



Blenheim Sewage Treatment Plant Consent Compliance Report - July 2021 to June 2022

Consent U077181

Prepared for Marlborough District Council
Prepared by Beca Limited



19 August 2022



Revision History

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A	Shamus Jenner	Draft for Client Review	15/08/2022
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Action	Name	Signed	Date
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Appendix A – Consent U071181

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Consent Compliance Summary

Condition	Number and Requirement	Observation	Compliance
7	Submission of an Annual Monitoring Report.	This report fulfils this requirement.	Met
7.1b	Discussion of operational difficulties	Pond I2 aeration not fully operational during Vintage 2022.	Met
7.1d	An identification of any maintenance works needed, proposed or undertaken to ensure compliance with these Conditions of Consent.	Identification of maintenance works required for old outfall pipe.	Met
7.2	Recording of volume of treated wastewater applied to areas 1-3.	96,994 m ³ was discharged to Areas 1-3 between February and March 2022.	Met
7.3a	Discharge of odour complaint, identification and discussion	One complaint, recorded and addressed in line with requirements	Met
7.5	A record of maintenance works of new and existing outfall pipelines	Annual inspection completed. Buoy chain replaced, anodes replaced, outfall end cleaned, jammed log removed.	Met
24	Maximum application of 200kg/ha/yr and maximum monthly application of 50kg/ha.	Not exceeded.	Met
29	Monthly groundwater monitoring for ammoniacal nitrogen, nitrate nitrogen, conductivity and <i>E. coli</i> during irrigation.	Ground water monitored monthly from December 2021 to April 2022.	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.	Measurements taken within stipulated time frame; ground water level not less than 0.8m below ground level.	Met
32	Installation and maintenance of weather station and anemometer/wind vane at the two locations specified by the consent.	New weather station and anemometer/wind vane installed during previous monitoring period.	Met
33	Spray irrigation boundary restrictions	Condition complied with.	Met
34	Treated wastewater shall only be applied to land at a rate that ponding does not occur	No ponding visible.	Met
35	Register of complaints received relating to land discharge system.	No complaints in relation to the discharge of wastewater to land.	Met
36	Installation and maintenance of signage on any access points to the BSTP.	Signage installed and maintained as required.	Met

38	The discharge shall be only exercised to the extent that it does not cause flooding or ponding on adjoining ground surfaces.	No ponding occurred as a result of irrigation.	Met
42	Register of complaints received relating to odour.	Register recorded 08/04/2022 complaint regarding pond odour.	Met
43	Should objectionable odour occur, MDC may request consent holder to provide a written report with 15 days of request being made.	No report requested by MDC.	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 shall not be less than 2g/m ³ on a rolling 10 percentile weekly measurement basis.	Weekly DO measurements carried out at pond and wetland outlets, 99% of samples were taken within the stipulated timeframe. All DO concentrations were above 2g/m ³ consent limit.	Met
45	Daily measurement of DO in Ponds I1 and I2 during peak loading periods associated with annual vintage. DO concentrations shall be greater than 0.5 g/m ³ on a 50 th percentile basis.	All conditions satisfied except for Pond I2 DO concentrations, which were not met due to insufficient aeration during Vintage 2022, caused by upgrades to the pond.	Partially met
51	Annual external visual inspections of outfall pipeline structures. A report documenting findings shall be submitted to the Marlborough District Council.	Outfall inspection carried out in April 2022. Remedial works have been carried out.	Met
52	Confirmation of outfall maintenance works shall be made to MDC within 20 working days of completion.	Condition met.	Met
53	The outfall pipelines shall not interfere with any public right of navigation.	The pipeline does not interfere with any public right of navigation.	Met
54	Marking of buoy at end of existing outfall with the words "Sewer Outfall"	Buoy marking complies.	Met
55	Discharge volumes of daily treated wastewater to the Wairau Estuary shall not exceed 20,248 m ³ /day, averaged over a continuous period of 365 days. Maximum daily discharge volume of 46,625 m ³ /day.	Average and maximum daily discharges were within the consent limits.	Met
56	Installation of flow measuring devices at the outlet from Ponds 6 and 14, which will record daily volumes of treated wastewater.	Flow measuring devices installed as required. Additional meter installed at the outlet to Pond 6 to record wastewater flow to irrigation areas. Flow data collected over this monitoring period can be found in Appendix E .	Met

59	Discharge of treated wastewater should not cause outfall effects to be observed outside of the mixing zone.	There was no conspicuous colour or clarity observations noted during the 2021/2022 monitoring period.	Met
60	There shall be no undesirable biological growths as a result of the discharge	No undesirable biological growths were observed.	Met
61	Monthly sampling of treated wastewater at the outlet of Pond 14. Annual sampling of metals/metalloids.	Sampling carried out at required frequency. Samples were analysed for all required parameters.	Met
62	Ammoniacal nitrogen and faecal coliform limits for Pond 10 outlet samples.	90 th percentile faecal coliform concentration at Pond 14 (wetlands outlet) was 28,000 cfu/100mL, which exceeded the limit of 2,150cfu/100mL. Other limits were achieved.	Partially met
63 – 70	Benthic survey and water quality monitoring in receiving environment.	Benthic survey was not required this monitoring year.	Met
71	A senior MDC representative shall be available to meet with iwi representatives at 6 monthly intervals.	An appointed senior MDC representative has been made available for iwi liaison. No specific requests were issued in this compliance year.	Met

1 Introduction

1.1 Overview

The Blenheim Sewage Treatment Plant (BSTP), located on Hardings Road, Blenheim, treats domestic (from residential and commercial properties) and industrial wastewater (predominantly from wineries) from the Blenheim area. Wastewater is treated in a series of ponds before being discharged to the Wairau Estuary during the ebb tide, via an approximately 2km long constructed conveyance wetland. Marlborough District Council (MDC or “Council”) operate the BSTP and is the holder of Consent U071181 (see **Appendix A**).

Consent U071181, which commenced on 4 October 2010, contains a number of individual land use consents, discharge permits and coastal permits relating to the various activities at the STP. Condition 2 of the General Conditions notes that unless an alternative term is identified in the Specific Conditions, the consents have a term of 35 years from the date of commencement. Special Condition 20, which, relates to the discharge to land, and Special Condition 48, which relates to the discharge to the Estuary, provide for a term of 15 years. On this basis, the terms of these two discharge activities will expire on 5 October 2025.

1.2 Background and Consents

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, Council 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.

The consents granted in late 2010 included further upgrading of the BSTP. This upgrading (which was 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 conveyance wetland system also 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 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, the higher organically loaded wastewater in 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 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 (offtake from Pond 6), 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.

1.3 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 2021 to 30 June 2022.

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

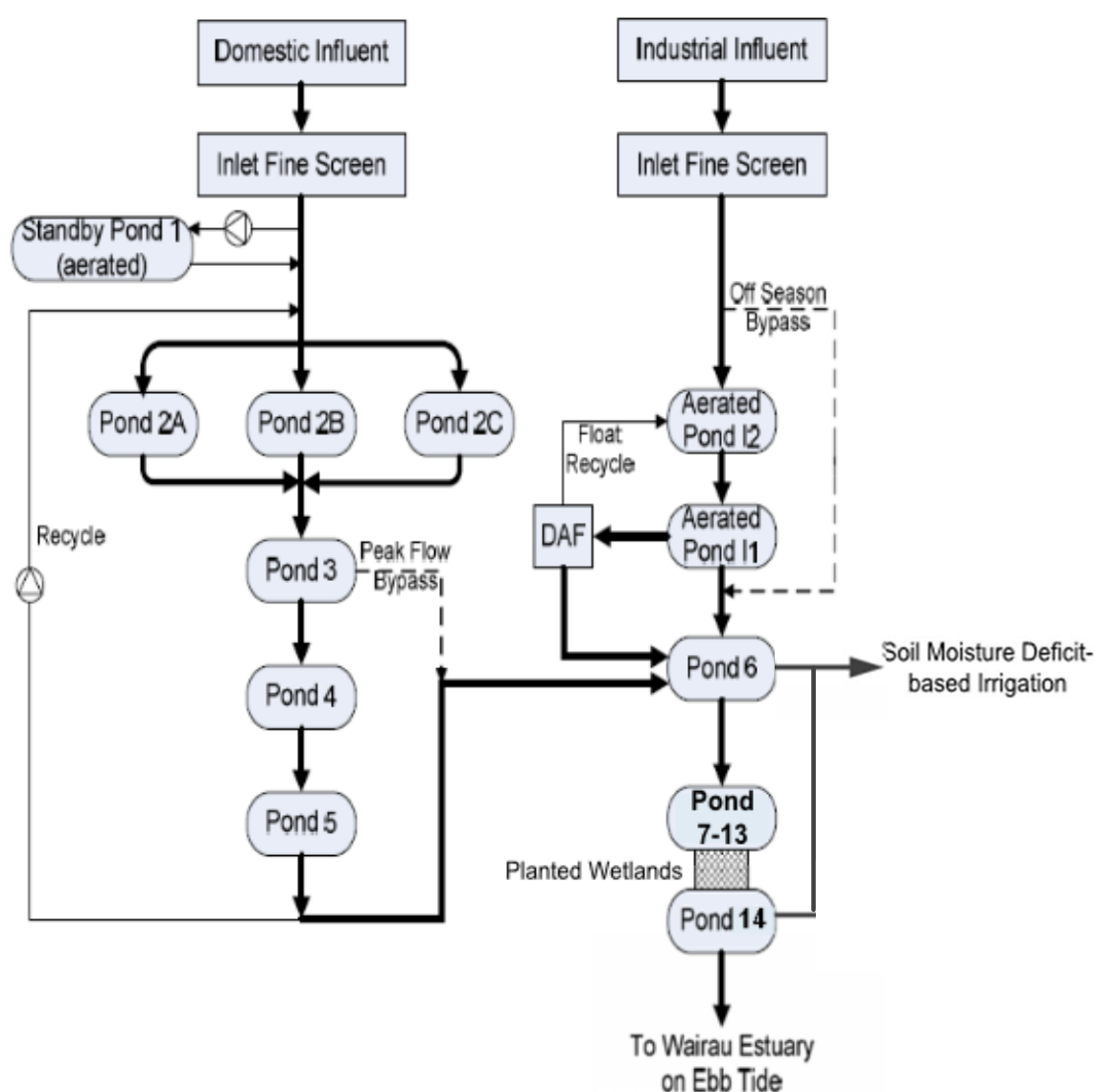


Figure 1-1 Blenheim STP process flow schematic (post - February 2014)

2 Compliance with Consent U071181

2.1 Consent Purpose

Consent U071181 authorises discharges from the BSTP treatment ponds to land, air, and water (the Wairau Estuary). Only those conditions that have numerical or qualitative monitoring requirements are assessed in this report. It is noted from the previous monitoring report that Condition 31 will no longer be assessed on an annual basis. This has been excluded as groundwater testing is no longer required in wells P28/446 and Lot 2 DP 12207 after completion of testing for five consecutive years, as required by the Consent.

For clarity, consent conditions are quoted in italics, with other commentary in normal font. Appendix references in italics refer to the appendices in the consent document. Appendix references not in italics refer to appendices in this report.

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.

It has been noted that the effluent faecal coliform 90th percentile limit at the Pond 14 (wetlands outlet) has been exceeded for the 2019/2020, 2020/2021 and 2021/2022 monitoring periods, and therefore requires investigation and possible remediation to be compliant with the Conditions of Consent. This issue is discussed further in Section 2.5.8

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

Outfall Sandbar Dredging Project (June – August 2021)

There are two outfall pipes installed in the Wairau River Estuary that take treated wastewater from Pond 14. The second pipe was installed in 2014. Since the 2016 earthquakes, sediment deposition in the river has accelerated the formation of a sandbar in close proximity to the ends of these pipes. One pipe was completely blocked and the other partially obstructed, and there was a risk that the sandbar could collapse and completely cover the ends of both pipes. A resource consent was granted and in June 2021, a contract

was let to dredge the sandbar in the area of the outfall pipes. The timeframe for completion of dredging under the resource consent was 14th August 2021. Despite being impacted by the record floods of July 17th 2021, the project successfully cleared the outfall pipe discharge area and unblocked the pipes within the required timeframe.

Pond 6 Desludging (February 2021 – Ongoing)

As part of a wider BSTP performance improvement programme, a contract was awarded in February 2021 to dredge, remove and dry accumulated sludge from Pond 6. Pond 6 has an area of approximately 18.5Ha with an estimated 7,200 tonnes of dry solids to be removed. Dredging started in December 2021 and is due for completion in December 2022. Approximately 2,900 tonnes of dry solids had been dredged at 30th June 2022.

Industrial Ponds I1 & I2 and Domestic Pond 1 Aerator Replacement and Upgrade Project (August 2021 – June 2022)

As part of a wider BSTP performance improvement programme, a contract was awarded in August 2021 to upgrade the floating aerators and electrical supply to Industrial Ponds I1 & I2 and to install new aerators in Domestic Pond 1. Due to supply chain delays and installation issues, the industrial pond upgrades were not completed until 10th March 2022, which had flow-on effects for the performance of the industrial ponds during the 2022 vintage period (see Section 2.3.13). The domestic pond aerator installation was completed in June 2022.

Pond Waveband Repairs (August 2021 – March 2022)

Repairs to concrete wavebands on Ponds 2a, 5 and 6 were included in the same contract as the pond aeration replacement and upgrade works. This involved construction of new rock walls over the deteriorating concrete wavebands.

Land Irrigation System/new septage intake

There has also been some work done on the land irrigation system to accommodate the new septage intake system. This includes removal of a small part of one of the irrigation driplines to accommodate work on the new septage intake. The new intake is being installed to make it safer for drivers and as an upgrade to improve existing facilities. An as-built plan is provided in **Appendix B**, which outlines the new layout of the irrigation driplines. Overall, the septage upgrade work results in only a minor reduction in irrigation capacity.

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).

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.

See Section 2.3.8.

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

No particular effects have been noted in the area irrigated with treated wastewater, either positive, neutral or negative (See Section 2.3.1).

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.

A complaint was received on 08/04/2022 by a local resident who complained of a one-off smell from the pond. The local resident also complained they were unhappy with the functioning of the sewer ponds. Operators on site could not detect odour more than 3m from the pond, and it is assumed the odour was generated by a one-off discharge to the industrial ponds from a septic tank truck. No further complaints have been received.

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 regarding the operation of the BSTP and the action(s) taken to address each complaint.

See 7.3a) above.

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 regarding the operation of the BSTP and the action(s) taken to address each complaint.

A complaint was received from a local resident on the 08/04/2022 regarding the operation of the BSTP ponds, which they believed to be responsible for odour. The complaint was investigated by MDC and odour was not detected more than 3m from the ponds. It is believed that the odour source was from a septic tank truck discharging to the ponds. No further complaints have been received.

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 was completed on 5th April 2022. Repairs were completed on 7th and 8th April 2022, including removing a jammed log, replacing the mooring buoy chain and corroded anodes, and cleaning the end of the outfall. A brittle end of pipe identified during the inspection was to be removed but this was not possible due to site conditions during repairs. The need to remove this pipe end will be re-assessed at the next inspection.

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.

Application to land only took place in the months of February and March 2022. 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. In total, a volume of 98,994 m³ was discharged to land, which equates to an overall average application rate of 606 m³/ha.

Table 2-1: Total volume of treated wastewater discharged to each irrigation area (June 2021 – July 2022)

Irrigation Area	Volume of Wastewater Applied (m ³)	Area (ha)	Total application rate (m ³ /ha)
1	16,360	42	390
2	19,528	32	610
3	61,106	86	711

For comparison, in the most recent monitoring year in which treated wastewater from Pond 6 was used for irrigation (2019/2020), a total of 34,054 m³ was discharged across the three irrigation areas. This was a tenfold decrease from the previous year (2018/19), when a total of 316,285 m³ was discharged.

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

No particular effects have been noted in the area irrigated with treated wastewater, either positive, neutral or negative. The conditions of this discharge consent regarding the treated wastewater application rates, net nitrogen loading limits and other contaminant concentrations were put in place to reduce the likelihood of negative effects occurring and appear to be effective so far.

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.

As noted above, treated wastewater from Pond 6 was only irrigated in February and March 2022. 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 from the outlet of Pond 6 during this period.

The February 2022 sample taken from the outlet of Pond 6 contained a nitrogen concentration of 21 g/m³, and the March sample was 15.3 g/m³. The annual total nitrogen load for each irrigation area is shown in

Appendix C.

The gross average annual nitrogen load across all segments (DLA-01 to 06, KLA-01 north & south, KLA-02 north & south, KLA-06 north & south, KLA-14) was 11.4 kg/ha/yr, but not all areas were irrigated over this monitoring period. The average annual nitrogen load for areas which were irrigated was 28.2 kg/ha/yr. As no hay has been removed from the field this year, this is also the net value for the monitoring period.

The average nitrogen application rates on all areas were well below the consent limit of 200kg/ha/yr. Area DLA-06 had the highest total load of 54.1 kg/ha/yr.

The calculated monthly nitrogen application rates did not exceed the limit of 50 kilograms of nitrogen per hectare in any month.

2.3.3 Condition 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 the specific areas 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.

Section 2.3.1 provides the summarised data as required by this condition. A full dataset can be made available by MDC on request.

2.3.4 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.

Irrigation of treated wastewater occurred in February and March 2022. This period is indicated on Figure 2-1 to Figure 2-3 with vertical lines. Groundwater samples were taken at each of the six wells on five occasions, on 20 December 2021, 24 January 2022, 03 February 2022, 07 March 2022 and 04 April 2022. This complies with the monthly sampling requirement during irrigation. All samples were analysed for the required parameters.

Groundwater ammoniacal nitrogen concentrations (Figure 2-1) reached or exceeded 5g/m³ on six occasions over this monitoring period. This has occurred in some previous monitoring periods, but in the most recent past period of irrigation (2018/2019), all ammoniacal nitrogen concentrations in samples collected were below 5 g/m³.

Groundwater electrical conductivities (**Error! Reference source not found.**) remained stable throughout the monitoring period.

Of the 36 samples, 2 had E. coli counts at, or greater than, 300 MPN/100mL and all other samples had E. coli counts below or equal to 100 MPN/100mL (Figure 2-3). The E. coli spikes were detected in bores MSC-055 and 10031. E. coli concentrations in this monitoring period were generally lower compared to previous years, apart from a result of 3000 MPN/100mL in Bore 10031.

The 20th December 2021 samples across all sites had the lowest ammoniacal nitrogen, nitrate nitrogen and E. coli concentrations, as well as the lowest conductivities. E. coli concentrations increased in all bores in the 24th January 2022 round of sampling, with the highest reading of 370 MPN/100mL in bore MSC-055. Irrigation commenced on 2nd February 2022, with the February bore samples collected the next day (3rd February 2022). The February results showed decreases in E. coli concentrations compared with the January results in all bores, except 10031 which recorded a result of 3,700 MPN/100mL. Results in the March and April 2022 samples were similar to those seen in January.

In general, no single bore produced consistently higher contaminant concentration results than the others, indicating that the irrigation effects are not localised. The one exception to this is Bore 10031, which had consistently higher conductivities than the other bores. This is consistent with previous monitoring data and thought to be due to the bore's proximity to the tidally influenced section of the Opawa River.

Historical data from the past five years of monitoring at each bore for each parameter is plotted on Figure 2-4 to Figure 2-8. No obvious trends can be observed from these graphs, indicating relatively stable groundwater quality over the past five years of irrigation.

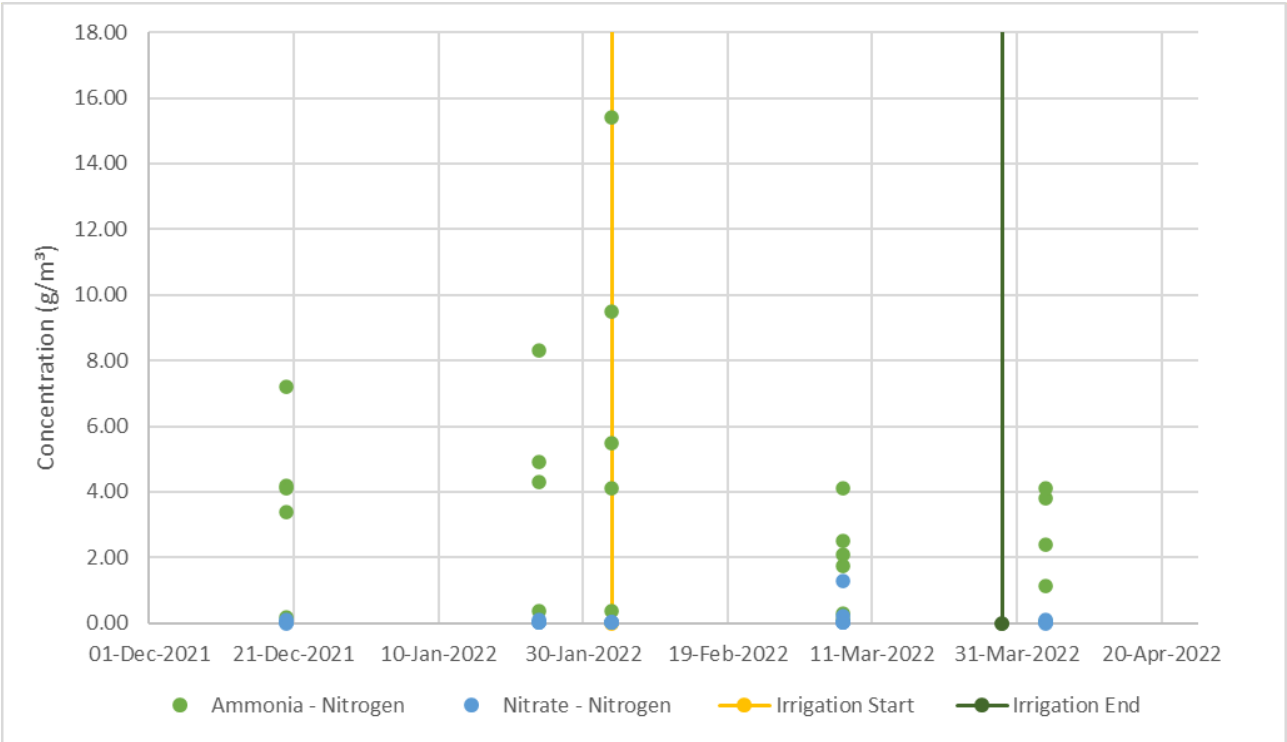


Figure 2-1 Groundwater testing results from six wells – nitrate nitrogen and ammoniacal nitrogen

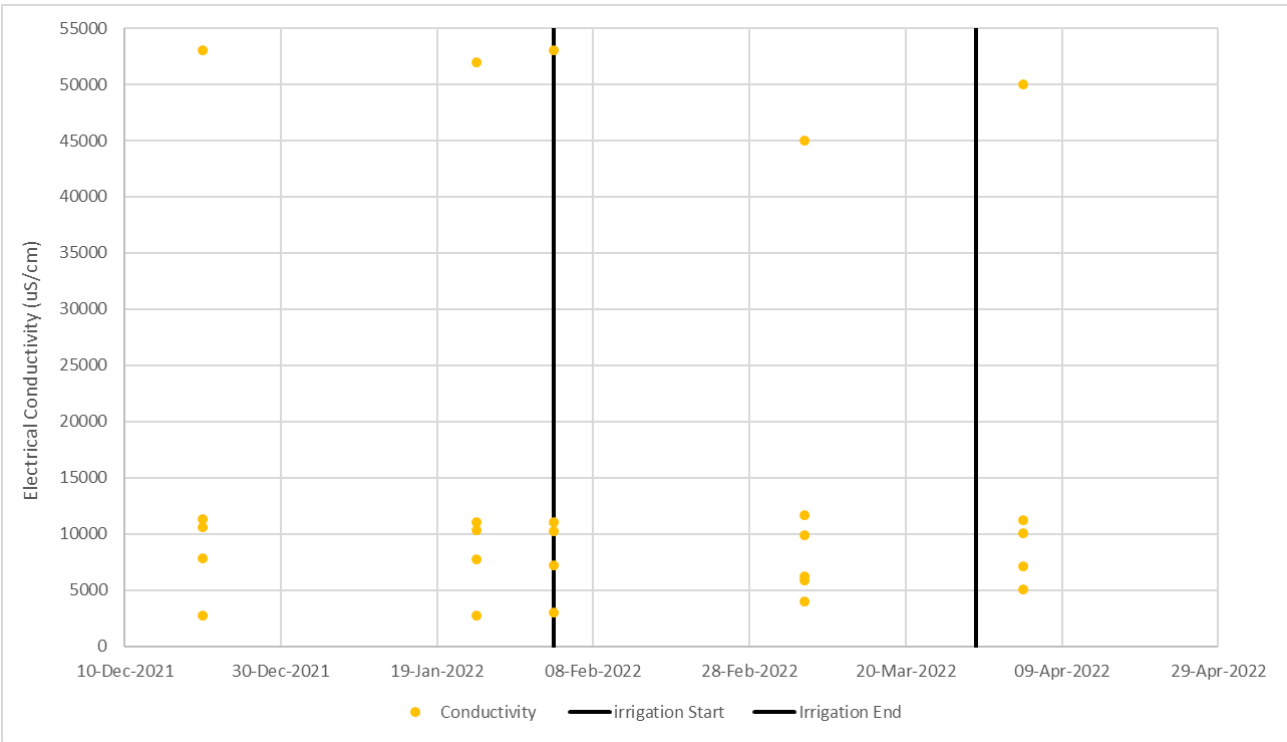


Figure 2-2 Groundwater testing results from six wells – electrical conductivity

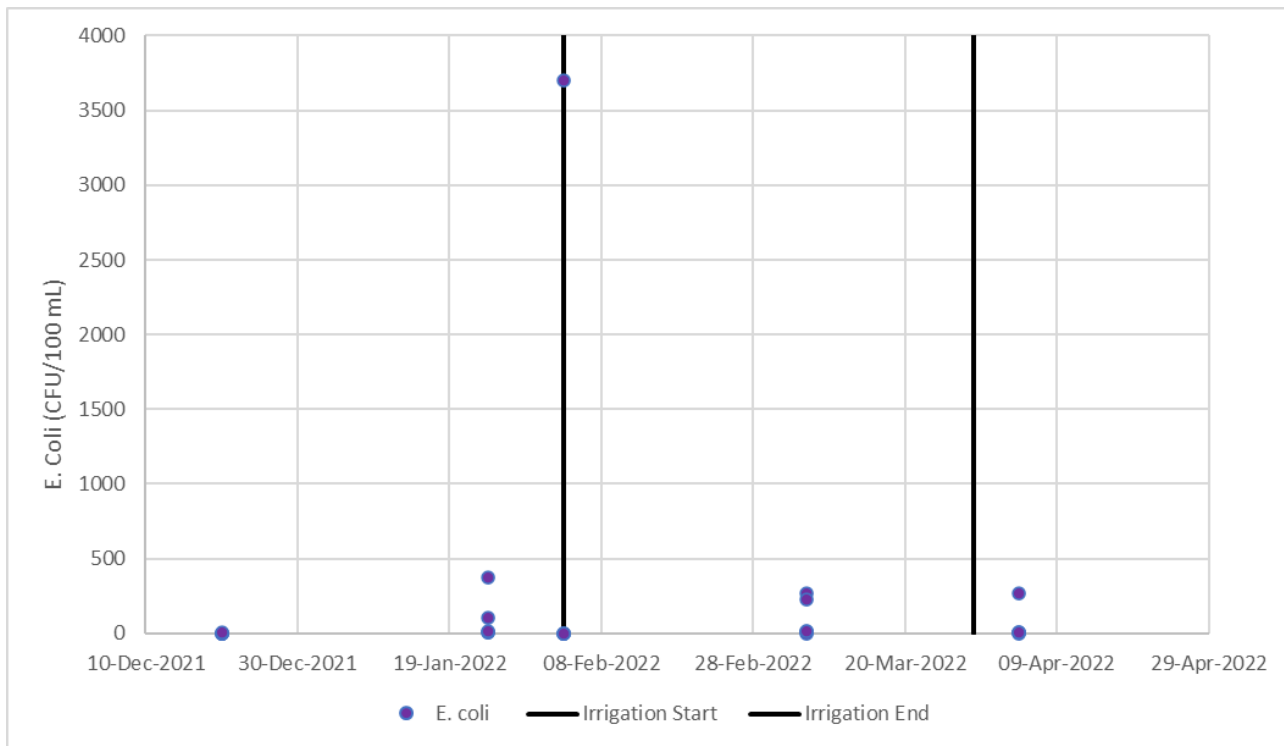


Figure 2-3 Groundwater testing results from six wells – E. coli

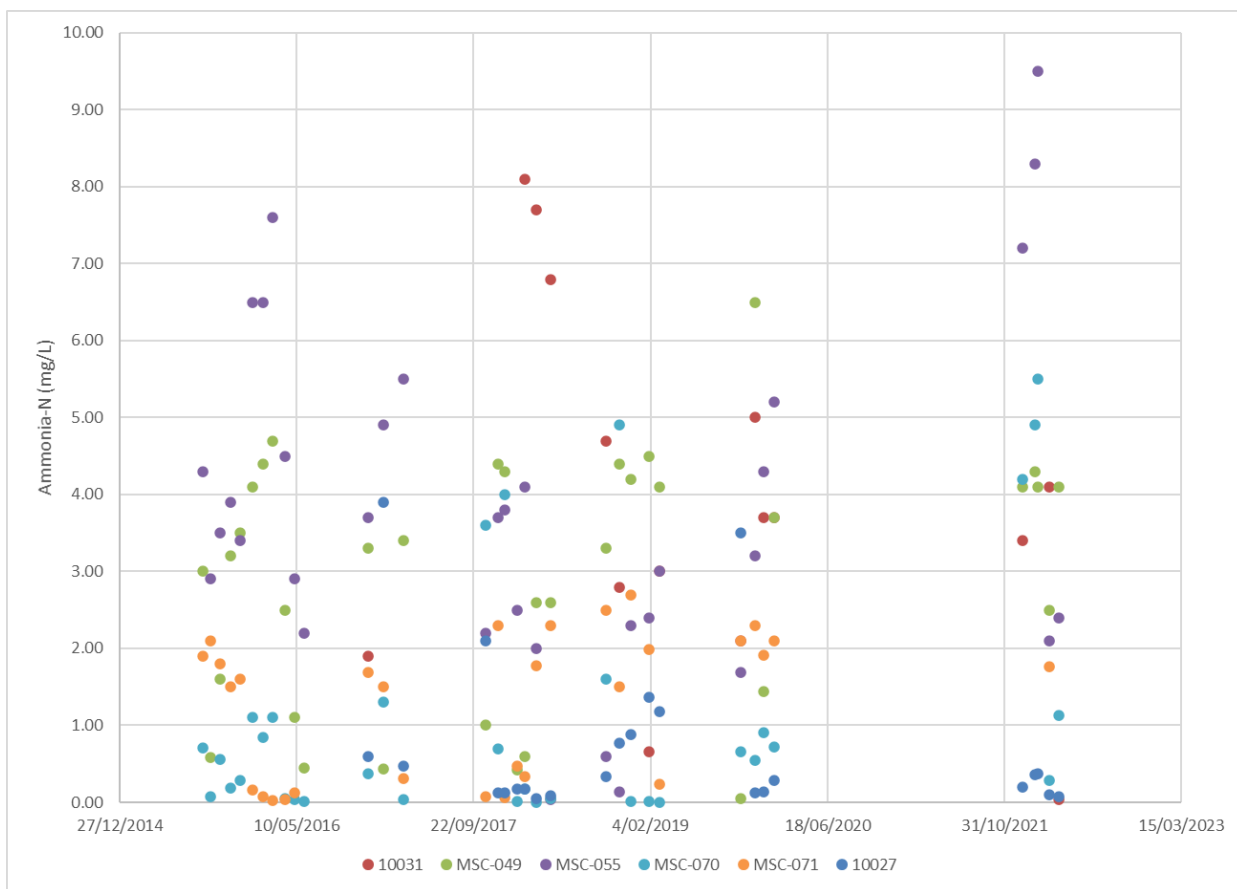


Figure 2-4 Ammoniacal-N concentrations in groundwater samples over 2015/16 to 2019/20 monitoring periods

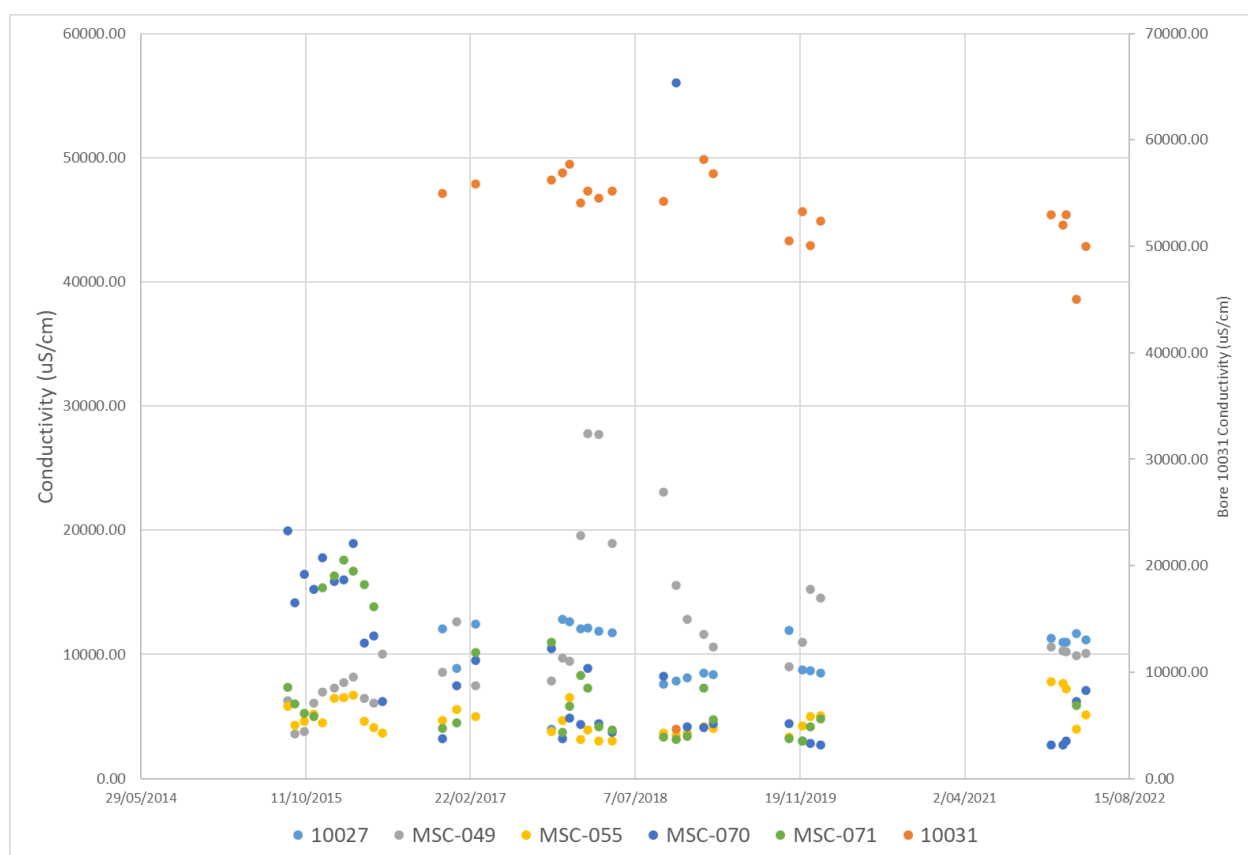


Figure 2-5 Conductivity of groundwater samples collected over 2015/16 to 2019/20 monitoring periods

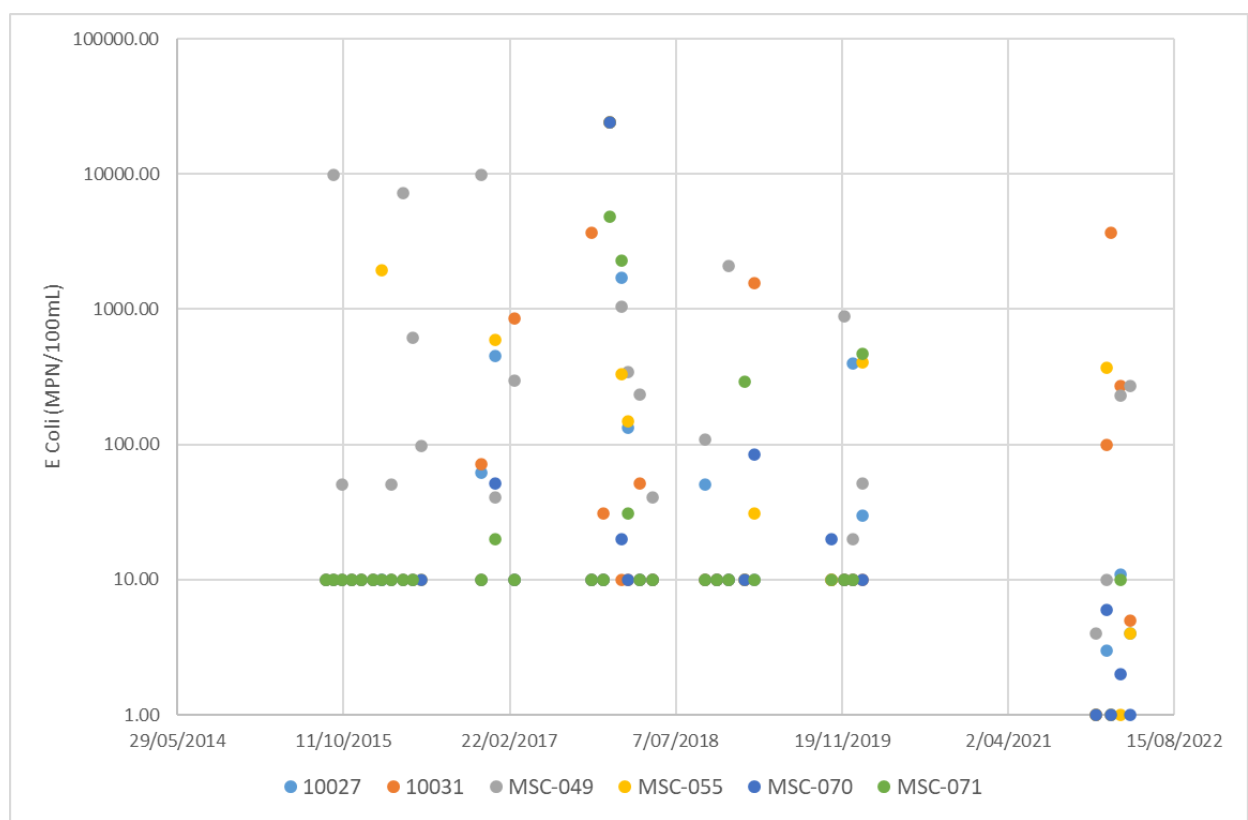


Figure 2-6 E. coli counts in groundwater samples collected over 2015/16 to 2019/20 monitoring periods

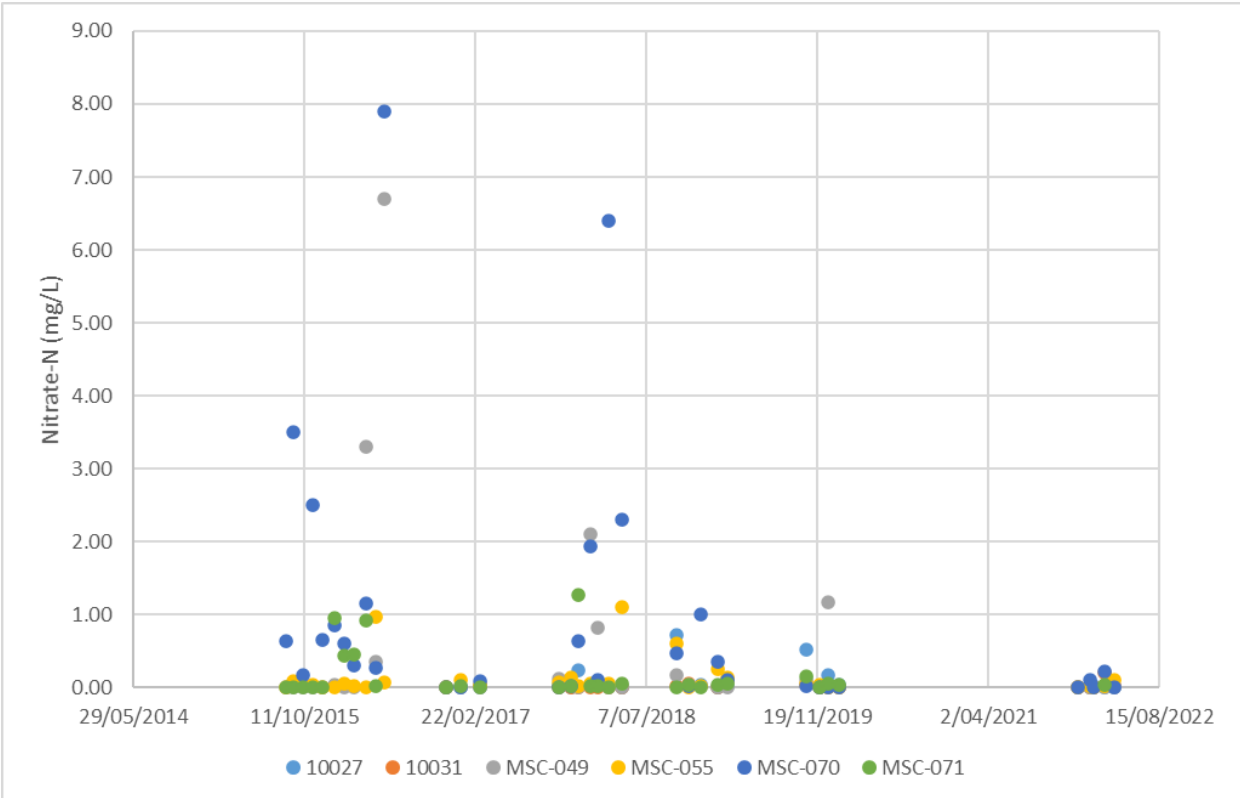


Figure 2-7 Nitrate nitrogen concentrations in groundwater samples collected over 2015/16 to 2019/20 monitoring periods



Figure 2-8 Measured water levels during groundwater sampling over 2015/16 to 2019/20 monitoring periods

2.3.5 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. A level measurement was taken on 18 January 2022, prior to irrigation commencing. The groundwater level monitoring frequency during the irrigation period was approximately fortnightly which meets the monitoring requirements during irrigation. All groundwater depths measured during the period 18 January – 29 March 2022 were greater than 0.3m below ground, which is consistent with previous years' observations.

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

Date	Depth to Groundwater (m)					
	MSC-070	MSC-071	MSC-049	MSC-055	10027	10031
18/01/2022	2.05	N/A	1.4	2.4	2.25	1.8
3/02/2022	2.05	2.15	N/A	2.3	2.15	1.65
15/02/2022	1.15	1.85	1.85	0.95	0.95	1.1
2/03/2022	1.44	1.91	1.38	1.36	1.24	0.84
17/03/2022	1.4	1.9	1.36	1.3	1.3	0.95
29/03/2022	1.35	1.85	1.24	1.32	1.28	1.05
18/01/2022	2.05	N/A	1.4	2.4	2.25	1.8
3/02/2022	2.05	2.15	N/A	2.3	2.15	1.65

2.3.6 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 specified in the consent, groundwater testing is no longer required in wells P28/446 and Lot 2 DP 12207 after completion of testing for five consecutive years, as no positive *E. coli* results have been detected.

2.3.7 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 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.

2.3.8 Condition 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.

No ponding was visible.

2.3.9 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.

No complaints were received in relation to the discharge of wastewater to land.

2.3.10 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 and maintained according to the requirements of Condition 36. The requirements of this condition have therefore been achieved.

2.3.11 Condition 38

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

No ponding occurred during this monitoring period

2.3.12 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.

MDC received one odour complaint regarding the STP during this monitoring period. A complaint was received on 08/04/2022 from a local resident who complained of a one-off smell from the ponds. The local resident also complained they were unhappy with the functioning of the ponds. Operators on site could not detect odour more than 3m from the ponds, and it is assumed the odour was generated by a one-off discharge to the industrial ponds from a septic truck. No further complaints have been received.

2.3.13 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 2-9 shows the weekly DO concentrations measured at the outlet of ponds 2A, 2B, 2C, 6, and the wetlands (Pond 14), and Table 2-3 compares the 10th percentile DO concentrations with the consent limits. DO concentrations were measured at the outlet of ponds 2A, 2B, 2C and 6 and 14, as required by the consent (noting the change of name of wetland pond 10 to pond 14).

Samples were taken on average every 7 days between 1 July 2021 and 30 June 2022, and 99% of samples were taken within the stipulated time period. The remaining two samples were taken at 10:30am and 10:45am.

As seen in Table 2-3, all the 10th percentile DO readings were well above the 2g/m³ consent limit, which is similar to the results reported in previous years. The 10th percentile DO concentrations measured in Ponds 2B and 2C are slightly lower than DO concentrations measured in Pond 2A, Pond 6 and wetland pond 14.

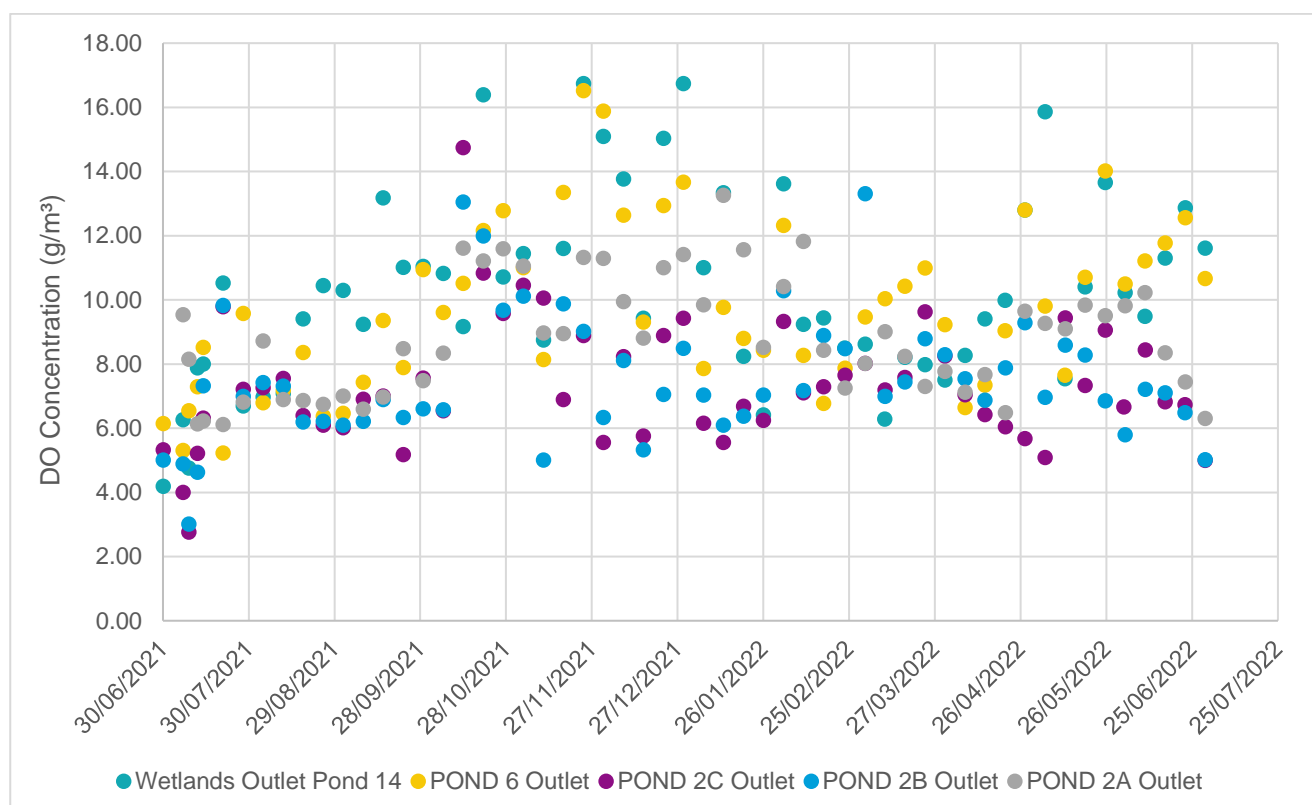


Figure 2-9 Dissolved oxygen monitoring results at the outlet of Ponds 2B, 2C, 6 and wetland Pond 14

Table 2-3 Comparison of 10th percentile dissolved oxygen monitoring results for Ponds 2B, 2C, 6 and wetland Pond 14 with consent limit

	10 th Percentile
Consent limit	>2.0g/m ³
Pond 2A outlet	6.64
Pond 2B outlet	5.13
Pond 2C outlet	5.25
Pond 6 outlet	6.58
Wetland Pond 14 outlet	6.80

2.3.14 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. DO concentrations in Ponds I1 and I2 were measured daily between 11am and 2pm from 11 March to 31 May 2022. Pond I1 and I2 DO measurements taken over the vintage period are plotted in Figure 2-10. While not a consent requirement, the industrial inlet cBOD₅ results are also plotted for comparison with DO.

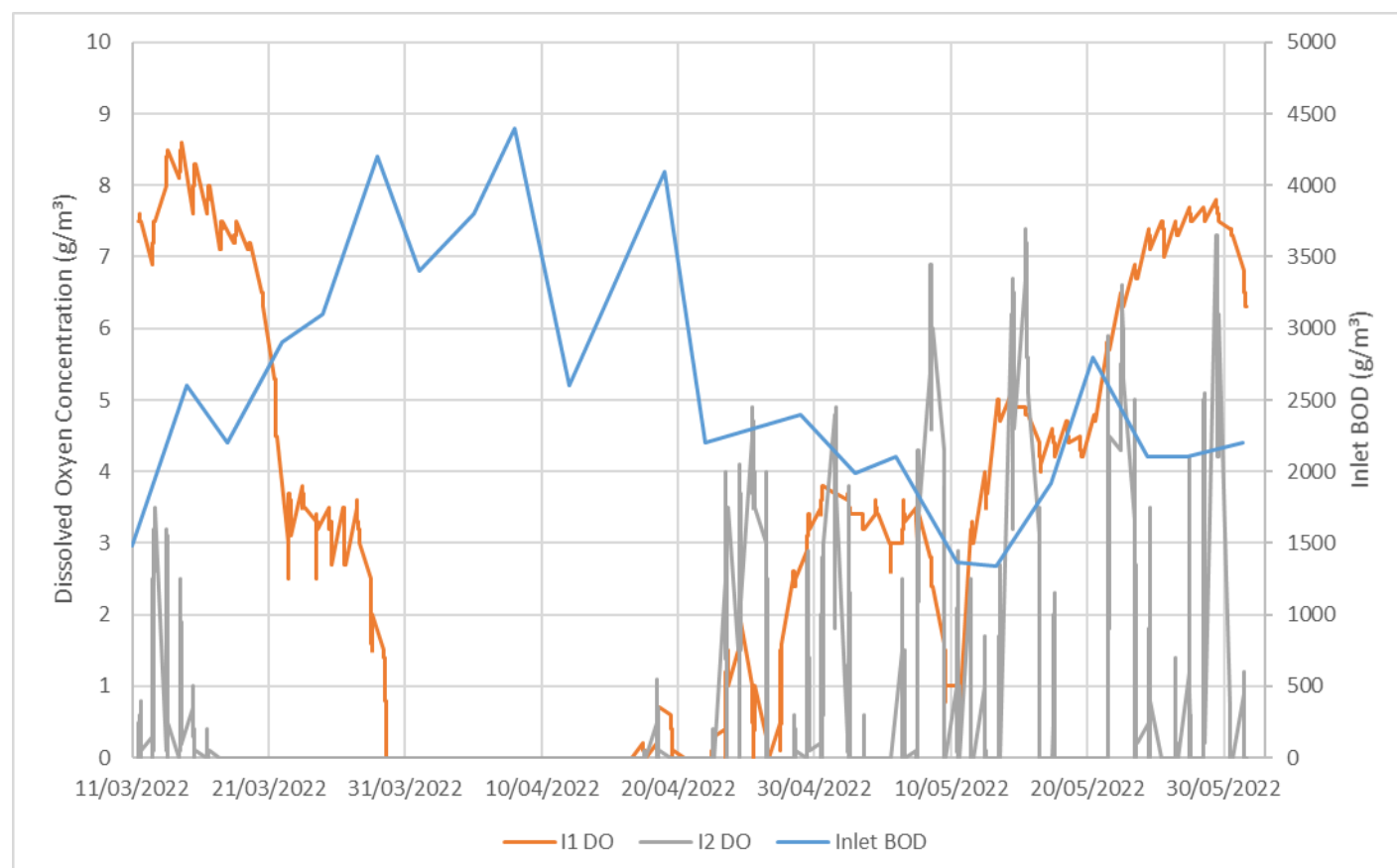


Figure 2-10 Dissolved oxygen daily averages in Ponds I1 and I2 compared to inlet BOD concentration

Figure 2-10 shows that the DO concentrations in Ponds I1 and I2 dropped below the consent limit of 0.5g/m³ and recorded 0 g/m³ for a significant amount of this period. The most notable drop was between late March

and mid-April, when the DO in both ponds was at zero. However, DO concentrations in Pond I2 were also very low before this and continued to drop to zero for extended periods after the DO in Pond I1 began increasing. Similar instances of DO dropping to zero during vintage have also been reported in previous monitoring periods, but typically for shorter periods than was the case this vintage.

The 50th percentile DO concentrations in both ponds over the vintage period are shown in Table 2-4. Pond I1's 50th percentile result was above the required limit of 0.5 gm³, but Pond I2 was recorded at zero.

Table 2-4 Dissolved oxygen monitoring results for Ponds I1 and I2 during vintage (March to May)

	50 th Percentile DO concentration
Consent Limit	>0.5g/m ³
Pond I1	3.1
Pond I2	0

The cause of these extended periods of low DO, when compared with other years, is thought to be the delays in returning the aerators to service after upgrade work was carried out on Ponds I1 and I2 prior to this year's vintage, as noted in Section 2.2.1. Typically, the aerators in the industrial ponds are turned on in early February to encourage biomass growth prior to the high BOD loads arriving at the ponds in March. However, the upgrades were delayed due to supply chain and installation issues, which meant that the aerators were not available for operation until 10 March 2022, after the increased BOD loads associated with the vintage period had already begun to arrive at the STP. The impact is more notable in Pond I2 as during vintage this pond receives flows first (see Figure 1-) and so has a higher oxygen demand. The upgrades are now complete and should not be an issue for next year's vintage.

Additionally, MDC has noted that the tankered winery wastes received at the site during vintage have been increasing in strength over the past few vintages. This has affected the DO concentrations in the ponds. The acceptance of tankered wastes at the BSTP was ceased for the 2022 vintage due to the lack of available aeration. Council has also expanded the testing of tankered winery wastes arriving at the site to determine load characteristics and help assess whether treatment system changes need to be made, or acceptance of these wastes should be ceased to maintain the capacity of the treatment system.

2.4 Discharge to Wairau Estuary

2.4.1 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 discharge outfall pipeline was conducted on April 2022 by Marine Services NZ Limited (see report in **Appendix D** dated 5 April 2022). A resource consent was granted for remedial pipe work and in June 2021, a contract was let to dredge the sandbar in the area of the outfall pipes. The timeframe for completion of dredging under the resource consent was 14th August 2021. Despite being impacted by the record floods of July 17th 2021, the dredging successfully cleared the outfall pipe discharge area and unblocked the pipes.

The outcomes and recommendations from the latest inspection are summarised below:

- Marker buoy in good condition, was cleaned during the inspection.
- Signage in good condition.
- No anodes were visible on the pipeline. It was assumed that these are buried under the bed. Two new anodes were fitted.
- Buoy chain and shackles were replaced during the inspection.
- Log blocking new pipeline nozzle cleared.
- The nozzle is in a crater that is kept free of sand by the velocity of the discharge and is surrounded by sand and sticks.
- Pipe feels to be in good condition, with only 300mm of pipe exposed on the top.
- The length of pipe not covered by seabed material is approximately 400mm, including the flange, at the very end of the pipe.
- New pipe is in good condition. Nozzle of old pipe is thin, and brittle.
- No pipe supports, or pedestals could be seen or felt during the inspection.
- Water lanced 3.5m of pipeline out of 1.5m of riverbed to replace chain tackle on marker buoy.

2.4.2 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. It is noted by the inspection report in **Appendix D** that the existing buoy marking is in a readable condition at the required distance.

2.4.3 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 for the 2021/22 year and the previous three years are shown in Table 2-3. It is acknowledged that some of the discharge was directed to land in preceding and current years, except for 2020-2021 where all discharge was to the estuary. The average daily discharge volume for the current monitoring period was 20,248 m³, while the maximum daily discharge volume was 46,625 m³ recorded on 22 July 2021.

Table 2-5 Treated wastewater discharge volumes 2017/2018 - 2021/2022

	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Average daily discharge (m ³)	18,365	16,058	17,386	15,787	20,248
Maximum daily discharge (m ³)	32,631	31,020	31,626	31,614	46,625

While higher than in the previous four years, both the average and maximum daily discharge volumes for 2021-2022 are below the average daily limit of 28,500m³ and the maximum daily limit of 103,680m³ set by Condition 55. While there have been significant sewer upgrades undertaken across Blenheim in the past five years to reduce inflow and infiltration (I&I) to the network, it is likely that the increased average and peak flows in this monitoring period are related to the significant rainfall and record floods which occurred in July 2021. This is supported by the daily flow data (Figure 2-11), with a significant increase in flows starting in mid-July 2021.

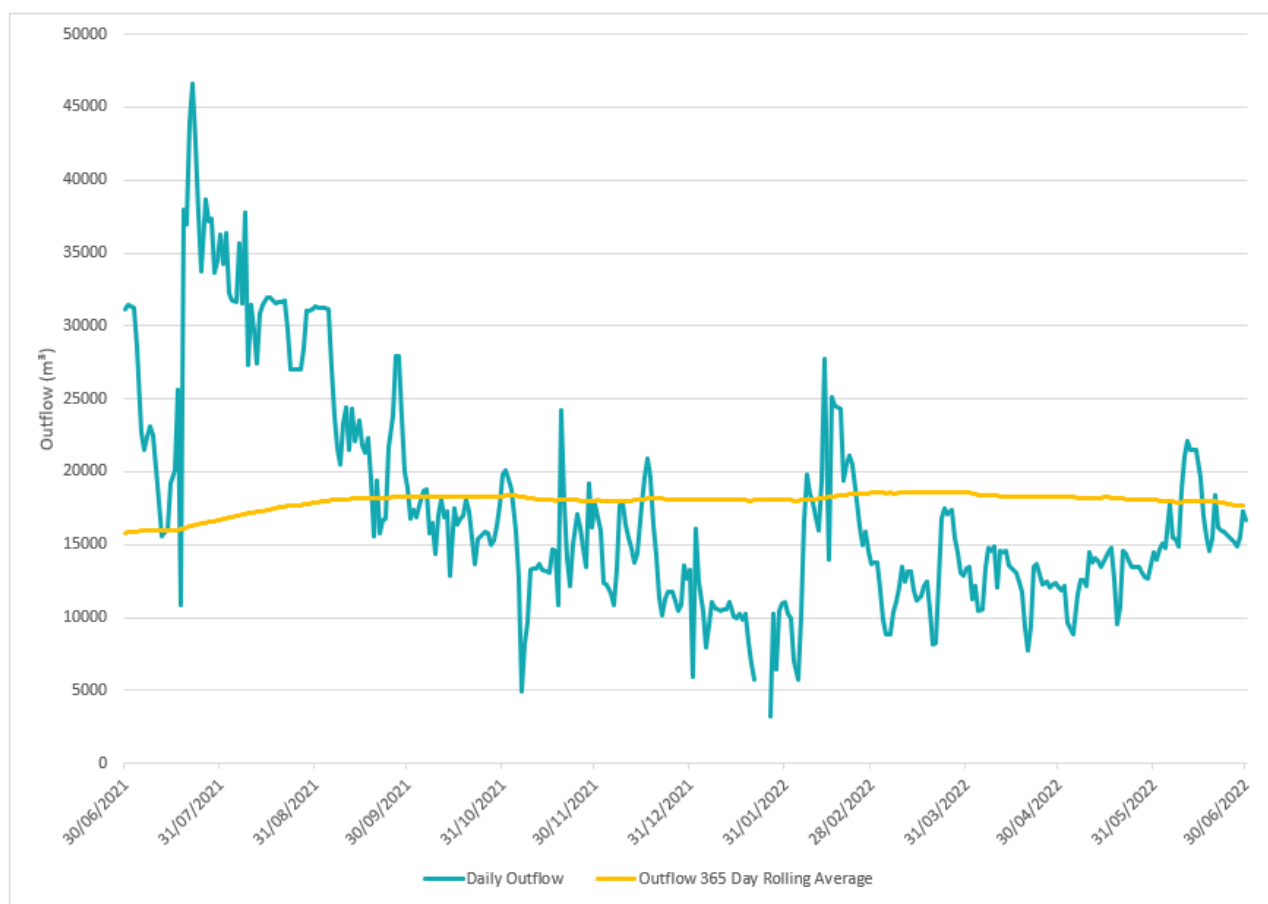


Figure 2-11 Daily discharge and 365 day rolling average discharge volume

2.4.4 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. Another flow meter has also been installed at the outlet to Pond 6 to record wastewater flow to irrigation areas. Flow data collected over this monitoring period can be found in **Appendix E**.

2.4.5 Condition 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.

This condition has been complied with (see outflow data in **Appendix E**).

2.4.6 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, indicate that there are unlikely to be any significant effects on water quality after reasonable mixing within the zone outlined in **Appendix A – Plan Consent No. D**. CH2M Beca (2007)¹ 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 flow through the Estuary out through the Wairau Bar to Cloudy Bay. 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, 2016 and 2018 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 significant 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 relocation of the discharge of the combined wastewater to an area of rapid flushing in the Estuary, as well as the relatively high-quality treated wastewater, means that there is a very low likelihood of significant adverse effects occurring in the receiving water as a result of the discharge.

Moreover, there was no conspicuous colour or clarity observations noted during the 2021/2022 monitoring period.

2.4.7 Condition 60

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

No undesirable growths occurred or were observed as a result of the discharge, during the monitoring period, therefore the requirements for Condition 60 were met.

2.4.8 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 2-4 in this report). The results shall be reported in the AMR 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, as noted earlier Pond 14 is now the final wetland cell before discharge to the Estuary. Grab samples are therefore collected from the outlet of Pond 14 and the results of sampling are shown in Figure 2-12 to Figure 2-16.

Sampling was carried out at the required frequency specified by this condition.

¹ CH2M Beca (2007) *Assessment of Environmental Effects for Upgrading of the Blenheim Sewage Treatment Plant*; report prepared for Marlborough District (November 2007)

Table 2-6 Treated wastewater consent monitoring requirements

Parameter	Unit	Frequency of Analysis
Carbonaceous biochemical oxygen demand (cBOD ₅)	g/m ³	Monthly
Total suspended solids (TSS)	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

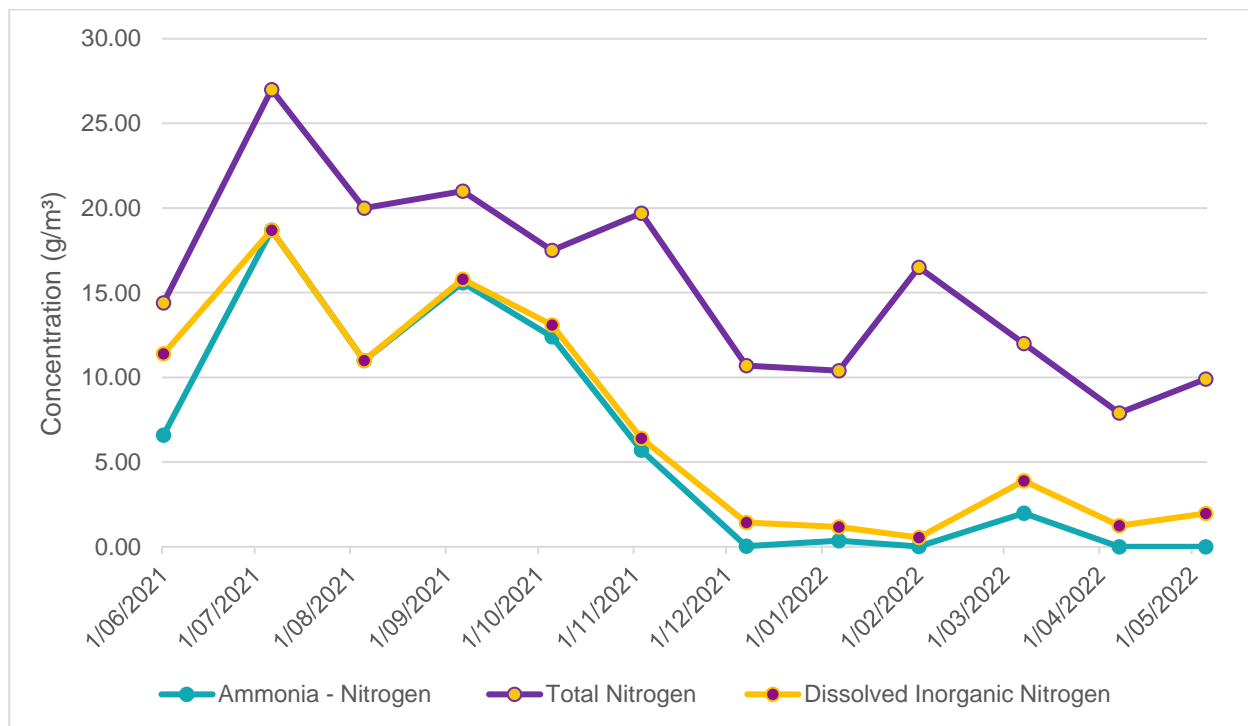


Figure 2-12 Treated wastewater monitoring results at Pond 14 outlet – nitrogen species

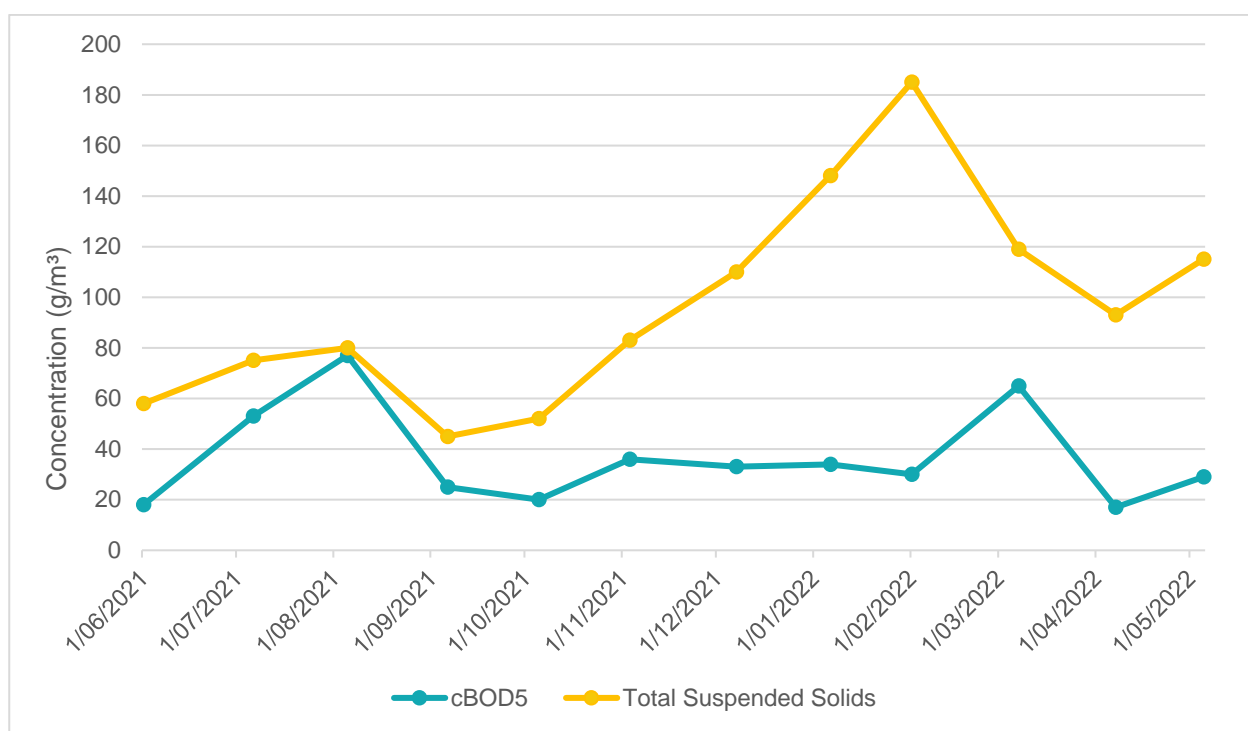


Figure 2-13 Treated wastewater monitoring results at Pond 14 outlet – cBOD5 and total suspended solids

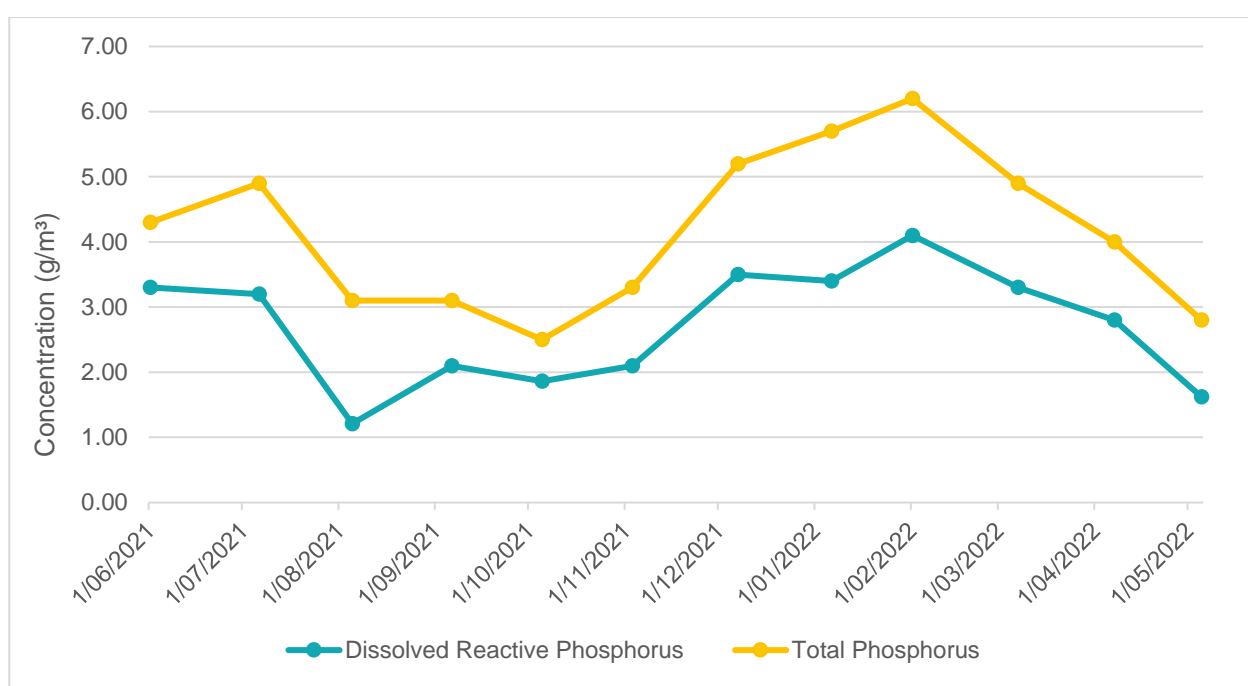


Figure 2-14 Treated wastewater monitoring results at Pond 14 outlet – phosphorus species

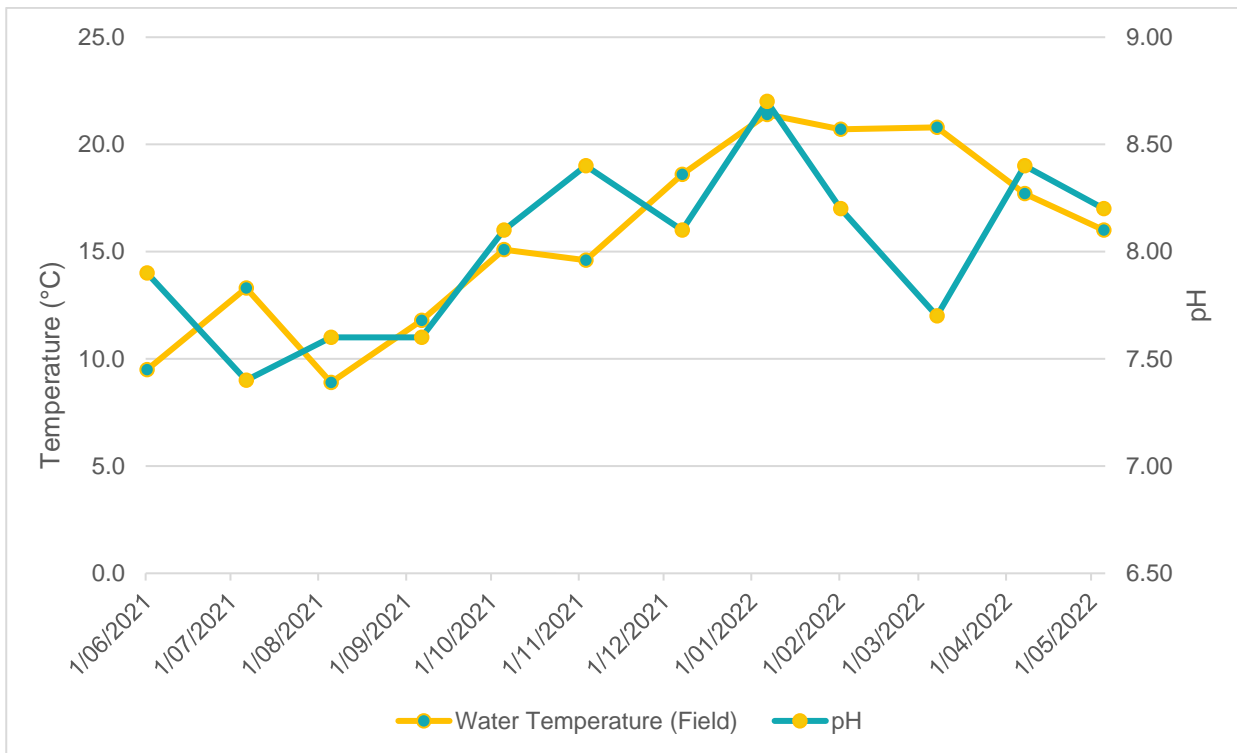


Figure 2-15 Treated wastewater monitoring results at Pond 14 outlet – temperature and pH

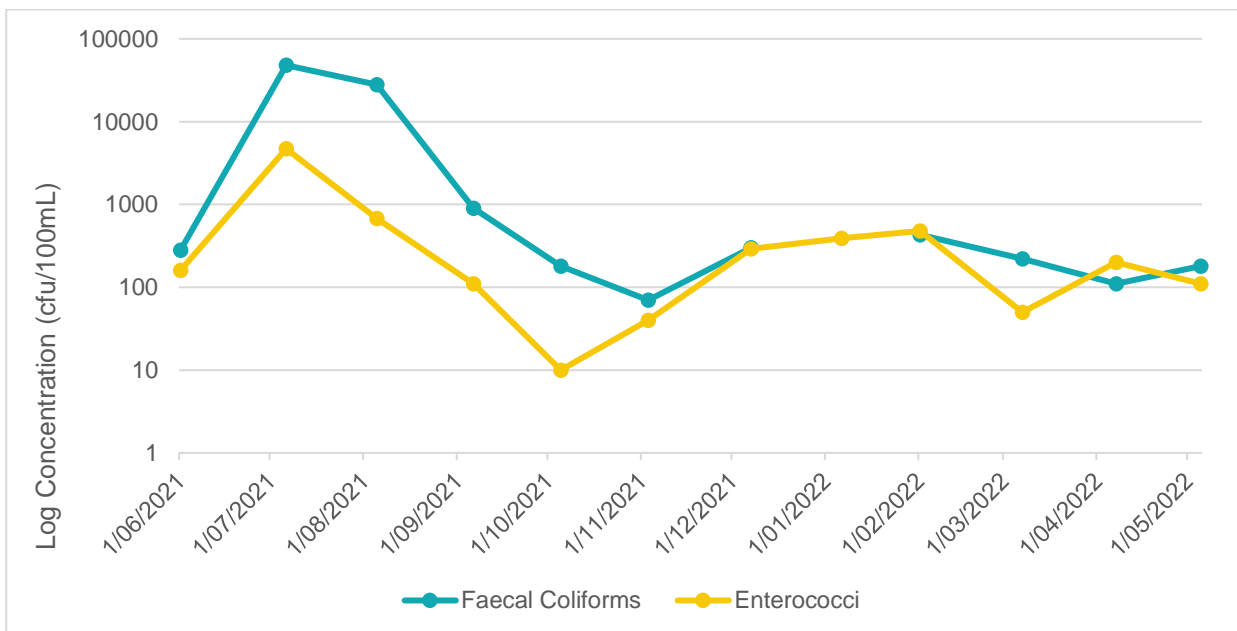


Figure 2-16 Treated wastewater monitoring results at Pond 14 outlet – Faecal coliforms and Enterococci (on a logarithmic scale)

The nitrogen species results trends for the 2021/22 monitoring period are similar to those observed in previous years, where concentrations peak July-August, then drop from approximately October onwards, before picking up around May. Concentrations of ammoniacal-nitrogen, dissolved inorganic nitrogen and total nitrogen recorded in 2021/22 have decreased relative to 2020-2021, with lower peaks and generally much lower values. This drop in total nitrogen and ammoniacal nitrogen concentrations in the discharge,

reflects increased nitrification and denitrification in the treatment ponds under warmer late spring, summer, and autumn conditions.

The cBOD₅ and TSS trends are different to the previous year. Recorded concentrations began slightly lower but achieved marginally greater peak and sustained values, with a more consistent TSS profile and a more variable cBOD₅ profile when compared to 2020-2021 results. cBOD₅ results peaked twice, in late winter and again in late summer with steady values in the interim. TSS concentrations rose steadily from spring before peaking in mid-summer and then steadily dropping. Phosphorus species results and measured temperature values all reflect similar annual trends to previous monitoring years. Temperature values show typical seasonal variation. There is an observed drop in pH in the March 2021 sample which is consistent with previously reported trends.

Faecal coliforms and enterococci values in the outlet of Pond 14 was steadier compared to the previous monitoring period. The logarithmic trend for both microbiological indicators were similar, with Faecal coliform concentrations slightly higher (Figure 2-7). Both parameters peaked in July-August before decreasing and plateauing from November onwards. It can be noted that both parameters started low then spiked in July 2021, before dropping sharply and plateauing. This spike may be due to high wet weather flows reducing the residence time and hence disinfection efficiency of the wetlands, or high numbers of waterfowl occupying the ponds over winter – see discussion in Section 2.4.8.

The results of the annual sample for metal and metalloids measured at the outlet of Pond 14 are summarised in Table 2-7.

Table 2-7 Wastewater monitoring results – metals and metalloids at outlet of Pond 14.

Date	Arsenic – Total (g/m ³)	Cadmium – Total (g/m ³)	Chromium – Total (g/m ³)	Copper – Total (g/m ³)	Lead – Total (g/m ³)	Nickel – Total (g/m ³)	Zinc – Total (g/m ³)
9/1/2020	0.004	0.00005	0.003	0.0049	0.00057	0.002	0.007
6/1/2021	0.006	0.00	0.003	0.0024	0.0004	0.002	0.005
6/1/2022	<0.021	<0.0011	<0.011	<0.011	<0.0021	<0.011	0<.021
ANZECC Trigger Values (99% level ecosystem protection)	0.001	0.00006	0.00001	0.001	0.001	0.008	0.0024

All contaminants listed in Table 2-7 were reported as being below the limit of detection for the tests used. These detection limits are higher than the ANZECC (2000) trigger values for a 99th percentile level of protection of freshwater and marine ecosystems in receiving waters. However, after initial dilution and reasonable mixing in the estuary, it is expected that these metal concentrations will be below the most stringent ANZECC trigger values.

2.4.9 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 2-6].

The monitoring results and consent limits for ammoniacal nitrogen and faecal coliform concentrations are given in Table 2-8. Figure 2-16 shows the results of the wastewater faecal coliform and enterococci monitoring (after Pond 14).

Faecal coliform concentrations at the outlet of Pond 14 were similar to the previous year's (2020/2021) monitoring data. Both experienced a spike mid-winter, before sharply dropping and maintaining low and steady values. The enterococci trend for 2021-2022 mirrors the 2021-2022 faecal coliform trend but is less similar to the previous monitoring period which displayed an irregular trend. The 2020-2021 enterococci trend showed a high concentration plateau, followed by a sharp drop then rise, peak and gradual drop off. Overall, the results for the 2021-2022 monitoring period are improved, with the exception of the July peaks.

Despite the overall reduction in faecal coliform concentrations, the 90th percentile faecal coliform consent limit was exceeded at the Pond 14 outlet based on the sampling data collected over the 2021/22 monitoring period. This is due to the very high faecal coliform concentrations in the sample collected in July. It is suspected that these spikes relate to increases in waterfowl numbers in the wetlands which has been identified as an area for further investigation. MDC undertook initial faecal source testing in August 2021, which found human, ruminant and avian faecal sources for the bacteria tested in the sample.

The median consent limit for faecal coliforms and both the median and 90th percentile ammoniacal nitrogen limits over the period were not exceeded.

Table 2-8 Wastewater ammoniacal nitrogen and faecal coliform monitoring results and consent limits

Parameter	Units	Median	Results	90th Percentile	
		Consent Limits		Consent Limits	Results
Pond 14 Ammoniacal nitrogen (NH ₃ -N)	g/m ³	30	6.15	40	15.91
Pond 14 Faecal coliforms	cfu/100ml	700	280	2,150	28,000

2.4.10 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 F of Assessment of Environmental Effects for Upgrading of Blenheim Sewage Treatment Plant, September 2007).

This condition is not applicable for this compliance year. The survey is due to be repeated in February 2023, with the outcomes to be presented in the 2022/2023 monitoring report.

2.5 Iwi Liaison

2.5.1 Condition 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

A senior MDC representative has been made available for iwi liaison. No specific requests were issued in this compliance year.

3 Summary

3.1 Overview

From an assessment of the results of monitoring at the BSTP, in the period 1 July 2021 to 30 June 2022, most conditions were met except for Condition 45 where the DO concentration measured in Pond I2 during vintage did not meet the 0.5 g/m³ 50th percentile limit, and for Condition 62 where the 90th percentile faecal coliform result at the Pond 14 outlet (28,000 cfu/100mL) was above the 2,150 cfu/100mL consent limit.

Overall, the BSTP treatment ponds and wetlands performed well in the 2021/22 year and the discharges to land, air and water did not appear to be having significant environmental effects. This is a good result in the context of the loads on the ponds, especially during vintage, and the difficulties around procurement for upgrading and maintenance work that was carried out.

While not necessarily a consent compliance issue, it is recommended that Council review the outcomes of the annual outfall pipeline inspection report and address the maintenance issues noted.

Specific conclusions are as follows:

3.2 Groundwater

Groundwater testing and levels monitoring were carried out as required between January and March 2022 and therefore compliance has been achieved. Conductivity, ammonia nitrogen, nitrate, E. coli and groundwater levels measured were all consistent with historical data.

3.3 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” and operating well. However, DO concentrations in pond I2 did not meet the requirements of Condition 45, due to the aerators not being fully operational during Vintage 2022. Aerators were not operational until 10th March 2022, due to supply chain issues and difficulties encountered during installation. These issues were out of MDC’s control.

3.4 Outfall Flow

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

3.5 Treated Wastewater

Treated wastewater at the outlet of Pond 14 was monitored at the required frequency for all parameters. Median faecal coliform and median and 90th percentile ammoniacal nitrogen concentrations were below the consent limit. However, the 90th percentile faecal coliform concentration exceeded the consent limit. While this exceedance was thought to be mainly due to avian (waterfowl) in the wetlands, an initial faecal source tracking analysis on a sample collected in August 2021 found human, ruminant and avian faecal sources.

Metal and metalloid analysis of the treated wastewater show that there has been a minor increase in all concentrations compared with the previous monitoring period. This may be related to increased stormwater inflows during wet periods experienced in 2021/2022. While no consent limits are set on metals, it is noted that the recorded concentrations are low and not expected to exceed the ANZECC (2000) trigger values for a 99 percent level of protection of freshwater and marine ecosystems after initial dilution and reasonable mixing in the receiving waters.

3.6 Receiving Water Quality and Ecological Effects

The second post-upgrade water quality and benthic survey of the Estuary, required under the consent, was carried out by Cawthron during the 2017/18 reporting period. Cawthron concluded that while there were some minor environmental and ecological changes between the 2006, 2016 and 2018 surveys overall, no adverse water quality or ecological effects due to the discharge were detected. The next survey is scheduled for the 2022/23 monitoring year.

A

Appendix A – Consent 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) 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.
- 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 Code	Station Location		NMG N (m)	Replicates per Station		
	NZMG E (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.

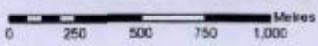
Appendix 1

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



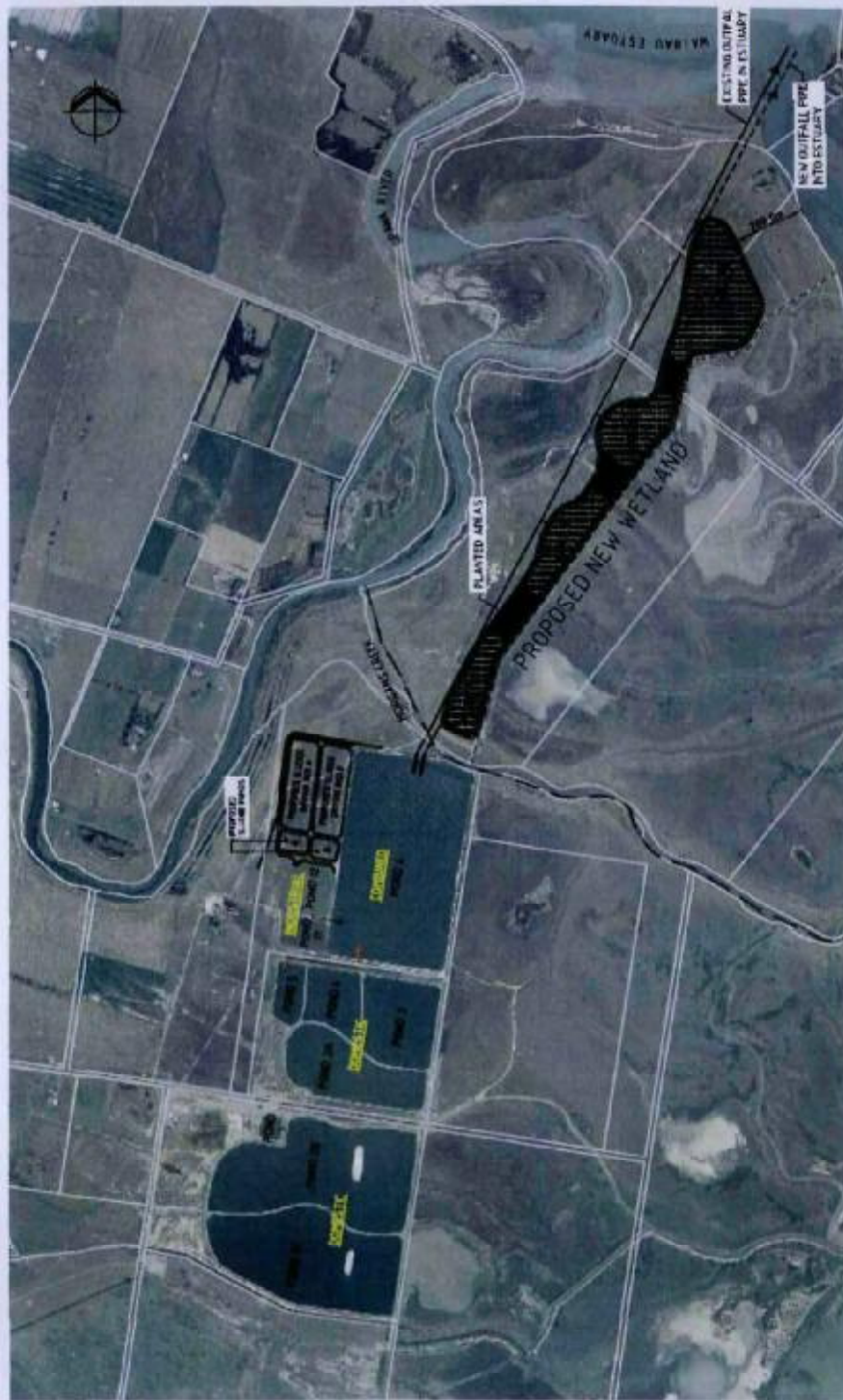
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PLAN CONSENT NO A



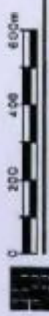
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PLAN CONSENT NO. C

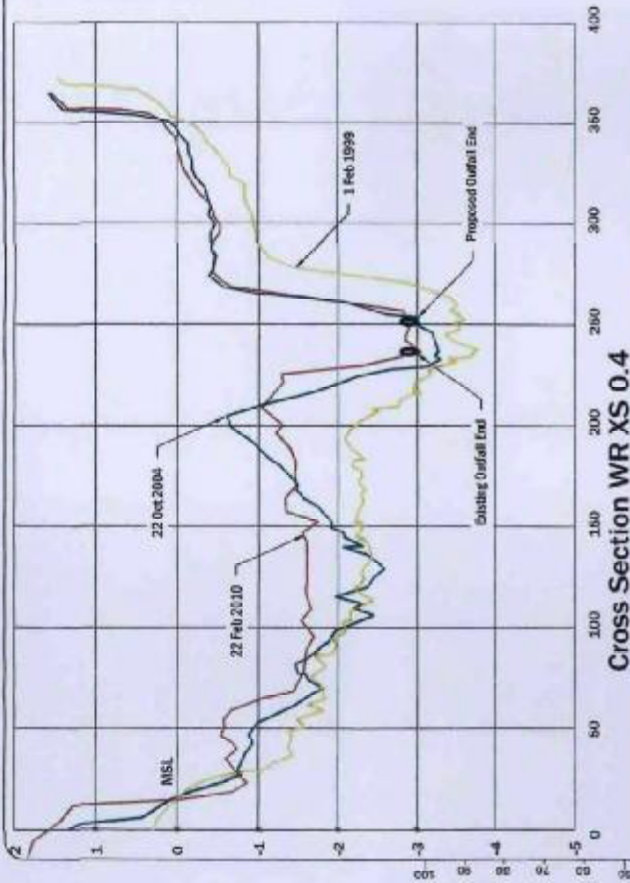


BLENHHEIM SEWAGE TREATMENT PLANT
UPGRADING CONCEPT PLAN

RESOURCES CONSERVATION
NOT FOR CONSTRUCTION



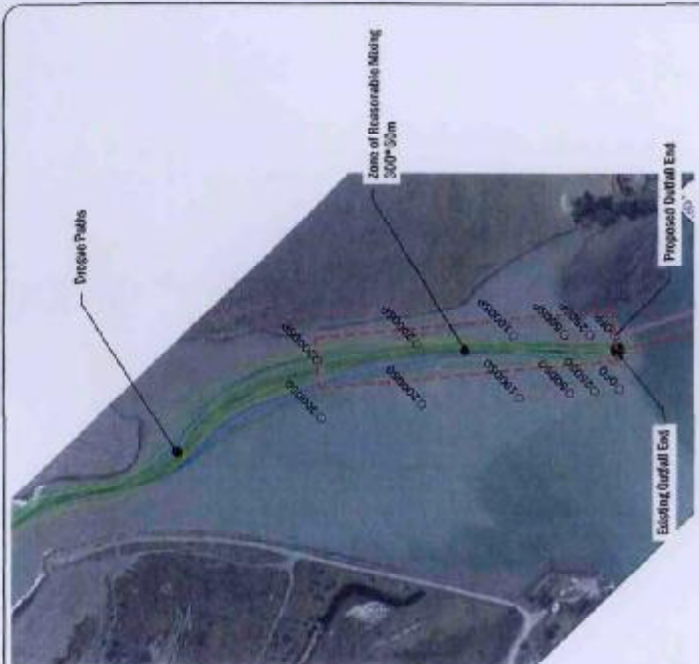
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MARLBOROUGH DISTRICT COUNCIL
 SERVICE SQUARE, P.O. BOX 443
 BLENHEIM 7540, NEW ZEALAND
 TEL: (03) 535-7165, FAX: (03) 535-1166

Blenheim Sewerage
 3STP
 Wai'ou Estuary Outfall and Cross Section



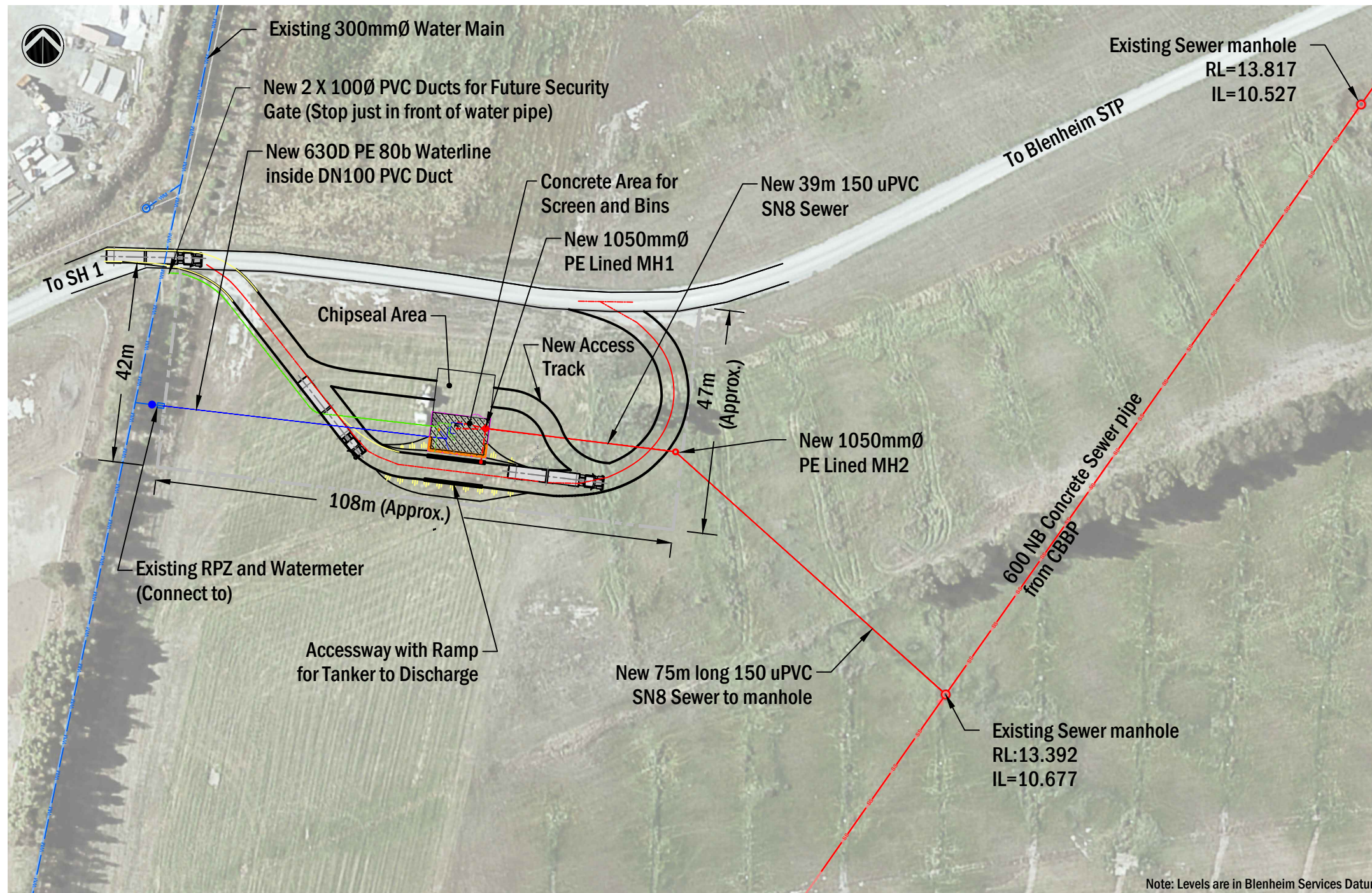
Plan : Zone of Reasonable Mixing
 Scale 1:40000

Station Code	NZMG E	NZMG N
OFF	2,093,849	5,966,513
25D SP	2,593,367	5,966,931
50D SP	2,693,384	5,966,949
100D SP	2,593,416	5,966,386
200D SP	2,593,460	5,966,462
300D SP	2,593,636	5,966,546
OFC	2,658,306	5,866,945
250 SO	2,658,324	5,966,365
500 SO	2,658,393	5,966,385
1000 SO	2,658,370	5,966,424
2000 SO	2,658,434	5,966,500
3000 SO	2,658,498	5,966,582

DATE	BY	CHKD	DATE	BY	CHKD
2/5/04					

B

Appendix B – Septage Receiving Site Plan



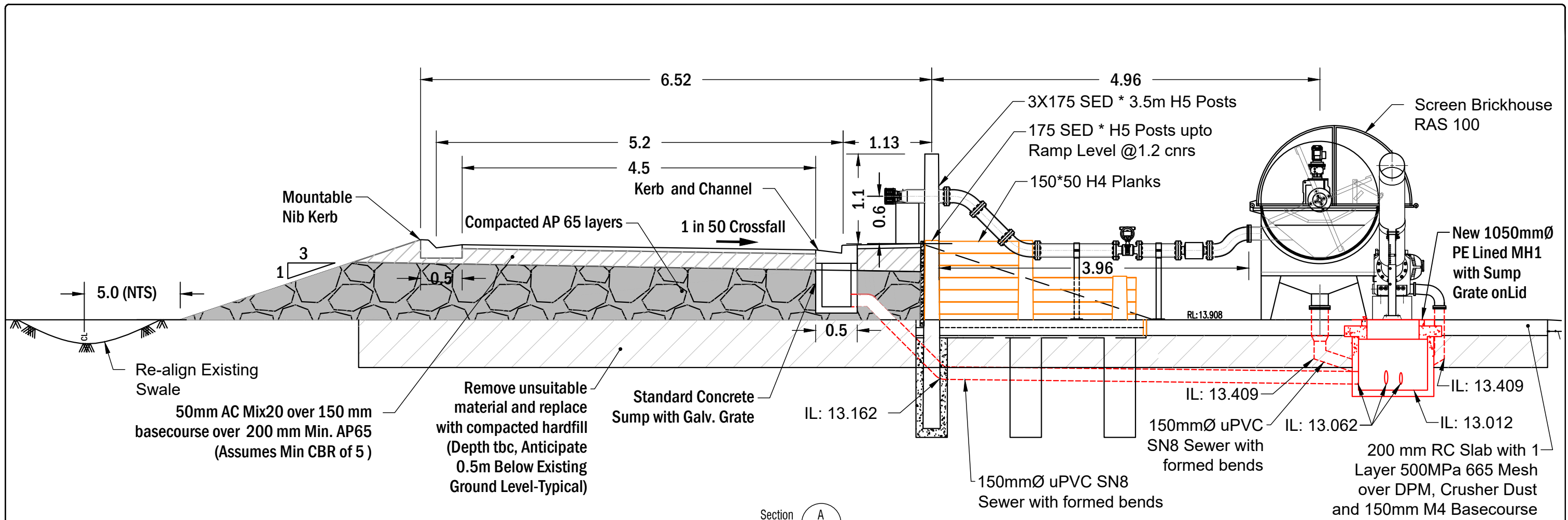
Site Plan,
Scale 1: 1000



Location Map
Scale (NTS)

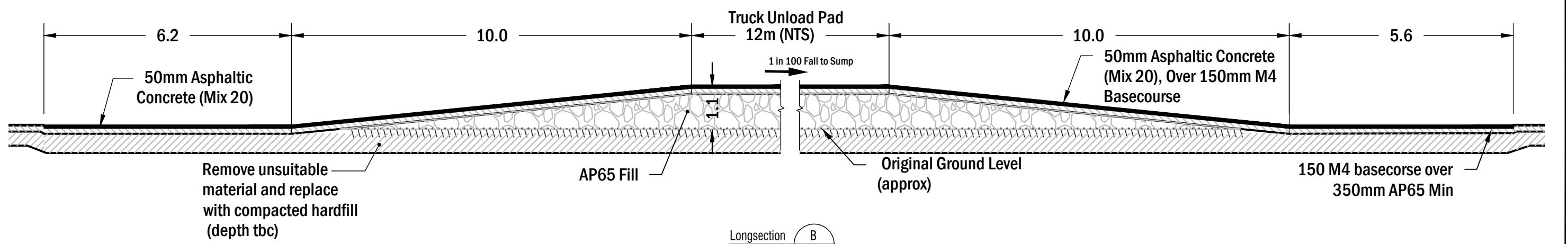
ISS	DATE	APPR	REVISION
A	19/04/18	SDo	For Information
B	10/02/21	SDo	For Information

DESIGNED BY	DRAWN	PLAN SIZE
DA/BM	BM	A3
DESIGN CHECK	M.D.C. DRAWING NO.	
SDo	2/622 Sht 1	
SCALES		



Section A
Embankment 2
Scale 1 : 50

Note: Co-Ordinates are in terms of NZTM.
Levels are in Blenheim Services Datum

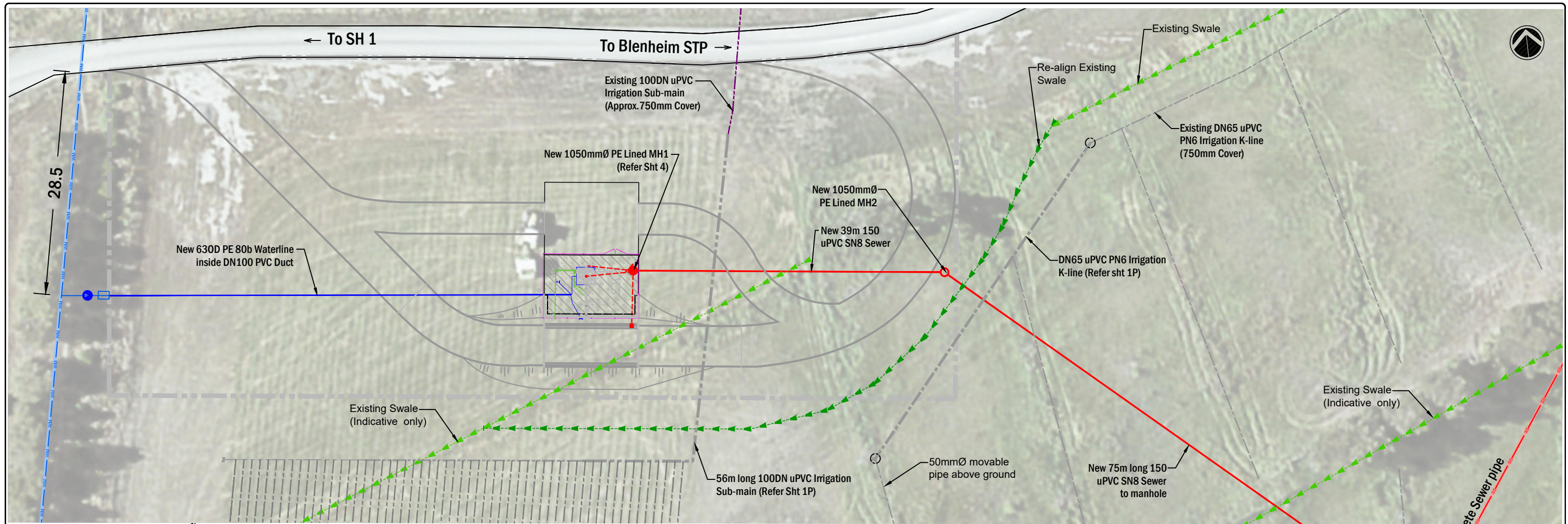


Longsection B
Ramp 2
Scale 1 : 10

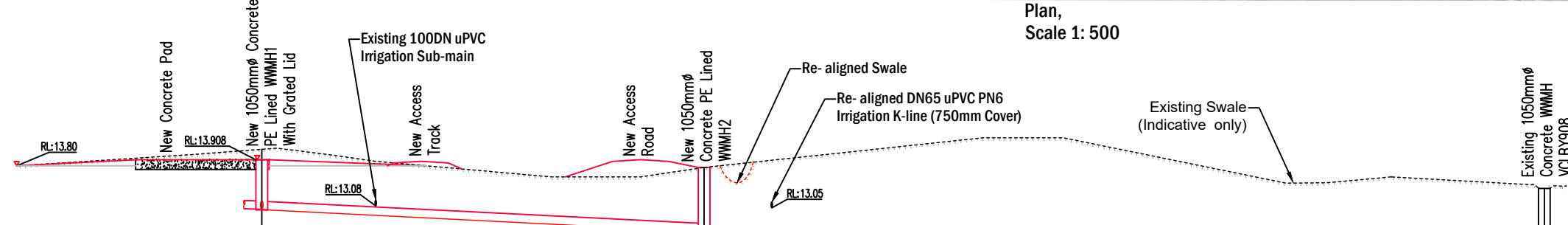
Blenheim Septage Receiving Facility
Section

ISS	DATE	APPR	REVISION
A	19/04/18	SDo	For Information
B	10/02/21	SDo	For Information

DESIGNED BY	DRAWN	PLAN SIZE
DA/BM	BM	A3
DESIGN CHECK	M.D.C. DRAWING NO.	
SDo	2/622 Sht 3	
SCALES		



Plan,
Scale 1: 500



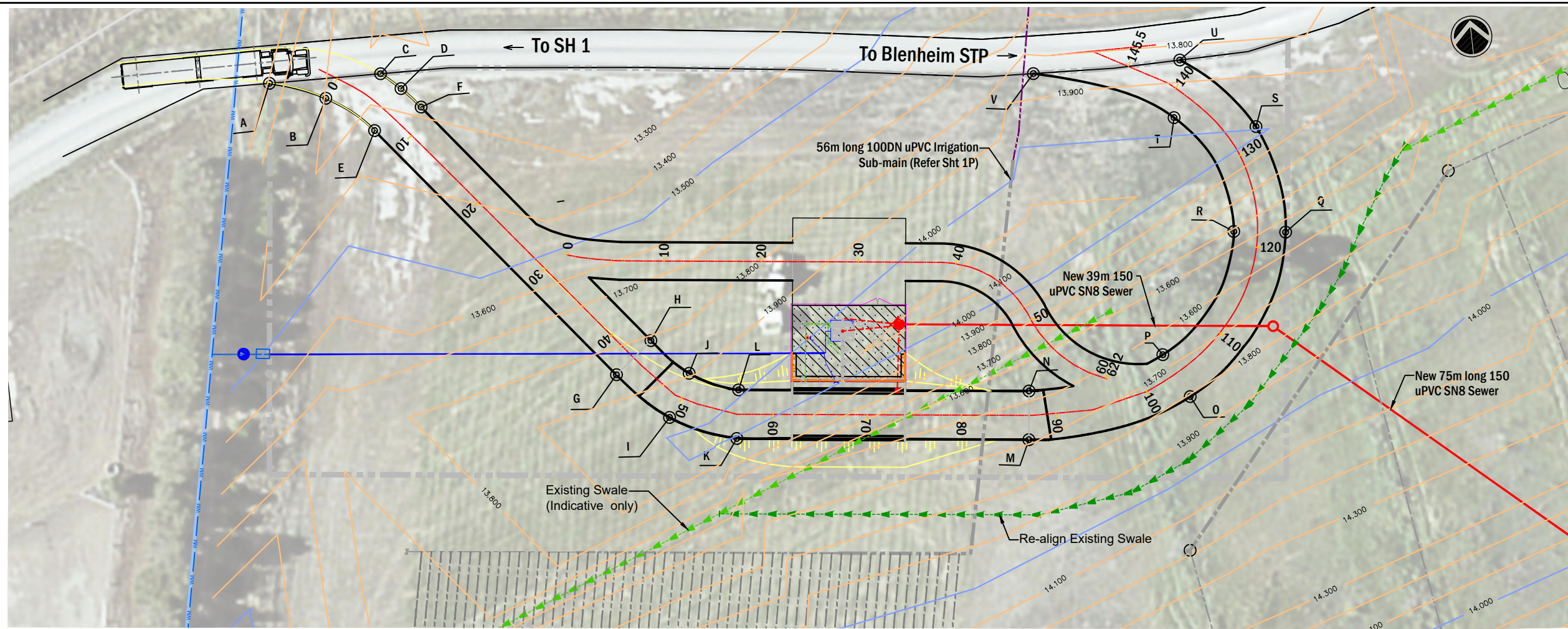
DATUM 10.00		Chainage	Stationing	Stationing	Stationing
EXISTING GROUND LEVEL		0.00	14.094	13.770	13.392
PROPOSED SEWER INVERT			13.012	12.615 / 12.565	11.810 / 10.677
CUT TO INVERT			1.082	1.155 / 1.205	1.582 / 2.715
CHAINAGE			0.00	39.72	115.18
PIPE SLOPE & GRADE			1.00% (1 in 100)	1.00% (1 in 100)	
PIPE DESCRIPTION :			L=39.72m DN150 uPVC SN 8	L=75.46m DN150 uPVC SN 8	

WW Line Long section
Scale:- H- 1: 500, V-1:100

PROPOSED SEWER LINE CO-ORDINATES		
POINT	EASTINGS	NORTHINGS
MH1	1685972.2738	5401035.8769
MH2	1686011.7147	5401031.1155

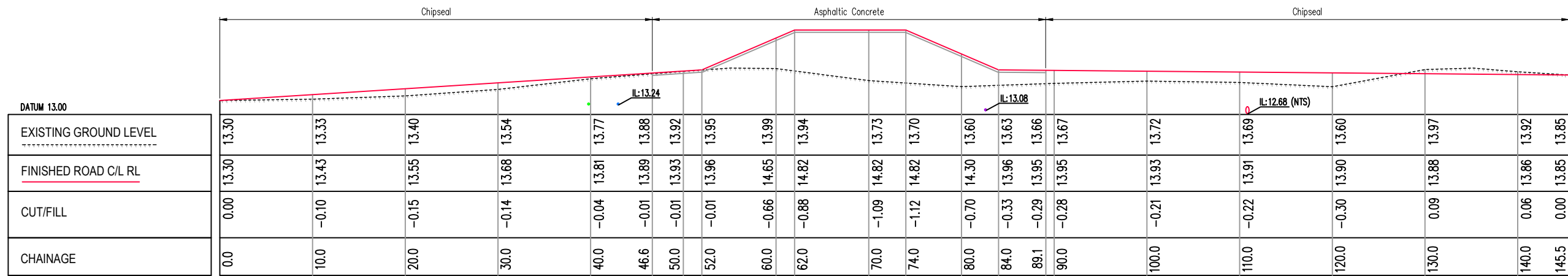
ISS	DATE	APPR	REVISION
A	19/04/18	SDo	For Information
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DESIGNED BY	DRAWN	PLAN SIZE
DA/BM	BM	A3
DESIGN CHECK	M.D.C. DRAWING NO.	
SDo	2/622 Sht 5	
SCALES		

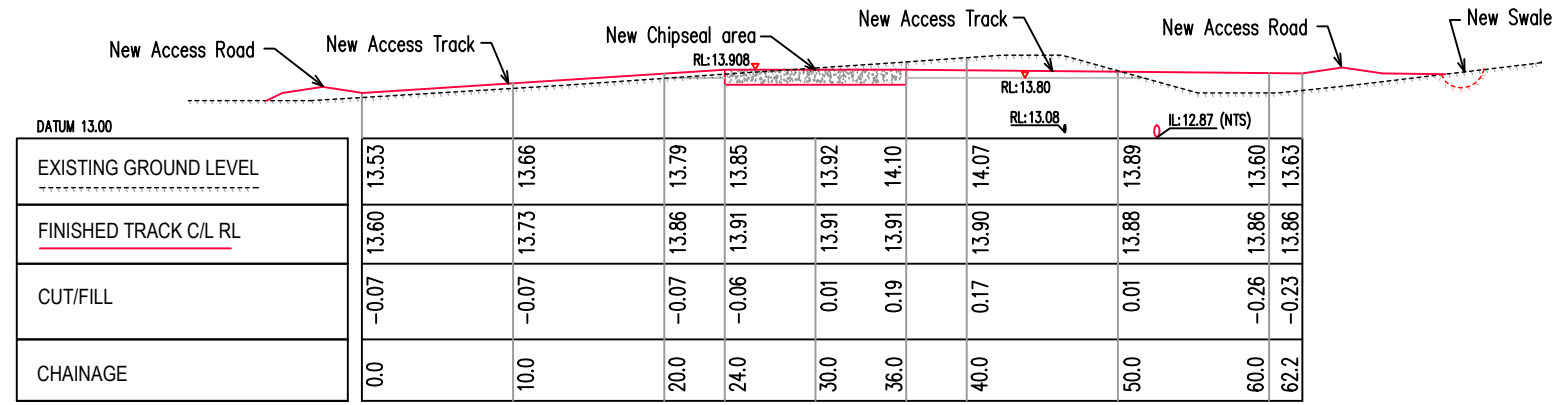


Plan,
Scale 1: 500

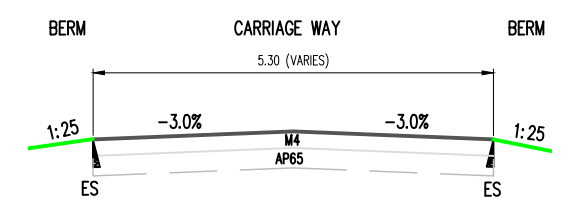
CO-ORDINATES		
POINT	EASTINGS	NORTHINGS
A	1685908.7909	5401068.9188
B	1685914.5605	5401066.6590
C	1685920.6331	5401068.5763
D	1685922.6099	5401066.7611
E	1685919.3073	5401062.6575
F	1685924.5044	5401064.5690
G	1685941.8567	5401033.9889
H	1685945.9049	5401037.1729
I	1685946.9367	5401028.8441
J	1685949.5435	5401033.2600
K	1685953.7772	5401025.8076
L	1685954.5579	5401030.9112
M	1685984.5645	5401022.1271
N	1685985.1772	5401027.2551
O	1686002.1159	5401024.7039
P	1685999.7330	5401029.4582
Q	1686014.1692	5401040.8654
R	1686008.7148	5401041.5757
S	1686012.3304	5401052.3531
T	1686003.8027	5401054.2945
U	1686005.0931	5401060.2861
V	1685989.4868	5401060.6462



Access Road Long section
Scale: H- 1: 500, V-1:100



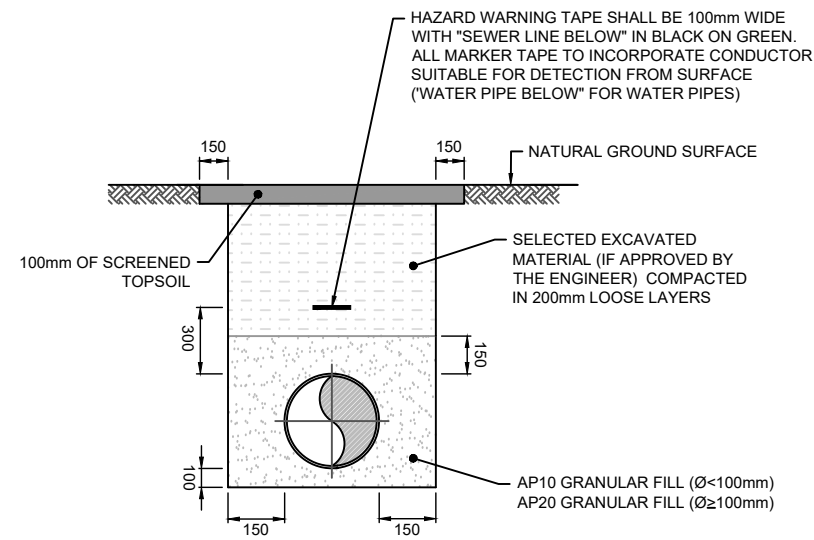
Access Track Long section
Scale: H- 1: 500, V-1:100



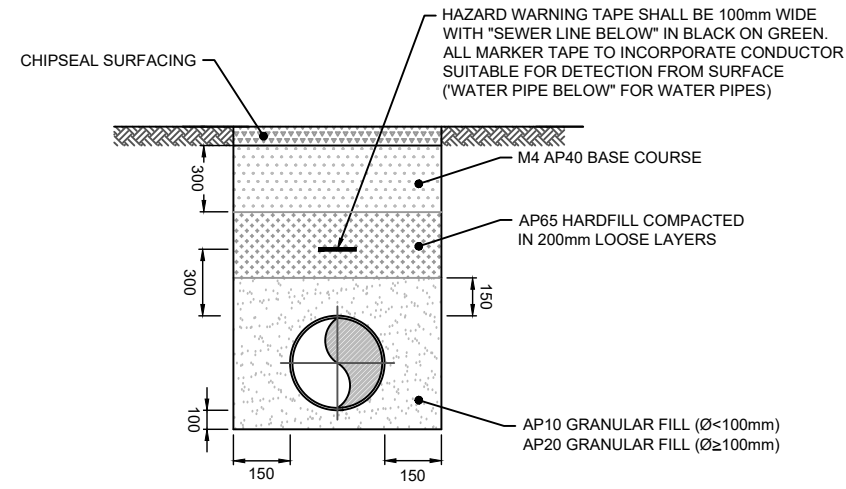
Typical Road Cross Section
Scale - 1:100@A3

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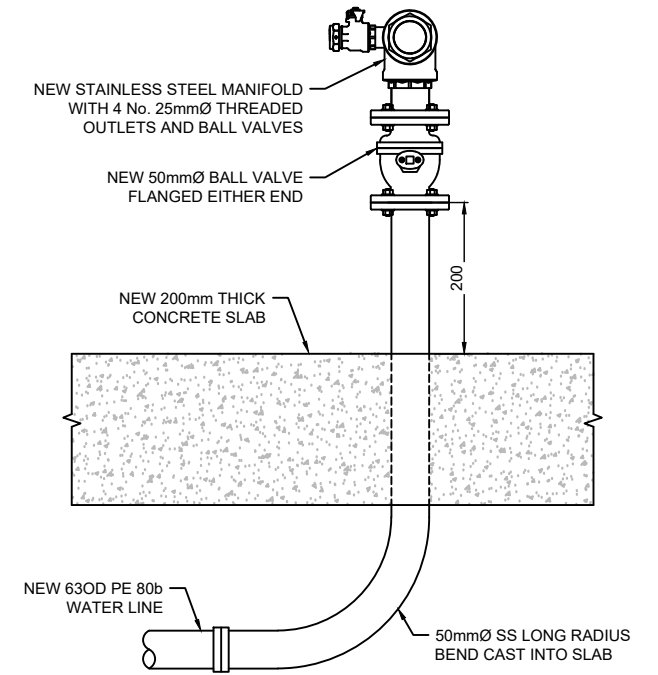
DESIGNED BY	DRAWN	PLAN SIZE
DA/BM	BM	A3
DESIGN CHECK	M.D.C. DRAWING NO.	
SDo	2/622 Sht 6	
SCALES		



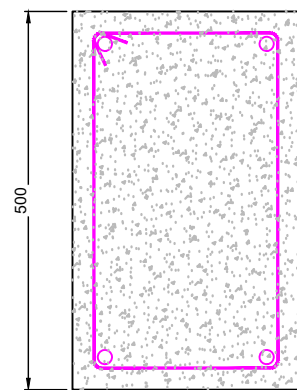
GRASSED AREA TRENCH DETAIL
SCALE (NTS)



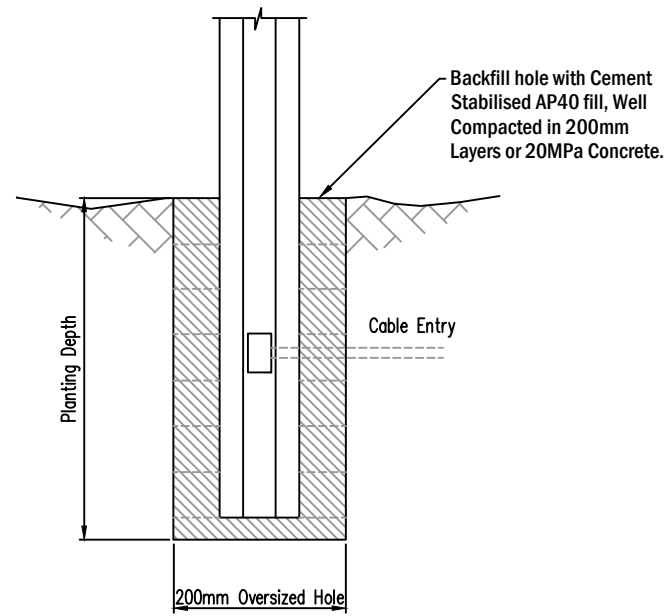
TRENCH DETAIL (EXCEPT GRASSED AREA)
SCALE (NTS)



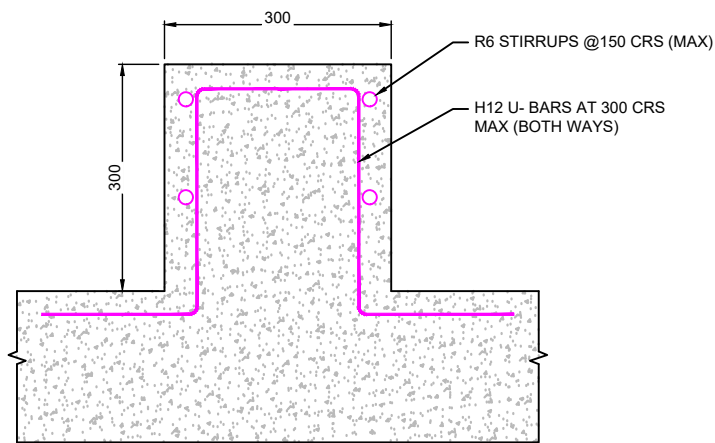
DETAIL A - WATER SUPPLY CONNECTION POINT
SCALE 1:10



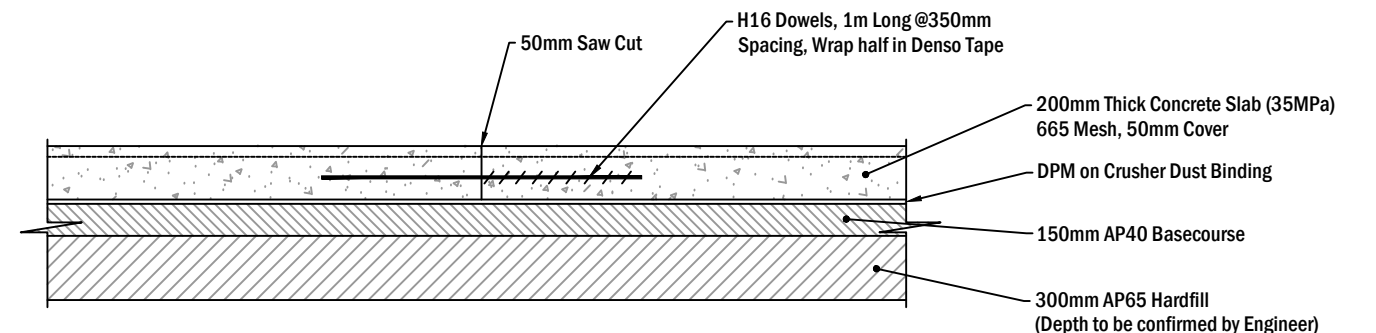
PLAN
SCALE 1:10



TYPICAL LAMP POST FOUNDATION
SCALE (NTS)



TYPICAL PLINTH DETAIL - SECTION
SCALE 1:10



TYPICAL SLAB JOINT DETAILS
SCALE (NTS)

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DESIGNED BY	DRAWN	PLAN SIZE
DA/BM	BM	A3
DESIGN CHECK	M.D.C. DRAWING NO.	
SDo	2/622 Sht 7	
SCALES		

C

Appendix C – Nitrogen Loading in Irrigation Area

Segment	Segment Area (ha)	Feb 2022 (kg/ha)	Mar 2022 (kg/ha)	Total for 2021/2022 (kg/ha)
DLA-01	1.6	14.8	0.0	14.8
DLA-02	1.4	33.8	0.0	33.8
DLA-03	2.5	16.7	0.0	16.7
DLA-04	2	17.3	13.3	30.7
DLA-05	3.7	18.8	14.4	33.2
DLA-06	1.4	24.8	19.0	43.8
DLA-07	5.4		0.0	0.0
KLA-01 Nth	8.8	22.6	0.0	22.6
KLA-01 Sth	8.7		18.7	18.7
KLA-02 Nth	9.8	8.1	0.0	8.1
KLA-02 Sth	9.8		14.1	14.1
KLA-03 Nth	6.6		0.0	0.0
KLA-03 Sth	6		0.0	0.0
KLA-04 Nth	4.4		0.0	0.0
KLA-04 Sth	4.4		0.0	0.0
KLA-05	5.5		0.0	0.0
KLA-06 Nth	10.5	12.4	0.0	12.4
KLA-06 Sth	6.1	0.8	15.4	16.2
KLA-07	8.6		0.0	0.0
KLA-08 Nth	7.4		0.0	0.0
KLA-08 Sth	8.3		0.0	0.0
KLA-09 Nth	2.3		0.0	0.0
KLA-09 Sth	2.1		0.0	0.0
KLA-10 Nth	1.9		0.0	0.0
KLA-10 Sth	1.9		0.0	0.0
KLA-11 Nth	1.1		0.0	0.0
KLA-11 Sth	1.3		0.0	0.0
KLA-12 East	2.7		0.0	0.0
KLA-12 West	1.8		0.0	0.0
KLA-13 East	6.2		0.0	0.0
KLA-13 West	4.1		0.0	0.0
KLA-14	11.3	14.0	11.9	25.9

D

Appendix D – Outfall Inspection Report

Annual Inspection of the OLD & NEW MDC Wairau Bar Effluent Pipelines

5th April 2022

0800 Mobilised gear in the yard Re-did Work Safe dive permit and spoke with Rob Addis

0900 till 1000 not on the clock waiting on Diver

1000 to 1300 Pack, load and travel to site

1300 to 1530 On site dive inspection

- The 20mm chain on the Old Float is down to 10mm in the seats

1530 to 1600 Travel

1600 to 1700 Unpack and demobilise dive gear

- **Marker buoy condition** – Gave the buoy a good clean and it is in good condition
- **Anode condition**..... No anodes visible on the pipeline, must be buried under the riverbed still.
- **Signage condition**..... Good condition
- **Coating & chain condition**...Chain is all ok on the New Mooring Buoy, but the old Buoy chain is down from 20mm to 12 mm in the seats. This needs to be replaced very soon.
- **Discharge Nozzle condition**... On the new pipeline nozzle there is a 250mm to 300mm log/tree across the front of it. Lots of debris on both sides as the log enters both sides of the crater. The log is hard against one side of the nozzle and about 300mm away from the other side.
- **Seabed condition surrounding nozzle** – nozzle is in a sand crater that the discharge keeps open – surrounded by sand and sticks
- **Pipe condition**...New pipe condition but the old pipe is very thin and brittle as per attached photo. We could cut this back to a more solid edge if you want.
- **Establish length of pipe not covered by seabed material** – just the end flange on the new pipe and only 400mm exposed on the old pipe.

- **Material entangled around the pipe support:** No supports or pedestal can be seen or felt. Debris building up around the new pipe from the log been stuck.
- **What sort of entanglement...** Sand, mud, sticks and the tree/log.

Please advise on any major repairs required:

1. Replace chain on the old pipe marker Buoy
2. Cut out the log jammed against the new pipe.
3. Look at cutting the edge of the old pipe where it is very brittle so it doesn't get crushed but would need more trash pumping to have more pipe exposed



Repairs Completed

7th April 2022

0700 to 0830 Mobilisation of SSBA gear and Vessel

0830 to 0900 Travel to site

0900 to 0940 Load and launch vessel

0940 to 1500 Dive operation

- Cut log off the end of the new pipeline. Started water lancing the old pipeline to remove and replace the mooring buoy chain.

1500 to 1530 Travel back to Picton

1530 to 1700 Unpack and demobilise dive gear. Prepare for Day three.

8th April 2022

0700 to 0800 Mobilisation of SSBA Gear

0800 to 0830 Travel to site

0830 to 0930 Launch vessel and load gear

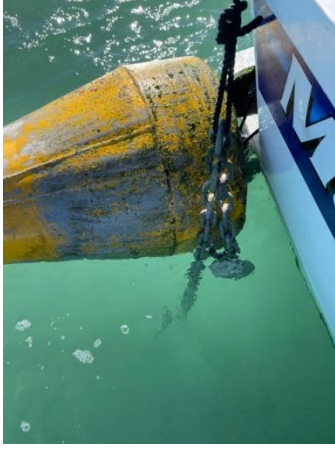
0930 to 1700 Dive operation

- Water lanced 3.5m of pipeline out of 1.5m of riverbed to replace chain tackle on marker buoy.
- Fitted 7m of 12mm galv chain using 2x 16mm galv shackles.
- Fitted two anodes.
- Attempted to cut off the brittle end of the old pipeline using broco gear, however the hole was backfilling too fast.

1700 to 1730 Travel to Picton

8th April 2022

1730 to 2100 Demobilisation of gear - 5 hours combined total



E

Appendix E – Flow Monitoring Data

BSTP Outfall Flow

Date	BSTP m3/d
1/07/2021	31398
2/07/2021	31383
3/07/2021	31271
4/07/2021	28641
5/07/2021	22751
6/07/2021	21479
7/07/2021	22442
8/07/2021	23120
9/07/2021	22461
10/07/2021	20332
11/07/2021	17950
12/07/2021	15587
13/07/2021	15920
14/07/2021	15934
15/07/2021	19158
16/07/2021	20124
17/07/2021	25645
18/07/2021	10813
19/07/2021	37970
20/07/2021	36933
21/07/2021	43927
22/07/2021	46625
23/07/2021	42718
24/07/2021	37805
25/07/2021	33789
26/07/2021	38689
27/07/2021	37176
28/07/2021	37378
29/07/2021	33612
30/07/2021	34420
31/07/2021	36281
1/08/2021	34225
2/08/2021	36331
3/08/2021	32280
4/08/2021	31741
5/08/2021	31644
6/08/2021	35630
7/08/2021	31592
8/08/2021	37719
9/08/2021	27284
10/08/2021	31447
11/08/2021	29693
12/08/2021	27440
13/08/2021	30855
14/08/2021	31411
15/08/2021	31977
16/08/2021	31931
17/08/2021	31721
18/08/2021	31548
19/08/2021	31664
20/08/2021	31675
21/08/2021	31738
22/08/2021	29832
23/08/2021	27020
24/08/2021	27031
25/08/2021	27010
26/08/2021	27060
27/08/2021	28418
28/08/2021	31063
29/08/2021	31024
30/08/2021	31124
31/08/2021	31294
1/09/2021	31289
2/09/2021	31290
3/09/2021	31269
4/09/2021	31146
5/09/2021	27249
6/09/2021	23881
7/09/2021	21615
8/09/2021	20510
9/09/2021	23360
10/09/2021	24422
11/09/2021	21547
12/09/2021	24295
13/09/2021	22121
14/09/2021	23515
15/09/2021	21808
16/09/2021	21289
17/09/2021	22353
18/09/2021	19532
19/09/2021	15549
20/09/2021	19431
21/09/2021	15779
22/09/2021	16659
23/09/2021	16833
24/09/2021	21574
25/09/2021	23768
26/09/2021	27923
27/09/2021	27923
28/09/2021	23824

Date	BSTP m3/d
29/09/2021	20019
30/09/2021	18899
1/10/2021	16774
2/10/2021	17421
3/10/2021	16854
4/10/2021	17647
5/10/2021	18670
6/10/2021	18829
7/10/2021	15782
8/10/2021	16526
9/10/2021	14420
10/10/2021	17025
11/10/2021	18092
12/10/2021	16895
13/10/2021	17265
14/10/2021	12829
15/10/2021	17473
16/10/2021	16383
17/10/2021	16782
18/10/2021	16941
19/10/2021	18070
20/10/2021	17317
21/10/2021	15512
22/10/2021	13654
23/10/2021	15364
24/10/2021	15547
25/10/2021	15917
26/10/2021	15732
27/10/2021	15014
28/10/2021	15229
29/10/2021	16270
30/10/2021	17639
31/10/2021	19828
1/11/2021	20061
2/11/2021	19449
3/11/2021	18787
4/11/2021	15993
5/11/2021	12784
6/11/2021	4930
7/11/2021	8114
8/11/2021	9657
9/11/2021	13261
10/11/2021	13363
11/11/2021	13396
12/11/2021	13653
13/11/2021	13321
14/11/2021	13208
15/11/2021	13031
16/11/2021	14656
17/11/2021	14617
18/11/2021	10884
19/11/2021	24169
20/11/2021	18006
21/11/2021	14061
22/11/2021	12166
23/11/2021	14943
24/11/2021	17087
25/11/2021	16211
26/11/2021	14737
27/11/2021	13484
28/11/2021	19207
29/11/2021	16150
30/11/2021	17832
1/12/2021	16934
2/12/2021	16001
3/12/2021	12331
4/12/2021	12265
5/12/2021	11706
6/12/2021	10819
7/12/2021	13285
8/12/2021	17643
9/12/2021	17926
10/12/2021	16383
11/12/2021	15511
12/12/2021	14747
13/12/2021	13774
14/12/2021	14412
15/12/2021	17650
16/12/2021	19550
17/12/2021	20851
18/12/2021	19614
19/12/2021	16397
20/12/2021	14246
21/12/2021	11352
22/12/2021	10125
23/12/2021	11266
24/12/2021	11797
25/12/2021	11734
26/12/2021	11139
27/12/2021	10475

Date	BSTP m3/d
28/12/2021	10902
29/12/2021	13585
30/12/2021	12708
31/12/2021	13261
1/01/2022	5936
2/01/2022	16032
3/01/2022	12448
4/01/2022	10484
5/01/2022	7932
6/01/2022	9499
7/01/2022	11048
8/01/2022	10623
9/01/2022	10594
10/01/2022	10495
11/01/2022	10572
12/01/2022	10581
13/01/2022	11028
14/01/2022	10096
15/01/2022	9934
16/01/2022	10278
17/01/2022	9890
18/01/2022	10221
19/01/2022	8340
20/01/2022	6889
21/01/2022	5789
22/01/2022	
23/01/2022	
24/01/2022	
25/01/2022	
26/01/2022	3272
27/01/2022	10269
28/01/2022	6485
29/01/2022	10490
30/01/2022	10990
31/01/2022	11100
1/02/2022	10212
2/02/2022	9993
3/02/2022	7005
4/02/2022	5747
5/02/2022	10059
6/02/2022	16584
7/02/2022	19795
8/02/2022	18449
9/02/2022	17850
10/02/2022	16879
11/02/2022	15968
12/02/2022	19319
13/02/2022	27709
14/02/2022	13970
15/02/2022	25150
16/02/2022	24498
17/02/2022	24435
18/02/2022	24322
19/02/2022	19394
20/02/2022	20487
21/02/2022	21148
22/02/2022	20457
23/02/2022	18914
24/02/2022	16245
25/02/2022	14964
26/02/2022	15841
27/02/2022	14529
28/02/2022	13636
1/03/2022	13734
2/03/2022	13752
3/03/2022	11977
4/03/2022	9812
5/03/2022	8884
6/03/2022	8868
7/03/2022	10408
8/03/2022	11019
9/03/2022	12080
10/03/2022	13460
11/03/2022	12474
12/03/2022	13205
13/03/2022	13133
14/03/2022	11871
15/03/2022	11209
16/03/2022	11440
17/03/2022	12143
18/03/2022	12443
19/03/2022	10598
20/03/2022	8174
21/03/2022	8230
22/03/2022	12376
23/03/2022	16767
24/03/2022	17533
25/03/2022	17105
26/03/2022	17353
27/03/2022	15486

Date	BSTP m3/d
28/03/2022	14485
29/03/2022	13065
30/03/2022	12863
31/03/2022	13390
1/04/2022	13427
2/04/2022	11284
3/04/2022	12190
4/04/2022	10458
5/04/2022	10542
6/04/2022	13379
7/04/2022	14750
8/04/2022	14625
9/04/2022	14849
10/04/2022	12095
11/04/2022	14544
12/04/2022	14476
13/04/2022	14592
14/04/2022	13592
15/04/2022	13343
16/04/2022	13052
17/04/2022	12429
18/04/2022	11798
19/04/2022	9325
20/04/2022	7770
21/04/2022	9348
22/04/2022	13493
23/04/2022	13678
24/04/2022	12949
25/04/2022	12248
26/04/2022	12514
27/04/2022	12025
28/04/2022	12287
29/04/2022	12388
30/04/2022	12099
1/05/2022	11891
2/05/2022	12144
3/05/2022	9652
4/05/2022	9268
5/05/2022	8880
6/05/2022	11597
7/05/2022	12531
8/05/2022	12617
9/05/2022	12193
10/05/2022	14513
11/05/2022	13806
12/05/2022	14101
13/05/2022	13884
14/05/2022	13513
15/05/2022	13890
16/05/2022	14508
17/05/2022	14762
18/05/2022	12682
19/05/2022	9578
20/05/2022	10649
21/05/2022	14586
22/05/2022	14345
23/05/2022	13918
24/05/2022	13464
25/05/2022	13430
26/05/2022	13466
27/05/2022	13076
28/05/2022	12779
29/05/2022	12682
30/05/2022	13585
31/05/2022	14445
1/06/2022	13994
2/06/2022	14668
3/06/2022	15083
4/06/2022	14808
5/06/2022	17836
6/06/2022	15445
7/06/2022	15337
8/06/2022	14870
9/06/2022	18670
10/06/2022	20952
11/06/2022	22069
12/06/2022	21534
13/06/2022	21536
14/06/2022	21496
15/06/2022	19646
16/06/2022	17000
17/06/2022	15539
18/06/2022	14541
19/06/2022	15407
20/06/2022	18411
21/06/2022	16206
22/06/2022	16010
23/06/2022	15835
24/06/2022	15706
25/06/2022	15513
26/06/2022	15213
27/06/2022	14839
28/06/2022	15514
29/06/2022	17307
30/06/2022	16709

TOTAL (m3) 6,356,026

Irrigation to land, from Pond 6 outlet

Date	Irrigation Line	Applied(m³)
3/02/2022	DLA-06	124
3/02/2022	DLA-05	248
3/02/2022	DLA-04	124
3/02/2022	DLA-03	191
3/02/2022	DLA-02	191
3/02/2022	DLA-01	95
3/02/2022	KLA-14	496
3/02/2022	KLA-06 Sth	316
3/02/2022	KLA-02 Nth	496
3/02/2022	KLA-01 Nth	509
4/02/2022	KLA-06 Nth	1197
4/02/2022	KLA-01 Nth	1772
5/02/2022	DLA-06	285
5/02/2022	DLA-05	570
5/02/2022	DLA-04	285
5/02/2022	DLA-03	510
5/02/2022	DLA-02	510
5/02/2022	DLA-01	255
6/02/2022	KLA-06 Nth	1226
6/02/2022	KLA-01 Nth	1806
6/02/2022	KLA-14	1297
7/02/2022	KLA-14	1457
7/02/2022	DLA-06	288
7/02/2022	DLA-05	576
7/02/2022	DLA-04	288
7/02/2022	DLA-03	360
7/02/2022	DLA-02	721
7/02/2022	DLA-01	360
9/02/2022	DLA-06	270
9/02/2022	DLA-05	541
9/02/2022	DLA-04	270
9/02/2022	DLA-03	576
9/02/2022	DLA-02	576
9/02/2022	DLA-01	288
9/02/2022	KLA-14	1458
10/02/2022	KLA-06 Nth	1245
10/02/2022	KLA-01 Nth	1845
11/02/2022	KLA-14	1450
11/02/2022	KLA-06 Nth	1260
12/02/2022	KLA-01 Nth	1836
13/02/2022	DLA-06	282
13/02/2022	DLA-05	565
13/02/2022	DLA-04	282
13/02/2022	DLA-03	576
13/02/2022	DLA-02	576
13/02/2022	DLA-01	288
14/02/2022	KLA-06 Nth	1247
14/02/2022	KLA-02 Nth	1409
15/02/2022	KLA-01 Nth	1837
15/02/2022	DLA-06	289
15/02/2022	DLA-05	579
15/02/2022	DLA-04	289

Date	Irrigation Line	Applied(m³)
15/02/2022	DLA-03	576
15/02/2022	DLA-02	576
15/02/2022	DLA-01	288
15/02/2022	KLA-14	1460
17/02/2022	KLA-02 Nth	1423
17/02/2022	KLA-01 Nth	1825
18/02/2022	DLA-06	287
18/02/2022	DLA-05	574
18/02/2022	DLA-04	287
18/02/2022	KLA-14	1379
18/02/2022	KLA-06 Nth	1253
22/02/2022	KLA-02 Nth	1865
22/02/2022	KLA-01 Nth	1827
23/02/2022	DLA-06	488
23/02/2022	DLA-05	977
23/02/2022	DLA-04	488
23/02/2022	KLA-06 Nth	1232
24/02/2022	KLA-14	1533
1/03/2022	KLA-01 Sth	1818
1/03/2022	KLA-01 Sth	1818
2/03/2022	KLA-06 Sth	1254
2/03/2022	KLA-02 Sth	1897
3/03/2022	DLA-06	383
3/03/2022	DLA-05	767
3/03/2022	DLA-04	383
3/03/2022	KLA-14	1977
4/03/2022	KLA-01 Sth	1818
5/03/2022	DLA-06	377
5/03/2022	DLA-05	755
5/03/2022	DLA-04	377
5/03/2022	KLA-06 Sth	1250
5/03/2022	KLA-02 Sth	1898
6/03/2022	KLA-14	2386
13/03/2022	KLA-02 Sth	1834
13/03/2022	KLA-01 Sth	1812
14/03/2022	KLA-06 Sth	1253
15/03/2022	DLA-06	250
15/03/2022	DLA-05	501
15/03/2022	DLA-04	250
18/03/2022	KLA-01 Sth	1799
19/03/2022	KLA-14	2337
19/03/2022	KLA-06 Sth	1252
19/03/2022	KLA-02 Sth	1749
20/03/2022	DLA-06	386
20/03/2022	DLA-05	773
20/03/2022	DLA-04	386
21/03/2022	KLA-02 Sth	1693
21/03/2022	KLA-01 Sth	1779
22/03/2022	KLA-06 Sth	1243
28/03/2022	DLA-06	379
28/03/2022	DLA-05	758
28/03/2022	DLA-04	379
29/03/2022	KLA-14	2298

Date	Pond 6 Daily Flow (m3)
3/02/2022	2790
4/02/2022	2969
5/02/2022	2415
6/02/2022	4329
7/02/2022	4050
9/02/2022	3979
10/02/2022	3090
11/02/2022	2710
12/02/2022	1836
13/02/2022	2569
14/02/2022	2656
15/02/2022	5894
17/02/2022	3248
18/02/2022	3780
22/02/2022	3692
23/02/2022	3185
24/02/2022	1533
1/03/2022	3636
2/03/2022	3151
3/03/2022	3510
4/03/2022	1818
5/03/2022	4657
6/03/2022	2386
13/03/2022	3646
14/03/2022	1253
15/03/2022	1001
18/03/2022	1799
19/03/2022	5338
20/03/2022	1545
21/03/2022	3472
22/03/2022	1243
28/03/2022	1516
29/03/2022	2298
TOTAL (m3)	96,994

