Mollie Weston/Lisa Mace	Final	29 August 2016

## Document Acceptance

Action	Name	Signed	Date
Prepared by	Mollie Weston/Lisa Mace		29 August 2016
Reviewed by	Sarah Burgess		29 August 2016
Approved by	Graeme Jenner		29 August 2016
on behalf of	CH2M Beca Limited		

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## 1 Introduction

### 1.1 Background

The Picton Sewage Treatment Plant (Picton STP) is located off Graves End Place, Picton. Treated effluent from the STP is discharged via an approximately 150m long pipeline into Picton Harbour. Marlborough District Council (MDC) was granted a 35-year consent (Consent U100802) in June 2011 to construct and operate the new outfall which is located on the western side of the harbour, north of the entrance to the Port Marlborough log yard. The new outfall replaced an under-capacity, above-ground pipeline and short outfall that was located at the harbour entrance (Kaipupu Point).

The new harbour outfall was commissioned on 7 December 2012. The above-ground pipeline to Kaipupu Point and the submarine portion of the decommissioned outfall were then removed.

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

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

### 1.2 Purpose of this Report

Condition 3 of Consent U100802 requires MDC 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 activities authorised under Consent U100802, for the period from 1 July 2015 to 30 June 2016. Note that Consent U100802 has been subdivided into conditions relating to the outfall discharge and conditions related to the outfall pipeline.

Some of the current consent conditions do not have on-going monitoring requirements, and 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.

### 1.3 Consent U960798

MDC was also granted Consent U960798 in February 1997 for land use activities. Compliance with the conditions of Consent U960798 was assessed separately in the report entitled *Picton Sewage Treatment Plant Consent Compliance Report - Discharge to Land - June 2014 to May 2015* dated 6 November 2015.

## **2 Consent U100802-Coastal Permit (discharge to seawater)**

### **2.1 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. A new outfall flow meter was installed in this reporting period.

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

### **2.2 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 consent authorises the discharge of treated effluent from the Picton STP, which includes the future screened and disinfected wet weather flows from the proposed Dublin Street Pump Station

Bypass Treatment facility. These combined flows would result in a maximum flow rate of approximately 400L/s through the outfall. Currently, only treated flows from the Picton STP can be discharged through the outfall. Flows in excess of the pump station's capacity currently overflow untreated to the Waitohi Stream.

The design of works to allow the bypassed treated flows to be added to the outfall is currently being undertaken, as part of an overall upgrade of the Picton/Waikawa Sewerage System. It is expected that the Dublin Street Pump Station work will be completed in late 2017, with the overall sewerage upgrade expected to be completed in 2019.

The maximum flow that can be discharged from the Picton STP to the outfall is 130L/s. There is also a flow meter on the discharge to record actual daily flows. The highest flow measured was 104L/s on 23 September 2015, and so the discharge complies with this condition

### 2.3 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 outfall mixing zone is shown in Drawing 6513000-C-K47 (see **Appendix B**).

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 (ie >200:1 at average flows), indicates that there is little potential for adverse effects, after 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.

### 2.4 Condition 13 – No Undesirable Biological Growths

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

The receiving water has not been specifically monitored for undesirable growths. However, the high effluent quality (see Section 2.6), coupled with the verified initial dilution after discharge ie (>200:1 at average flows), indicates that there is little potential for undesirable biological growths after reasonable mixing.

The Annual Outfall Inspection Report (N-Viro Mooring Systems, 2016) (see **Appendix D**) did not identify any sign of undesirable biological growth along the pipeline, however there has been an increase of marine growth on the clamps.

## 2.5 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:

Parameter	Reported as	Frequency	Sampling Method
Carbonaceous Biochemical Oxygen Demand (cBOD)	g/m <sup>3</sup>	Monthly	24 Hour Composite
Total Suspended Solids (TSS)	g/m <sup>3</sup>	Monthly	24 Hour Composite
pH	No units	Monthly	24 Hour Composite
Ammoniacal Nitrogen	g/m <sup>3</sup>	Monthly	24 Hour Composite
Faecal coliforms and Enterococci	Number/100mls	Monthly	24 Hour Composite
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	Quarterly	24 Hour Composite
Copper, Lead, Mercury and Zinc	g/m <sup>3</sup>	Quarterly	24 Hour Composite
Arsenic, Cadmium, Chromium and Nickel	g/m <sup>3</sup>	Annually	24 Hour Composite
Semi-Volatile Organic Compounds (SVOC)	g/m <sup>3</sup>	Annually	24 Hour Composite

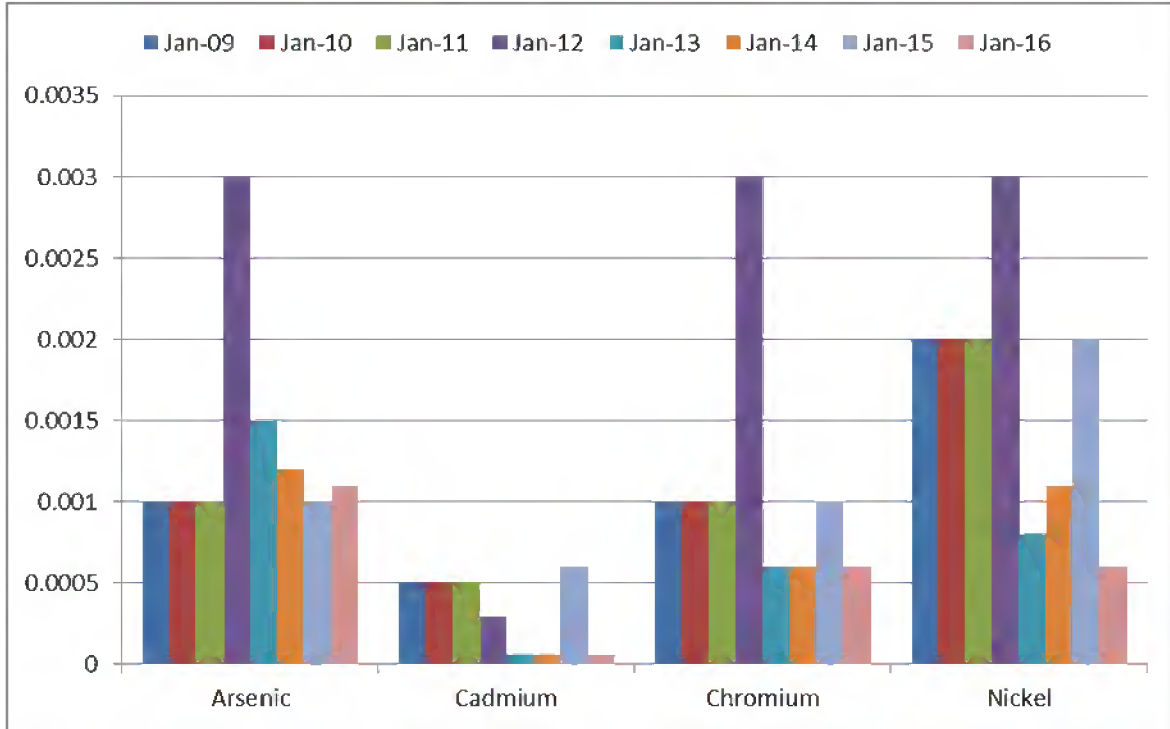
All parameters were sampled in the final effluent, at the frequency indicated above, thus fulfilling the requirements of Condition 14.

Table 2-1 shows parameters that were measured as required by Condition 14 (but do not have consent limits).

**Table 2-1 – Effluent Sampling Results for Parameters without Consent Limits**

Parameter	Unit	Statistical Basis	Results of Analysis
Ammoniacal Nitrogen	g/m <sup>3</sup>	Annual Median	2.85
Arsenic	g/m <sup>3</sup>	Single Measurement	<0.0011
Cadmium	g/m <sup>3</sup>	Single Measurement	<0.00006
Chromium	g/m <sup>3</sup>	Single Measurement	<0.0006
Nickel	g/m <sup>3</sup>	Single Measurement	<0.0006
Semi-Volatile Organic Compounds (SVOC)	g/m <sup>3</sup>	Single Measurement	See results in Appendix E

Figure 2-1 shows the 2015/2016 effluent trace metal concentrations (arsenic, cadmium, chromium and nickel) compared to the historical monitoring results (no consent limits are applicable). The results show that effluent concentrations of these metals are low and consistent with previous monitoring results.



**Figure 2-1 - Effluent Trace Metal Concentrations**

Figure 2-2 shows effluent ammoniacal nitrogen concentrations for the period 2015/2016. Concentrations over the winter months were generally higher than in subsequent months apart from December. Higher ammonia concentrations would be expected in the winter months, as nitrification (the process which converts ammonia into nitrates), occurs more slowly with cooler temperatures

The higher reading in December is likely to be due to increases in load over the holiday period when the tourist population increases significantly.

Results in 2015/16 were well below the high ammonia result (ie 18g/m<sup>3</sup>) recorded at the January 2015 sampling. Nitrification requires dissolved oxygen (DO) values greater than 2 ppm. In the 2014/15 report, a comparison of the ammonia monitoring results with DO concentrations at the aeration basin outlet suggested that the loading is increasing over the summer period. This trend was also seen in the 2015/16 period but to a lesser extent. The increases in inlet load and outlet ammonia concentrations, during the summer period, should continue to be monitored.



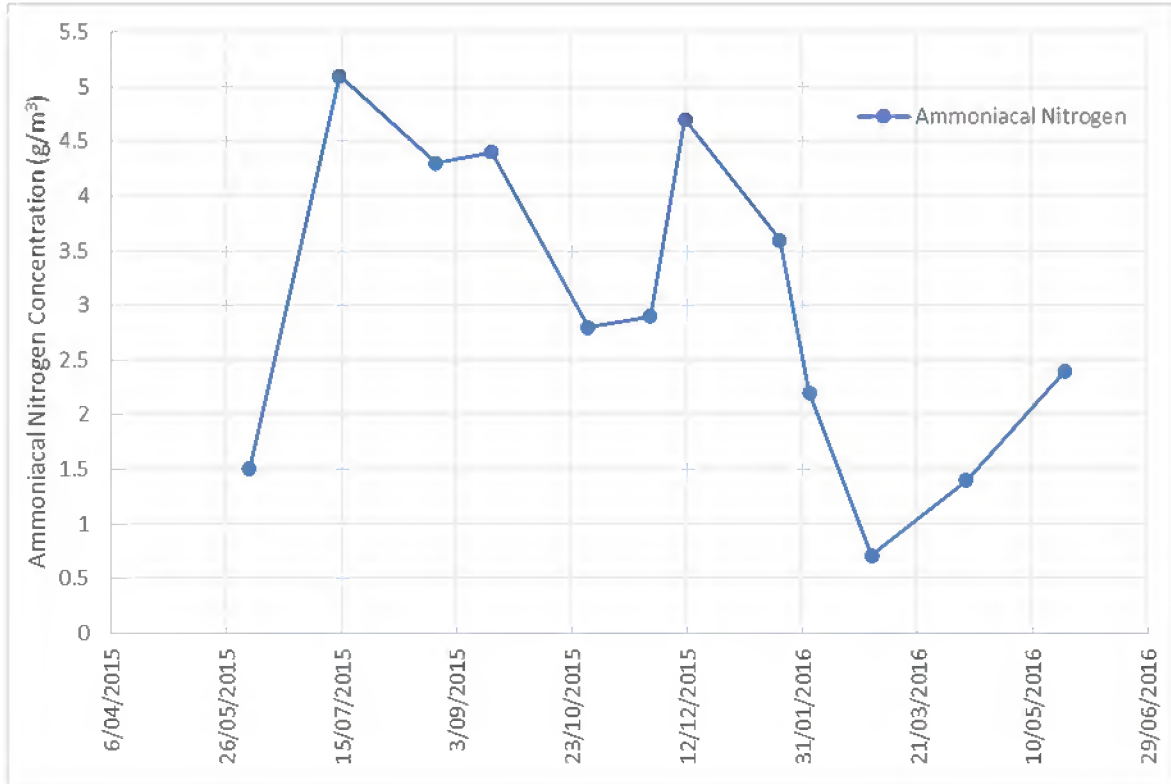


Figure 2-2 – Effluent Ammoniacal Nitrogen Concentrations

## 2.6 Condition 15 – Effluent Quality Consent Limits

The effluent discharged from the Picton Sewage Treatment Plant must meet the following standards (see first four columns of the table):

<b>Parameter</b>	<b>Reported as</b>	<b>Statistical Basis</b>	<b>Consent Limit</b>	<b>Results of Analysis</b>
<i>cBOD</i>	<i>g/m<sup>3</sup></i>	<i>Annual Median</i>	<i>30</i>	<i>4.5</i>
<i>TSS</i>	<i>g/m<sup>3</sup></i>	<i>Annual Median</i>	<i>40</i>	<i>9.0</i>
<i>pH</i>	<i>No units</i>	<i>Range</i>	<i>6.0-8.5</i>	<i>6.2 – 7.0</i>
<i>Faecal Coliforms</i> <sup>1</sup>	<i>Number/100mls</i>	<i>Annual Geometric Mean</i>	<i>700</i>	<i>14.9</i>
	<i>Number/100mls</i>	<i>Annual 90<sup>th</sup> Percentile</i>	<i>4,300</i>	<i>67.5</i>
<i>Enterococci</i>	<i>Number/100mls</i>	<i>Annual Geometric Mean</i>	<i>500</i>	<i>9.3</i>
<i>Dissolved Reactive Phosphorus</i>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	<i>20</i>	<i>3.35</i>
<i>Copper</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	<i>0.065</i>	<i>0.0133</i>
<i>Lead</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	<i>0.22</i>	<i>0.0006</i>
<i>Mercury</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	<i>0.02</i>	<i>&lt;0.00008</i>
<i>Zinc</i> <sup>2</sup>	<i>g/m<sup>3</sup></i>	<i>Rolling median of last 8 samples</i>	<i>0.75</i>	<i>0.051</i>

1. 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.

2. 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.

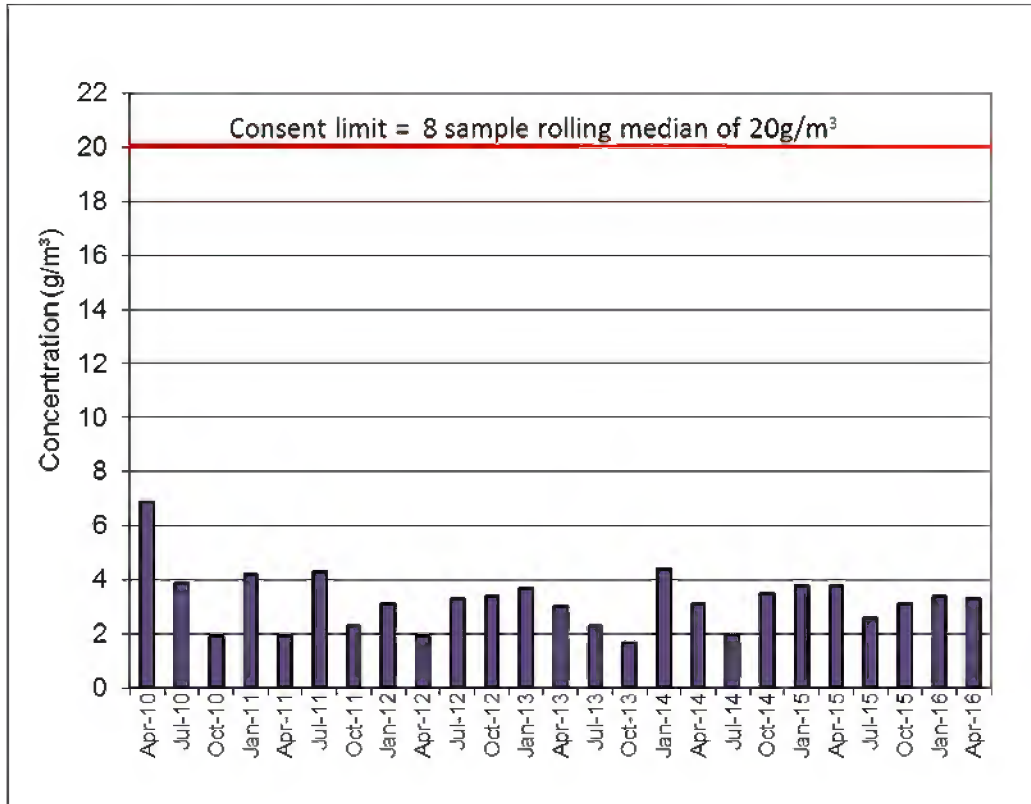
The final column (see “Results of Analysis”) in the above table shows the results of the effluent monitoring for the reporting period. As can be noted from the table, all of these measured values fall within the consent limits. Where a rolling median of the last eight samples, or an annual average was required, some data from the previous monitoring period was used.

Table 2-2 shows the results of monitoring of the concentrations of effluent Dissolved Reactive Phosphorus (DRP) in 2015/2016 compared with historical monitoring results.

Figure 2-3 shows that all DRP results in 2015/16 are well below the consent limit of 20g/m<sup>3</sup>.

**Table 2-2 – Effluent Dissolved Reactive Phosphorus Concentrations**

<b>Date</b>	<b>Value (g/m<sup>3</sup>)</b>	<b>8 Sample Rolling Median (g/m<sup>3</sup>)</b>
July 2015	2.6	3.30
October 2015	3.1	3.30
January 2016	3.4	3.25
April 2016	3.3	3.35
<b>Consent Limit</b>	-	<b>20</b>



**Figure 2-3 - Effluent Dissolved Reactive Phosphorus Concentration**

Tables 2-3 to 2-6 show the concentrations and rolling medians for the effluent metals (copper, zinc, lead and mercury). The results show that effluent concentrations of these metals in 2015/16 are well below consent limits. Figure 2-4 shows that results in 2015/16 were consistent with results for previous years.

**Table 2-3 – Effluent Copper Concentration**

Date	8 Sample Rolling Median (g/m³)
July 2015	0.0112
October 2015	0.0112
January 2016	0.0107
April 2016	0.0107
<b>Consent Limit</b>	<b>0.065</b>

**Table 2-4 – Effluent Zinc Concentration**

<b>Date</b>	<b>8 Sample Rolling Median (g/m<sup>3</sup>)</b>
July 2015	0.037
October 2015	0.037
January 2016	0.035
April 2016	0.035
<b>Consent Limit</b>	<b>0.75</b>

**Table 2-5 – Effluent Lead Concentration**

<b>Date</b>	<b>8 Sample Rolling Median (g/m<sup>3</sup>)</b>
July 2015	0.00044
October 2015	0.00042
January 2016	0.00037
April 2016	0.00037
<b>Consent Limit</b>	<b>0.22</b>

**Table 2-6 – Effluent Mercury Concentration**

<b>Date</b>	<b>8 Sample Rolling Median (g/m<sup>3</sup>)</b>
July 2015	0.00008
October 2015	0.00008
January 2016	0.00008
April 2016	0.00008
<b>Consent Limit</b>	<b>0.02</b>

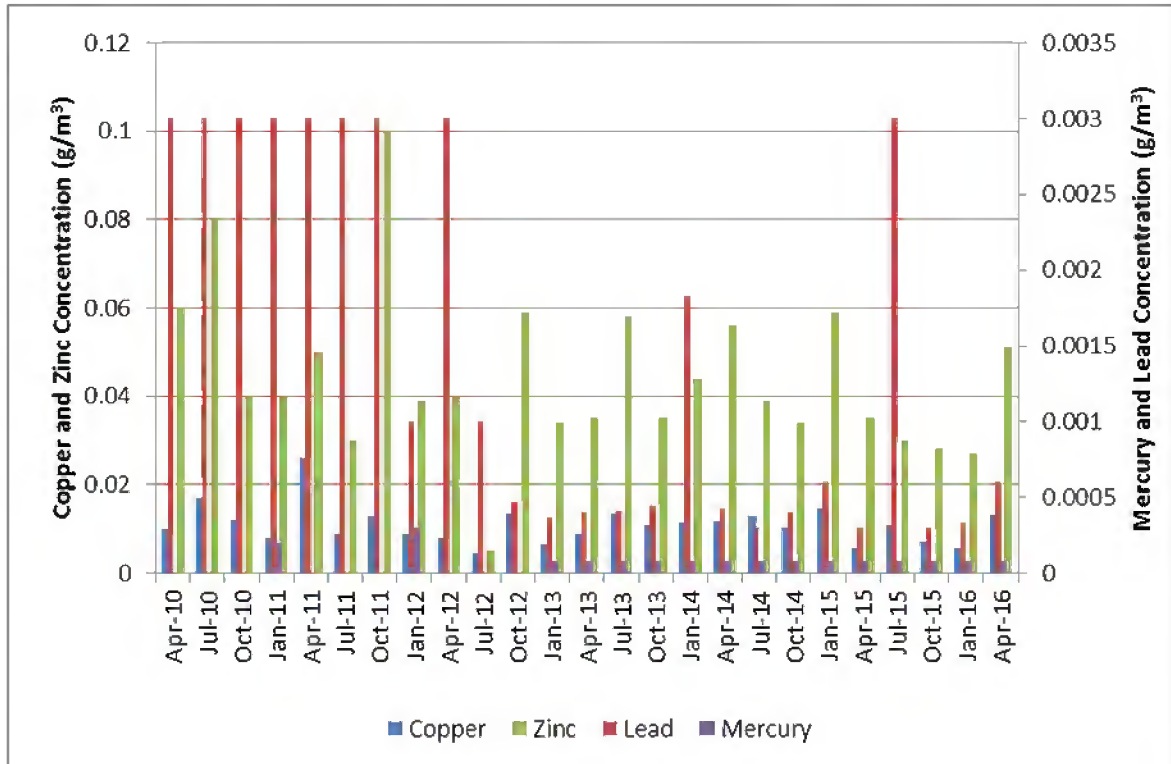


Figure 2-4 - Three-Monthly Effluent Copper, Zinc, Lead and Mercury Concentrations

## 2.7 Condition 16 - Validation of Initial Dilution

*The consent holder must carry out a one-off study within 12 month of the commissioning of the outfall to validate the predicted initial dilution of the diffuser.*

A study to validate outfall initial dilution was carried out by Cawthron in 2013. The results of the one-off study were described in the 2013/14 monitoring report and showed that the dilution levels predicted for the outfall, in the consent application, were generally being achieved (ie 200:1). The results showed that initial dilutions generally exceeded those predicted by pre-commissioning modelling.

No further reporting is therefore required under this condition.

## 2.8 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:*

- a) *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.*
- b) *Four replicate samples must be collected at each sampling location from cores driven approximately 100mm into the sediment.*

- c) *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 surveys 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.*

Cawthron carried out a post-commissioning benthic survey in 2014 in accordance with consent requirements. This report, entitled "*Benthic Survey for the Relocated Picton Wastewater Treatment Plant Outfall 2014*" (Cawthron Institute, 2015), is included in **Appendix F**.

The Cawthron survey report noted that there had been little change in the benthic environment, in the vicinity of the outfall, in the two years since commissioning. 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 of Condition 17.

Another benthic survey will be carried out early in 2019 (ie 5 years after the post-commissioning survey in accordance with consent requirements).

## **2.9 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 monitoring shellfish quality are shown in Table 2-7.

**Table 2-7 - Shellfish Monitoring Standards and 2015/16 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	<18	0.76	<0.01	18.8
Kaipupu Point	20	0.59	<0.01	16.1
Bob's Bay	80	1.05	<0.01	15.4
Westshore	80	0.34	<0.01	12.4
Picton Wharf	130	0.70	<0.01	26

\*: 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**). All of the shellfish samples in 2015/16 are well within the ANZFSC/MOH standards and were also below the MIS trace element in shellfish standards.

## 2.10 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 out at specific times, it is assumed that the results from this monitoring are representative of effluent and water quality at other times, unless specifically stated otherwise.

Effluent quality has been consistently good since the commissioning of the Picton STP in September 1999. The results of effluent quality monitoring, during 2015/16, were within the limits set by the conditions in Consent U100802. No effects from the discharge have been observed, within or outside the outfall mixing zone specified by the consent.

An outfall post-commissioning benthic ecology survey carried out by Cawthron in 2014 showed that the outfall discharge is not causing significant adverse effects on the seabed habitats, or aquatic life, at any of the stations sampled. The next benthic survey will be carried out in 2019.

Shellfish samples were taken at sampling locations as required by the consent and were analysed for a microbiological parameters and trace elements. All samples were within the limits required by Consent U100802.

Overall, the requirements of Consent U100802 were met in the 2015/16 monitoring period.

### **3 Consent U100802-Coastal Permit (Outfall Pipeline)**

#### **3.1 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.*

N-Viro Mooring Systems carried out an inspection of the outfall on 25<sup>th</sup> February 2016 (see report in **Appendix D**).

This inspection found that the outfall pipe including anodes, ports and thrust block were in good condition. There was no change in the seabed and no debris found under the pipe. The clamps are in good condition however have an increase in marine growth. Following a full bolt tightness check at the last inspection, the bolts was randomly checked in February 2016 and were found to be all tight.

#### **3.2 Conclusions**

The outfall inspection carried out in February 2016 fulfils the outfall pipeline inspection requirements of Consent U100802.



## 4 Bibliography

Cawthron Institute. (2015, March 5). *Benthic Survey for the Relocated Picton Wastewater Treatment Plant Outfall 2014*. Nelson.

N-Viro Mooring Systems. (2016). *Diving Inspection Report Picton Sewerage Pipeline - February 2016*.

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:

<b>Parameter</b>	<b>Reported as</b>	<b>Frequency</b>	<b>Sampling Method</b>
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:
- a) 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**

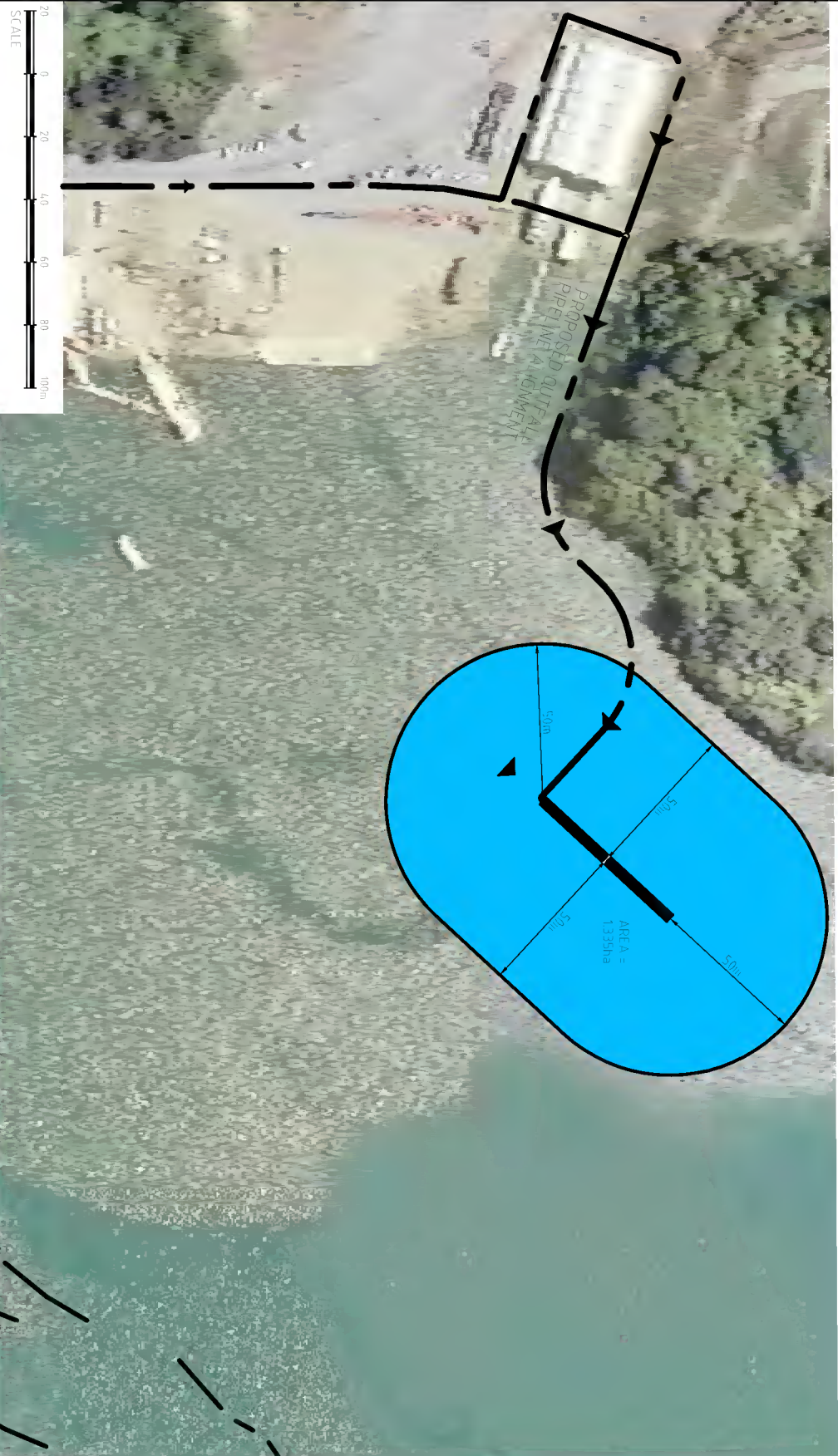
1. Except insofar as required to comply with other conditions of this consent, the activity must be undertaken in accordance with the Application for Resource Consent U100802 received by Council 21 December 2010.
2. Not later than one month prior to the commencement of site works, the consent holder 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.

Appendix B

## Mixing Zone Drawing



**FOR INFORMATION  
NOT FOR CONSTRUCTION**

Project:		PSTP OUTFALL AEE		Title:		PROPOSED OUTFALL MIXING ZONE	
Client:		 MORLAIPOUQUI DISTRICT COUNCIL		Discipline:		CIVIL	
Approved for Construction *		Date:		Drawing No.:		Rev. A	
* Refer to Revision 1 for Original Signatures				6513000-C-K47			

FOR INFORMATION		Scale as drawn (1:1)		By: CHK   Appd   Date		24.03.10	
Revision		1:2000		CAL			
No. A		Designed		GJM		24.03.10	
		Drawn		CAL		24.03.10	
		Deg. Verifier		Dwg Check			



DO NOT SCALE

IF IN DOUBT ASK

Appendix C

## Figure 5 - Shellfish Sampling Locations



Figure 3 - Map Showing Shellfish Monitoring Sites.

Appendix D

## N-Viro Mooring Systems Outfall Inspection Report



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## Diving Inspection Report Picton Sewerage Pipeline – February 2016

WO-034429JST1

25<sup>th</sup> February 2016:- Worksafe Permit lodged

26<sup>th</sup> February 2016

- Mobilise Work vessel 'Soundz Image' and SSBA:- Surface Supplied Breathing Apparatus
- Contact Picton Harbour Radio to notify them of pending Diving Operations
- Contact Ferry Operators for Arrival/Departure times to enable us to dive in between berthing
- Carry out Tool Box meeting on site
- Carry out Pre Start meeting on site
  
- **Diver carried out inspection of Diffuser pipeline**
- All anodes are active and show approximately 30-35% wastage
- All discharge Duckbill Ports are working and clear of fouling
- All clamps are in good condition with no sign of corrosion but have an increase of marine growth
- A random check on bolt tightness was carried out – bolts found to be correct tension
- There has been no change in the seabed since the last survey – good condition with no debris under the pipe
- The Thrust Block is in good condition
- A random check for flange bolt tightness was carried out – all tight

Page 2/.

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

- All anodes are active with approximately 30-35% wasted
- All clamps are in good condition

Demobilised 'Soundz Image' and equipment

Thank you for contracting N-Viro Ltd to carry out this project.

Regards



Mike Baker  
N-Viro Ltd



Appendix E

## SVOC Lab Results



## ANALYSIS REPORT

<b>Client:</b>	Marlborough District Council	<b>Lab No:</b>	1527698	SPV1
<b>Contact:</b>	C Hutchison C/- Marlborough District Council PO Box 443 BLLENHEIM 7240	<b>Date Registered:</b>	21-Jan-2016	
		<b>Date Reported:</b>	03-Feb-2016	
		<b>Quote No:</b>	50185	
		<b>Order No:</b>	51493Chu	
		<b>Client Reference:</b>	Picton Sewage, Consent, Annual	
		<b>Submitted By:</b>	Dave McConnell	

### Sample Type: Aqueous

<b>Sample Name:</b>	20160160 - 24 Hr Sampling Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm	20160160 - Grab Samples Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm			
<b>Lab Number:</b>	1527698.1	1527698.2			

### Individual Tests

pH	pH Units	6.9	-	-	-	-
Total Suspended Solids	g/m <sup>3</sup>	9	-	-	-	-
Total Recoverable Mercury	g/m <sup>3</sup>	< 0.00008	-	-	-	-
Total Ammoniacal-N	g/m <sup>3</sup>	3.6	-	-	-	-
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	3.4	-	-	-	-
Carbonaceous Biochemical Oxygen Demand (cBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	5	-	-	-	-
Faecal Coliforms	MPN / 100mL	-	< 18 #1	-	-	-
Enterococci	MPN / 100mL	-	< 10 #1	-	-	-

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

Total Recoverable Arsenic	g/m <sup>3</sup>	< 0.0011	-	-	-	-
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>	0.0056	-	-	-	-
Total Recoverable Lead	g/m <sup>3</sup>	0.00034	-	-	-	-
Total Recoverable Nickel	g/m <sup>3</sup>	< 0.0006	-	-	-	-
Total Recoverable Zinc	g/m <sup>3</sup>	0.027	-	-	-	-

### 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>	20160160 - 24 Hr Sampling Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm	20160160 - Grab Samples Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm			
<b>Lab Number:</b>	1527698.1	1527698.2			

**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>	20160160 - 24 Hr Sampling Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm	20160160 - Grab Samples Outlet -Effluent LOC1038 21-Jan-2016 2:10 pm			
<b>Lab Number:</b>	1527698.1	1527698.2			

**Plasticisers in SVOC Water Samples by GC-MS**

Di-n-octylphthalate	g/m <sup>3</sup>	< 0.010	-	-	-	-
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**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 Please interpret this result with caution as the sample was > 8 °C on receipt at the lab. The sample temperature is recommended by APHA to be less than 8 °C on receipt at the laboratory (but not frozen). However, it is acknowledged that samples that are transported quickly to the laboratory after sampling, may not have been cooled to this temperature.

**SUMMARY OF METHODS**

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

**Sample Type: Aqueous**

Test	Method Description	Default Detection Limit	Sample No
Heavy metals total recoverable, trace As,Cd,Cr,Cu,Ni,Pb,Zn	Nitric/Hydrochloric acid extraction, ICP-MS, trace level	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 22 <sup>nd</sup> ed. 2012. 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.	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 22 <sup>nd</sup> ed. 2012.	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	Filtered sample. Phenol/hypochlorite colorimetry. Discrete Analyser. (NH <sub>4</sub> -N = NH <sub>4</sub> <sup>+</sup> -N + NH <sub>3</sub> -N). APHA 4500-NH <sub>3</sub> F (modified from manual analysis) 22 <sup>nd</sup> ed. 2012.	0.010 g/m <sup>3</sup>	1
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colorimetry. Discrete Analyser. APHA 4500-P E (modified from manual analysis) 22 <sup>nd</sup> ed. 2012.	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. Analysed at Hill Laboratories - Microbiology; 1 Clow Place, Hamilton. APHA 5210 B (modified) 22 <sup>nd</sup> ed. 2012.	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, 9221 E 22 <sup>nd</sup> ed. 2012.	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. APHA 9230 D, 22 <sup>nd</sup> ed. 2012, MIMM 12.4.	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.

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A handwritten signature in blue ink, consisting of several overlapping, stylized strokes.

Ara Heron BSc (Tech)  
Client Services Manager - Environmental Division