

Report

Picton Sewage Treatment Plant Annual Consent Compliance Report - July 2017 to June 2018

Prepared for Malborough District Council

By CH2M Beca Limited

7 September 2018



Revision History

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A	Julia van Eeden	Draft for client review	18/06/18
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Action	Name	Signed	Date
Prepared by	Julia van Eeden		6/09/18
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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**.

Drawing 6513000-C-K47 (see **Appendix B**) shows the outfall location and consented discharge mixing zone. A map showing the shellfish gathering 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 2017 to 30 June 2018. Note that Consent U100802 has been subdivided into conditions relating to the outfall discharge and conditions related to the outfall pipeline structure.

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 in a separate report, entitled *Picton Sewage Treatment Plant Consent Compliance Report - Discharge to Land - June 2017 to May 2018* dated August 2018

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.

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. Until the pump station upgrade is completed, only treated

flows from the Picton STP can be discharged through the outfall. Flows in excess of the pump station's current capacity 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. Construction of Stages 2 – 3 of the works (including the Dublin Street Pump Station, new pump stations at Surrey Street and Fishermans Reserve, replacement of approximately 3.75km of gravity/pressure sewers and new overflows pipes and structures), commenced in May 2017. Construction of this phase of works is expected in late July, with commissioning currently underway. The scheduled completion in May 2018 was delayed by inclement weather. Stage 4 of the upgrade (including upgrading work at the Beach Road and Waikawa Wharf pump stations), is 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 105.3 L/s on 16 May 2018, 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, 2017) (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 and duckbill ports.

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 ₅)	g/m ³	Monthly	24 Hour Composite
Total Suspended Solids (TSS)	g/m ³	Monthly	24 Hour Composite
pH	No units	Monthly	24 Hour Composite
Ammoniacal Nitrogen	g/m ³	Monthly	24 Hour Composite
Faecal coliforms and Enterococci	Number/100mls	Monthly	24 Hour Composite
Dissolved Reactive Phosphorus (DRP)	g/m ³	Quarterly	24 Hour Composite
Copper, Lead, Mercury and Zinc	g/m ³	Quarterly	24 Hour Composite
Arsenic, Cadmium, Chromium and Nickel	g/m ³	Annually	24 Hour Composite
Semi-Volatile Organic Compounds (SVOC)	g/m ³	Annually	24 Hour Composite

All parameters were sampled in the final effluent at the frequency indicated above, with the exception of the August 2017 results for Ammoniacal Nitrogen and Carbonaceous Biological Oxygen Demand (cBOD₅). Therefore, the requirements of Condition 14 have not been completely fulfilled.

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 ³	Annual Median	2.1
Arsenic	g/m ³	Single Measurement	<0.003
Cadmium	g/m ³	Single Measurement	<0.0001
Chromium	g/m ³	Single Measurement	<0.0011
Nickel	g/m ³	Single Measurement	<0.0011
Semi-Volatile Organic Compounds (SVOC)	g/m ³	Single Measurement	See results in Appendix E

Figure 2-1 shows the 2017/2018 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 the monitoring results in previous years.

Figure 2-1 - Effluen

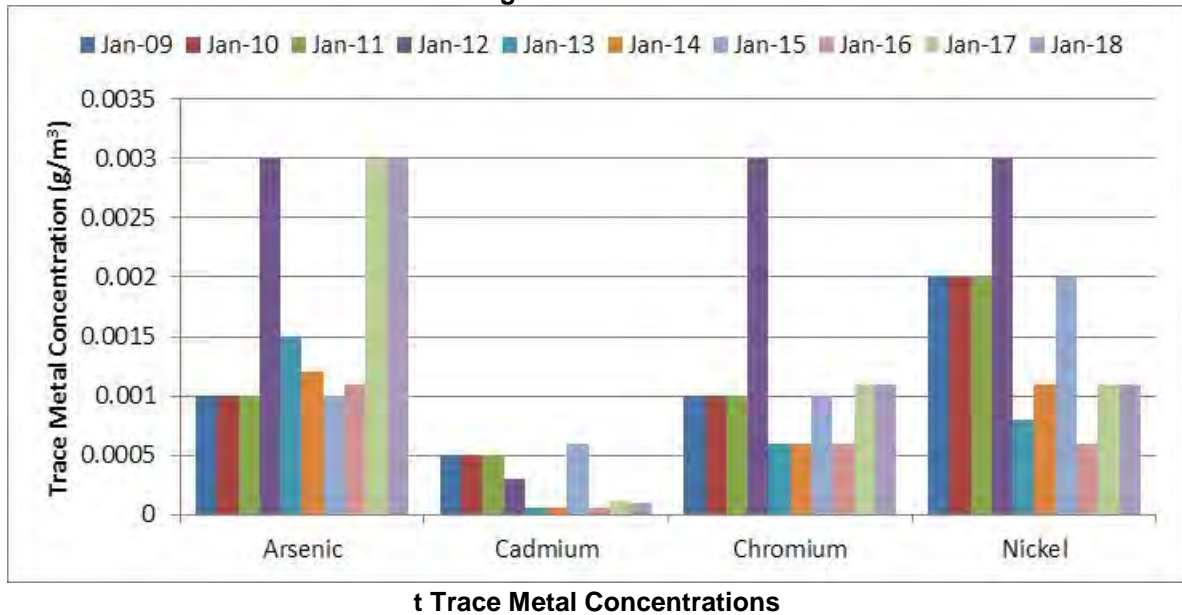


Figure 2-2 shows effluent ammoniacal nitrogen concentrations for the period 2017/2018. The concentrations measured in June 2017 and January - March 2018 appear to be higher than in subsequent months. Higher ammonia concentrations would generally be expected in the cooler months, as nitrification (the process which converts ammonia into nitrates), occurs more slowly with lower temperatures. Tests for the month of August 2017 were excluded as, when comparing these results to the inlet readings, they appear to have been assigned to the wrong locations.

Regardless, the results from the 2017/2018 period were well below the high ammonia result (18g/m³) recorded in January 2015. This issue was discussed in the 2014/15 report, based on the requirement for dissolved oxygen (DO) values to be greater than 2g/m³ in activated sludge treatment processes to achieve sufficient nitrification. A comparison of the ammonia monitoring results with DO concentrations at the aeration basin outlet indicated that the organic loading is increasing over the summer period and may have been inhibiting nitrification. This trend was also seen in the 2015/16 period, but to a lesser extent, and was not continued in 2016/17, when the highest recorded value occurred in September.

Ammonia results in more recent years show increasing variability. Higher concentrations, particularly during the summer period, warrant particular attention by the STP operators to ensure treatment conditions remain optimal. However, significant initial dilutions after discharge will ensure that marine guideline limits for ammonia are not exceeded.

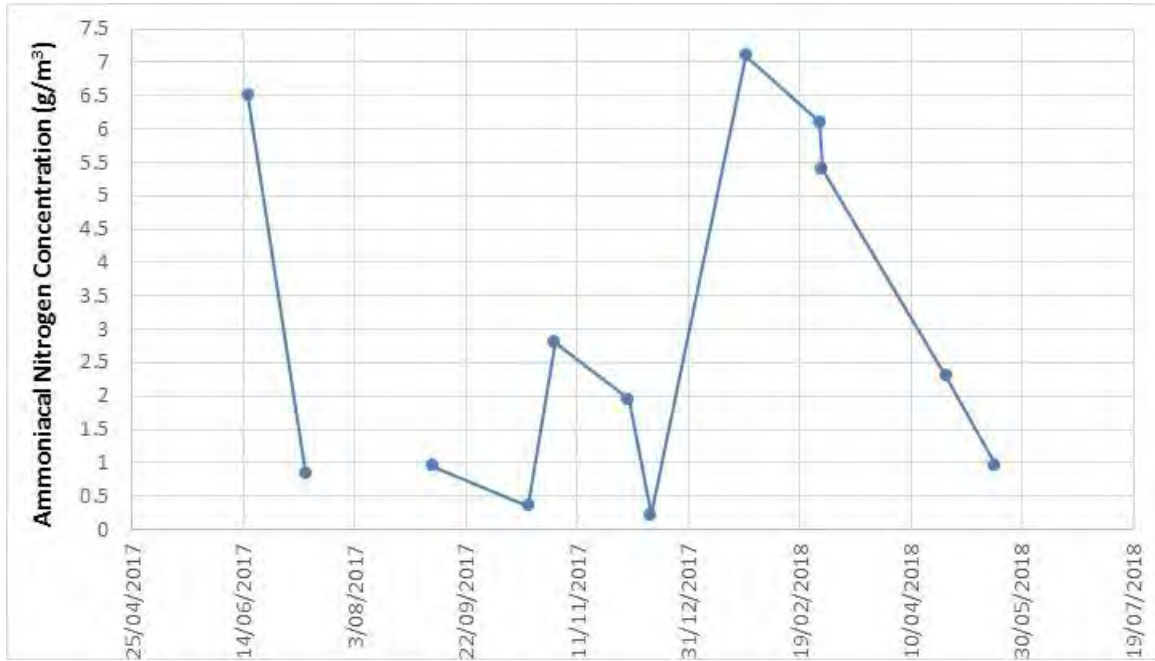


Figure 2-2 – Effluent Ammoniacal Nitrogen Concentrations

2.6 Condition 15 – Effluent Quality Consent Limits

The effluent discharged from the Picton Sewage Treatment Plant must meet the following standards (see Table 2-2):

Table 2-2 – Test Parameters, Consent Limits and Monitoring Results (2017/18)

<i>Parameter</i>	<i>Reported as</i>	<i>Statistical Basis</i>	<i>Consent Limit</i>	<i>Results of Analysis</i>
<i>cBOD</i>	<i>g/m³</i>	<i>Annual Median</i>	30	3.5
<i>TSS</i>	<i>g/m³</i>	<i>Annual Median</i>	40	9
<i>pH</i>	<i>No units</i>	<i>Range</i>	6.0-8.5	6.6 – 7.2
<i>Faecal Coliforms</i> ¹	<i>Number/100mls</i>	<i>Annual Geometric Mean</i>	700	80.9
	<i>Number/100mls</i>	<i>Annual 90th Percentile</i>	4,300	1,314
<i>Enterococci</i>	<i>Number/100mls</i>	<i>Annual Geometric Mean</i>	500	95.3
<i>Dissolved Reactive Phosphorus</i>	<i>g/m³</i>	<i>Rolling median of last 8 samples</i>	20	3.35
<i>Copper</i> ²	<i>g/m³</i>	<i>Rolling median of last 8 samples</i>	0.065	0.0116
<i>Lead</i> ²	<i>g/m³</i>	<i>Rolling median of last 8 samples</i>	0.22	0.0005
<i>Mercury</i> ²	<i>g/m³</i>	<i>Rolling median of last 8 samples</i>	0.02	<0.00008
<i>Zinc</i> ²	<i>g/m³</i>	<i>Rolling median of last 8 samples</i>	0.75	0.0388

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 95th 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 Table 2-2 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 was required, data from April 2016 was used to compensate for the missing April 2017 values that were not taken (due to an error when taking samples).

Table 2-3 shows the results of monitoring of the concentrations of effluent Dissolved Reactive Phosphorus (DRP) in 2017/2018 compared with the eight-sample rolling median.

Figure 2-3 shows that effluent DRP concentrations, measured since the consent was granted in 2010, have been well below the consent limit of 20g/m³.

Table 2-3 – Effluent Dissolved Reactive Phosphorus Concentrations (2017/18)

<i>Date</i>	<i>Concentration (g/m³)</i>	<i>8 Sample Rolling Median (g/m³)</i>
July 2017	2.1	3.20
October 2017	3.4	3.35
January 2018	4.8	3.40
April 2018	3.1	3.35
Consent Limit	20	20

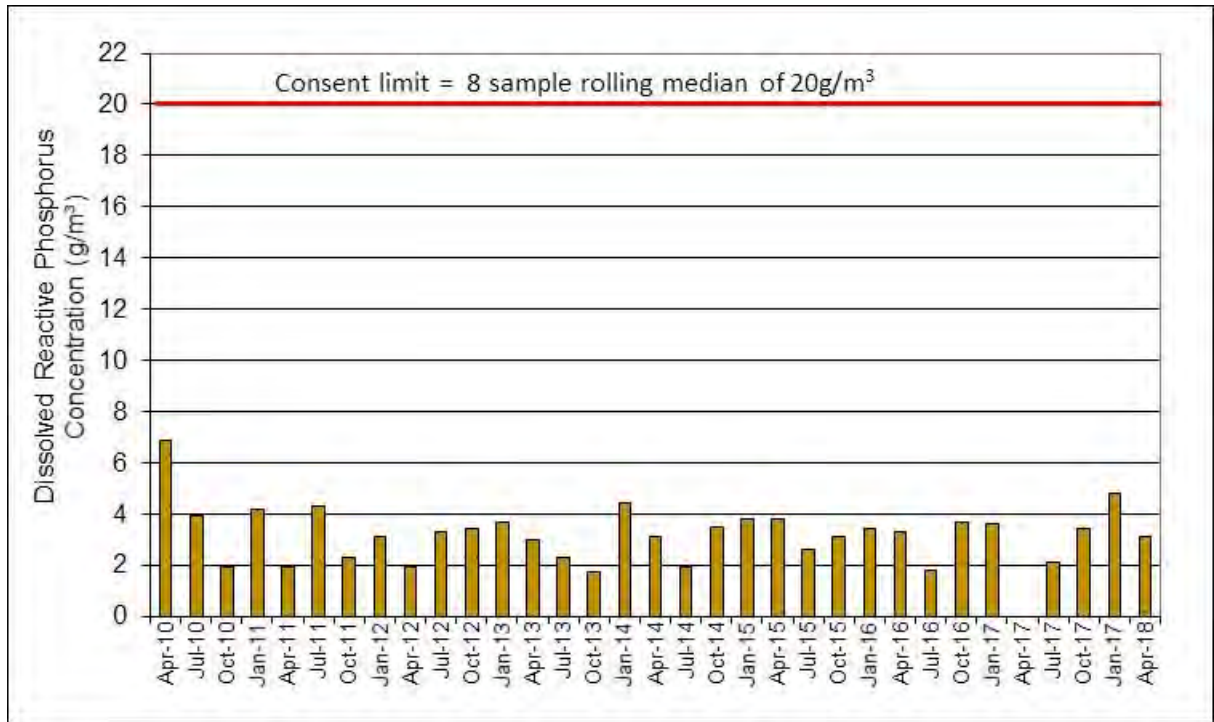


Figure 2-3 - Effluent Dissolved Reactive Phosphorus Concentrations (2010-18)

Tables 2-4 to 2-7 show the concentrations and rolling medians for effluent metals (copper, zinc, lead and mercury). The results show that effluent concentrations of these metals in 2017/18 are well below consent limits. Figure 2-4 shows that results in 2017/18 were consistent with results for previous years.

Table 2-4 – Effluent Copper Concentration

Date	Concentration (g/m ³)	8 Sample Rolling Median (g/m ³)
July 2017	0.0078	0.0088
October 2017	0.0161	0.0088
January 2018	0.0280	0.0096
April 2018	0.0162	0.0116
Consent Limit	0.065	0.065

Table 2-5 – Effluent Zinc Concentration

Date	Concentration (g/m ³)	8 Sample Rolling Median (g/m ³)
July 2017	0.037	0.0335
October 2017	0.042	0.0358
January 2018	0.040	0.0373
April 2018	0.047	0.0388
Consent Limit	0.75	0.75

Table 2-6 – Effluent Lead Concentration

Date	Concentration (g/m ³)	8 Sample Rolling Median (g/m ³)
July 2017	0.0003	0.0004
October 2017	0.0005	0.0004
January 2018	0.0014	0.0005
April 2018	0.0007	0.0005
Consent Limit	0.22	0.22

Table 2-7 – Effluent Mercury Concentration

Date	Concentration (g/m ³)	8 Sample Rolling Median (g/m ³)
July 2017	0.00008	0.00008
October 2017	0.00008	0.00008
January 2018	0.00008	0.00008
April 2018	0.00008	0.00008
Consent Limit	0.02	0.02

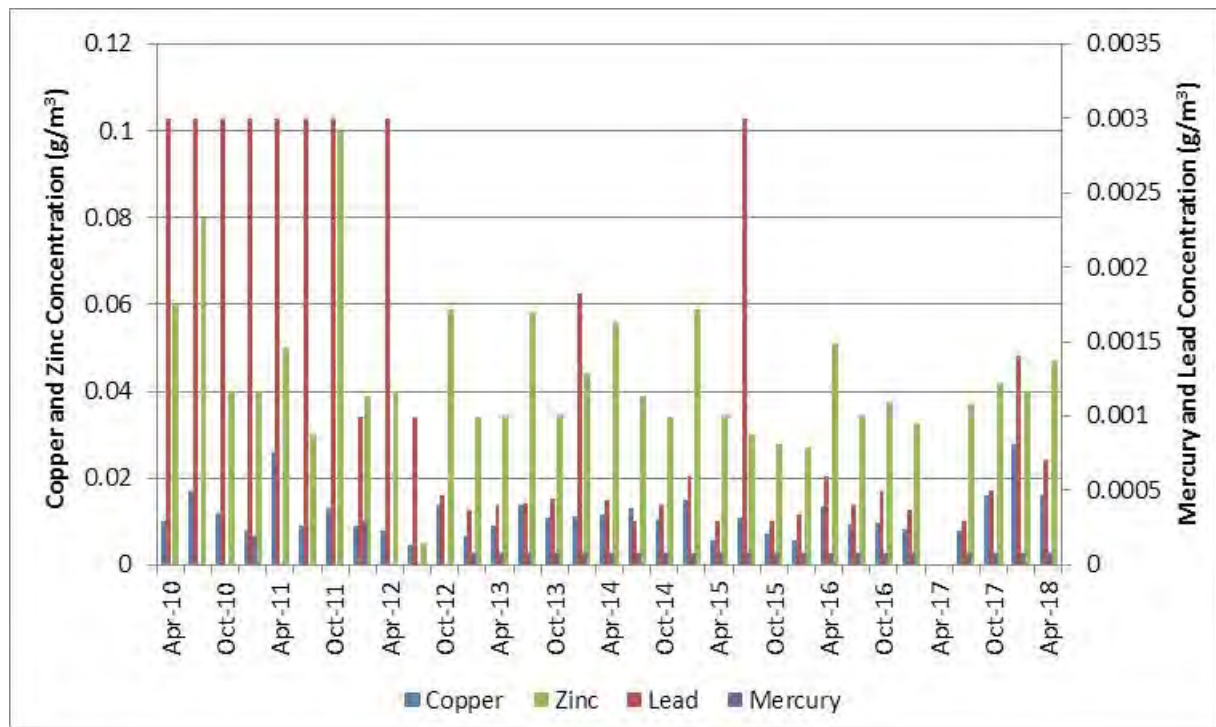


Figure 2-4 - Three-Monthly Effluent Copper, Zinc, Lead and Mercury Concentrations

2.7 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:

- 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), was appended to the 2014/2015 annual report.

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, which is 5 years after the 2014 post-commissioning survey, in accordance with consent requirements.

2.8 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 monitoring shellfish quality are shown in Table 2-8.

Table 2-8 - Shellfish Monitoring Standards and 2017/18 Results

Source	Faecal coliforms (MPN/100g)	Copper (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)
Standard				
ANZFSC/MOH*	230	-	0.5	-
Median International Standard for Trace Elements in Shellfish (MIS)	-	30	0.5	40
Results				
Mabel Island	130	0.91	<0.01	25
Kaipupu Point	20	0.99	<0.01	27
Bob's Bay	<20	1.02	<0.01	31
Westshore	110	1.06	<0.01	35
Picton Wharf	130	1.22	<0.01	48

*: 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**). The zinc sample at Picton's wharf exceeded the Median International Standard for Trace Elements in Shellfish (MIS).. All other shellfish samples in 2017/18 are well within the ANZFSC/MOH standards and were also below the MIS standards.

It should be noted that the consent does not require that the shellfish samples comply with these standards. The influence of other sources of metals on water and shellfish quality, particularly around the wharf (e.g. from stormwater runoff and other port activities) is significantly greater than from the outfall located about 500m away. The very low concentrations of zinc measured in the effluent and high initial dilutions also effectively preclude any significant effect from the discharge at the Port sampling site. Regardless, the sampling results are useful in advising the public where, or where not, to gather shellfish in the harbour.

2.9 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 out 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 consistently good since the commissioning of the Picton STP in September 1999. The results of effluent quality monitoring, during 2017/18, 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.

All parameters were sampled in the final effluent at the required frequency, with the exception of the August 2017 samples for Ammoniacal Nitrogen and Carbeneous Biological Oxygen Demand (cBOD₅). Thus, the requirements of Condition 14 were not completely fulfilled.

The results of the one-off study in 2013/14 showed that the outfall dilution levels predicted in the consent application and pre-commissioning modelling (ie 200:1) were generally being exceeded.

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 the required locations, analysed for microbiological parameters and trace elements, and assessed against the relevant food-related standards in accordance with Condition 18. However, compliance with these standards is not a consent requirement. With the exception of the Picton Wharf zinc sample (which exceeds the MIS standard), all results were within the relevant food standards.

Overall, apart from missing one effluent sample of Ammoniacal Nitrogen and cBOD₅ in August 2017, the requirements of Consent U100802 were met in the 2017/18 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 15 February 2018 (see report in **Appendix D**).

This inspection found the following:

- The anodes and thrust block on the pipe were in good condition.
- The Duckbill ports were in good condition however have slight marine growth on the outside.
- There was no change in the seabed and no debris found under the pipe.
- The clamps are in good condition however an increase in marine growth since the last inspection was observed.
- Following a full bolt tightness check at the last inspection, the bolts was randomly checked in February 2018 and were found to be all tight.

3.2 Conclusions

The outfall inspection carried out in February 2018 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. (2018). *Diving Inspection Report Picton Sewerage Pipeline - February 2018*. Picton.

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 ³	Monthly	24 Hour Composite
Total Suspended Solids	g/m ³	Monthly	24 Hour Composite
pH	No units	Monthly	Grab
Ammoniacal Nitrogen	g/m ³	Monthly	Grab
Faecal Coliforms and Enterococci	Number/100mls	Monthly	Grab
Dissolved Reactive Phosphorus	g/m ³	Quarterly	Grab

Copper, Lead, Mercury and Zinc	g/m ³	Quarterly	Grab
Arsenic, Cadmium, Chromium and Nickel	g/m ³	Annually	Grab
Semi-Volatile Organic Compounds	g/m ³	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 ³	Annual Median	30
Total Suspended Solids	g/m ³	Annual Median	40
pH	No Units	Range	6.0-8.5
Faecal Coliforms ₁	Number/100mls	Annual Geometric Mean	700 MPN
	Number/100mls	Annual 90 th Percentile	4,300
Enterococci	Number/100mls	Annual Geometric Mean	500
Dissolved Reactive Phosphorus	g/m ³	Rolling median of last 8 samples	20
Copper, ₂	g/m ³	Rolling median of last 8 samples	0.065
Lead, ₂	g/m ³	Rolling median of last 8 samples	0.22
Mercury, ₂	g/m ³	Rolling median of last 8 samples	0.02
Zinc, ₂	g/m ³	Rolling median of last 8 samples	0.75

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 95th 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.

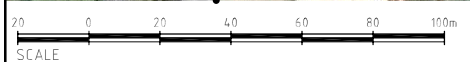
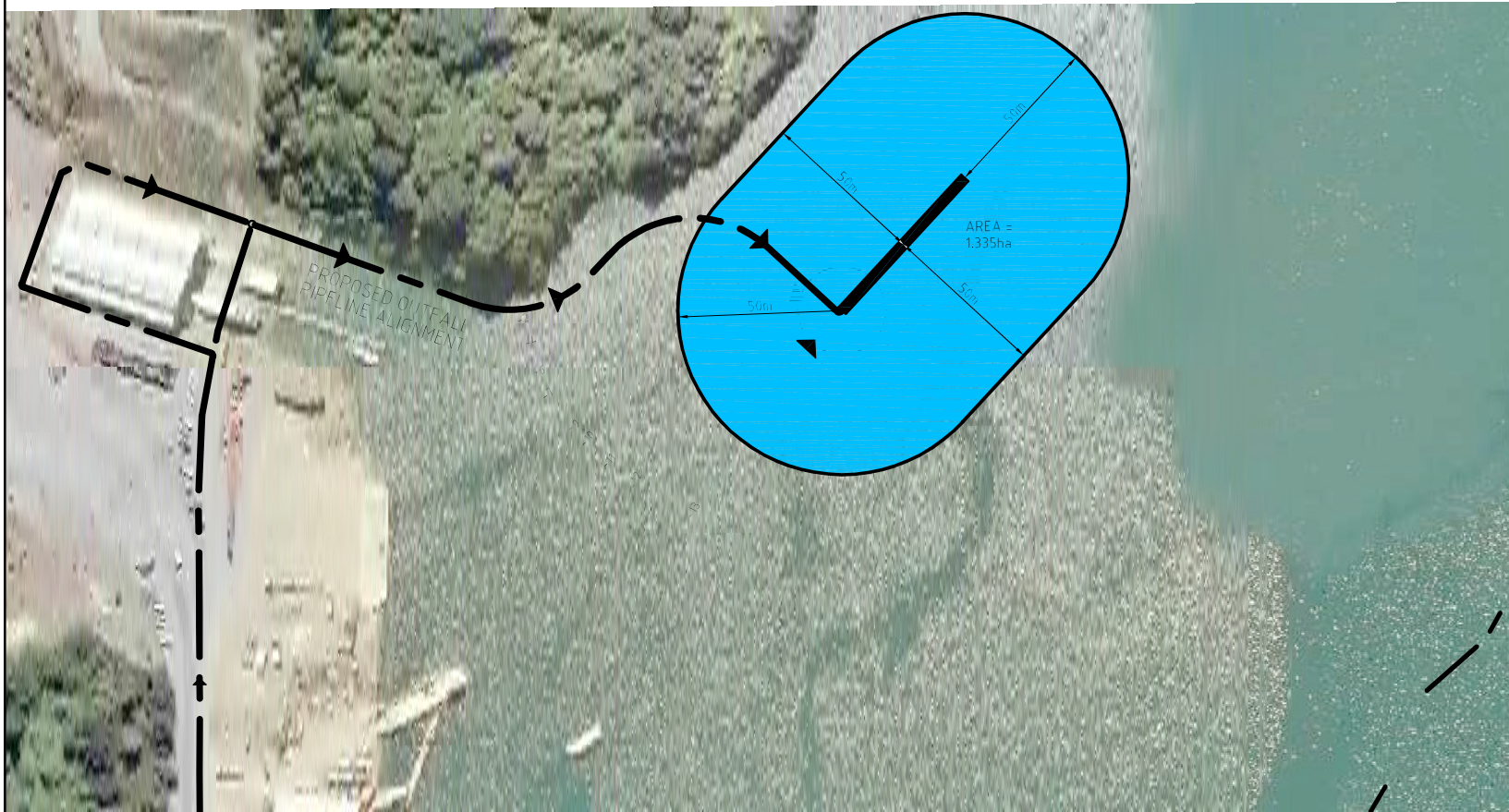
Land Use Consent – Removal of Existing Pipeline

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

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

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



Diving Inspection Report
Picton Sewerage Pipeline – February 2018

ON: HW10264753

14th February 2018:

- Emailed Harbour Master details of Inspection starting on the 15.02.2018
- Worksafe Permit lodged and copied to Rob Addis

15th 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
- Carry out Tool Box meeting on site
- Carry out Pre Start meeting on site

Diver carried out inspection of Diffuser pipeline

- All of the anodes are active but showing approximately 50-55% wastage
- All discharge Duckbill Ports are clear of fouling and uninhibited but have slight marine growth on the outside. Divers observed clear water discharging
- All clamps are in good condition with no sign of corrosion but have an increase of marine growth. There is an increase of marine growth since last inspection.
- As per the last inspection a random check on the tightness of the nuts & bolts was carried out:- found to be under correct tension
- No change in the seabed condition since the last survey – it is in good condition with no debris under or over the pipe
- 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 50-55% wasted
- All clamps are in good condition with no sign of corrosion

Note:

- **The 'Notification of Pipeline' Sign on the shore is missing – a new one is required**
- Overall, everything is in good operating condition
- Demobilised 'Soundz Image' and equipment

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

Regards

Donna Baker
N-Viro Ltd

Appendix E

SVOC Lab Results



ANALYSIS REPORT

Client:	Marlborough District Council	Lab No:	1915117	SPV1
Contact:	C Hutchison C/- Marlborough District Council PO Box 443 Blenheim 7240	Date Received:	26-Jan-2018	
		Date Reported:	13-Feb-2018	
		Quote No:	50185	
		Order No:	51493 Chu	
		Client Reference:	Picton Sewage, Consent, Annual	
		Submitted By:	Chris McAnulty	

Sample Type: Aqueous

Sample Name:	20180227 - 24 Hr Sampling Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm	20180227 - Grab Samples Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm			
Lab Number:	1915117.1	1915117.2			

Individual Tests

pH	pH Units	7.0	-	-	-	-
Total Suspended Solids	g/m ³	9	-	-	-	-
Total Recoverable Mercury	g/m ³	< 0.00008	-	-	-	-
Total Ammoniacal-N	g/m ³	7.1	-	-	-	-
Dissolved Reactive Phosphorus	g/m ³	4.8	-	-	-	-
Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	g O ₂ /m ³	3 #1	-	-	-	-
Faecal Coliforms	MPN / 100mL	-	< 18 #2	-	-	-
Enterococci	MPN / 100mL	-	< 10 #2	-	-	-

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

Total Recoverable Arsenic	g/m ³	< 0.003	-	-	-	-
Total Recoverable Cadmium	g/m ³	< 0.00011	-	-	-	-
Total Recoverable Chromium	g/m ³	< 0.0011	-	-	-	-
Total Recoverable Copper	g/m ³	0.028	-	-	-	-
Total Recoverable Lead	g/m ³	0.0014	-	-	-	-
Total Recoverable Nickel	g/m ³	< 0.0011	-	-	-	-
Total Recoverable Zinc	g/m ³	0.040	-	-	-	-

Haloethers in SVOC Water Samples by GC-MS

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

Nitrogen containing compounds in SVOC Water Samples by GC-MS

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

Organochlorine Pesticides in SVOC Water Samples by GC-MS

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



Sample Type: Aqueous

Sample Name:	20180227 - 24 Hr Sampling Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm	20180227 - Grab Samples Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm			
Lab Number:	1915117.1	1915117.2			

Organochlorine Pesticides in SVOC Water Samples by GC-MS

gamma-BHC (Lindane)	g/m ³	< 0.005	-	-	-	-
4,4'-DDD	g/m ³	< 0.005	-	-	-	-
4,4'-DDE	g/m ³	< 0.005	-	-	-	-
4,4'-DDT	g/m ³	< 0.010	-	-	-	-
Dieldrin	g/m ³	< 0.005	-	-	-	-
Endosulfan I	g/m ³	< 0.010	-	-	-	-
Endosulfan II	g/m ³	< 0.010	-	-	-	-
Endosulfan sulfate	g/m ³	< 0.010	-	-	-	-
Endrin	g/m ³	< 0.010	-	-	-	-
Endrin ketone	g/m ³	< 0.010	-	-	-	-
Heptachlor	g/m ³	< 0.005	-	-	-	-
Heptachlor epoxide	g/m ³	< 0.005	-	-	-	-
Hexachlorobenzene	g/m ³	< 0.005	-	-	-	-

Polycyclic Aromatic Hydrocarbons in SVOC Water Samples by GC-MS

Acenaphthene	g/m ³	< 0.003	-	-	-	-
Acenaphthylene	g/m ³	< 0.003	-	-	-	-
Anthracene	g/m ³	< 0.003	-	-	-	-
Benzo[a]anthracene	g/m ³	< 0.003	-	-	-	-
Benzo[a]pyrene (BAP)	g/m ³	< 0.003	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	g/m ³	< 0.003	-	-	-	-
Benzo[g,h,i]perylene	g/m ³	< 0.003	-	-	-	-
Benzo[k]fluoranthene	g/m ³	< 0.003	-	-	-	-
1&2-Chloronaphthalene	g/m ³	< 0.003	-	-	-	-
Chrysene	g/m ³	< 0.003	-	-	-	-
Dibenzo[a,h]anthracene	g/m ³	< 0.003	-	-	-	-
Fluoranthene	g/m ³	< 0.003	-	-	-	-
Fluorene	g/m ³	< 0.003	-	-	-	-
Indeno(1,2,3-c,d)pyrene	g/m ³	< 0.003	-	-	-	-
2-Methylnaphthalene	g/m ³	< 0.003	-	-	-	-
Naphthalene	g/m ³	< 0.003	-	-	-	-
Phenanthrene	g/m ³	< 0.003	-	-	-	-
Pyrene	g/m ³	< 0.003	-	-	-	-

Phenols in SVOC Water Samples by GC-MS

4-Chloro-3-methylphenol	g/m ³	< 0.010	-	-	-	-
2-Chlorophenol	g/m ³	< 0.005	-	-	-	-
2,4-Dichlorophenol	g/m ³	< 0.005	-	-	-	-
2,4-Dimethylphenol	g/m ³	< 0.005	-	-	-	-
3 & 4-Methylphenol (m- + p-cresol)	g/m ³	< 0.010	-	-	-	-
2-Methylphenol (o-Cresol)	g/m ³	< 0.005	-	-	-	-
2-Nitrophenol	g/m ³	< 0.010	-	-	-	-
Pentachlorophenol (PCP)	g/m ³	< 0.10	-	-	-	-
Phenol	g/m ³	< 0.010	-	-	-	-
2,4,5-Trichlorophenol	g/m ³	< 0.010	-	-	-	-
2,4,6-Trichlorophenol	g/m ³	< 0.010	-	-	-	-

Plasticisers in SVOC Water Samples by GC-MS

Bis(2-ethylhexyl)phthalate	g/m ³	< 0.03	-	-	-	-
Butylbenzylphthalate	g/m ³	< 0.010	-	-	-	-
Di(2-ethylhexyl)adipate	g/m ³	< 0.005	-	-	-	-
Diethylphthalate	g/m ³	< 0.010	-	-	-	-
Dimethylphthalate	g/m ³	< 0.010	-	-	-	-
Di-n-butylphthalate	g/m ³	< 0.010	-	-	-	-

Sample Type: Aqueous

Sample Name:	20180227 - 24 Hr Sampling Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm	20180227 - Grab Samples Outlet -Effluent LOC1038 26-Jan-2018 2:35 pm			
Lab Number:	1915117.1	1915117.2			
Plasticisers in SVOC Water Samples by GC-MS					
Di-n-octylphthalate	g/m ³	< 0.010	-	-	-
Other Halogenated compounds in SVOC Water Samples by GC-MS					
1,2-Dichlorobenzene	g/m ³	< 0.010	-	-	-
1,3-Dichlorobenzene	g/m ³	< 0.010	-	-	-
1,4-Dichlorobenzene	g/m ³	< 0.010	-	-	-
Hexachlorobutadiene	g/m ³	< 0.010	-	-	-
Hexachloroethane	g/m ³	< 0.010	-	-	-
1,2,4-Trichlorobenzene	g/m ³	< 0.005	-	-	-
Other compounds in SVOC Water Samples by GC-MS					
Benzyl alcohol	g/m ³	< 0.05	-	-	-
Carbazole	g/m ³	< 0.005	-	-	-
Dibenzofuran	g/m ³	< 0.005	-	-	-
Isophorone	g/m ³	< 0.005	-	-	-

Analyst's Comments

#1 During the original analysis of carbonaceous Biochemical Oxygen Demand (cBOD5) the result obtained for the Quality Control standards were outside our acceptance limits and so the analysis of cBOD5 was repeated from the frozen samples.

#2 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. APHA 3125 B 22 nd ed. 2012.	0.00005 - 0.0010 g/m ³	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 ⁺ B 22 nd 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. 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 22 nd ed. 2012.	3 g/m ³	1
Total Recoverable Mercury	Total recoverable extraction, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m ³	1
Total Ammoniacal-N	Phenol/hypochlorite colourimetry. Flow injection analyser. (NH ₄ -N = NH ₄ ⁺ -N + NH ₃ -N). APHA 4500-NH ₃ H (modified) 22 nd ed. 2012.	0.010 g/m ³	1
Dissolved Reactive Phosphorus	Filtered sample. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified). 22 nd ed. 2012.	0.004 g/m ³	1
Carbonaceous Biochemical Oxygen Demand (cBOD ₅)	Incubation 5 days, DO meter, nitrification inhibitor added, dilutions, seeded. APHA 5210 B (modified) 22 nd ed. 2012.	2 g O ₂ /m ³	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 nd ed. 2012.	2 MPN / 100mL	2

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
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 9230D.	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 report must not be reproduced, except in full, without the written consent of the signatory.



Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental