Blenheim Sewage Treatment Plant Annual Consent Compliance Report - 1 July 2018 - 30 June 2019

Prepared for Marlborough District Council
Prepared by Beca Limited

21 November 2019

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Revision History

Revision Nº	Prepared By	Description	Date
A	Kevin Joeng	Draft for Client Review	30/10/2019
B	Kevin Joeng	For final issue	21/11/2019

Document Acceptance

Action	Name	Signed	Date
Prepared by	Kevin Joeng		21/11/2019
Reviewed by	Sarah Burgess		21/11/2019
Approved by	Graeme Jenner		21/11/2019
on behalf of	Beca Limited		

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Consent Compliance Summary

Condition	Requirement	Observation	Compliance
7	Submission of an Annual Monitoring Report	Report prepared in accordance with consent requirements.	Met
7.2	Recording of volume of treated wastewater applied to areas 1-3.	Volumes recorded for monitoring period.	Met
24	Maximum application of 200kg/ha/yr and maximum monthly application of 50kg/ha.	Average annual nitrogen load exceeded for one segment. Monthly application limit exceeded on three occasions (67, 74.1 & 63 kg/ha)	Partially met
29	Monthly groundwater monitoring for ammoniacal nitrogen, nitrate nitrogen, conductivity and *E. Coli* during irrigation.	Groundwater samples obtained at required frequency and tested for all required parameters. Two spikes observed in *E. Coli* data. All other parameters were stable.	Met
30	Groundwater level measurements must be taken at least fortnightly. Irrigation must not commence on areas where depth to groundwater is less than 0.3m beneath the ground surface.	Groundwater level measurement frequency was approximately monthly. All measured depths to groundwater were greater than 0.3m beneath ground surface.	Partially met
32	Installation and maintenance of weather station and anemometer/wind vane at the two locations specified by the consent.	Both weather stations are set up in accordance with the consent requirements.	Met
35	Register of complaints received relating to land discharge system.	No complaints received during monitoring period.	Met
36	Installation and maintenance of signage on any access points to the BSTP.	Signage in place.	Met
42	Register of complaints received relating to odour.	No complaints received during monitoring period.	Met
44	Measurement of DO concentrations in wastewater at the outlet of Ponds 2A, 2B, 2C, 6 and 10 every Wednesday between 11 am and 2pm. DO must not be less than 2g/m^3 on a rolling 10 percentile weekly measurement basis.	Weekly readings taken at outlet of ponds 2A, 2B, 2C, 6 and wetlands (equivalent to pond 10). Depending on location, 33-44% of samples were not taken within the specified time. 10th percentiles were found to be above the minimum consent limit.	Partially met
45	Daily measurement of DO in Ponds I1 and I2 during peak loading periods associated with annual vintage. DO concentrations must be greater than 0.5 g/m^3 on a 50th percentile basis.	DO concentrations measured at Ponds I1 and I2 every 6 minutes. 50th percentile DO concentrations during peak loading periods were greater than 0.5 g/m^3.	Met
51	Annual external visual inspections of outfall pipeline structures. A report documenting finding must be submitted to the Marlborough District Council.	Inspection carried out. Outfall pipeline structures found to be in good condition. No significant maintenance required.	Met
54	Marking of buoy at end of existing outfall with the words “Sewer Outfall”	Buoy marked as required.	Met

Condition	Requirement	Observation	Compliance
55	Discharge volumes of daily treated wastewater to the Wairau Estuary must not exceed 28,500 m^3/day, averaged over a continuous period of 365 days. Maximum daily discharge volume of 103,680 m^3/day.	Average daily discharge of 16,058m^3. Maximum daily discharge of 31,020m^3.	Met
56	Installation of flow measuring devices at the outlet from Pond 10 and 6, which will record daily volumes of treated wastewater.	Flow meters installed at required locations, recording daily discharge volumes.	Met
59	Discharge of treated wastewater should not cause outfall effects to be observed outside of the mixing zone.	No effects likely to be observed based on results of wastewater monitoring.	Met
61	Monthly sampling of treated wastewater at the outlet of Pond 10. Annual sampling of metals/metalloids.	Required sampling frequencies for all parameters were met. No disconcerting trends observed. Annual metal/metalloids sampling carried out.	Met
62	Ammoniacal nitrogen and faecal coliform limits for Pond 10 outlet samples.	Median and 90th percentile of ammoniacal nitrogen and faecal coliform data below consent limits.	Met
63-70	Benthic survey and water quality monitoring in receiving environment.	Next survey due to be carried out in February 2023.	Met

1 Introduction

1.1 Purpose of Report

This report assesses the compliance of discharges from the Blenheim Sewage Treatment Plant (BSTP) with the conditions of Consent U071181, for the reporting period 1 July 2018 to 30 June 2019.

A map showing the layout of the STP and the locations of the sampling points can be found in Consent U071181, which is attached in **Appendix A**.

1.2 Background

The BSTP, located at Hardings Road, treats domestic (from residential and commercial properties) and industrial wastewater (mainly from wineries) from the Blenheim area. Treated wastewater is discharged to the Wairau Estuary during ebb tide. Marlborough District Council (MDC) are the owners and operators of the Blenheim STP and are the holders of Consent U071181.

1.2.1 Treatment Plant History

Prior to 2002, the BSTP consisted of a number of treatment ponds which treated domestic wastewater from Blenheim and industrial flows from Canterbury Meat Packers and the Riverlands Industrial Estate. The industrial ponds were formerly owned by the PPCS Meat Processing Plant, but were purchased by MDC in 2002, after the PPCS operation closed. The former PPCS factory site was subdivided and is now known as Cloudy Bay Business Park. Various new industries, including two wineries, have moved onto this site and the number of wineries in the Riverlands Industrial Estate has also increased.

From 2006 to 2008, MDC made a series of upgrades and changes to the treatment pond system to accommodate significant peak trade waste loads during the wine vintage, which occurs in the period March to May each year. The changes included diverting major industrial flows from the domestic to the industrial ponds and increasing the aeration capacity of the industrial ponds in order to treat the increased load. Small trade waste discharges in Blenheim continue to contribute about 15% of the domestic flow into the BSTP.

MDC was granted consents in late 2010 to upgrade the BSTP treated wastewater disposal system. This upgrading (completed in February 2014), included the construction of a series of wetland cells which convey the combined treated flows from both the domestic and industrial pond systems, before discharging to a new outfall in the Wairau Estuary. The 1.6km long wetland system provides some further “polishing” treatment of the combined flows. Approximately 160ha of MDC-owned land around the BSTP is also available for wastewater irrigation on a soil moisture deficit basis from spring to autumn.

It should be noted that at the time consent U071181 was granted, four wetland ponds were proposed, with the final pond to be named Pond 10. During the detailed design stage, it was determined that eight wetland ponds should be constructed instead of four. Therefore, the final pond was renamed Pond 14.

1.2.2 Current-installed Treatment Systems

The BSTP consists of two separate treatment systems. A fine screen, as well as facultative and maturation ponds, are used to treat domestic flows while the industrial stream is treated using fine screening and mechanically aerated and facultative ponds. During the vintage, wastewater from the industrial ponds is redirected through twin DAF units for solids separation and recycling to create an activated sludge process.

The flow from Domestic Pond 5 is then combined with the industrial wastewater in Pond 6 before being discharged to the new wetland (Ponds 7-14). Treated wastewater is then passed through the wetland before discharging from Pond 14 to the Wairau Estuary via a new larger capacity outfall. The completed upgrade

also includes land application of treated wastewater, when soil and groundwater conditions allow, via K-line irrigation and drip lines. A schematic of the current treatment systems and combined estuarine discharge is shown in Figure 1-1.

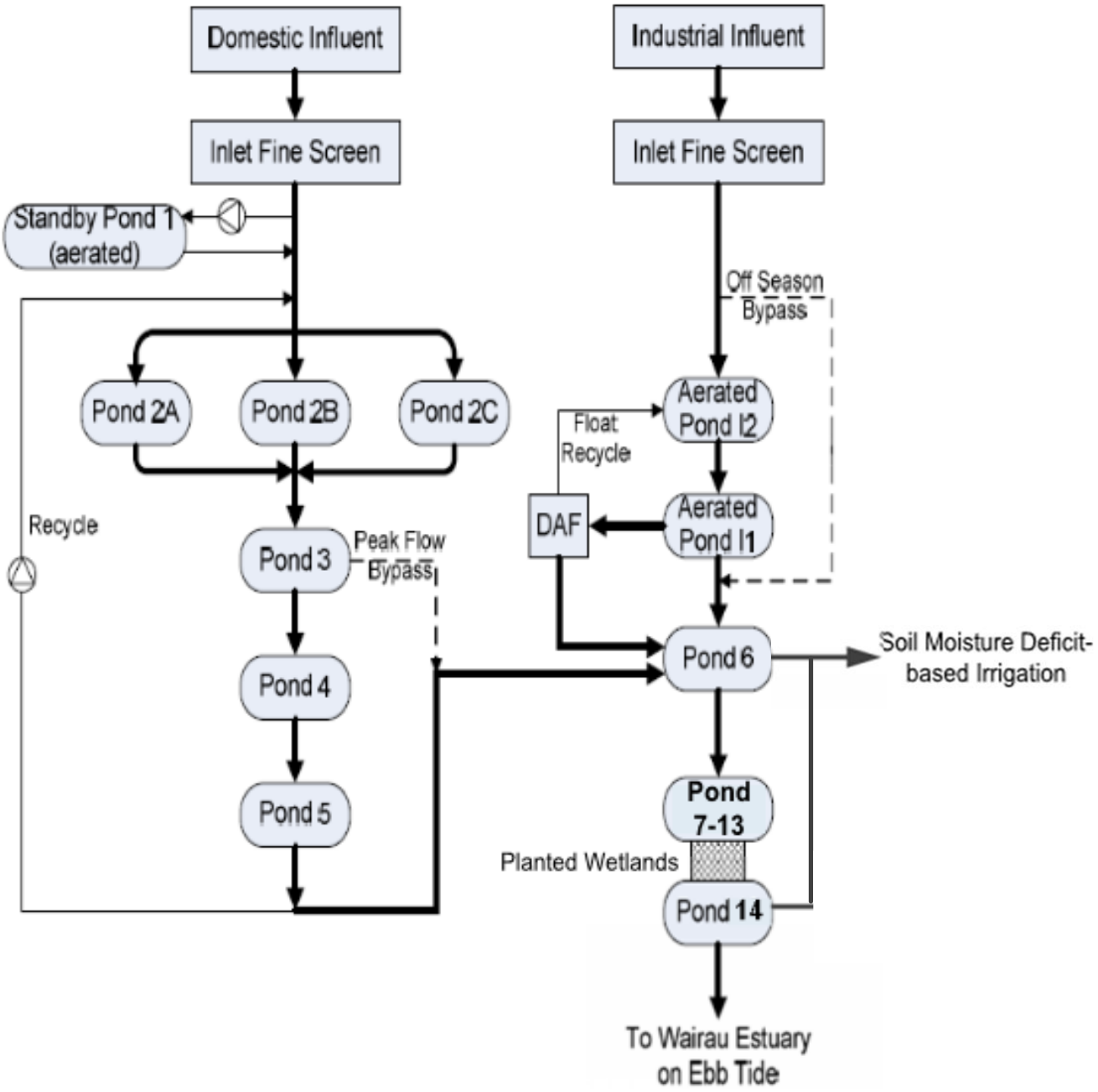


Figure 1-1 Blenheim STP wastewater flow schematic (post- February 2014)

2 Compliance with Consent U071181

2.1 Consent Purpose

Consent U071181 authorises discharges from the BSTP treatment ponds to land, air and the Wairau Estuary. Some of the consent conditions do not have on-going monitoring requirements and are not covered in this report. Only those conditions that have numerical or qualitative monitoring requirements are assessed. For clarity, consent conditions are quoted in italics, with other commentary in normal font.

2.2 Reporting

2.2.1 Condition 7

The Consent Holder shall provide to the Manager, Regulatory Department, Marlborough District Council, on or before 31 August in each year of the term of consent, from and including 2011, an Annual Monitoring Report (AMR) which must contain at least the following information:

7.1 General

a) An analysis of the extent to which the Consent Holder has, in operating the BSTP and exercising these consents, complied with these Conditions of Consent and the extent and cause of any noncompliance, in each case with a summary of the environmental effects of the operation of the BSTP during the preceding 12 month period from 1 July- 30 June inclusive (the Reporting Period).

b) An identification and discussion of any operational difficulties, changes or improvements made to the wastewater treatment or operating processes, which would cause any material difference in environmental outcomes from the previous Reporting Period.

The preparation and submission of this annual monitoring report achieves compliance with 7.1 a) and b).

c) A comparison of results obtained over the Reporting Period with the results from previous reporting periods.

Comparisons with previous results are noted in the relevant sections of the report.

d) An identification of any maintenance works needed, proposed or undertaken to ensure compliance with these Conditions of Consent.

No works carried out in this period, but issues have been identified with the waveband protection in Ponds 2A, 5 and 6A which need addressing. Works planned for next year include desludging Ponds 6A and 6B.

e) An identification of any improvements or changes required and the timetable for implementation.

No improvements or changes required in this period. Works planned for next year (2019/20) include bringing Pond I1 into 'off season' service and installing new larger aerators on domestic Pond 1.

7.2 Discharge of Treated Wastewater to land

a) The volume of treated wastewater applied to each of the Areas 1 – 3 (see **Appendix B** for the Proposed amended Consent Drawings and Condition 32(b) and **Appendix C** for the acceptance of these by MDC Regulatory Department).

See Section 2.3.1.

b) A summary and analysis (including graphical and statistical representations) of all data collected as a requirement of the Specific Conditions applicable to the discharge consent to discharge treated wastewater to land.

See Section 2.3.1.

c) A record and discussion of any complaints received regarding the discharge to land and the consent holder's response to those complaints.

No complaints received. See Section 2.3.7.

d) An analysis of any environmental effects, positive, neutral and adverse, which are attributable to the discharge of treated wastewater to land.

See Section 2.3.

7.3 Discharge of Odour

a) Identification and discussion of any complaints received with respect to odour as per Condition 42 of the Discharge Permit to Air and any action taken to address the complaints.

See Section 2.4.1.

b) The measurements of Dissolved Oxygen (DO) concentrations as per Conditions 44 and 45 of the Discharge Permit to Air.

See Sections 2.4.2 and 2.4.3.

c) An analysis of the data in terms of consent compliance and environmental effects.

See Sections 2.4.2 and 2.4.3.

d) A discussion of any relevant operational changes or improvements carried out during the Reporting Period.

None identified.

e) A comparison of results in the Reporting Period to previous reporting periods and a discussion of any trends.

Comparisons with previous years are noted in relevant sections of the report.

f) Any complaints received in regard to the operation of the BSTP and the action(s) taken to address each complaint.

No complaints were received regarding the operation of the BSTP. See Section 2.4.1.

7.4 Wastewater Monitoring and Benthic and Water Quality Monitoring

a) A summary of all the monitoring data collected as a requirement of the conditions of the discharge permit to discharge treated wastewater to the Wairau Estuary during the Reporting Period.

See Section 2.5.

b) An analysis of the data in terms of consent compliance and environmental effects during the Reporting Period.

See Section 2.5.

c) A discussion of any relevant operational changes or improvements carried out during the Reporting Period.

See Section 2.5.

d) A comparison of results with previous years and a discussion of any trends during the Reporting Period.

Comparisons with previous years' results are noted in relevant sections of the report.

e) Any complaints received in regard to the operation of the BSTP and the action(s) taken to address each complaint.

No complaints were received regarding the operation of the BSTP. See Section 2.4.1

7.5 Outfall Pipelines

a) A record of any maintenance works undertaken in accordance with Condition 52 of the Coastal Permit for the new and existing outfall pipelines.

The annual inspection of the Wairau Bar effluent pipeline was undertaken on 14 February 2019 (report in **Appendix B**).

2.3 Discharge to Land

2.3.1 Condition 7.2

Condition 7.2 requires that the AMR must include:

The volume of treated wastewater applied to each of the Areas 1-3 in the reporting period.

Table 2-1 shows the volume of treated wastewater and total applied volume per hectare that was discharged to each irrigation area during the reporting period.

Table 2-1: Total volume of treated wastewater discharged to each irrigation area (June 2018 – July 2019)

Irrigation Area	Volume of Wastewater Applied (m^3)	Area (ha)	Total application rate (m^3/ha)
1	66,997	42	1,595
2	39,407	32	1,231
3	209,881	86	2,440

The application rate in Area 1 is similar to that applied in the 2017/2018 monitoring year (1,680 m^3/ha). For Area 2, the application rate has decreased to 1,231m^3 from 2,036m^3/ha in the previous year. The opposite is true for Area 3, where the application rate has increased from 1,387m^3/ha to 2,440m^3/ha. Total disposal volumes have decreased for Areas 1 and 2 since last year, reducing from 70,546m^3 to 66,997m^3 in Area 1 and from 65,162m^3 to 39,407m^3 in Area 2. Area 3 had a significant increase in the disposal volume applied from last year, from 119,276m^3 to 209,881m^3.

The change in flow distribution between the areas this year is due to better operator understanding of the operational capacity of the three areas. Area 3, in particular, has the capacity for higher application rates due to its location and the size of the irrigation transfer piping.

2.3.2 Condition 24

The following net nitrogen loading limits shall be observed:

a) The maximum annual application of nitrogen shall not exceed a net loading of 200 kilograms of nitrogen per hectare per year.

b) Monthly applications shall not exceed a net loading of 50 kilograms of nitrogen per hectare.

Treated wastewater from Pond 6 (some of which is recirculated from Pond 14) can be irrigated when soil and groundwater conditions are suitable. In the 2018/19-year, irrigation of treated wastewater occurred from November 2018 to April 2019. The total mass of nitrogen applied to each irrigation area during this period was calculated based on the volumes applied and the nitrogen concentrations measured in samples taken during this period. The annual total nitrogen load for each irrigation area is shown in **Appendix D**.

The average annual nitrogen load across all segments was 54.4kg/ha/yr. This is higher than both the 33.2 kg/ha/yr average recorded in the previous year's monitoring period, and the 32 kg/ha/yr average recorded in the 2016/2017 monitoring period. The last monitoring period which had a similar average nitrogen load was 2015/2016, where the nitrogen load was 52.5kg/ha/yr. Segment DLA-02 had the highest total load of 224.8kg/ha/yr, for at least the third year running. The average nitrogen application rates on all other segments were below the consent limit of 200kg/ha/yr.

The calculated monthly nitrogen application rate exceeded the limit of 50 kilograms of nitrogen per hectare on three instances. Twice in January 2019 on segments DLA-01 and DLA-02, where the application rates were 67kg/ha and 74.1kg/ha respectively, and once in February 2019 on segment DLA-02, at an application rate of 63.1kg/ha.

2.3.3 Condition 29

Groundwater shall be sampled monthly while irrigation is occurring in each area identified in Plan Consent No A in Appendix 1 [see **Appendix B** *for the revised consent and* **Appendix C** *for the MDC acceptance] to these conditions of consent, except that if irrigation has occurred for less than 14 days in the previous month no sampling is required. For each Irrigation Area, the wells identified within that area shown on Plan Consent No B attached in Appendix 1 [see* **Appendix B** *for the revised consent and* **Appendix C** *for the MDC acceptance] to these conditions of consent, shall be sampled. The samples shall be analysed for.*

a) Ammoniacal nitrogen.

b) Nitrate nitrogen.

c) Conductivity.

d) E-coli.

The water level in each bore shall be measured and recorded at the time the sample is taken.

Irrigation of treated wastewater occurred between November 2018 and April 2019. This period is indicated by the vertical black lines on Figure 2-1 to Figure 2-3. Samples were taken at each of the six wells between 1 October 2018 and 28 February 2019.

The groundwater monitoring results presented in Figure 2-1 to Figure 2-3 show that all the parameters tested were reasonably consistent over the monitoring period, except for two spikes observed in the E. Coli data (Figure 2-3). These two spikes were observed in samples taken from 11 December 2018 (Bore MSC-049) and 28 February 2019 (Bore 10031) and had values of 2,100 MPN/100mL and 1,552 MPN/100mL respectively. These spikes are small in comparison with other spikes observed previously - the highest recorded result was a reading of 24,200 MPN/100mL observed in five wells on 19 December 2017.

Ammoniacal Nitrogen concentrations (Figure 2-1) were below 5g/m^3 throughout this monitoring period, and showed no concentration spikes, unlike previous monitoring periods.

Electrical conductivities (Figure 2-2) remained stable throughout the monitoring period. Well 10031 measured high in terms of conductivity, which is consistent with previous monitoring data, and with its location close to the tidally-influenced section of the Opawa River,

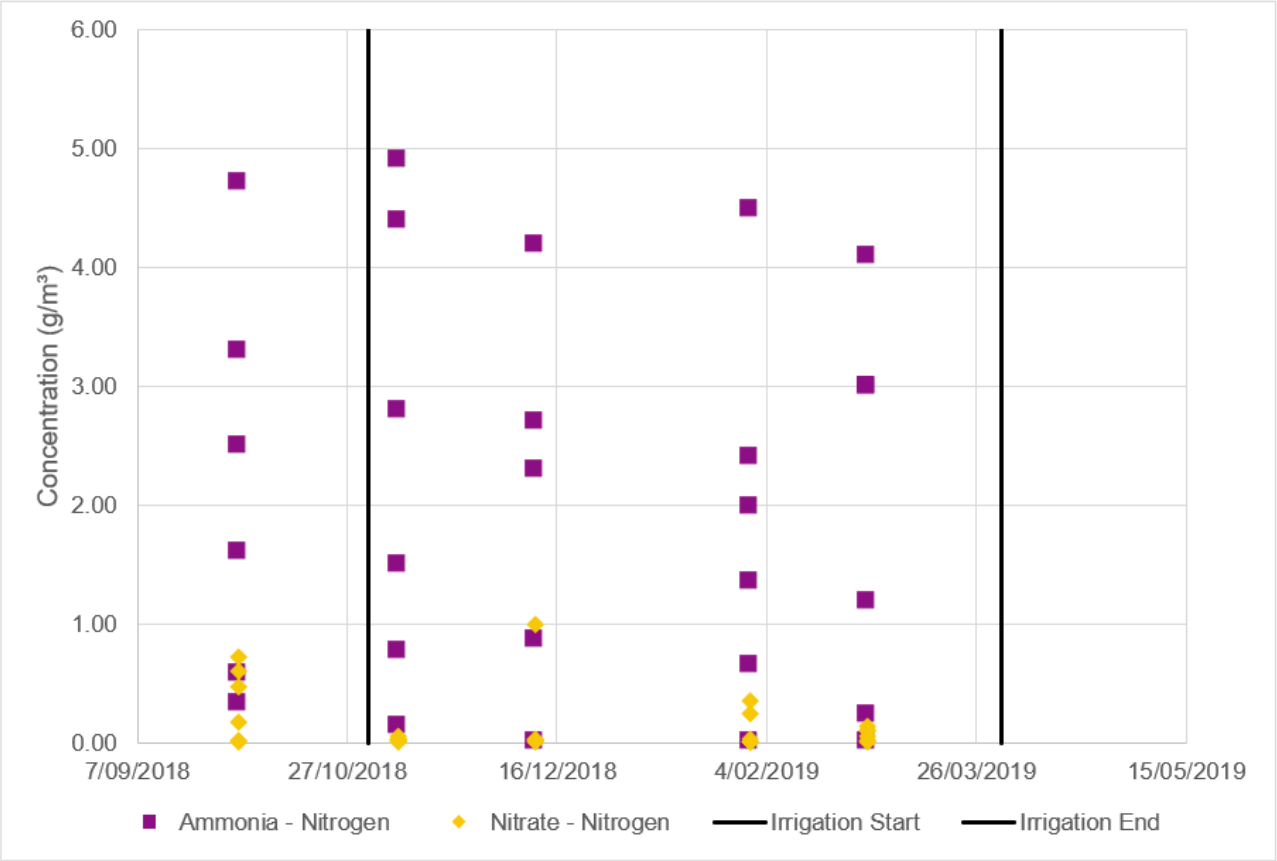


Figure 2-1 Groundwater testing results from six wells – Nitrate N and Ammoniacal N

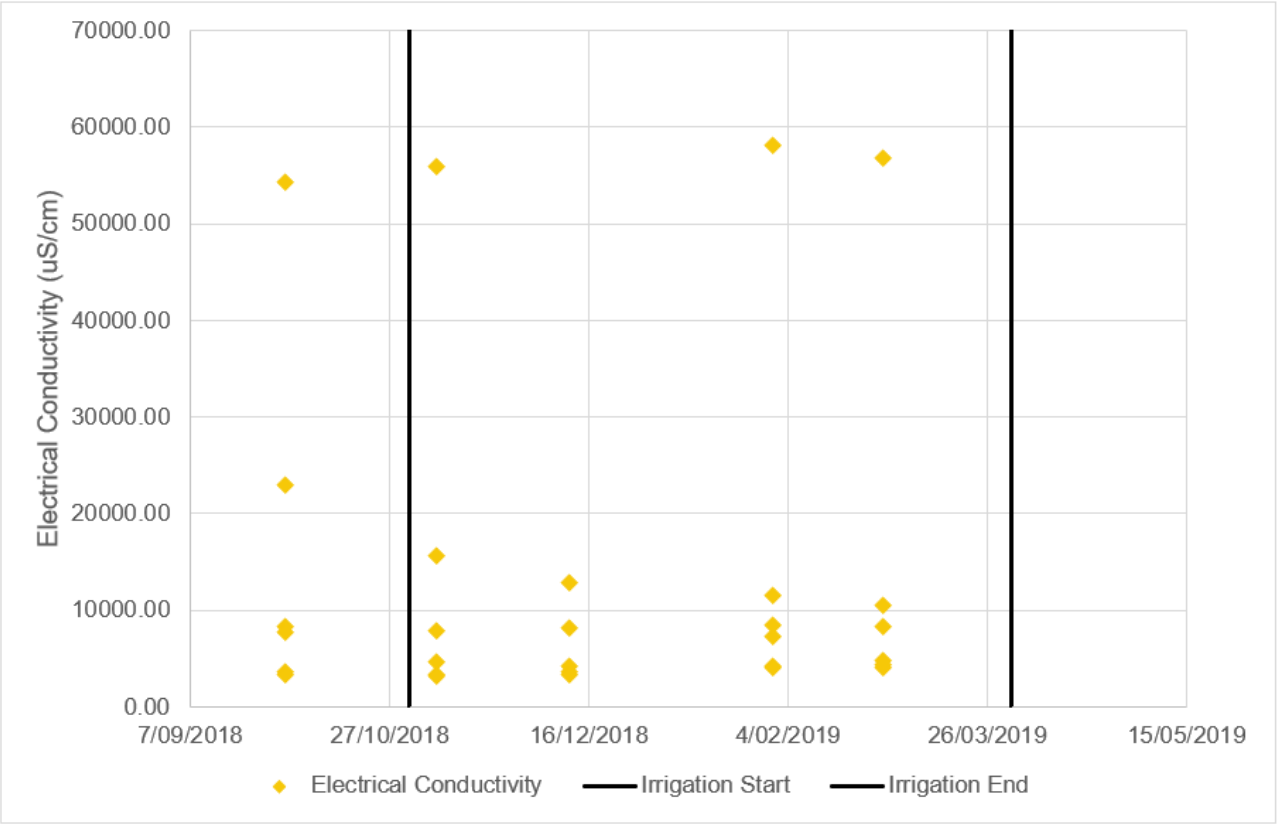


Figure 2-2 Groundwater testing results from six wells – electrical conductivity

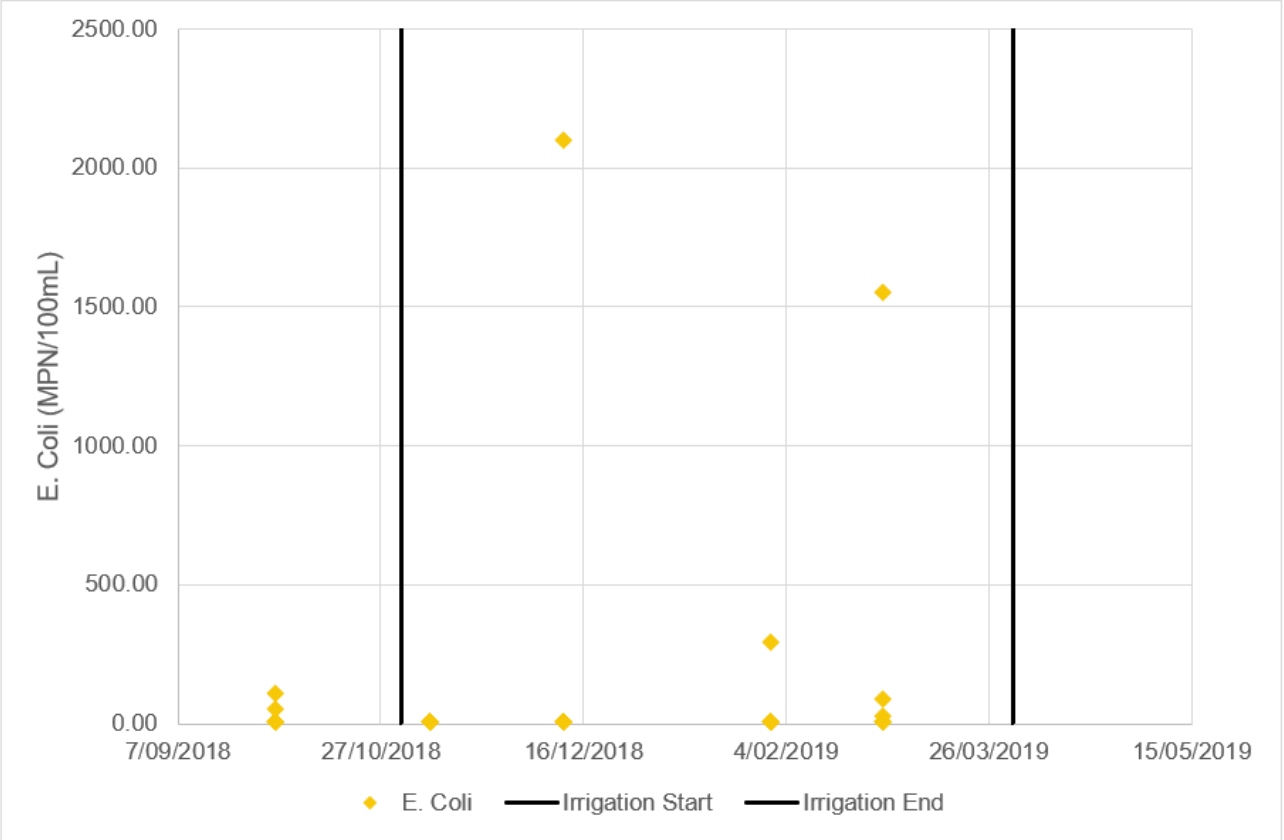


Figure 2-3 Groundwater testing results from six wells – E. coli

2.3.4 Condition 30

The groundwater level in the wells shown on Plan Consent No B attached in Appendix 1 [see **Appendix B** *for the Revised Plan Consent and* **Appendix C** *for the MDC acceptance] to these conditions of consent shall be monitored prior to wastewater irrigation commencing and at least fortnightly thereafter while irrigation is occurring. If the groundwater level measured in any monitoring well, for a particular irrigation area, is closer than 0.3 metres from the ground surface, irrigation shall cease in that area. Irrigation shall not recommence until the groundwater level is greater than 0.3 metres below the ground surface.*

The groundwater levels at each monitoring well were measured and recorded, as shown in Table 2-2. The groundwater level monitoring frequency was approximately monthly, which is not in line with the consent's fortnightly monitoring requirements. All groundwater depths measured during the period 1 October 2018 to 28 February 2019 were greater than 0.3m below ground, which is consistent with previous years' observations. The groundwater depth measurement taken from monitoring well MSC-071 on 28 February 2019 was recorded as being 19.30m, which may be an input error, as a depth of 1.93m is consistent with the other groundwater depths recorded in Table 2-2.

Table 2-2 Groundwater levels prior to and during irrigation period

	Depth to Groundwater (m)					
Date	MSC-049	MSC-055	MSC-070	MSC-071	10027	10031
1/10/2018	0.70	1.90	1.10	1.92	1.25	1.08
8/11/2018	1.48	1.85	1.50	2.42	1.40	1.30
11/12/2018	1.10	1.90	1.72	1.96	1.61	1.21
31/1/2019	2.31	2.21	1.84	2.20	1.85	1.78
28/2/2019	1.84	2.61	2.14	1.93[1]	2.27	1.53

2.3.5 Condition 31

The potable water in well P28/4446 and one well on Lot 2 DP12207 shall be monitored as follows:

c) Sampling of both wells shall continue at monthly intervals during the wastewater irrigation season with a final sample being taken no later than 30 days after wastewater irrigation ceases each season.

d) Sampling shall continue for a period of 5 years after wastewater irrigation commences. If E. coli are detected then the sampling shall continue for a further 5 years from that time.

As per the consent requirements, potable water from the wells located at 138 Hardings Road and 99 Hardings Road was tested monthly during the irrigation period (Table 2-3). Undetectable concentrations of E. Coli were found in all samples (i.e. <1 cfu/100mls), and therefore no further action is considered necessary.

No samples have tested positive during the six years of monitoring for E. Coli in the potable water wells required under this consent.

Table 2-3 Potable wells water monitoring – E. coli concentration (cfu/100mL)

Date	138 Hardings Road	99 Hardings Road
11-Jul-2018	<1	<1
07-Aug-2018	<1	<1
12-Sep-2018	<1	<1
03-Oct-2018	<1	<1
08-Nov-2018	<1	<1
14-Dec-2018	<1	<1
07-Jan-2019	<1	<1
08-Feb-2019	<1	<1
11-Mar-2019	<1	<1
01-Apr-2019	<1	<1
07-May-2019	<1	<1

2.3.6 Condition 32

Conditions 32a and b were revised in 2012 and accepted by MDC Regulatory. The condition is now as follows with amendments in **bold**:

Prior to commencing the discharge;

a) A weather station shall be installed at the office building shown on Plan Consent No B attached in Appendix 1 to these conditions of consent. The weather station shall measure and record wind speed and direction and rainfall and have sufficient instrumentation to allow calculation of evapotranspiration. The wind

[1] Originally inputted as 19.30, but assumed to be an error.

speed and direction recorded at the weather station shall be deemed to represent the wind speed and direction for Areas 1 ***and 2****.*

b) An anemometer and wind vane shall be installed at the location shown as ***Wind Measurement Site (Area 3)*** *on Plan Consent No B attached in Appendix 1 to these conditions of consent. The anemometer and wind vane shall measure and record wind speed and direction. The wind speed and direction recorded shall be deemed to represent the wind speed and direction for* ***Irrigation Area 3****.*

c) The weather station, anemometers and wind vanes shall be maintained in an operational condition throughout the term of this consent.

The two weather stations are set up and operating in accordance with the amended requirements of Condition 32. The proposed amendment letter and acceptance by MDC Regulatory can be provided if requested or alternatively, can be found in the previous four monitoring reports.

2.3.7 Condition 35

The Consent Holder shall maintain a register of any complaints received relating to any aspect of the land discharge system. The record shall include the date and time of complaint, cause of the complaint, weather conditions at the time of complaint and action taken in response to the complaint. The register shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of complaints received by the consent holder shall be included in the AMR required by Condition 7.

As no complaints regarding the land discharge system were received during the reporting period, compliance with the requirements of Condition 35 was achieved. No complaints have been received regarding the land discharge system for the previous three monitoring periods.

2.3.8 Condition 36

For the duration of these consents, the Consent Holder shall install and maintain appropriate signage on any access points to the BSTP warning that partially treated wastewater is discharged to the land. Written confirmation of the signage wording, size and placement shall be provided to the Manager, Regulatory Department, Marlborough District Council, within three months of the commencement of this consent.

Signage has been installed according to the requirements of Condition 36.

2.4 Discharge to Air

2.4.1 Condition 42

Any complaints received in regard to odour shall be recorded in a Complaints Register specifying the complaint, time and date, weather conditions and action required. A copy of the complaints shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of these complaints shall be part of the AMR required by Condition 7 of these Conditions of Consent.

No odour complaints were received in this monitoring period therefore the requirements of Condition 42 were achieved.

2.4.2 Condition 44

The Consent Holder shall measure the Dissolved Oxygen (DO) concentrations in the wastewater near the outlet of Ponds 2A, 2B, 2C, 6 and 10 every Wednesday, except when a Wednesday falls on a public holiday, when the measurement shall be taken on the nearest following working day. The DO concentration shall be measured between 11 am and 2pm and shall not be less than 2 grams of DO per cubic metre, on a rolling 10 percentile weekly measurement basis.

Figure 2-4 shows the weekly DO concentrations at the outlet of ponds 2A, 2B, 2C, 6, and the wetlands, and Table 2-4 compares the 10th percentile DO concentrations with the consent limits. DO concentrations were measured at the outlet of ponds 2B, 2C and 6, as required by the consent. However, readings were not taken from Pond 10. During the consent procurement stage, the name of the final wetland pond was Pond 10. This was renamed to Pond 14 during the detailed design stage. Samples obtained from this location will therefore meet the requirements of the consent.

Samples were being taken approximately every 3.3 days. Time of sample collection varied depending on location. At Pond 2A, 33% of samples were collected outside the stipulated time frame, while at Pond 2B and 2C, this was 46%. At the wetlands and Pond 6, 34% of samples were taken outside of the required time frame. As solar radiation (and therefore algal photosynthesis), is usually greatest between 11am and 2pm, pond DO concentrations should be always measured (for compliance purposes), during this period.

As seen in Figure 2-4, there was only one occasion where the dissolved oxygen content dropped below the 2g/m^3 consent limit. This was observed in Pond 2C, on 25 March 2019. Table 2-4 shows that all the 10th percentile values were well above the consent limit. This is similar to what has been reported in previous years. It is interesting to note that Pond 2B and 2C (the domestic ponds) had the lowest DO concentrations overall.

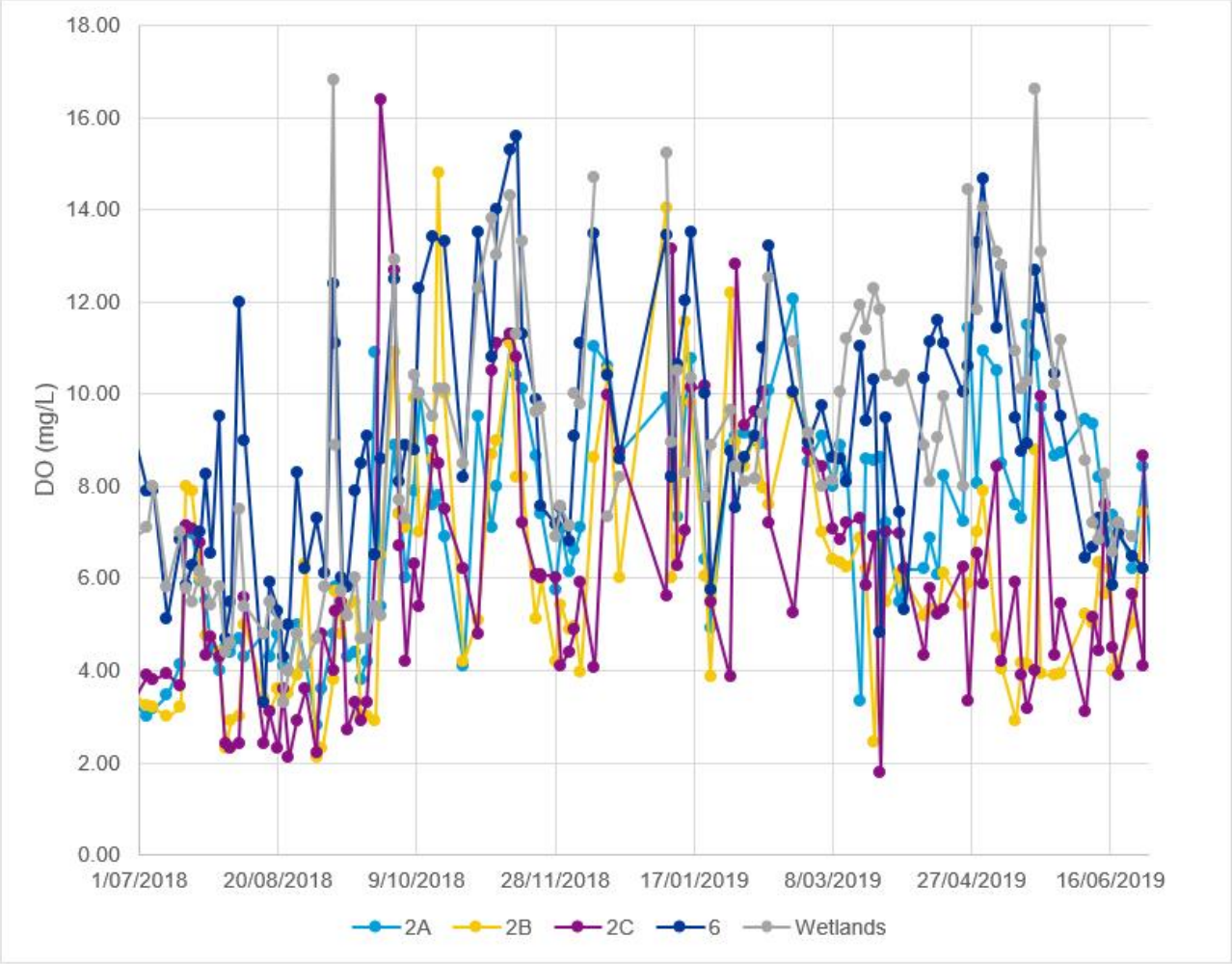


Figure 2-4 Dissolved oxygen monitoring results at the outlet of Ponds 2B, 2C, 6, I1 and wetlands

Table 2-4 Comparison of dissolved oxygen monitoring results for Ponds 2B, 2C, 6, I1 and wetlands with consent limit

	10th Percentile
Consent Limit	>2.0g/m^3
Pond 2A Outlet	4.10
Pond 2B Outlet	3.08
Pond 2C Outlet	3.10
Pond 6 Outlet	5.83
Wetlands Outlet	5.16

2.4.3 Condition 45

The DO of the wastewater in Ponds I1 and I2 shall be measured daily between 11am and 2pm during peak loading periods associated with the annual vintage, with DO concentrations maintained at not less than 0.5 grams per cubic metre on a 50th percentile basis. The time of the peak loading periods shall be determined by consultation between the Consent Holder and the Manager, Regulatory Department, Marlborough District Council. The results of the measurements shall be included in the AMR required by Condition 7.

The annual peak vintage period occurs between March and May in each year. Probes record DO concentrations in Ponds I1 and I2 every six minutes over this period. Daily averages of the DO concentration between 11am and 2pm each day are shown in Figure 2-5.

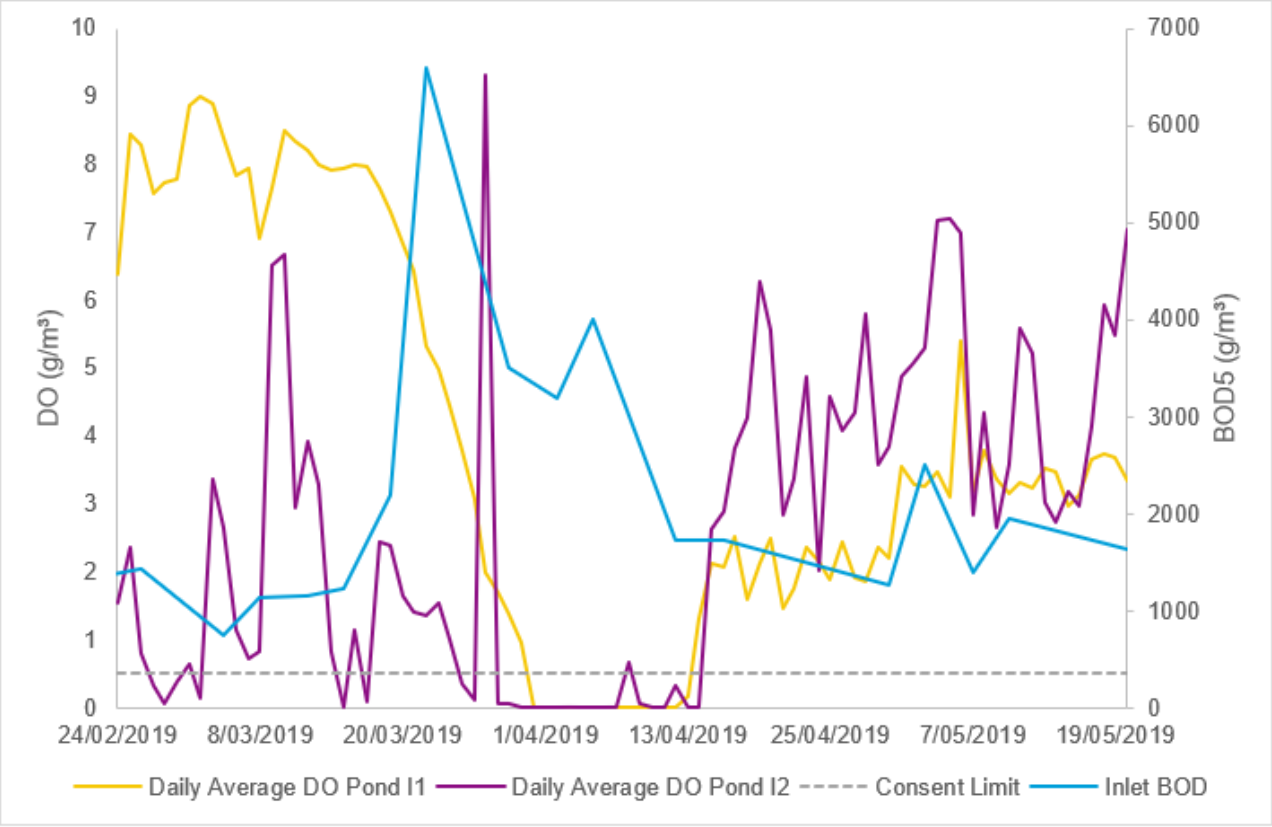


Figure 2-5 Dissolved oxygen daily averages in Ponds I1 and I2 compared to inlet BOD concentration

Figure 2-5 shows that the average daily DO concentration in Pond I1 and I2 were at zero in the first half of April 2019. Before this, DO concentrations in Pond I2 dropped to around zero on five occasions between 28 February 2019 and 26 March 2019. However, as shown in Table 2-5, the 50th percentile DO concentration in both ponds over the vintage period was well above the 0.5g/m^3 consent limit. Similar instances of DO dropping to zero during vintage have also been reported in previous monitoring periods. After 16 April 2019,

the DO concentrations began to rise after a period of 15 days below the consent limit. Inlet BOD_5 concentrations also stabilised around 2500 – 1270g/m^3 after 16 April 2019.

Table 2-5 Dissolved oxygen monitoring results for Ponds I1 and I2 during March to May

	50th Percentile during peak period
Consent Limit	**>0.5g/m^3**
Pond I1	3.1
Pond I2	2.5

2.5 Discharge to Wairau Estuary

2.5.1 Condition 51

The Consent Holder shall undertake annual external visual inspections of the outfall pipeline structures for the duration of the consent. A report shall be submitted to the Manager, Regulatory Department, Marlborough District Council, within 20 working days of the inspection being carried out. The report shall include but not be limited to:

a) The date and time of the inspection.

b) The condition of the outfall structures.

c) Any maintenance work that may be required, and if it is required, when the work will be carried out

An inspection of the new Wairau Bar discharge pipeline was conducted on 14 February 2019 by Marine Services NZ (see report in **Appendix B** dated 14 February 2019). In general, no real problems were found with the pipeline, and no major repairs are required. The outcomes from this inspection are summarised below:

- Marker buoy in good condition, was cleaned during inspection.
- All signage in good condition.
- Chain in good condition, shackles fastened with stainless steel wire.
- Discharge nozzle condition appears to be fine.
- The nozzle is in a crater that is kept free of sand by the discharge and is surrounded by sand and sticks.
- Pipe feels to be in good condition, visibility around pipe was zero.
- The length of pipe not covered by seabed material is approximately 500mm, at the very end of the pipe.
- Sand and sticks were found to be entangled around the top of the first pipe support.

2.5.2 Condition 54

*The existing buoy marking the location of the end of the existing outfall shall be marked with the words **Sewer Outfall** and the lettering used shall be bold and clear such that it can easily be read from a distance of 10 metres.*

The existing buoy has been marked according to the requirements of the condition.

2.5.3 Condition 55

The total discharge of treated wastewater authorised by this consent shall not exceed an average daily volume of 28,500 cubic metres, where the average volume is calculated on a continuous basis over a period of 365 consecutive days. The maximum discharge volume per day shall not exceed 103,680 cubic metres.

The daily treated wastewater discharge volumes to the Wairau Estuary for the 2018/2019 year and the previous three years are shown in Table 2-6. The average daily discharge volume for the current monitoring period was 16,058m^3, while the maximum daily discharge volume was 31,020m^3 recorded on 5 August 2018.

Table 2-6 Treated wastewater discharge volumes 2015/2016 – 2018/2019

	2015/2016	2016/2017	2017/2018	2018/2019
Average Daily Discharge (m^3)	11,078	15,868	18,365	16,058
Maximum Daily Discharge (m^3)	28,285	52,733	32,631	31,020

The average daily discharge volumes for this year have decreased slightly from the previous year but remain higher than the 2015/2016 and 2016/2017 average daily discharge volumes. Average daily and maximum daily discharge volumes for 2018/2019 are well below the limits set by Condition 55.

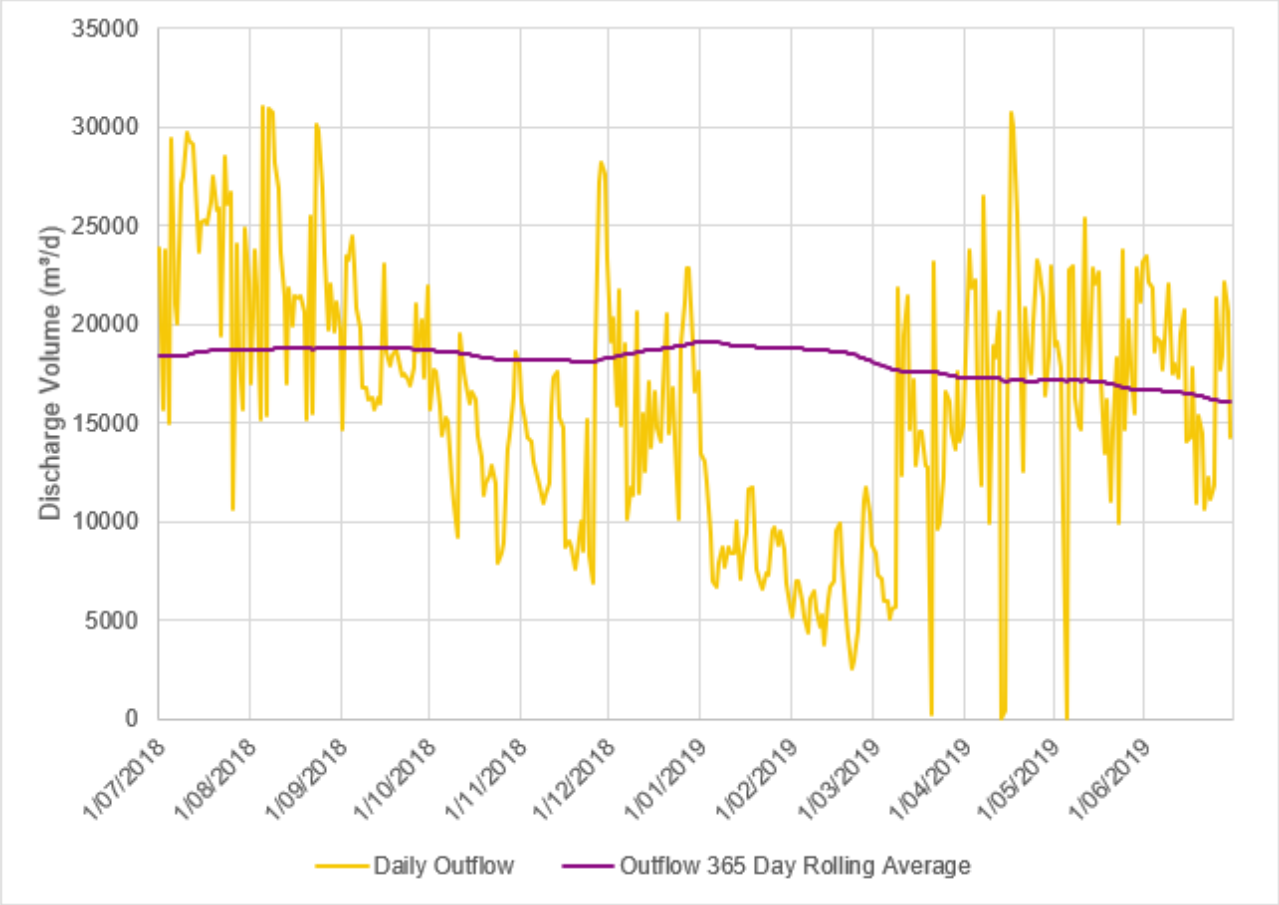


Figure 2-6 Daily discharge volume to Wairau Estuary

2.5.4 Condition 56

*The Consent Holder shall install flow measuring devices after the outlet from wetland Pond 10 and Pond 6 (as shown on Plan Consent No C attached in Appendix 1 [see **Appendix B** for the Revised Plan Consent and **Appendix C** for the acceptance of this] to these conditions of consent) and record the daily volume of treated wastewater discharged to the Wairau Estuary. A copy of these records shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of this data shall be provided in the AMR required by Condition 7.*

Flow meters are installed at the outlet from the wetlands, at Pond 14 (numbered Pond 10 at the preliminary design stage). Another flow meter has also been installed at the outlet to Pond 6 to record wastewater flow to irrigation areas.

2.5.5 Condition 59

The discharge of treated wastewater from the upgraded BSTP shall not cause any of the following effects outside the mixing zone described in Condition 58:

a) The natural temperature of the receiving water to change by more than 3 degrees Celsius;

b) Any conspicuous change in colour or clarity of the receiving water such that visual clarity of water is reduced by more than 50% as per the Water Quality Guidelines No 2 Ministry for the Environment (1994);

c) The concentration of dissolved oxygen of the receiving water to fall below 80 percent of the saturation content

While the above effects have not been directly monitored in the receiving water, the results of wastewater monitoring (see Figures 2-7 to 2-10), indicate that there are unlikely to be any significant effects on water quality after reasonable mixing. CH2M Beca (2007)[2] indicated that, based on computer modelling, the "worst case" initial dilution in the Estuary under existing average flows would be 50:1. In addition, the treated wastewater is only discharged under ebb tide conditions when there is a strong outflow from the Estuary. On this basis, none of the effects noted in Condition 59, are likely to have occurred after reasonable mixing, as a result of the discharge.

Successive surveys of the Estuary by Cawthron, in 2001, 2007, and 2016 (see **Appendix C**), show that the outfall "*was having no discernible effect on sediment quality or the seabed dwelling community*". A wastewater plume that remains submerged for some distance downstream of the outfall, strong tidal flows, sediment re-suspension and bed movement mitigate against any adverse effects occurring on the bed of the Estuary. The strong tidal flows result in significant re-oxygenation of the bed so that the potential for the creation of anoxic sediments is also very low.

The decommissioning of the Opawa River outfall and discharge of the combined wastewater to an area of rapid flushing in the Estuary, as well as the relatively high-quality treated wastewater (including low concentrations of ammonia), means that there is a very low likelihood of significant adverse effects occurring in the receiving water as a result of the discharge.

[2] CH2M Beca (2007) *Assessment of Environmental Effects for Upgrading of the Blenheim Sewage Treatment Plant*; report prepared for Marlborough District

2.5.6 Condition 61

The Consent Holder shall take grab samples of treated wastewater at the outlet of Pond 10 following commissioning of the new wetland. Samples shall be analysed for the parameters and frequency shown in Table 1 (reproduced as Table 2-7 in this report). The results shall be reported in the AMP required by Condition 7.

Condition 61 of the consent requires that grab samples be taken at the outlet of Pond 10 which was the number of the final wetland pond at the consent procurement (preliminary design) stage. However, following changes made during detailed design, Pond 14 is now the final wetland cell before discharge to the Estuary. Grab samples are therefore collected from the outlet of Pond 14. The results of sampling at the outlet of the wetland are shown in Figure 2-7 to Figure 2-11.

Table 2-7 Treated wastewater monitoring requirements

Parameter	Unit	Frequency of Analysis
Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	g/m^3	Monthly
Suspended Solids (SS)	g/m^3	Monthly
Faecal Coliforms and Enterococci	cfu/100ml	Monthly
Ammoniacal Nitrogen (NH_3-N)	g/m^3	Monthly
Total Nitrogen (TN)	g/m^3	Monthly
Dissolved Inorganic Nitrogen	g/m^3	Monthly
Dissolved Reactive Phosphorus	g/m^3	Monthly
Total Phosphorus (TP)	g/m^3	Monthly
pH	pH units	Monthly
Temperature	Celsius	Monthly
Metals/metalloids: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc	g/m^3	Annually

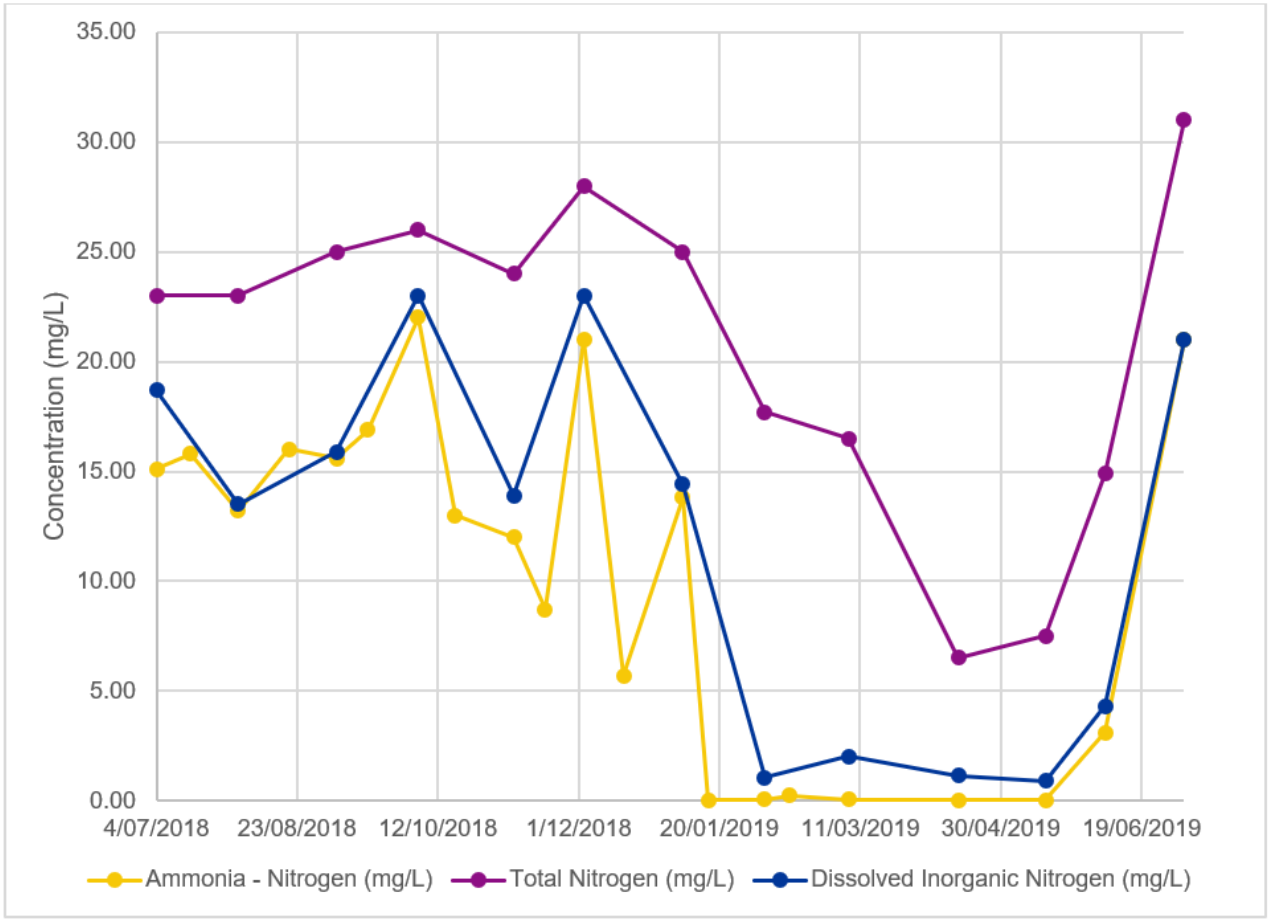


Figure 2-7 Treated wastewater monitoring results at Pond 14 outlet – nitrogen species

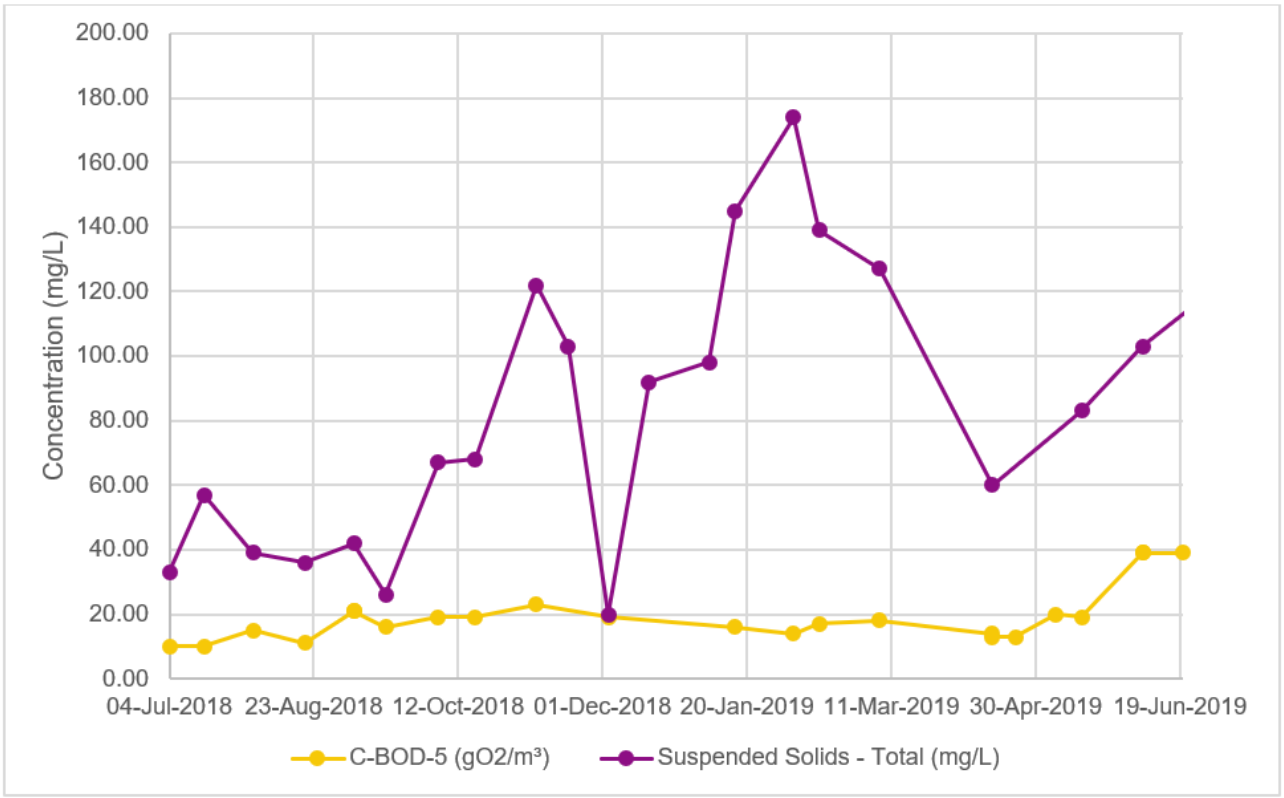


Figure 2-8 Treated wastewater monitoring results at Pond 14 outlet – $cBOD_5$ and suspended solids

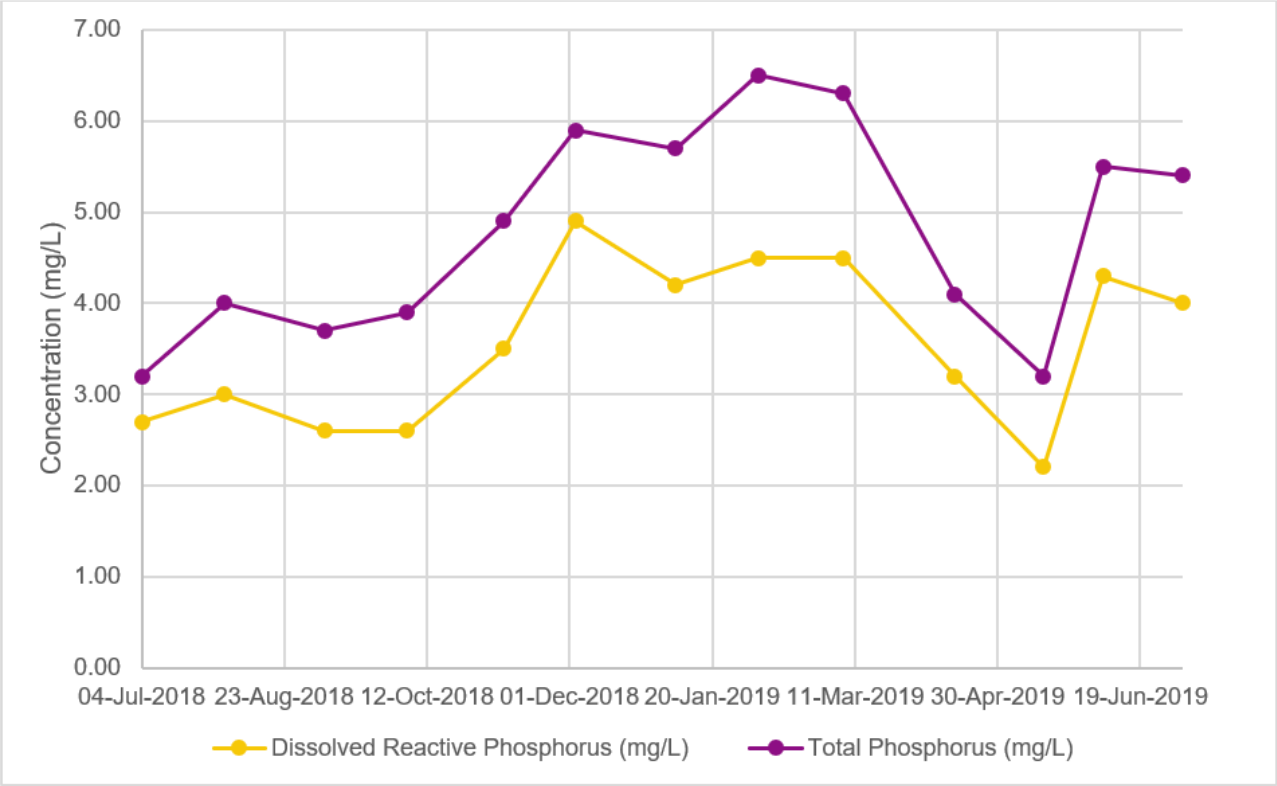


Figure 2-9 Treated wastewater monitoring results at Pond 14 outlet – phosphorus species

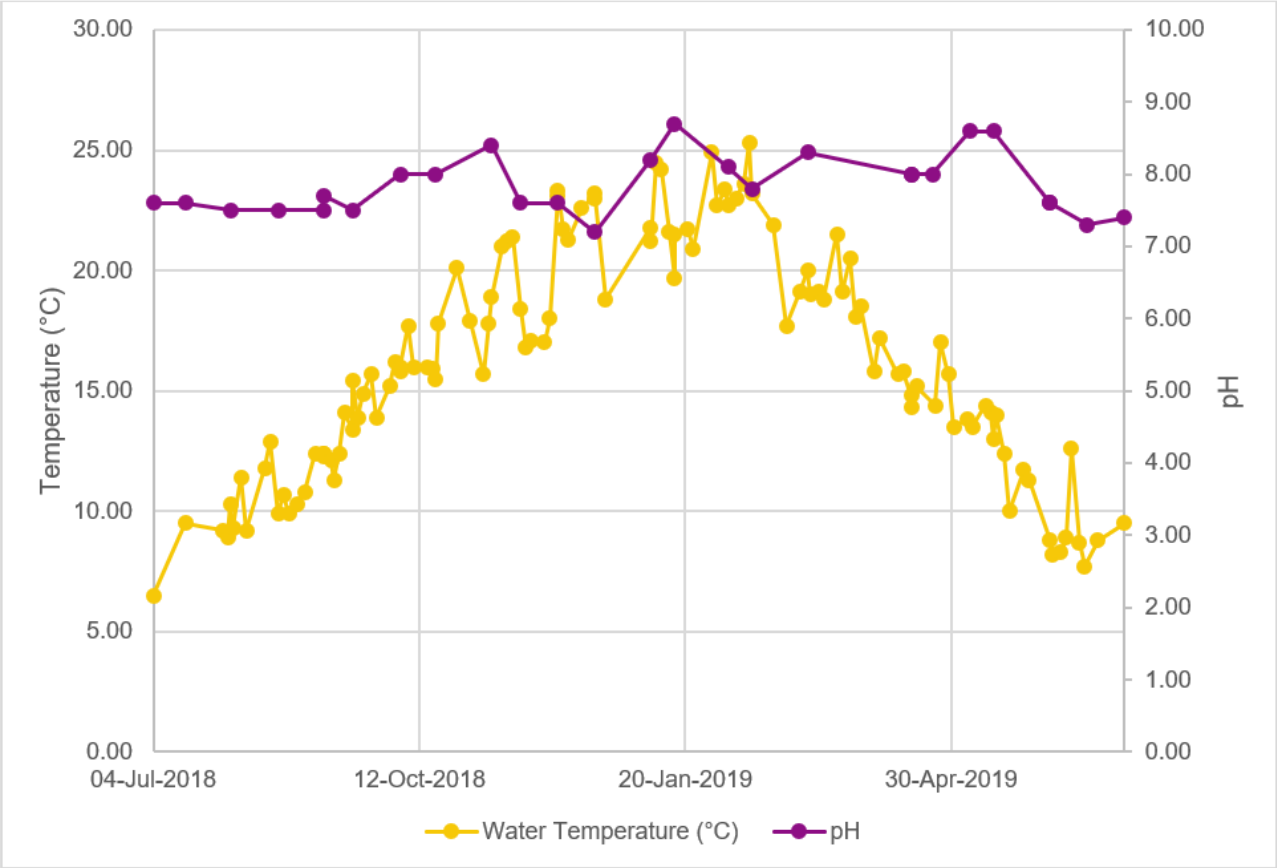


Figure 2-10 Treated wastewater monitoring results at Pond 14 outlet – temperature and pH

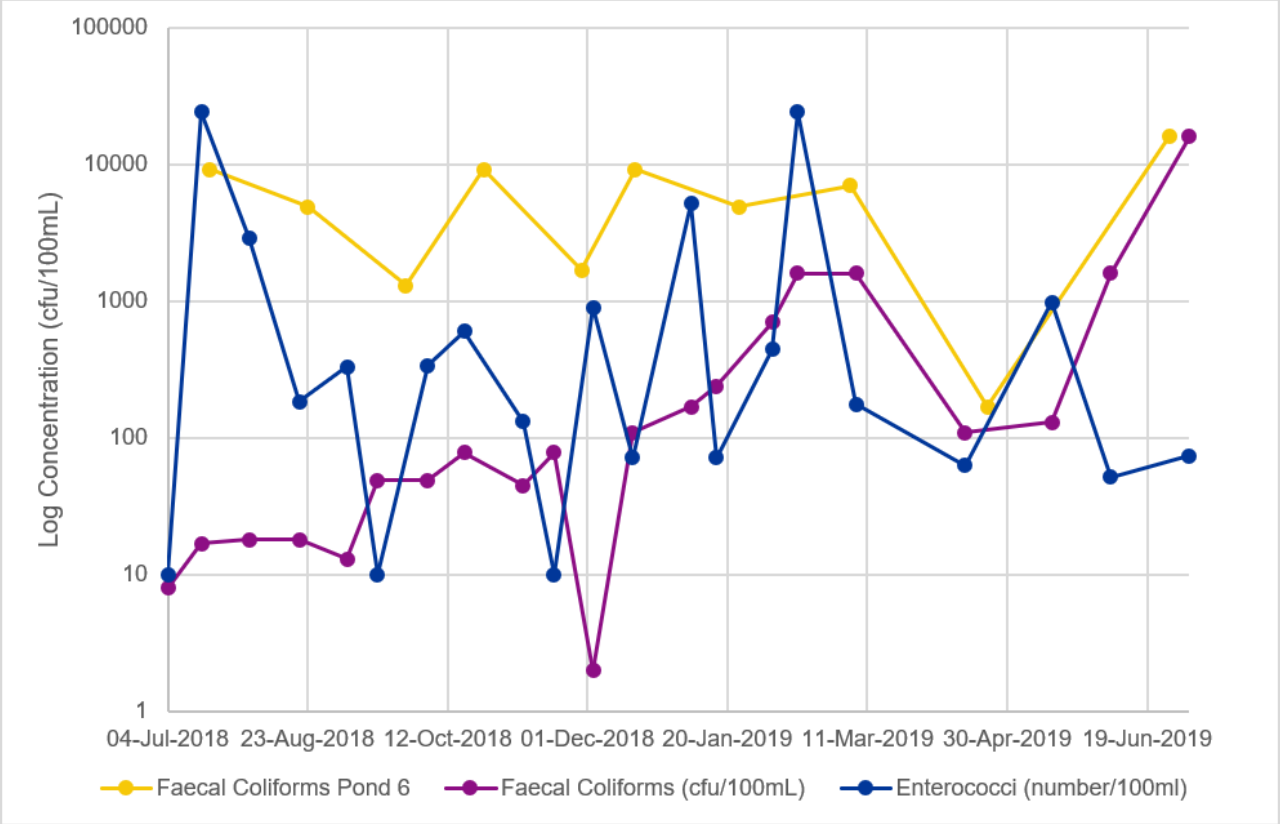


Figure 2-11 Treated wastewater monitoring results – Faecal coliforms at the outlet of Pond 6 and Faecal coliforms and Enterococci at outlet of Pond 14 (on a Logarithmic Scale)

Although not a consent requirement, faecal coliform concentrations at Pond 6 were obtained during the monitoring period (see Figure 2-11).

All sampling was generally carried out at the required frequency. The longest time between samples was 44 days (for $_{C}$BOD-5 testing), between 3 December 2018 and 16 Jan 2019. However, these two samples were still obtained over consecutive months, and given this time included the Christmas and New Year holiday periods, the time period is justified.

The nitrogen species trends for the 2018/2019 monitoring period are similar to those observed in previous years, where concentrations drop from approximately October onwards and begin to pick up around May.

The BOD, suspended solids, phosphorus species, temperature and pH values measured all reflect similar annual trends to previous monitoring years. Apart from the occasional spike, no overall trends up or down were observed for the enterococci values in Ponds 14. Faecal coliform concentrations have been steadily increasing since April 2019, although they have not been excessively high, they should be monitored closely in the next monitoring period.

The results for the sample for metal and metalloids measured at Pond 14 are summarised in Table 2-8.

Table 2-8 Wastewater monitoring results – metals and metalloids at Pond 14

Date	Arsenic – Total (g/m3)	Cadmium – Total (g/m3)	Chromium – Total (g/m3)	Copper – Total (g/m3)	Lead – Total (g/m3)	Nickel – Total (g/m3)	Zinc – Total (g/m3)
9/1/2019	0.004	<0.000	0.001	0.002	0.001	0.002	0.005
7/1/2019	0.005	0.00	0.002	0.0024	0.00037	0.002	0.004
ANZECC Trigger Values (99% level protection)	0.001	0.00006	0.00001	0.001	0.001	0.008	0.0024

Arsenic, chromium and copper concentrations showed small increases from the previous monitoring year (up to 0.001g/m^3). However, lead and zinc concentrations have decreased from the previous year, and cadmium has not changed (undetectable). The ANZECC (2000) trigger values for a 99 percent level of protection of freshwater and marine ecosystems in receiving waters were exceeded for arsenic, chromium, copper and zinc in the treated wastewater. However, after dilution and reasonable mixing in the estuary, it is expected that the ANZECC trigger values will not be exceeded.

2.5.7 Condition 62 – Wastewater Monitoring Limits

The treated wastewater sampled under Condition 61 shall comply on an annual basis with the ammoniacal nitrogen and faecal coliform limits listed in Table 2 [reproduced in the Consent Limits columns of Table 2 9].

The monitoring results and consent limits for ammoniacal nitrogen and faecal coliform concentrations are given in Table 2-9. Figure 2-11 shows the results of the wastewater faecal coliform and enterococci monitoring (after Pond 14), as well as results of faecal coliform monitoring at the outlet of Pond 6 (i.e. before the wetlands).

Median and 90th percentile limits for ammoniacal nitrogen and faecal coliforms were not exceeded, according to the data collected over the 2018/2019 monitoring period. This is an improvement over the previous year's monitoring data, where the 90th percentile of the faecal coliform's concentration exceeded the limit by over 4,700 cfu/100mL.

Wastewater faecal coliform concentrations recorded at the outlet of Pond 6 generally range between 10,000 and 1,000 cfu/100mL. By comparison, the faecal coliform concentrations at the outlet of Pond 14 are between 10 and 1,600 cfu/100mL, a 1-2 log reduction, according to the 2018/2019 monitoring data. This shows that ponds 7-14 (the wetlands) are effective at providing further disinfection of the wastewater before discharge to the estuary. Note there are no consent limits set on faecal coliform concentrations at the outlet of Pond 6.

Table 2-9 Wastewater microbiological monitoring results and consent limits

Parameter	Units	Median		90th Percentile	
		Consent Limits under existing flows	Results	Consent Limits under existing flows	Results
Pond 14 Ammoniacal Nitrogen (NH3-N)	g/m^3	30	13.00	40	21
Pond 14 Faecal coliforms	cfu/100ml	700	78	2,150	1,600
Pond 6 Faecal coliforms	cfu/100ml	N/A	5,950	N/A	9,880

2.5.8 Conditions 63-70

The Consent Holder shall carry out benthic surveys and water quality monitoring in the receiving environment to identify changes (notably adverse ecological impacts), as a result of the treated wastewater discharge. The survey design shall be consistent with the survey conducted by the Cawthron Institute (Technical Report on Effects of Outfall Discharge in Appendix D of Assessment of Environmental Effects for Upgrading of Blenheim Sewage Treatment Plant, September 2007).

Condition 64 requires that benthic and water quality surveys commence two years after commissioning of the new outfall. A survey was carried out by Cawthron Institute in February 2016). The survey was repeated again in January 2018 (see report issued 26 April 2018 in **Appendix C**). Surveys are required to be repeated at five yearly intervals for the duration of the consent.

The 2018 survey results are summarised as follows:

- Some minor environmental and ecological differences were apparent between the 2006, 2016 and 2018 surveys such as:
  - A change in the dominant infauna species at some sites over the years (such as the snail *Potamopygus estuarinus*), although this is unlikely to be caused by the discharge.
  - Evidence of increased concentrations of metals in near-bed waters downstream of the mixing zone, but little evidence on the boundary of the mixing zone itself.
  - Concentrations of TSS and TN were higher at the mixing zone and near-bed sample taken at the bar in 2016 and 2018, however the BSTP outfall is not considered to be the sole source of these higher concentrations.
  - In 2018, enterococci concentration levels were below the limit of detection at all stations measured, in comparison to higher values recorded in 2016. This suggests that the outfall discharge is unlikely to be the predominant source of the enterococci contamination to the estuary. Similar findings were found for faecal coliforms.
  - Turbidity levels were similar at all three stations, however slightly lower than 2016.
- No overall adverse ecological effects of the BSTP discharge (and no breaches of the water quality consent conditions) were detected.
- These overall results are likely due to the good quality of the discharge and its release only on the ebb tide, as well as the rapid tidal flushing that occurs within the vicinity of the outfall.

The survey is due to be repeated in February 2023, with the outcomes to be presented in the 2022/2023 monitoring report.

3 Summary

3.1 Overview

3.1.1 Groundwater

Groundwater testing was carried out monthly during the periods of irrigation, which is the testing frequency required by the consent. Over all the wells tested, *E. Coli* concentrations remained well below 500 MPN/100mL, except for two spikes occurring in separate bores at different times. One spike of 2,100 MPN/100mL was observed at bore MSC-049 in 11 December 2018, and another spike of 1,552 MPN/100mL was recorded at bore 10031 in 28 February 2019. Ammoniacal nitrogen concentrations were stable at each of the monitoring bore, remaining below 5g/m^3.

The average annual nitrogen load applied across the full irrigation area for this monitoring period was 54.4 kg/ha/yr (below the 200kg/ha/yr consent limit). However, the load on DLA-02 exceeded the 200 kg/ha/yr limit, and the calculated monthly nitrogen application rate exceeded the monthly 50kg/ha limit on three occasions, twice in January 2019 on segments DLA-01 and DLA-02 and once on segment DLA-02 in February 2019.

Results of monthly samples taken from potable water monitoring wells have shown that *E. Coli* concentrations are at undetectable limits (<1 cfu/100mL).

3.1.2 Pond Dissolved Oxygen

DO concentrations measured weekly at the outlet of the treatment ponds were above the consent minimum limits, indicating that they are in good health.

3.1.3 Outfall Flow

Average and maximum daily outfall flow volumes met the consent limits.

3.1.4 Treated Wastewater

Treated wastewater at the outlet of Pond 14 was monitored at the required frequency for all parameters. Median and 90th percentile ammoniacal nitrogen and faecal coliform concentrations were below the consent limit. Metal and metalloid analysis of the treated wastewater show that it has largely unchanged from the previous monitoring period. No consent limits are set on metals, but the concentrations are low and did not exceed the ANZECC (2000) trigger values for a 99 percent level of protection of freshwater and marine ecosystems in the receiving waters.

3.1.5 Ecological Effects

The second post-upgrade benthic and water quality survey of the Estuary, required under the consent, was carried out during the 2018/18 reporting period. The survey concluded that there were some minor environmental and ecological changes between the 2006, 2016 and 2018 surveys but overall, no adverse ecological effects due to the discharge were detected.

3.2 Compliance with Consent Conditions

From an assessment of the results of monitoring in the period 1 July 2018 to 30 June 2019, all consent conditions were met except:

- Condition 24: Exceedance of the monthly nitrogen application limit three times during the 2018/2019 monitoring period, and exceedance of the annual nitrogen application limit on one segment.

- Condition 30: Groundwater level measurements were taken monthly, and not fortnightly as required by the consent.

Overall, the BSTP treatment ponds and wetlands appear to be performing well. While there is still some room for improvement in adhering to the sampling frequency, general compliance with consent conditions was achieved in the 2018/19 monitoring period.

A

Appendix A – Consent U071181

U071181

PART I: CONSENTS GRANTED

1. Land Use Consents:

A To disturb land, clear indigenous vegetation and excavate land for the purposes of constructing a wetland, an outfall pipeline, sludge ponds and drying beds.

B To use land for the purpose of disposing treated wastewater to land.

2. Discharge Permits:

C To discharge treated wastewater to land.

D To discharge seepage from treatment ponds, wetlands, sludge ponds and drying beds.

E To discharge odour to air from treatment ponds, wetlands, sludge ponds and drying beds and from the land used for the disposal of treated wastewater.

F To discharge treated wastewater to the Opawa River.

3. Coastal Permit:

G. Coastal Permit to:

a) use and maintain an existing outfall pipeline and a new outfall pipeline in the Coastal Marine Area of the Wairau Estuary

b) occupy space in the Coastal Marine Area of the Wairau Estuary with an existing outfall pipeline and a new outfall pipeline

c) discharge treated wastewater to the Wairau Estuary from a new outfall pipeline

PART II: GENERAL CONDITIONS

1. The consents identified in Part I above are to be exercised in a manner which is consistent with the proposal and methodologies described in the documents, information and analysis provided by the Consent Holder in support of its Application for Resource Consents and held on Council file U071181.

2. Unless an alternative term is identified in the Specific Conditions, the resource consents granted have a term of 35 years from the date that the consents commence.

3. The Consent Holder shall, at least one month prior to the commencement of the works that are the subject of this consent, submit to the Manager, Regulatory Department, Marlborough District Council, final copies of the following draft management plans:

a) Blenheim Sewage Treatment Plant: Construction Management Plan - Wetlands, Sludge Ponds and Drying Beds, 5 July 2010, as amended by the evidence of H Archer dated 6 September 2010

b) Blenheim Sewage Treatment Plant: Construction Management Plan - Outfall and Outfall Pump Station, 5 July 2010, as amended by the evidence of H Archer dated 6 September 2010

c) Blenheim Sewage Treatment Plant: Buffer Planting Plan (undated)

d) Wastewater Irrigation Management Plan Blenheim Sewage Treatment Plant, version 3, 6 September 2010

e) Blenheim Sewage Treatment Plant: Operation and Management Plan, Revision C, July 2010

f) Blenheim Sewage Treatment Plant – Wetland Management Plan, 5 July 2010, as amended by the evidence of H Archer dated 6 September 2010

4. The final versions of the management plans listed in Condition 3 shall be prepared by qualified and experienced personnel with expertise in the matters that the individual management plans address. The management plans may be prepared as separate plans or as part of a combined plan.

5. When preparing the final versions of the management plans listed in condition 3, the Consent Holder shall take into account any comments provided by the Manager, Regulatory Department, Marlborough District Council, on the draft management plans. No works may commence until the final management plans have been approved in writing by Council, through the Manager, Regulatory Department.

6. All work shall be carried out in accordance with the approved final management plans, except that the Consent Holder may, at any time, submit to the Manager, Regulatory Department, Marlborough District Council, amendments to the plans for approval, provided those amendments improve the efficiency and/or quality of the construction works or operational activities, or avoid, remedy or mitigate an adverse effect.

7 The Consent Holder shall provide to the Manager, Regulatory Department, Marlborough District Council, on or before 31 August in each year of the term of consent, from and including 2011, an Annual Monitoring Report (AMR) which must contain at least the following information:

7.1 General

a) An analysis of the extent to which the Consent Holder has, in operating the BTSP and exercising these consents, complied with these Conditions of Consent and the extent and cause of any noncompliance, in each case with a summary of the environmental effects of the operation of the BTSP during the preceding 12 month period from 1 July – 30 June inclusive (the Reporting Period).

b) An identification and discussion of any operational difficulties, changes or improvements made to the wastewater treatment or operating processes, which would cause any material difference in environmental outcomes from the previous Reporting Period.

c) A comparison of results obtained over the Reporting Period with the results from previous reporting periods.

d) An identification of any maintenance works needed, proposed or undertaken to ensure compliance with these Conditions of Consent.

e) An identification of any improvements or changes required and the timetable for implementation.

7.2 Discharge of Treated Wastewater to Land

a) The volume of treated wastewater applied to each of the Areas 1 – 3 (as shown at Plan Consent No A in Appendix 1 to these conditions of consent) in the Reporting Period.

b) A summary and analysis (including graphical and statistical representations) of all data collected as a requirement of the Specific Conditions applicable to the discharge consent to discharge treated wastewater to land.

c) A record and discussion of any complaints received regarding the discharge to land and the consent holder's response to those complaints.

d) An analysis of any environmental effects, positive, neutral and adverse, which are attributable to the discharge of treated wastewater to land.

7.3 Discharge of Odour

a) Identification and discussion of any complaints received with respect to odour as per Condition 42 of the Discharge Permit to Air and any action taken to address the complaints.

b) The measurements of Dissolved Oxygen (DO) concentrations as per Conditions 44 and 45 of the Discharge Permit to Air.

c) An analysis of the data in terms of consent compliance and environmental effects.

d) A discussion of any relevant operational changes or improvements carried out during the Reporting Period.

e) A comparison of results in the Reporting Period to previous reporting periods and a discussion of any trends.

f) Any complaints received in regard to the operation of the BSTP and the action(s) taken to address each complaint.

7.4 Wastewater Monitoring and Benthic and Water Quality Monitoring

a) A summary of all the monitoring data collected as a requirement of the conditions of the discharge permit to discharge treated wastewater to the Wairau Estuary during the Reporting Period.

b) An analysis of the data in terms of consent compliance and environmental effects during the Reporting Period.

c) A discussion of any relevant operational changes or improvements carried out during the Reporting Period.

d) A comparison of results with previous years and a discussion of any trends during the Reporting Period.

e) Any complaints received in regard to the operation of the BSTP and the action(s) taken to address each complaint.

7.5 Outfall Pipelines

a) A record of any maintenance works undertaken in accordance with Condition 52 of the Coastal Permit for the new and existing outfall pipelines.

8. With the agreement of the residents around the BSTP the Consent Holder shall set up a Community Liaison Group (CLG) which will consist of representatives of the community of residents affected by the BTSP who wish to participate and representatives of the Consent Holder. The CLG will meet every six months for the first two years following the commencement of these consents and, thereafter, at times to be agreed by the parties. The CLG's administration costs, including the taking and distribution of minutes, will be the responsibility of the Consent Holder.

9. All water and wastewater samples required to be taken under these Conditions of Consent shall be analysed in accordance with Standard Methods for the Examination of Water and Wastewater prepared and published by the American Public Health Association, the American Waterworks Association and the Water Environment Federation or any other suitable and comparable methodology approved by the Consent Authority.

10. Any laboratory carrying out analyses required under these Conditions of Consent shall be accredited for those analyses to NZS/ISO/IEC/17025 or equivalent, or to any other comparable standard approved by the Consent Authority.

11. The Consent Holder shall undertake a Performance Review of the BSTP five years after the commencement of the consents. The Performance Review shall include, but not be limited to:
    a) compliance with consent conditions
    b) analysis and conclusion of monitoring results
    c) other available treatment technologies that may be options for the future

12. The Consent Holder shall undertake a Best Practice and further Performance Review of the BSTP ten years after the commencement of the consents. The Best Practice Review shall include, but not be limited to, research of available treatment technologies that would enable the removal of the discharge to the Wairau Estuary and improve the quality of the discharge.

13. The Consent Authority may review these Conditions of Consent by serving notice in September or October of any year for any of the following purposes:
    a) To deal with any adverse effect on the environment which may arise from the exercise of these consents, which was not foreseen at the time of the granting of the consents.
    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 General Condition 7.
    d) To comply with the relevant requirements of a Council resource management plan.
    e) To implement any outcomes of the Performance and Best Practice Reviews required under Conditions 11 and 12.

14. The Consent Holder shall be responsible for all costs associated with the monitoring of these resource consents and Conditions of Consent as required by Section 36 of the Resource Management Act 1991 and Marlborough District Council's Schedule of Fees.

15. The Consent Holder shall be responsible for all costs incurred by the Consent Authority associated with the review of or requested changes to any Management Plans which form part of this consent.

16. A copy of all resource consents granted under U071181, including conditions imposed, shall be readily available at Marlborough District Council's office building.

PART III: SPECIFIC CONDITIONS

A. Applicable to Land Use Consent to disturb land, clear indigenous vegetation and excavate land for the purposes of constructing a wetland, an outfall pipeline, sludge ponds and drying beds.

17. This consent will have a term of three years from the date this consent commences.

18. The works the subject of this consent shall be undertaken in terms of Plan Consent No C in Appendix 1 to these conditions of consent.

19. The Consent Holder shall notify the Manager, Regulatory Department, Marlborough District Council, in writing of the proposed date of commencement of the construction works, at least 1 week prior to the start date of the works.

B Applicable to Land Use Consent use land for the purpose of disposing of treated wastewater to land

Advisory Note: There are no special conditions for this land use consent.

C Applicable to Discharge Consent to discharge treated wastewater to land

20. This consent will have a term of fifteen years from the date this consent commences.

21. The discharge shall only be of treated wastewater from the BTSP taken from the outlet of Pond 6, or from any point between Pond 6 and the outlet of Pond 10.

22. The discharge of wastewater to land shall be via drip irrigation or spray irrigation in the areas shown on Plan Consent No A. Only surface or subsurface drip irrigation shall be used within 25 metres of the site boundary and public walking tracks, except that on the western boundary adjoining neighbouring land, only surface or subsurface drip irrigation shall be used within 80 metres of the site boundary. For all other areas of the site, spray irrigation may be used.

23. The treated wastewater shall only be applied to the land using a deficit irrigation management regime. Deficit irrigation is defined as irrigation of a depth of wastewater that does not exceed the soil moisture deficit at the time of application. The soil moisture deficit shall be calculated in accordance with the Wastewater Irrigation Management Plan (IMP). The Consent Holder shall maintain records of rainfall and evapotranspiration that shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request and which must be summarised in the AMR required by Condition 7.

24. The following net Nitrogen Loading Limits shall be observed:
    a) The maximum annual application of nitrogen shall not exceed a net loading of 200 kilograms of nitrogen per hectare per year.
    b) Monthly applications shall not exceed a net loading of 50 kilograms of nitrogen per hectare.
    c) Net loadings shall be calculated by taking into account the amounts of nitrogen contained in the pasture removed from the Irrigation Areas 1-3 of the site.

25. Spray irrigation shall not commence within 150 metres of adjacent property boundaries until the buffer planting required by the Buffer Planting Plan has grown to a height of at least 2 metres.

26. Spray irrigation of wastewater shall not occur within 10 metres of flowing surface water. Drip irrigation of wastewater shall not occur within 3 metres of flowing surface water.

27. Records shall be maintained of: the area of land used in each discharge event; the date, time and duration of the event; the wind speed and direction; and the wastewater application rate and dry matter quantities removed from specific areas and associated nitrogen content. A copy of these records shall be made available to

the Manager, Regulatory Department, Marlborough District Council, on request. A summary of this data shall be provided in the AMR required by Condition 7.

28. Groundwater shall be sampled monthly for a minimum of six months prior to commissioning of the irrigation system. Groundwater shall be sampled from the wells shown on Plan Consent No B in Appendix 1 to these conditions of consent. The samples shall be analysed for:

    a) Ammoniacal nitrogen.
    b) Nitrate nitrogen.
    c) Conductivity.
    d) *E-coli.*

    The water level in each bore shall be measured and recorded at the time the sample is taken.

29. Groundwater shall be sampled monthly while irrigation is occurring in each area identified in Plan Consent No A in Appendix 1 to these conditions of consent, except that if irrigation has occurred for less than 14 days in the previous month no sampling is required. For each Irrigation Area, the wells identified within that area shown on Plan Consent No B attached in Appendix 1 to these conditions of consent, shall be sampled. The samples shall be analysed for:

    a) Ammoniacal nitrogen.
    b) Nitrate nitrogen.
    c) Conductivity.
    d) *E-coli.*

    The water level in each bore shall be measured and recorded at the time the sample is taken.

30. The groundwater level in the wells shown on Plan Consent No B attached in Appendix 1 to these conditions of consent shall be monitored prior to wastewater irrigation commencing and at least fortnightly thereafter while irrigation is occurring. If the groundwater level measured in any monitoring well, for a particular irrigation area, is closer than 0.3 metres from the ground surface, irrigation shall cease in that area. Irrigation shall not recommence until the groundwater level is greater than 0.3 metres below the ground surface.

31. The potable water in well P28/4446 and one well on Lot 2 DP12207 shall be monitored as follows:

    a) A sample of water shall be taken from well P28/4446, within 30 days of wastewater irrigation commencing in Area 3 south of Hardings Road or Area 1 north of Hardings Road.
    b) A sample of water shall be taken from one potable supply well on Lot 2 DP12207, within 30 days of wastewater irrigation commencing in Area 1 north of Hardings Road.
    c) Sampling of both wells shall continue at monthly intervals during the wastewater irrigation season with a final sample being taken no later than 30 days after wastewater irrigation ceases each season.
    d) Samplying shall continue for a period of 5 years after wastewater irrigation commences. If *E.coli* are detected then the sampling shall continue for a further 5 years from that time.
    e) The samples shall be tested for *E.coli.* If *E.coli* are detected:

(i) The Consent Holder shall immediately advise the well owner and the Manager, Regulatory Department, Marlborough District Council. A further sample shall be taken and tested for *E.coli* within 5 working days.

(ii) The Consent Holder shall undertake an investigation into the likely causes of contamination and any measures recommended to avoid further contamination. Within 14 days of the first sample the Consent Holder shall provide a written report on the investigation to the well owner and the Manager, Regulatory Department, Marlborough District Council.

32 Prior to commencing the discharge;

a) A weather station shall be installed at the office building shown on Plan Consent No B attached in Appendix 1 to these conditions of consent. The weather station shall measure and record windspeed and direction and rainfall and have sufficient instrumentation to allow the calculation of evapotranspiration. The wind speed and direction recorded at the weather station shall be deemed to represent the wind speed and direction for Irrigation Area 1.

b) An anemometer and wind vane shall be installed at each of the two locations shown on Plan Consent No B attached in Appendix 1 to these conditions of consent. The anemometers and wind vanes shall measure and record wind speed and direction. The wind speed and direction recorded shall be deemed to represent the wind speed and direction for Irrigation Areas 2 and 3 respectively.

c) The weather station, anemometers and wind vanes shall be maintained in an operational condition throughout the term of this consent.

33. Spray irrigation shall cease within 150 metres of the adjacent property boundaries as shown on Plan Consent No B attached in Appendix 1 to these conditions of consent for each Irrigation Area when the wind speed exceeds 15 kilometres per hour (as an average over 15 minutes) in the direction of the adjacent property boundaries as recorded at the respective weather recording device for that Irrigation Area. Drip irrigation may continue in such circumstances.

34. Treated wastewater shall only be applied to land at a rate such that ponding for a period greater than 12 hours does not occur.

35. The Consent Holder shall maintain a register of any complaints received relating to any aspect of the land discharge system. The record shall include the date and time of complaint, cause of the complaint, weather conditions at the time of complaint and action taken in response to the complaint. The register shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of complaints received by the consent holder shall be included in the AMR required by Condition 7.

36 For the duration of these consents, the Consent Holder shall install and maintain appropriate signage on any access points to the BSTP warning that partially treated wastewater is discharged to the land. Written confirmation of the signage wording, size and placement shall be provided to the Manager, Regulatory Department, Marlborough District Council, within three months of the commencement of this consent.

D. Applicable to Discharge Consent to discharge seepage from treatment ponds, wetlands, sludge ponds and drying beds.

37. The discharge the subject of this consent is limited to discharge from the base of the treatment ponds, the base of the wetlands and the base of the sludge ponds and drying beds.

38. The discharge shall only be exercised to the extent that it does not cause flooding or ponding on adjoining ground surfaces.

E. Applicable to Discharge Consent to discharge odour to air from treatment ponds, wetlands, sludge ponds and drying beds and from the land used for the disposal of treated wastewater.

39. The Consent Holder shall take all practicable steps to minimise the potential for generation of objectionable or offensive odour that causes an adverse effect at the legal boundary of any property adjoining the consent site.

40. For the purpose of monitoring compliance with Condition 39, an objectionable or offensive odour that causes an adverse effect is considered to have occurred if the Manager, Regulatory Department, Marlborough District Council, deems it so, applying the FIDOL (frequency, intensity, duration, offensiveness and location) criteria as set out in the Good Practice Guide for Assessing and Managing Odour in New Zealand (Ministry for Environment, 2003).

41. The Consent Holder shall respond as quickly as practicable to any complaints about odour and shall take all practicable measures to minimise the odour and prevent reoccurrence.

42. Any complaints received in regard to odour shall be recorded in a Complaints Register specifying the complaint, time and date, weather conditions and action required. A copy of the complaints shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of these complaints shall be part of the AMR required by Condition 7 of these Conditions of Consent.

43. Should an event occur which results in an objectionable or offensive odour at the boundary of any property, the Manager, Regulatory Department, Marlborough District Council, may request the Consent Holder to provide a written report within 15 days of the request being made, specifying:

    a) The cause or likely cause of the event and any factors which influenced its severity.

    b) The nature and timing of any measures implemented by the consent holder to avoid, remedy or mitigate any adverse effects.

    c) The steps to be taken, if any, in the future to prevent a recurrence of similar events.

44. The Consent Holder shall measure the Dissolved Oxygen (DO) concentrations in the wastewater near the outlet of Ponds 2A, 2B, 2C, 6 and 10 every Wednesday, except when a Wednesday falls on a public holiday, when the measurement shall be taken on the nearest following working day. The DO concentration shall be measured between 11am and 2pm and shall not be less than 2 grams of DO per cubic metre, on a rolling 10 percentile weekly measurement basis.

45. The DO of the wastewater in Ponds I1 and I2 shall be measured daily between 11am and 2pm during peak loading periods associated with the annual vintage, with DO concentrations maintained at not less than 0.5 grams per cubic metre on a 50 percentile basis. The time of the peak loading periods shall be determined by consultation between the Consent Holder and the Manager, Regulatory Department, Marlborough District Council. The results of the measurements shall be included in the AMR required by Condition 7.

F. Applicable to Discharge Consent to discharge treated wastewater to the Opawa River.

46. This consent shall have a term of three years from the date the consent commences.

47. The conditions of consent U961050.6 as shown in Appendix 2 to these conditions of consent will remain in force and will apply to this consent until the wetland is established and the new outfall pipeline is completed so that the Opawa outfall is able to be decommissioned.

G. Applicable to Coastal Permit to:

a) use and maintain an existing outfall pipeline and a new outfall pipeline in the Coastal Marine Area of the Wairau Estuary

b) occupy space in the Coastal Marine Area of the Wairau Estuary with an existing outfall pipeline and a new outfall pipeline

c) discharge treated wastewater to the Wairau Estuary that has passed through a wetland (Pond 10)

Advice Note: *This coastal Permit does not authorise the discharge of wastewater from the existing outfall pipeline where that wastewater has not passed through the new wetland (Pond 10). That discharge is authorised under existing discharge consent U950167.1 which expires on 1 October 2011.*

48. This consent shall have a term of fifteen years from the date that it commences.

49 The outfall pipelines shall be located in general accordance with Plan Consent No C attached in Appendix 1 to these conditions of consent with the outlets at about NZMG E 2,598,349 NZMG N 5,966,313.

50. The outfall pipelines shall be maintained in an operational condition at all times.

51. The Consent Holder shall undertake annual external visual inspections of the outfall pipeline structures for the duration of the consent. A report shall be submitted to the Manager, Regulatory Department, Marlborough District Council, within 20 working days of the inspection being carried out. The report shall include but not be limited to:

a) The date and time of the inspection.

b) The condition of the outfall structures.

c) Any maintenance work that may be required, and if it is required, when the work will be carried out.

52. Should the report required by Condition 51 identify the requirement for maintenance, confirmation of the completion of the works shall be forwarded to the Manager, Regulatory Department, Marlborough District Council, within twenty working days of the completion of the works.

53. The outfall pipelines shall not interfere with any public right of navigation.

54. The existing buoy marking the location of the end of the existing outfall shall be marked with the words *Sewer Outfall* and the lettering used shall be bold and clear such that it can easily be read from a distance of 10 metres.

55. The total discharge of treated wastewater authorised by this consent shall not exceed an average daily volume of 28,500 cubic metres, where the average volume is calculated on a continuous basis over a period of 365 consecutive days. The maximum discharge volume per day shall not exceed 103,680 cubic metres.

56. The Consent Holder shall install flow measuring devices after the outlet from wetland Pond 10 and Pond 6 (as shown on Plan Consent No C attached in Appendix 1 to these conditions of consent) and record the daily volume of treated wastewater discharged to the Wairau Estuary. A copy of these records shall be made available to the Manager, Regulatory Department, Marlborough District Council, on request. A summary of this data shall be provided in the AMR required by Condition 7.

57. The discharge of treated wastewater shall generally take place over a four hour period, commencing one hour after high tide, except that longer discharge periods may be used after a prolonged wet weather event when peak wastewater flows and/or high rainfall cause the storage capacity of the ponds/wetland to be exceeded.

58. The proposed mixing zone for the discharge to the Wairau Estuary shall be as shown on Plan No D in Appendix 1 to these conditions of consent.

59. The discharge of treated wastewater from the upgraded BSTP shall not cause any of the following effects outside the mixing zone described in Condition 58 above:
    a) The natural temperature of the receiving water to change by more than 3 degrees Celsius;
    b) Any conspicuous change in colour or clarity of the receiving water such that visual clarity of water is reduced by more than 50% as per the Water Quality Guidelines No 2 Ministry for the Environment (1994);
    c) The concentration of dissolved oxygen of the receiving water to fall below 80 percent of the saturation content.

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

Wastewater Monitoring

61. The Consent Holder shall take grab samples of treated wastewater at the outlet of Pond 10 following commissioning of the new wetland. Samples shall be analysed for the parameters and frequency shown in Table 1. The results shall be reported in the AMP required by Condition 7.

62. The treated wastewater sampled under Condition 61 shall comply on an annual basis with the ammonical nitrogen and faecal coliform limits listed in Table 2.

Table 1: Monitoring Parameters

Parameter	Unit	Frequency of Analysis
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	g/m^3	Monthly
Suspended Solids (SS)	g/m^3	Monthly
Faecal Coliforms and Enterococci	cfu/100ml	Monthly
Ammoniacal Nitrogen (NH_3-N)	g/m^3	Monthly
Total Nitrogen (TN)	g/m^3	Monthly
Dissolved Inorganic Nitrogen (DIN)	g/m^3	Monthly
Dissolved Reactive Phosphorus (DRP)	g/m^3	Monthly
Total Phosphorus (TP)	g/m^3	Monthly
pH	pH units	Monthly
Temperature	°Celsius	Monthly
Metals/metalloids: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc	g/m^3	Annually

Table 2: Wastewater Limits

Parameter	Unit	Median		90 Percentile	
		Estimated Existing Flow	Future Design Flow	Estimated Existing Flow	Future Design Flow
Ammoniacal Nitrogen (NH_3-N)	g/m^3	30	15	40	20
Faecal coliforms	cfu/100 ml	700	350	2150	1075

Advice Note: *The future design flows are an average daily volume of 28,500 cubic metres and to meet the limits the initial dilution has been calculated as 25:1. When lower flows are being discharged, the wastewater concentration limits can be increased after discharge based on a back calculation from the assessed initial dilution. The Cawthron Institute (Technical Report on Effects of Outfall Discharge in Appendix D of Assessment of Effects for Upgrading of Blenheim Sewage Treatment Plant, September 2007) has determined that an initial dilution of 50:1 can be achieved at an average daily volume of 14,250 cubic metres (estimated existing flow).*

Table 3: Benthic Survey Parameters

Station Location			Replicates per Station		
Station Code	**NZMG E (m)**	**NMG N (m)**	**Infauna**	**Sediment Chemistry**	**Shellfish**
OF P	2,598,336	5,966,320	3	4	1[a]
25DS P	2,598,350	5,966,340	3	4	1
50DS P	2,598,357	5,966,361	3	4	1
100DS P	2,598,404	5,966,466	3	4	1
200DS P	2,598,476	5,966,466	3	4	1
300DS P	2,598,539	5,966,546	3	4	1
OF O	2,598,326	5,966,314	3	4	1[a]
25DS O	2,598,353	5,966,301	3	4	1
50DS O	2,598,335	5,966,368	3	4	1
100DS O	2,598,361	5,966,417	3	4	1
200DS O	2,598,434	5,966,500	3	4	1
300DS O	2,598,496	5,966,582	3	4	1[a]

Key:

OF Outfall
DS Downstream
P Plume
O Outside (of the plume)

a No target species of shellfish found at this station during 2006 survey

Receiving Environment Monitoring

63. The Consent Holder shall carry out benthic surveys and water quality monitoring in the receiving environment to identify changes (notably adverse ecological impacts), as a result of the treated wastewater discharge. The survey design shall be consistent with the survey conducted by the Cawthron Institute (Technical Report on Effects of Outfall Discharge in Appendix D of Assessment of Environmental Effects for Upgrading of Blenheim Sewerage Treatment Plant, September 2007).

Benthic Survey

64. A benthic survey shall be carried out in accordance with the station designation, locations, and replication as set out in Table 3:
    a) Within two years of commissioning the new outfall pipeline, but not less than 12 months after commissioning.
    b) Within four years of commissioning the new outfall pipeline, but not less than three years after commissioning.
    c) Thereafter at five yearly intervals.

65. Twelve stations (six pairs, located both inside and outside the wastewater plume) shall be sampled at discreet distances (i.e. <5m, 25m, 50m, 100m, 200m and 300m) downstream from the discharge.
    a) Infauna shall be collected via 13 cm diameter cores (approx 10 cm depth) and samples shall be processed using a 0.5 mm sieve with taxa collected counted and identified to the lowest practicable taxonomic level.
    b) Sediment samples shall be collected via 6 cm (minimum) diameter cores manually driven into the benthic sediments to a depth of 10-15 cm. The colour and the visible presence/absence of any anoxic patches or layers within the cores shall be recorded. One of the four replicate cores per station shall be split and photographed to provide a permanent visual record. The top 5 cm of the remaining three cores shall be sub-sampled for analysis of the following:
        i) Sediment texture – particle grain size distribution
        ii) Organic content (total organic carbon or ash-free dry weight)
        iii) Metals/Metalloids – arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), and zinc (Zn)

66. Where present, 15-20 shellfish of the target species *Paphies austral* (pipi) shall be collected and composite tissue samples analysed for faecal coliforms and trace metals/metalloids (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn).

Water Quality

67. At the same time as the seabed surveys, near surface (within 1m) and near-bottom (within 1m) water quality samples shall be taken at the following sites during the ebb tide discharge: 300-550 metres upstream of the discharge; at the downstream edge of the mixing zone (300 metres downstream of the discharge) and at the bar entrance (500-600 metres downstream).

68. The water quality at each site shall be visually assessed for:
    a) Scums, foams and other floatable material
    b) Conspicuous changes in colour or clarity

69. Water quality samples shall be taken and tested for the following:

a) Presence of any objectionable odour

b) Biochemical oxygen demand (BOD), total suspended solids (TSS), faecal coliforms, Enterococci, and trace metals/metalloids (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn).

c) Nutrients (Total-N, Ammonical-N, Dissolved reactive phosphorus)

d) Standard hydrological parameters (pH, temperature, dissolved oxygen, salinity and turbidity)

70. The Consent Holder shall forward a record of the outcomes of Conditions 63 to 69 to the Manager, Regulatory Department, Marlborough District Council, within one month of the analysis of the monitoring being completed.

Iwi Liaison

71. The Consent Holder shall make a senior Marlborough District Council representative available to meet with Ngati Toa, Ngati Rarua and Rangitane at six monthly intervals throughout the duration of the consent, to review treatment plant performance, including the results of any monitoring.

Changes/Modifications

72. Any changes in the scope, frequency or timing of the monitoring programme identified as being necessary by the Consent Authority shall be addressed in the course of any review of conditions initiated by the Consent Authority under Section 128 of the RMA, as contemplated by Condition 13.

Appendix 1

Plan Consent No A
Plan Consent No B
Plan Consent No C
Plan Consent No D

MARLBOROUGH DISTRICT COUNCIL

PLAN CONSENT NO A

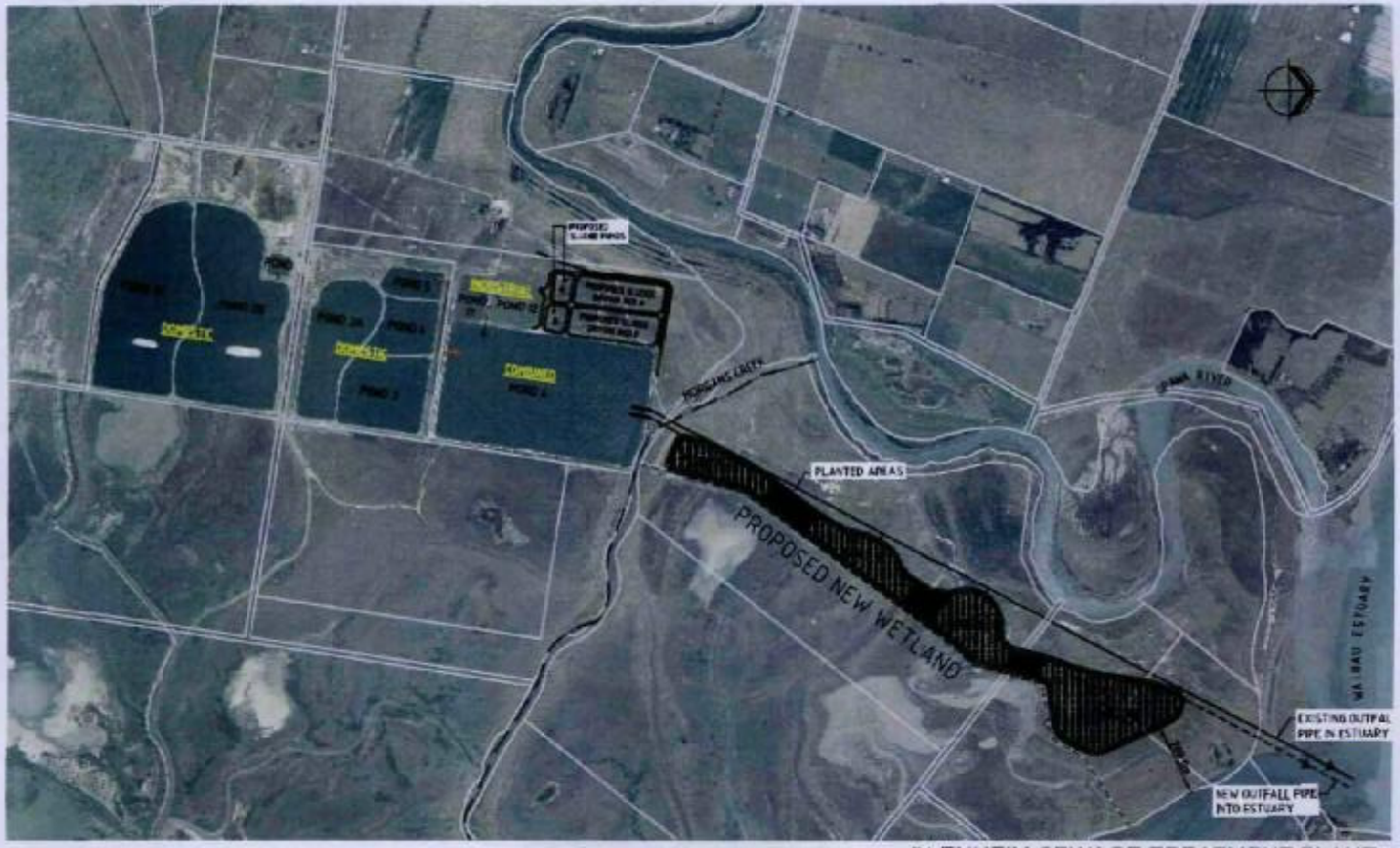
PATTLE DELAMORE PARTNERS LTD

MARLBOROUGH DISTRICT COUNCIL

PLAN CONSENT NO B

PATTLE DELAMORE PARTNERS LTD

PLAN CONSENT NO. C

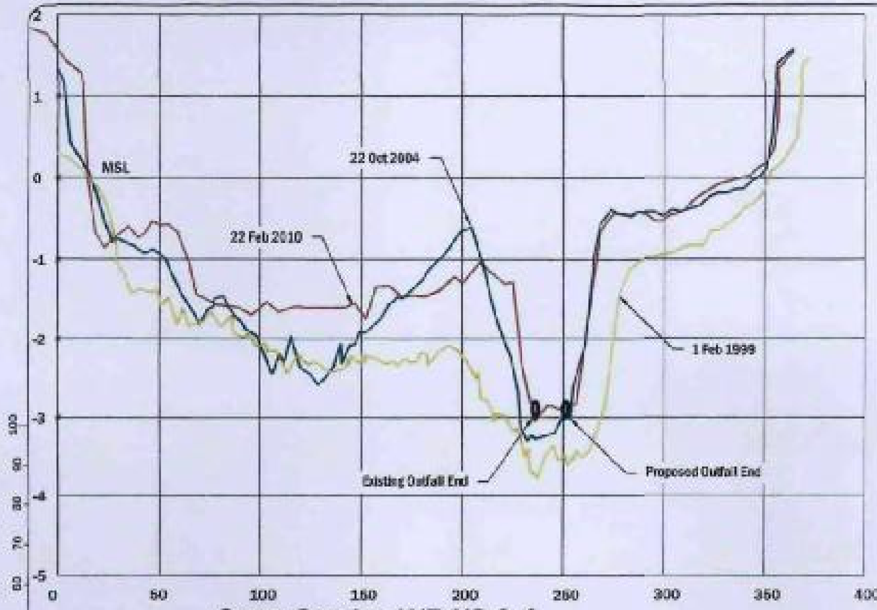


0 200 400 600m

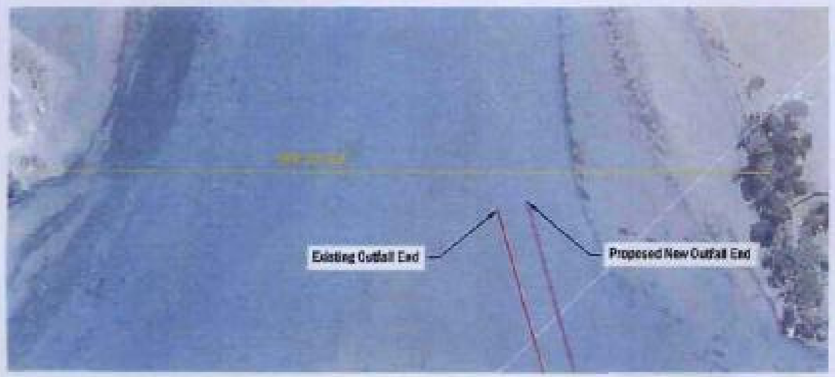
RESOURCE CONSENT NOT FOR CONSTRUCTION

BLENHEIM SEWAGE TREATMENT PLANT
UPGRADING CONCEPT PLAN

5613042
5613042-C-K02



Cross Section WR XS 0.4



Plan : Cross Section WR XS 0.4 Scale 1:2000

Plan : Zone of Reasonable Mixing

Scale 1:4000

Station Code	NZMG E	NZMG N
OFP	2,598,349	5,966,313
25D SP	2,598,367	5,966,331
50D SP	2,598,384	5,966,349
100D SP	2,598,418	5,966,386
200D SP	2,598,460	5,966,462
300D SP	2,598,538	5,966,546
OFO	2,598,308	5,966,346
25D SO	2,598,324	5,966,365
50D SO	2,598,339	5,966,385
100D SO	2,598,370	5,966,424
200D SO	2,598,434	5,966,500
300D SO	2,598,486	5,966,582

MARLBOROUGH DISTRICT COUNCIL
SEYMOUR SQUARE, P.O. BOX 443
BLENHEIM 7240, NEW ZEALAND
TEL: (03) 520-7400, FAX: (03) 520-7496

Blenheim Sewerage
BSTP
Wairau Estuary Outfall and Cross Section

A 31/5/10 For Resource Consent

A3 As Shown 2/604

Plan Consent No. D

B

Appendix B – Annual Inspection of the MDC Wairau Bar Effluent Pipeline

Marine Services NZ Limited
Specialists in Screw Anchors, Moorings, Jetties & Construction Diving

Annual Inspection of the NEW MDC Wairau Bar Effluent Pipeline

14TH February 2019 **ON: WWTP Wo-04560Rad**

- **Marker buoy condition – buoy is in good condition just gave it a good clean**
- **Anode condition…… 95% good condition**
- **Signage condition…… Good condition**
- **Coating & chain condition… Chain in good condition, shackles moussed with stainless wire**
- **Discharge Nozzle condition… See photos but everything did feel right by the diver**
- **Seabed condition surrounding nozzle – nozzle is in a sand crater that the discharge keeps open – surrounded by sand and sticks**
- **Pipe condition…feels to be in good condition, zero visibility but tried photos instead**
- **Establish length of pipe not covered by seabed material – just the very end of the pipe maybe 500mm**
- **Material entangled around the pipe support:** Yes/No **only the top of the first support is exposed**

- **What sort of entanglement…** **Sand and sticks**

Please advise on any major repairs required:

No real problems with the new pipeline

……

……

……

buoy Marker anchor point on pipeline.

Chain links in buoy Marker

bolt on end flang

bolt on end flang

bolt on flang

shackle & S/S mousing.

anode

Marine growth on inside of pipe line.

C

Appendix C – Benthic Survey

D

Appendix D – Nitrogen Load to Land

Irrigation Area	Total Annual Nitrogen Load per Area (kg/ha)		
	2016/17	2017/18	2018/19
DLA-01	41.1	54.6	132.8
DLA-02	94.7	101.0	224.8
DLA-03	53.0	58.6	129.9
DLA-04	51.6	68.0	79.6
DLA-05	55.8	72.5	85.3
DLA-06	73.7	82.5	117.9
DLA-07	16.8	97.1	0.0
KLA-01 Nth	7.8	10.7	5.6
KLA-01 Sth	12.7	37.3	103.4
KLA-02 Nth	2.5	20.4	6.4
KLA-02 Sth	39.3	20.5	128.8
KLA-03 Nth	35.5	28.8	76.9
KLA-03 Sth	11.6	15.3	0.0
KLA-04 Nth	6.3	28.5	91.6
KLA-04 Sth	40.8	21.9	0.0
KLA-05	26.6	24.9	57.7
KLA-06 Nth	18.6	24.9	22.3
KLA-06 Sth	24.1	14.6	98.0
KLA-07	24.5	23.5	50.9
KLA-08 Nth	30.4	25.5	0.0
KLA-08 Sth	7.6	15.5	26.1
KLA-09 Nth	13.2	25.6	24.5
KLA-09 Sth	20.7	17.5	0.1
KLA-10 Nth	26.2	14.8	14.5
KLA-10 Sth	10.7	27.5	75.4
KLA-11 Nth	4.9	19.9	0.2
KLA-11 Sth	27.3	17.2	26.9
KLA-12 East	9.9	4.2	0.0
KLA-12 West	15.6	22.6	50.1
KLA-13 East	11.2	31.2	55.6
KLA-13 West	26.5	0.6	17.1
KLA-14	32.1	33.2	39.4