

Resource Consent Compliance Report

Ōtaki WWTP 2020/2021

WI21028AP



Prepared for
Kāpiti Coast District Council

30 September 2021

Contact Information

Cardno (NZ) Limited

Company No: 36749 / GST: 42-019-690

Level 5, IBM Building
 25 Victoria Street
 Petone Lower Hutt 5012
 PO Box 38098

www.cardno.com

Phone +64 4 478 0342

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Author(s):




Paola Hernandez

Jared Mayes

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Process Engineer

Senior Process Engineer

Approved By:



Brett Eaton

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Sector Lead – Water Infrastructure

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Executive Summary

This report has been compiled in accordance with the reporting requirements of the Resource Consent Permit No. WGN160002 that allows the Ōtaki Wastewater Treatment Plant (WWTP) to discharge treated effluent to land to a Land Discharge and Treatment Area (LDTA) and contaminants to air from the operation of the plant.

Kāpiti Coast District Council (KCDC) must provide the compliance report for the previous financial year, and present it to the Manager, Environmental Regulation, Greater Wellington Regional Council by 30 September. The period covered in this report is 1 July 2020 to 30 June 2021.

The performance of the LDTA distribution system has been improved through the various upgrades completed during the 2020/2021 financial year including:

- > Replacement of effluent pumps and installation of variable speed drives. This allows the pumps' speeds to be cycled to create different effluent patterns from the laterals, resulting in a more uniform distribution and reducing the risk of ponding.
- > The distribution system has been automated to irrigate one zone at a time (3 laterals) and control the maximum hydraulic application rate of 155mm/day (current maximum discharge volume divided by one zone). Once the maximum volume for that day is delivered, a valve opens to redirect flows to the storage pond.
- > Removal of the three header chambers and replacement of the header pipe.

The new system has been in use for over two months demonstrating successful reduction of ponding and allowing better control and flexibility of the discharge distribution. Additionally, the operations team can now optimise the distribution with the following tools:

- > Automated lateral distribution selection system and ability to manually change order of distribution events
- > Ability to utilise historical data, and optimise future operation based on this more accurate history





As a result of the mechanical upgrades to the LDTA, a new sampling point has been installed providing combined effluent from ponds A and B. Data collected from this sampling point will be included in future reports.

Fencing of the grounds is now completed and perimeter planting is in progress.

A summary of the 2020/2021 performance against the resource consent conditions is provided in Table 1-1 and Table 1-2.

Table 1-1 Monitoring Conditions to Resource Consent

Conditions to Resource Consent		Compliance
General Conditions	1 & 2	●
LDTA Optimisation	3, 4 & 5	●
Operations and Maintenance	6, 7 & 8	●
Maximum Discharge Rate	9 & 10	●
Maintaining Wet Weather Storage	11	●
Wastewater Volume Measurement	12, 13 & 14	●
Monitoring of Pond Effluent Quality	15 & 16*	●
Soluble Carbonaceous BOD	17 a)	●
Total Suspended Solids	17 b)	●
Faecal Coliforms	17 c)	●
Ammoniacal Nitrogen	17 d)	●
Dissolved Reactive Phosphorus	17 e)	●
Monitoring of Groundwater and Spring Water	18	●

Conditions to Resource Consent		Compliance
<i>E. coli</i> and Soluble Inorganic Nitrogen in Bores 4 & 5	19 & 20	
Attenuation Equilibrium, Bores 4, 5 and Spring	21	
Total Nitrogen		
Dissolved Reactive Phosphorus		
<i>E. coli</i>		

*Nitrite was not measured

Table 1-2 Other Conditions















Conditions to Resource Consent		Compliance
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1 Ōtaki Wastewater Treatment Plant

The Ōtaki Wastewater Treatment Plant (WWTP) was granted a revised resource consent permit (WGN160002) to discharge treated effluent to land to a Land Discharge and Treatment Area (LDTA) and contaminants to air from the operation of the plant, in October 2016. As part of this consent, the Kāpiti Coast District Council (KCDC) must provide a compliance report on the performance of the plant against the parameters presented in the permit.

Under condition 43 of this consent, KCDC must provide the compliance report for the previous financial year, and present it to the Manager, Environmental Regulation, Wellington Regional Council by 30 September. The period covered in this report is 1 July 2020 to 30 June 2021.

This report outlines the required consent conditions and reports their status and/or compliance.

2 Compliance Monitoring and Analysis

This section covers conditions 9-21 of the resource consent related to flow and treated effluent / bore quality monitoring and compliance.

2.1 Maximum Discharge Rate

Condition 9 and 10 permits the discharge of treated wastewater from the Ōtaki wastewater treatment plant into the Land Discharge Treatment Area (LDTA), at a maximum rate of 2,820m³/day and 155mm/day application depth.

2.1.1 Compliance

Figure 2-1 shows the flow volume discharged to the LDTA.

Figure 2-1 Treated Effluent Discharged to LDTA

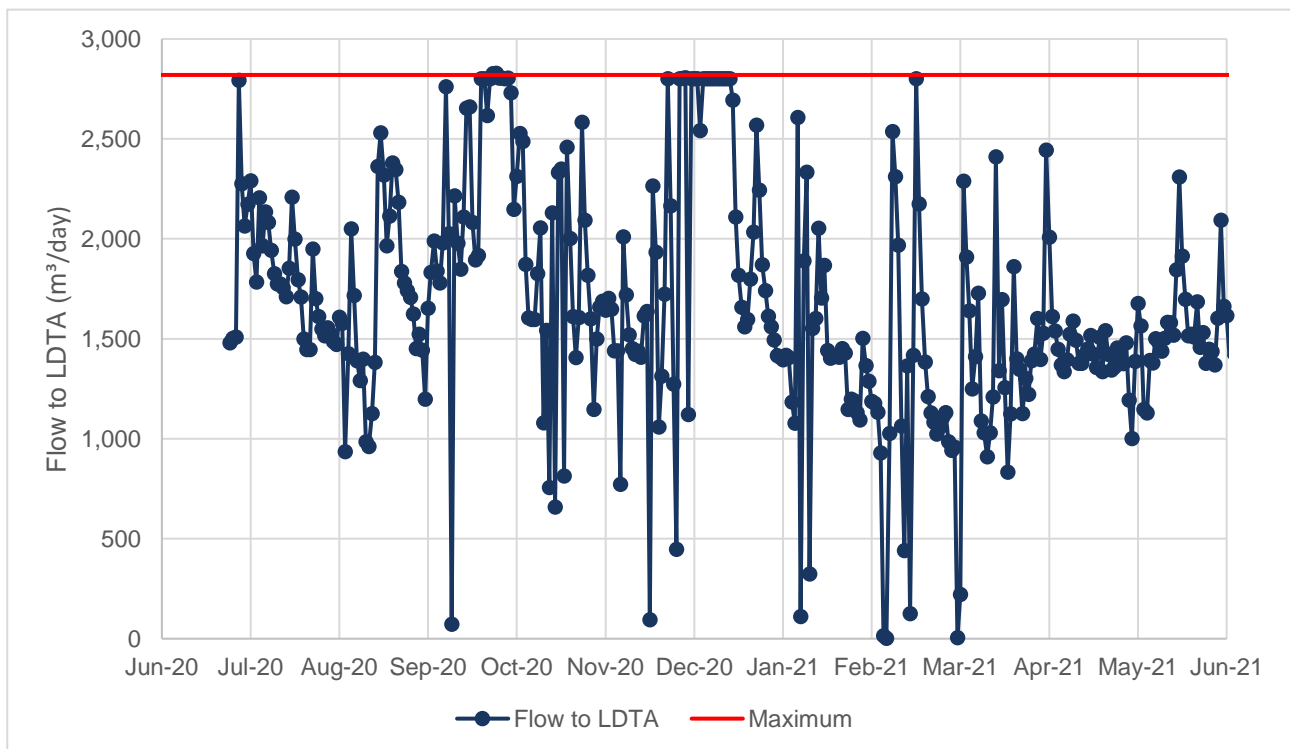


Figure 2-1 demonstrates full compliance with conditions 9 and 10. As demonstrated the control system successfully limits the flow at 2,800 m³/day.

2.2 Wet Weather Storage

Condition 11 requires 5,000m³ of wet weather storage capacity at the site, and assessment of predicted inflow volumes and population.

2.2.1 Compliance

As per condition 11, KCDC's storm flow buffering pond is 5,200m³ and was maintained for use during the compliance period. The pond was kept empty throughout the year, and used only for temporary storm storage events as wet weather conditions and discharge volume dictated.

This consent stipulates that a predicted inflow of 2,090m³/day to the WWTP was calculated based on a Ōtaki resident population of 6,520 in 2035. As stated in the 2019/2020 annual consent compliance report to GWRC, there is a risk that storage is likely to be exceeded before expiry of this consent if Ōtaki's population continues to grow as currently predicted. Investigations are underway to increase storage capacity to ensure that the maximum discharge limit is not exceeded.

2.3 Monitoring of Wastewater Flows

Condition 14 requires daily records of influent wastewater flow, the treated effluent volume discharged to the LDTA and which zones were irrigated.

2.3.1 Compliance

Refer to Appendix A for flow records. Refer to Section 2.1.1 for discussion on the application volume and rate.

2.4 Pond Effluent Quality

According to condition 15, weekly records of dissolved oxygen, weather conditions (temperature), pond appearance and odour, are presented in Appendix A.

Condition 16 of the resource consent require the consent holder to monitor the following parameters:

- > BOD5 (g/m³)
- > Non-filterable residue (suspended solids) (g/m³)
- > E. coli (MPN/100mL)
- > Faecal coliforms (MPN/100mL)
- > Ammonia (g/m³)
- > Nitrate (g/m³)
- > Nitrite (g/m³)
- > Total Nitrogen (g/m³)
- > Total Phosphorus (g/m³)
- > Dissolved Reactive Phosphorus (DRP) (g/m³)
- > pH

From the conditions required in condition 16, the Nitrite parameter was partially monitored during the current period. Since December 2020, KCDC has been measuring nitrite concentrations in the pond effluent, and since July 2020 in the ground water and spring water.

It has been noted that since nitrite (NO₂) is an intermediate oxidation state of nitrogen both in the oxidation of ammonia to nitrate and in the reduction of nitrate, and it is a relatively unstable form of nitrogen, monitoring nitrite concentrations could lead to unreliable measurements. During this period, the nitrite concentrations in the effluent ranged from <0.015g/m³ to 0.075 g/m³ in pond A, and 0.021 g/m³ to 0.153 g/m³ in pond B. The nitrite concentration in the bores continue to be primarily below the test detection limit (<0.015g/m³).

2.4.1 Compliance

The following sub-sections graphically demonstrate compliance with the treated effluent standards for ScBOD, TSS, faecal coliforms, ammoniacal nitrogen and DRP, prior to discharge to the Land Discharge and Treatment Area, as specified in Condition 17.

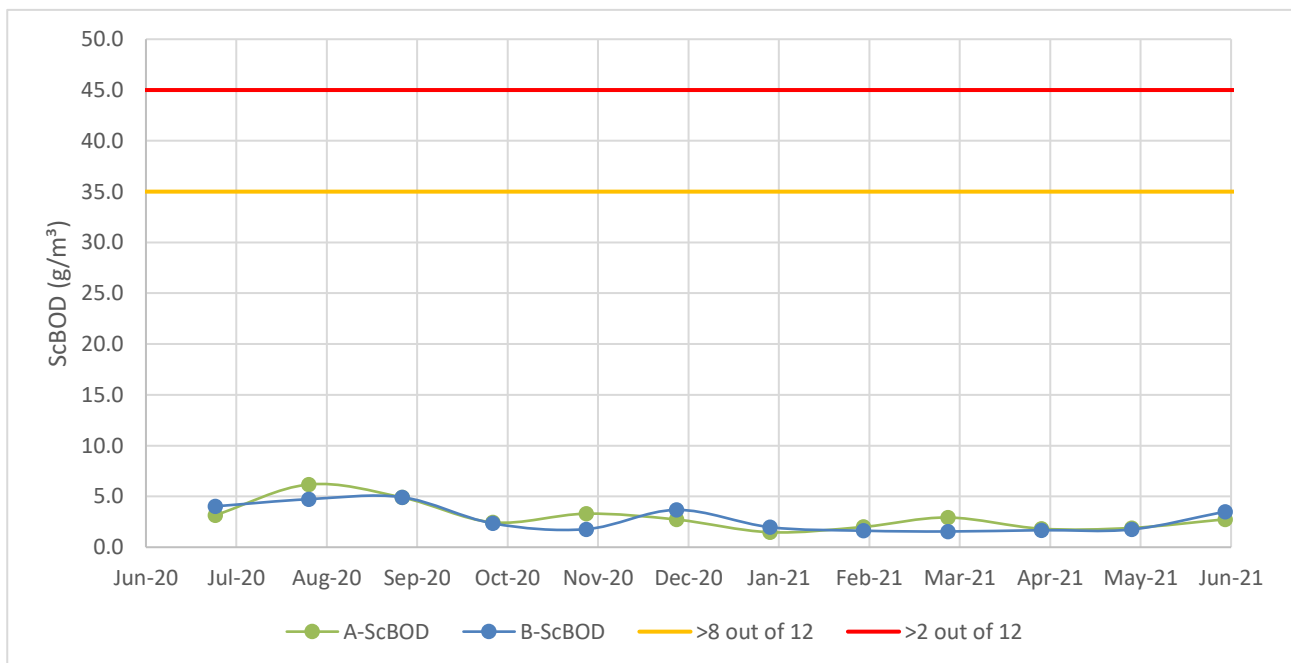
The graphs show the Pond A and Pond B treated effluent quality separately. Compliance is measured at the outlet to the land discharge and treatment area. Since Pond A and Pond B flow by gravity on a combined line to the LDTA and both effluents are monitored individually, each point in the graph represents the average of the two pond effluents to allow compliance assessment against the consent criteria. Compliance limits are drawn on the graph, with the key identifying the number of samples not to exceed that specified concentration (i.e. 2 out of 12, or 8 out of 12). As part of the LDTA upgrade a combined sampling has been installed, in the future compliance reporting will be based on the combined sampling point.¹

It is worth noting that in the coming reports, the samples will be taken from the new combined sampling point installed during the LDTA upgrades.

2.4.1.1 Soluble Carbonaceous Biochemical Oxygen Demand (ScBOD)

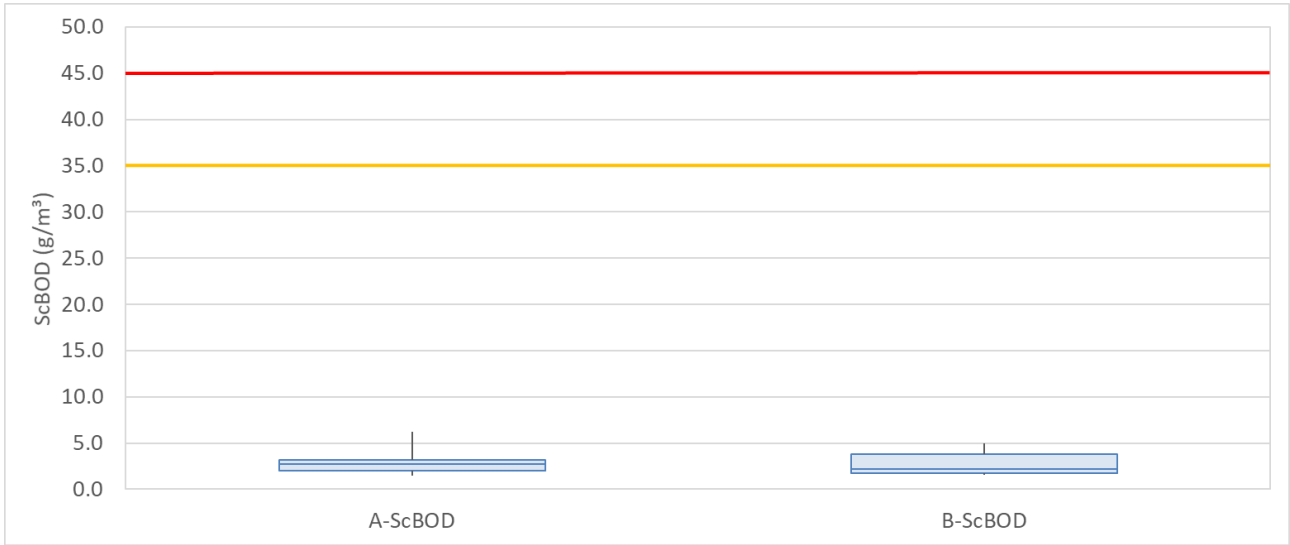
Figure 2-2 and Figure 2-3 demonstrate full compliance in terms of ScBOD5 against permit limits for both Pond A and Pond B.

Figure 2-2 ScBOD Concentration in Pond Effluent



¹ Previous correspondence to GWRC (KCDC letter 27/08/2021) indicated that “analysis of the data gathered, so far, the combined sample point has raised doubts as to how representative this data is”. KCDC is pleased to report that this issue has been resolved through an improved sampling method and the combined sample shows a strong correlation with pond effluent data.

Figure 2-3 ScBOD Concentration in Pond Effluent – Box Plot



2.4.1.2 Total Suspended Solids (TSS)

Figure 2-4 and Figure 2-5 demonstrate full compliance with the TSS conditions for both Pond A and Pond B.

Figure 2-4 TSS Concentration in Pond Effluent

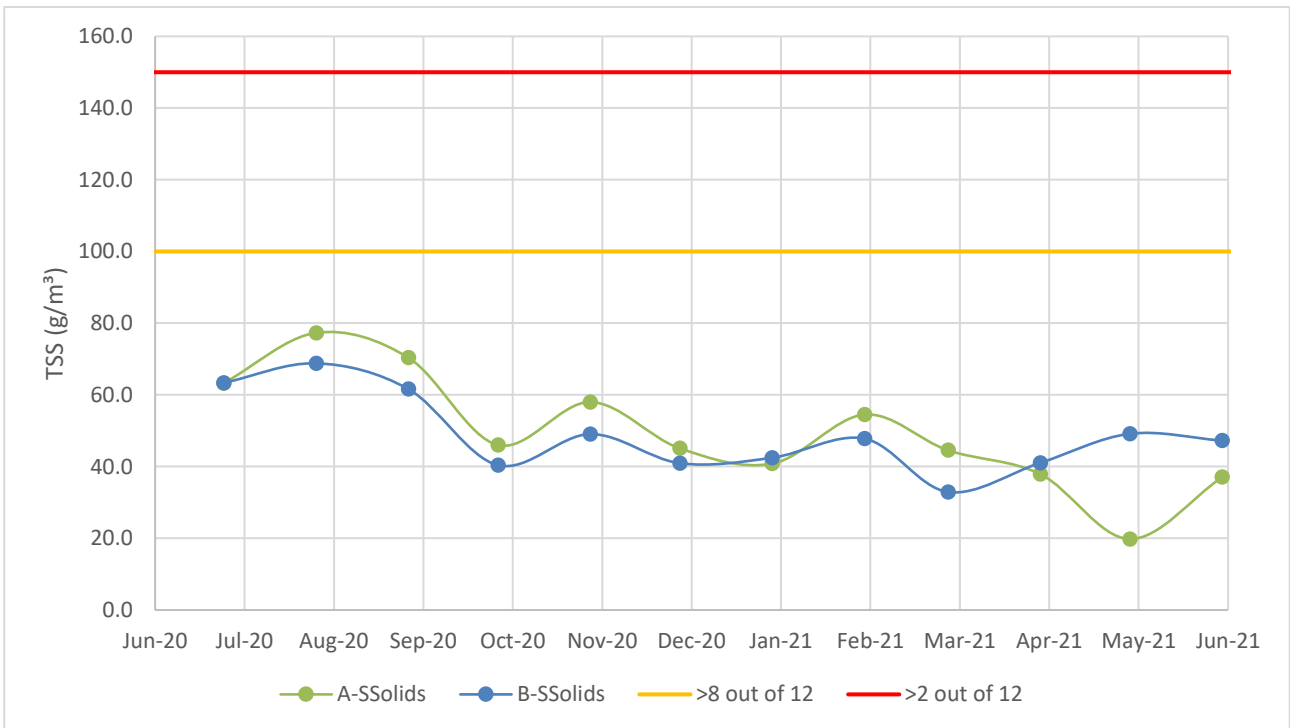
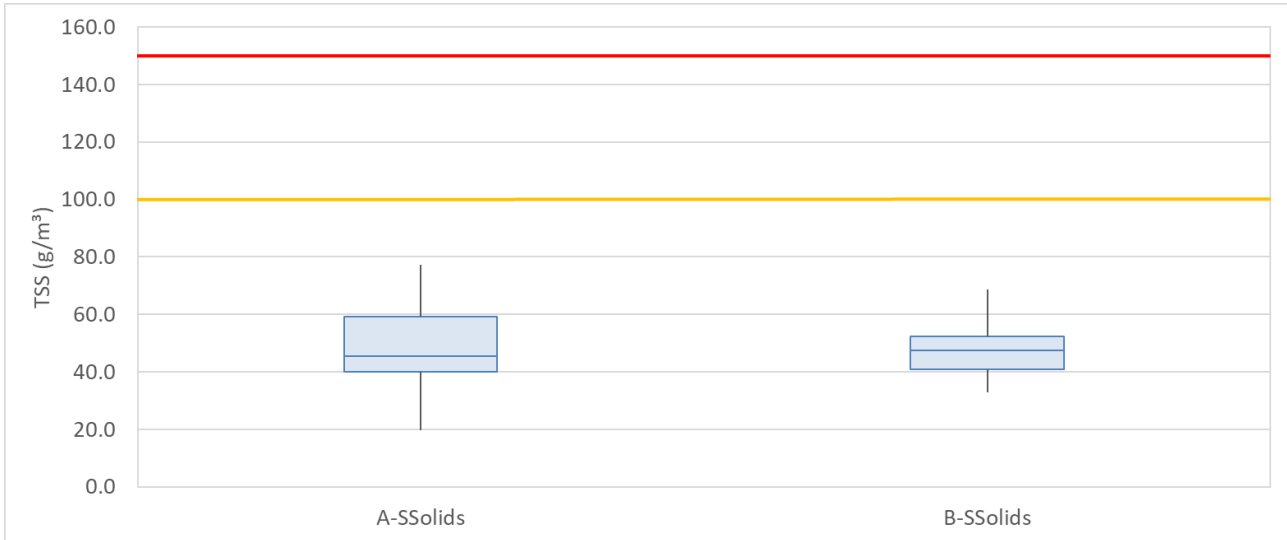


Figure 2-5 TSS Concentration in Pond Effluent – Box Plot



2.4.1.3 Faecal coliforms

Figure 2-6 and Figure 2-7 show overall compliance with the faecal coliform limits with 4 out of 12 exceedances of the lower limit (50,000cfu/100mL) and no exceedances of the upper limit during this period for both Pond A and Pond B.

Figure 2-6 Faecal coliforms Concentration in Pond Effluent

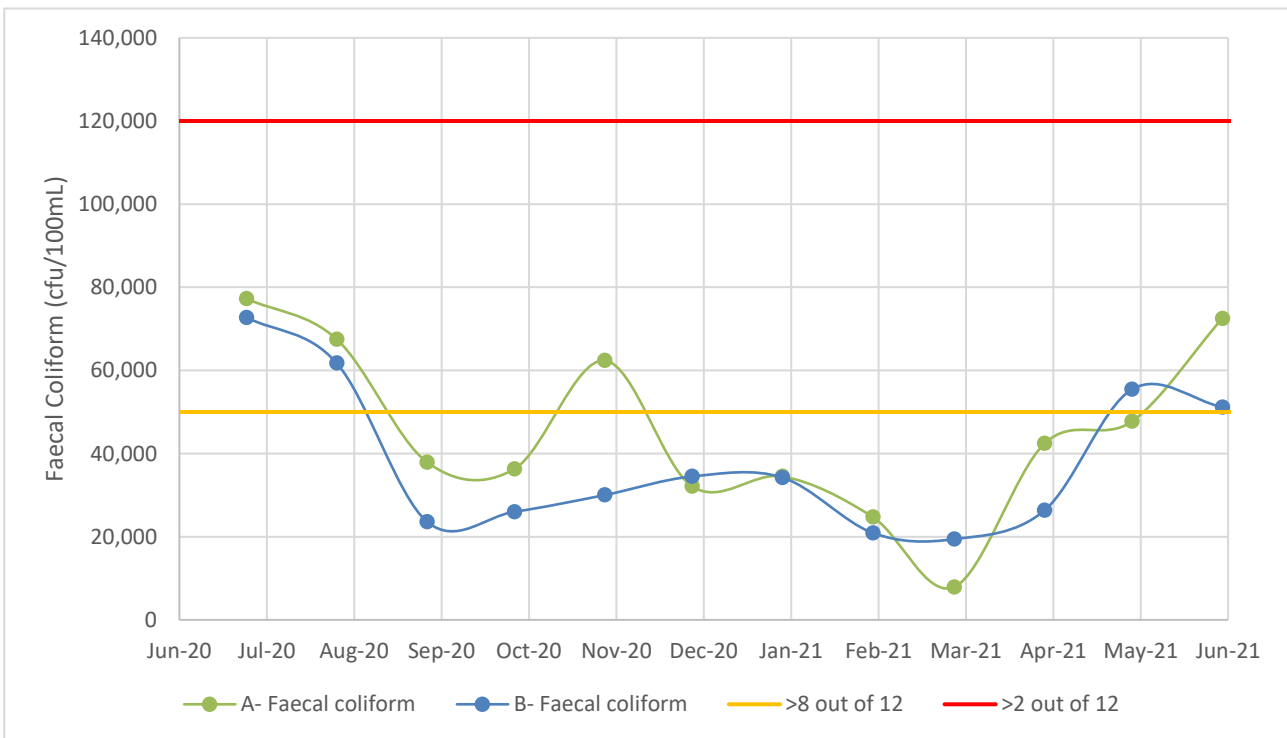
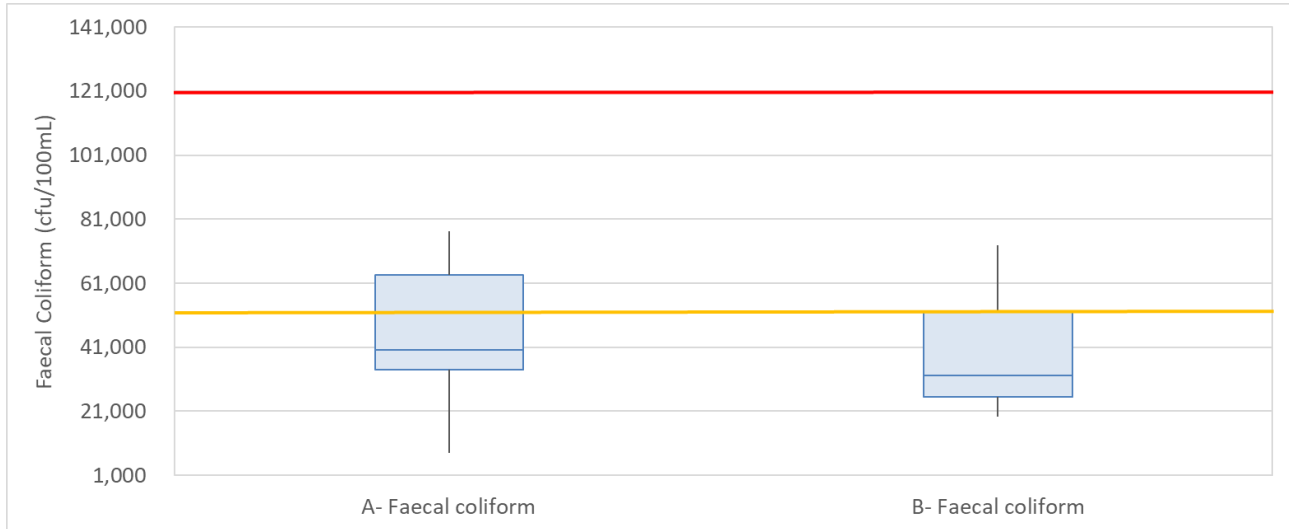


Figure 2-7 Faecal coliforms Concentration in Pond Effluent – Box Plot



2.4.1.4 Ammoniacal Nitrogen

Figure 2-8 and Figure 2-9 show the Ammoniacal Nitrogen concentration in the pond effluent for both Pond A and Pond B.

- > Pond A - the lower limit of 23 g/m³ was exceeded by 7 out of 12 samples (compliant), and the upper limit of 30 g/m³ was exceeded by 4 out of 12 samples (non-compliant).
- > Pond B - the lower limit of 23 g/m³ was exceeded by 8 out of 12 samples (compliant), and the upper limit of 30 g/m³ was exceeded by 1 out of 12 samples (compliant).

Figure 2-8 Ammoniacal Nitrogen Concentration in Pond Effluent

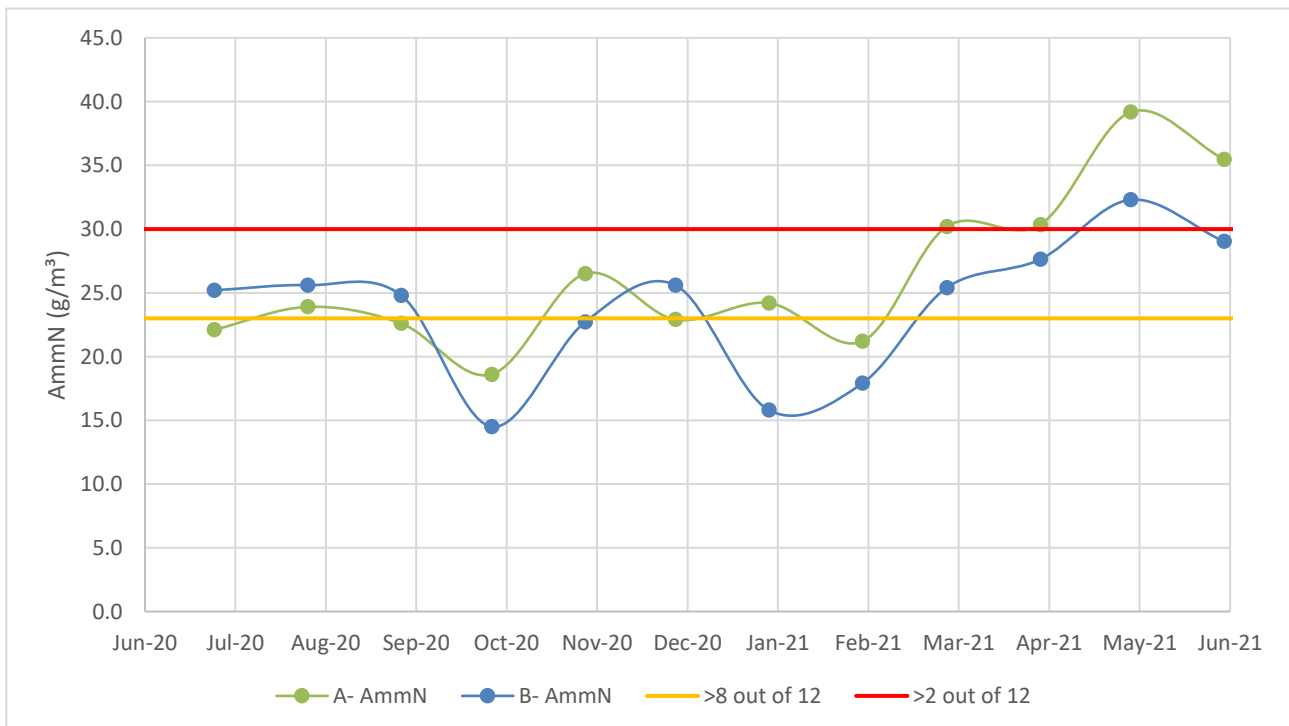
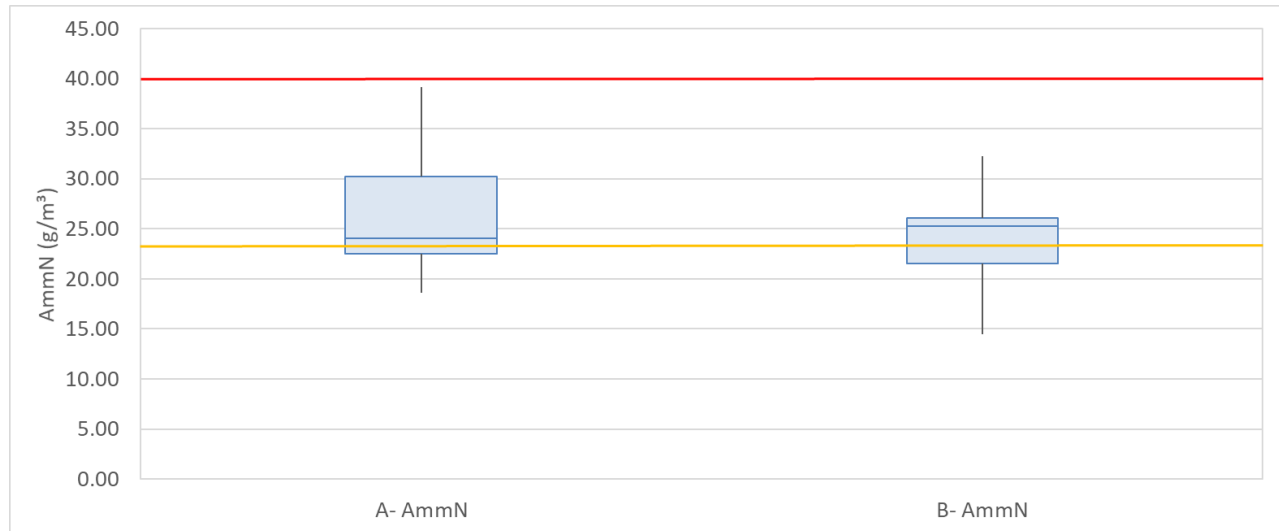


Figure 2-9 Ammoniacal Nitrogen Concentration in Pond Effluent – Box Plot



Investigations into the high ammonia concentrations suggest that:

- > Trade waste issues involving a local manufacturer/supplier, as highlighted in previous compliance reports, continue to be an intermittent issue involving the discharge of:
 - obvious cleaning products (foams, colouring)
 - probable algae removal treatments (affecting oxygenation in Oxidation Ponds A&B).
- > The long-term retention of solid material in the oxidation ponds releases ammonia as volatile organic content degrades.
- > The pond dissolved oxygen content appears to inversely correlated with ammonia levels.

In response to these issues KCDC:

- > Implemented aeration of effluent prior to entering the ponds to improve DO. The results so far show a significant decrease in ammonia. There has been a small increase in the nitrate concentration, however, this is less than the decrease in ammonia (i.e. there appears to be some denitrification occurring in the pond). The results will appear in the next 3 monthly report.
- > Issuing an RFP for the desludging of the ponds to be largely completed this FY.
- > Engaging with manufacturer to minimise discharge of cleaning chemicals and algaecides.

Further discussion is provided in KCDC's response to GWRC regarding high ammonia in the pond effluent provided in Appendix C.

2.4.1.5 Dissolved Reactive Phosphorus (DRP)

Figure 2-10 and Figure 2-11 demonstrate compliance with the DRP conditions, with one exceedance of the lower limit for both ponds.

Figure 2-10 DRP Concentration in Pond Effluent

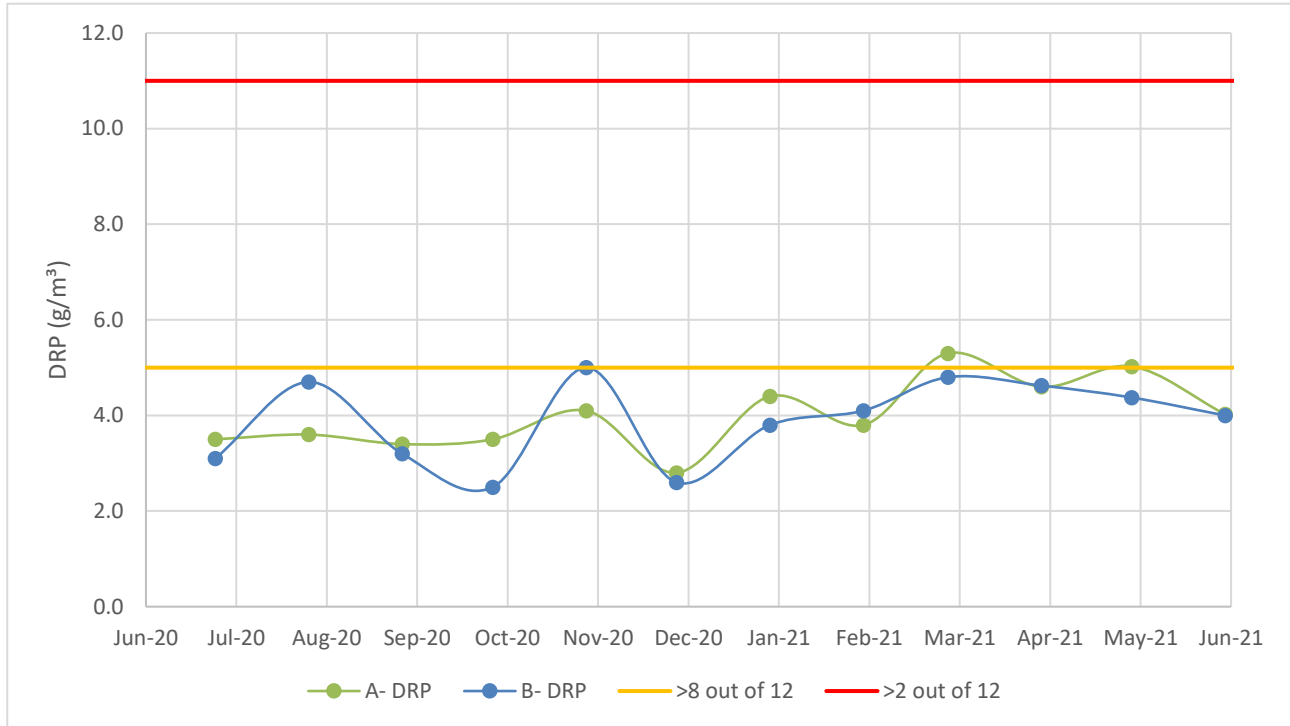
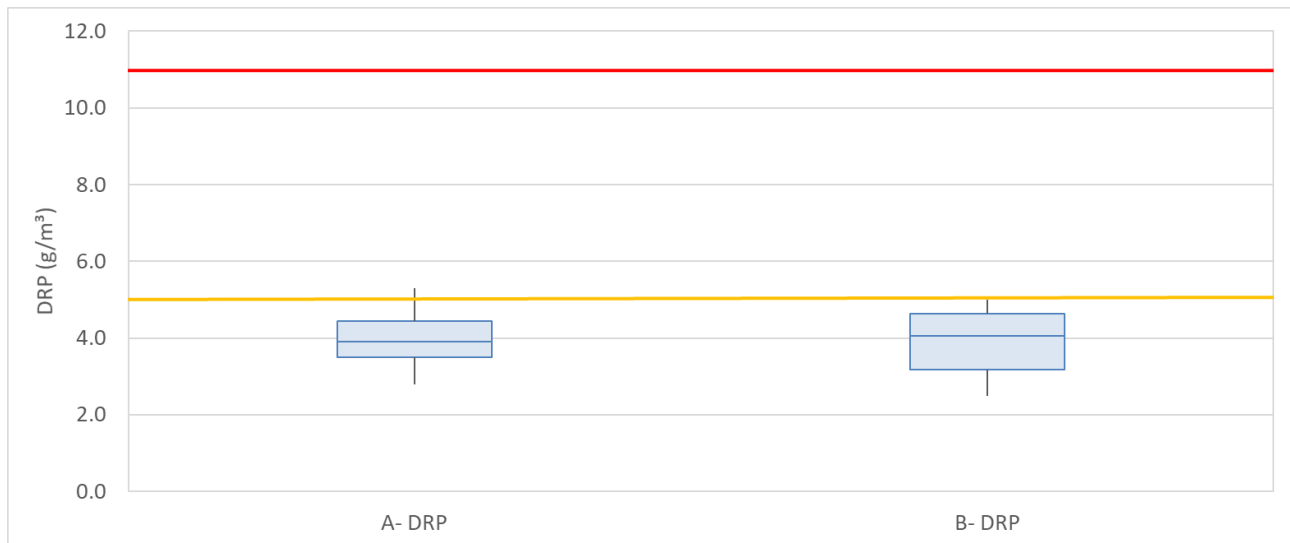


Figure 2-11 DRP Concentration in Pond Effluent – Box Plot



2.5 Ground Water and Spring Water Quality

Condition 18 specifies monitoring of ground water levels and water quality at bores 1, 2, 3, 4, 5, 6, 7 and water quality in the spring, for the following parameters:

- > BOD₅ (g/m³)
- > Chloride (g/m³)
- > E. coli (cfu/100mL)
- > Ammonia (g/m³)
- > Nitrate (g/m³)
- > Nitrite (g/m³)
- > Dissolved Reactive Phosphorus (g/m³)
- > Total Phosphorus (g/m³)

- > Temperature (°C)
- > pH
- > Conductivity (µs/cm at 25°C)

2.5.1 Compliance

Full bore monitoring records are provided in Appendix A.

2.5.2 Compliance - *E. coli* and Soluble Inorganic Nitrogen (Condition 19)

Condition 19 specifies the following limits for water quality monitoring in bores 4 and 5 (from Condition 18):

- > *E. coli* (100 MPN/100ml (100cfu/100mL))
- > Soluble Inorganic Nitrogen (11.3g/m³ as N)

Table 2-1 demonstrates that sampling of bores 4 and 5 were in full compliance with the limits stated by condition 19.

KCDC laboratory monitors *E. coli* levels using the Standard Method 9222D membrane filtration for faecal coliforms. If faecal coliforms are present, the filter is then transferred onto a media to determine if the faecal colonies are *E. coli* (Standard Methods 9222I). Where there is a dash (-) in the data, there were not faecal coliforms present, thus there was not transfer to the media to determine *E. coli* as no colonies were present.

Table 2-1 Water Quality – Bore 4 and 5

Date	Bore OT4		Bore OT5	
	<i>E.coli</i> (cfu/100ml)	Soluble Inorganic Nitrogen (g/m ³)	<i>E.coli</i> (cfu/100ml)	Soluble Inorganic Nitrogen (g/m ³)
22/07/2020	1	2	10	7
27/08/2020	-	1	1	<1
8/09/2020	<1	3	<1	4
16/10/2020	*	1	1	5
11/11/2020	<1	4	12	4
21/12/2020	1	2	25	1
14/01/2021	1	1	<1	1
12/02/2021	* (<1)	<1	13	<1
10/03/2021	1	1	<1	<1
8/04/2021	1	<1	1	<1
25/05/2021	<1	2	5	2
9/06/2021	<1	2	4	4

2.5.3 Compliance – Reporting Non-Compliance (Condition 20)

Condition 20 requires KCDC to notify GWRC of a breach of Condition 19, within 24 hours, and provide an investigation report within 10 working days.

There was no breach during this compliance period, so no notification or report was required.

2.5.4 Compliance – Attenuation Equilibrium (Condition 21)

Condition 21 requires KCDC to monitor, and report on water quality data from bores 4, 5 and surface water spring, against contaminant trigger levels. The specified data is summarised in Table 2-2.

The consent holder has to undertake an investigation into whether the attenuation equilibrium of the soil has been breached if three consecutive monitoring rounds reach the following limits:

- > Total Nitrogen (11.3 g/m³)
- > Dissolved Reactive Phosphorus (0.1 g/m³)
- > *E. coli* (100 cfu/100mL)

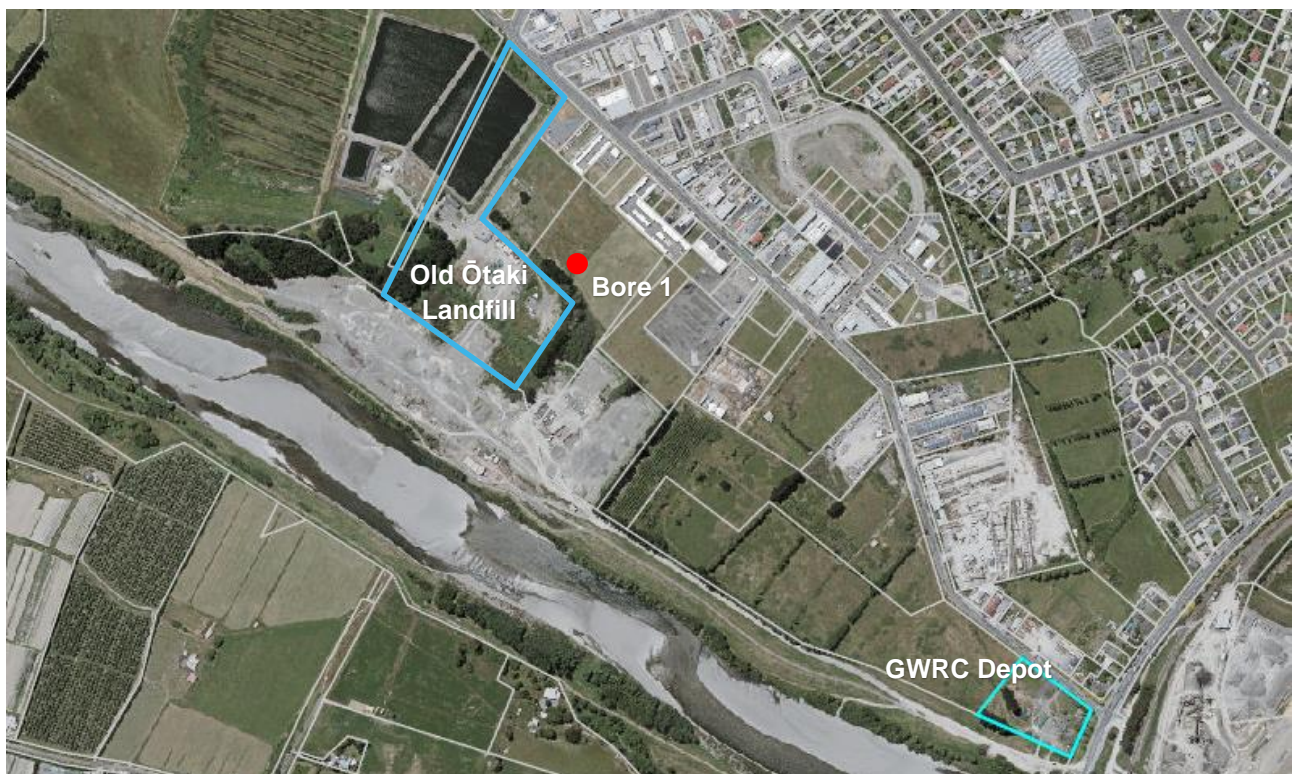
Table 2-2 Bore 4, 5 and Spring Water Quality

Date	Bore OT4			Bore OT5			Spring		
	TN (g/m ³)	DRP (g/m ³)	<i>E.coli</i> (cfu/100ml)	TN (g/m ³)	DRP (g/m ³)	<i>E.coli</i> (cfu/100ml)	TN (g/m ³)	DRP (g/m ³)	<i>E.coli</i> (cfu/100ml)
22/07/2020	2	0.16	1	9	0.26	10	<1	0.02	-
27/08/2020	1	0.08	-	1	0.28	1	<1	0.02	1
08/09/2020	3	0.15	<1	4	0.31	<1	1	0.01	1,370
16/10/2020	2	0.15	*	5	0.26	1	1	0.01	-
11/11/2020	5	0.16	<1	5	0.36	12	3	0.02	29
21/12/2020	2	0.15	1	2	0.79	25	1	0.01	28,000
14/01/2021	1	0.05	1	1	1.61	<1	1	0.01	7,000
12/02/2021	1	0.15	* (<1)	1	0.95	13	<1	0.03	9,000
10/03/2021	2	0.17	1	1	1.36	<1	<1	<0.05	500
08/04/2021	2	0.15	1	<1	1.02	1	<1	<0.05	45
25/05/2021	2	0.17	<1	2	0.53	5	<1	<0.05	21
09/06/2021	3	0.15	<1	5	0.48	4	1	<0.05	7,200

As suggested in GWRC’s 2017-2019 report to KCDC, another bore site is being sought. Previously laboratory staff had spoken to Winston’s Quarry management previously to gain consent to access their onsite bore. However, on closer inspection it was found that the bore was not secure and therefore not suitable. Furthermore, the site recently changed hands and new owners of the quarry do not use the bore and so taking representative samples at this location is not possible. Also, there is a safety risk accessing site with heavy machinery movements.

Consideration is being given to using Bore 1 as a control bore site, however, the degree of contamination from the old landfill site is not known, or Bore 7, which is downstream of the WWTP but outside of the plume. An alternative being considered is approaching the GWRC to dig a control bore at the Depot site on Riverbank Rd, as shown in the figure below. This site is suitably removed from the landfill to provide a representative control sample.

Figure 2-12 Proposed Alternative Control Bore Site



2.5.4.1 Total Nitrogen

The total nitrogen trigger level was not reached in any of the bores or spring.

2.5.4.2 E. Coli

As per discussed in previous reports, the *E. coli* limits were breached during the warmer season from December 2020 to March 2021 with no direct connection between the *E. coli* concentrations in the spring and those in the effluent discharged to the LDTA. It is believed that the following factor contribute to these results:

- > The spring’s flow is usually low and almost non-existent during the summer months. This makes it difficult to get a “clean” sample from the spring as it is often overgrown with weed and the samplers have to move this weed to obtain a sample. This stirs the sediment on the bottom and hence a high bacteria count is measured.
- > The spring is overgrown with weed and frequented by farm animals and waterfowl which may contribute to the high *E.coli* results.

KCDC believes that the *E.coli* limit for the spring is excessively low considering the lack of protection around and the factors listed above. KCDC has recently installed a sampling pot at the stream that will mitigate these issues, as shown in the figure below. The improved results will be available for the next quarterly report.

Figure 2-13 Installed Spring Sample Pot



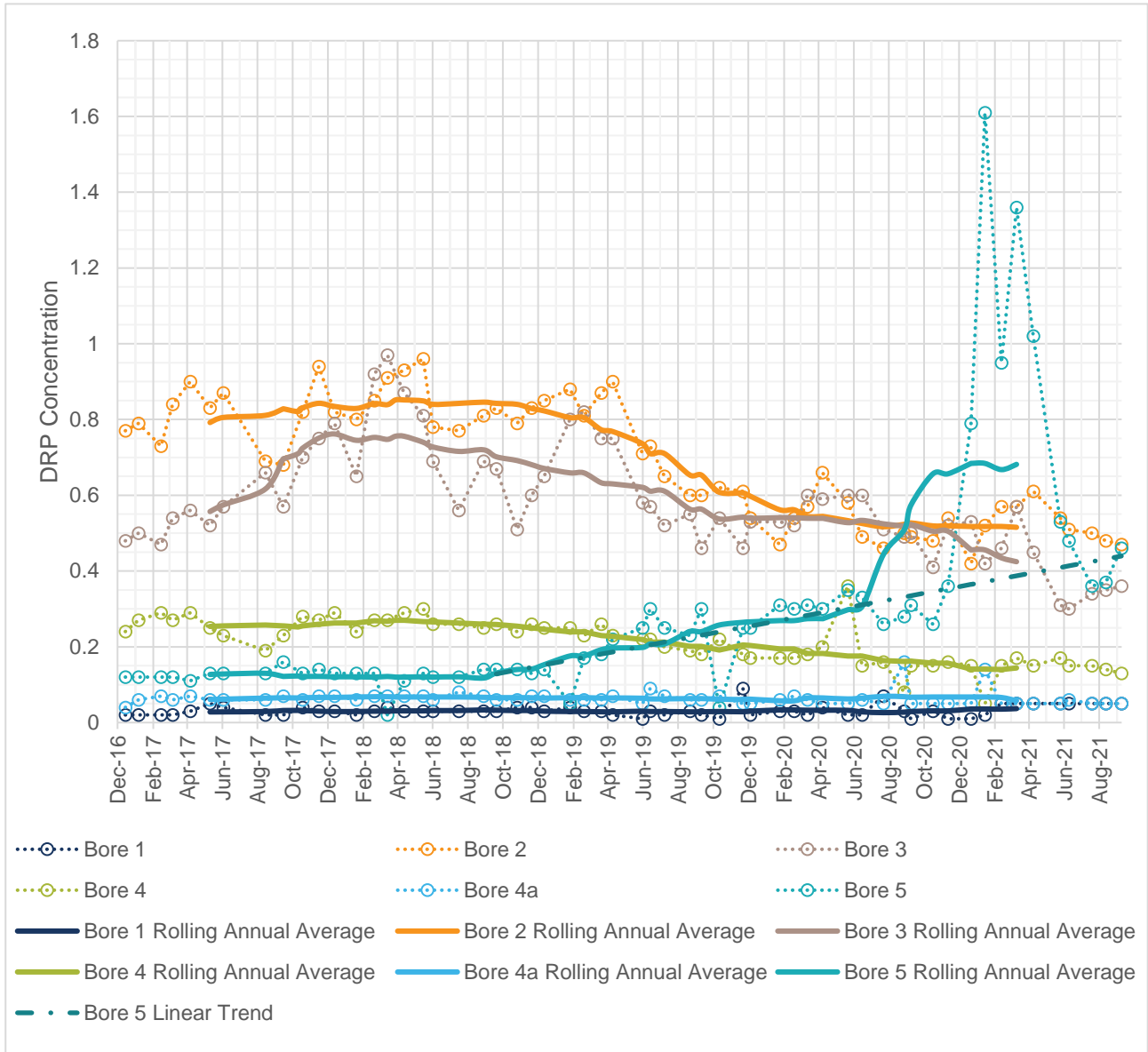
2.5.4.3 Dissolved Reactive Phosphorus

The DRP limit of 0.1g/m³ has been breached in bores 4 and 5, which has been a recurring issue since the new monitoring programme was implemented in 2016. The median DRP value from 2016 to 2021 is 0.23 for bore 4, and 0.15 for bore 5. However, bore 5 has shown a massive increase in the 2020/2021 period with a median of 0.505, while bore 4 showed a reduction in DRP concentration with a median of 0.15 for the same period. This is likely due to the work undertaken during the LDTA throughout, causing a substantial spike in the DRP over the period since November 2020. Data since March 2021 shows a substantial decline in the DRP concentration at Bore 5, as shown in the figure on the following page.

Furthermore, as can be seen, since December 2018 the DRP in Bores 2, 3, and 4 has been constantly improving, whereas the DRP in Bore 5 has been constantly degrading. In December 2018 maintenance works repaired damaged pipes in the distribution pipes closest to Bores 2, 3, and 4. This likely resulted in more even distribution.

In addition to this there was a significant increase in the Bore 5 DRP between December 2020 and April 2021. This was during the construction of the LDTA upgrade, which may have been the cause. As can be seen since April 2021 the results have been decreasing and in line with expectations.

Figure 2-14 Bore DRP Trends



As discussed in previous reports, the DRP limit for the bores needs to be reviewed as they have been consistently exceeding the limit since testing started in 2016. It is worth noting that the LDTA has been operating as a land disposal field since 1978, therefore, it is likely that the DRP concentrations have been fairly stable with no known environmental effects. However, as mentioned in KCDC’s previous annual consent compliance reports, there is no information on groundwater studies prior to the application of this consent in 2016. KCDC is considering alternative options to determine the effect of the discharge, including an investigation to determine if more even LDTA cell effluent distribution resulting from the recent LDTA Upgrades project has resulted in monitoring bores sampling anomalies.

3 Various Items

3.1 LDТА Optimisation Report (KCDC & NHoŌ)

Since 2016 KCDC has been in the process of fulfilling the requirements under conditions 3 and 4, for the assessment and optimisation of the Land Disposal Treatment Area in collaboration with Nga Hapu o Ōtaki.

3.1.1 Compliance

- > The Optimisation Study Report (Condition 3) was completed in February 2018.
- > The Optimisation Study (Condition 3) was prepared by Cardno in collaboration with KCDC and NHoŌ, such that the collaboration required under Condition 4 had already occurred prior to the completion of the Optimisation Study in Condition 3.
- > The Optimisation Study was approved by GWRC in 2019.

3.2 Implementation of Changes to LDТА

Condition 5 requires KCDC to implement changes to the LDТА as per Condition 4.

3.2.1 Compliance

- > Following acceptance of the Optimisation Report, KCDC engaged Cardno for the detail design, tender support, construction administration and project management of the automation of the LDТА.
- > During the 2019/20 FY the LDТА was improved through ground levelling, weed clearing and refurbishment work to effluent dispersion/irrigation lines.
- > During the 2020/21 FY the tendering process and construction of the pumping station upgrades and effluent dispersion network upgrades were completed.

3.3 Operations and Maintenance Manual

Conditions 6-8 refer to the Operations and Maintenance Manual (OMM) for the Ōtaki WWTP. The OMM needs to be updated once the LDТА Optimisation Report has been approved, or at least 3-yearly from 2019 onwards.

3.3.1 Compliance

There have been no further changes to the OMM as the LDТА upgrade was completed in FY 2020/2021. The OMM will be updated and submitted to GWRC.

3.4 Performance and Maintenance of the Distribution System

Condition 24 refers to the operation and maintenance of the distribution system. For infiltration of the discharge area is maintained, KCDC need to ensure:

- > Even distribution across the discharge area, and that effluent is applied to no less than 75% of the area
- > Ensuring there is no ponding in the distribution zones prior to next application, and that any ponding does not exceed 24 hours under dry conditions
- > There is no surface flow redistribution within the discharge area of more than 10m under dry weather flow conditions

3.4.1 Compliance

The performance of the distribution system has been improved through the various upgrades completed during the 2020/2021 financial year including:

- > Replacement of effluent pumps and installation of variable speed drives. This allows the pumps' speeds to be cycled to create different effluent patterns from the laterals, resulting in a more uniform distribution and reducing the risk of ponding.
- > The distribution system has been automated to irrigate one zone at a time (3 laterals) and control the maximum hydraulic application rate of 155mm/day (current maximum discharge volume divided by one

zone). Once the maximum volume for that day is delivered, a valve opens to redirect flows to the storage pond.

- > Removal of the three header chambers and replacement of the header pipe.

The new system has been in use for over two months demonstrating successful reduction of ponding and allowing better control and flexibility of the discharge distribution. Additionally, the operations team can now optimise the distribution with the following tools:

- > Automated lateral distribution selection system and ability to manually change order of distribution events
- > Ability to utilise historical data, and optimise future operation based on this more accurate history

As a result of the mechanical upgrades to the LDTA, a new sampling point has been installed providing combined effluent from ponds A and B. Data collected from this sampling point will be included in future reports.

3.5 Reserve Area for Effluent Discharge

Condition 27 requires the maintenance of 5.45ha of land to be maintained in close proximity to the LDTA for future disposal capacity.

3.5.1 Compliance

KCDC continues to own the field adjacent to the LDTA, which exceeds the plan area.

3.6 Inflow and Infiltration Investigations, Works and Reporting

Condition 28 requires KCDC to continue to investigate and implement ways and means of minimising stormwater inflow and infiltration (I/I) into the sewerage system. Condition 43 (annual report) requires commencement summary of I/I work for the previous 3 years, and a schedule for the next 3 years.

3.6.1 Compliance

Reporting on this condition is not required for the 2020/2021 annual report, however, as a brief update KCDC has completed comprehensive hydraulic modelling of the network and has put in place an upgrade programme in the 2020/21 asset management plan (AMP) to be implemented in the upcoming years.

The previous 2019/20 Network Management Improvement Programme is provided in Appendix B for reference.

3.7 Odour Management

Conditions 29 to 32 refer to odour management at the site.

3.7.1 Compliance

There have been no odour complaints related to the Ōtaki LDTA during the compliance period.

The odour management system has been refurbished during this reporting period.

- > The carbon filter used to treat foul air from the sludge dewatering building was upgraded during July 2020.
- > The biofilter refurbishment included installation of new liner and media in October 2020, and additional media in December 2020 to account for media settlement.

3.8 Planting within the LDTA

Conditions 33 to 35 require suitable planting within the LDTA.

3.8.1 Compliance

1. During the 2018/2019 period, harakeke was removed from the LDTA in line with iwi expectations, and replanted along the road boundary. During the same year, a number of planting programmes were investigated in relation to the distribution changes.
2. Since then the area has been cleared of all growth and re-grassed. KCDC continues to maintain the LDTA grass area healthy and free of weeds.

3.9 Perimeter Planting

Condition 36 requires suitable perimeter planting.

3.9.1 Compliance

During the 2020/21 financial year KCDC prepared and awarded the contract for perimeter planting. The planting progress is described below:

- > Planting of manuka was completed along the northern boundary during the first trimester of 2021. An irrigation system was installed to support young plants.
- > Planting of manuka along the western boundary commenced in the second trimester of 2021.
- > Planting of harakeke on the northern and eastern boundaries are due to commence in the new financial year.

3.10 Fencing and Signage

Condition 37 requires perimeter fencing and signage.

3.10.1 Compliance

During the 2020/21 financial year, KCDC prepared and awarded the contract for supply and installation of the new 8ft tall electric fence. The fencing works are now completed with signage installed on the visible perimeter fencing.

3.11 Iwi Consultation

Condition 38 and 39 require KCDC to invite NHOŌ to a yearly briefing and informing NHOŌ of any changes on site.

3.11.1 Compliance

KCDC, and NHOŌ have been working closely together since the early stages of the LDTA Optimisation Study and throughout the different plant upgrades complying with the requirements of this condition.

During this reporting period KCDC has engaged Iwi representatives, employed local specialists and used local supply chains. The planting and fencing contractors have a clear connection to NHOŌ, and the Ōtaki community, which is convenient for future site maintenance.

3.12 Community Liaison Group

Condition 40 requires the establishment of a community liaison group for the Ōtaki WWTP.

3.12.1 Compliance

During the 2019/2020 reporting period, KCDC endeavoured to set up a community liaison group, however, the community did not express any interest.

During the current reporting period KCDC has been building stakeholder engagement through the Paraparaumu WWTP re consenting process. It is envisaged that once this is fully developed and established it will be extended to encompass wider stakeholder engagement with wastewater in the district.

3.13 Complaints

Condition 41 requires KCDC to maintain a permanent record of complaints relating to the Ōtaki WWTP and LDTA.

3.13.1 Compliance

No complaints have been received during the compliance period.

3.14 Incident Notification

Condition 42 requires KCDC to notify GWRC of any incident which results, or could result in, an adverse effect on the environment beyond the boundary of the consent holder's site.

APPENDIX

A

FLOW & SAMPLING RECORDS

Discharge to LDТА Monitoring Data

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
1/07/2020	1,704	1,480	6.8	0.3	14.3		5/1	0.42	7.6	9.6	8.6	Green/Ok	8	9.9	11	Green/Ok	overcast	none	3
2/07/2020	1,871	1,503	6.8	0.3	13.8		1	0.42	8.3	8.6	8.7	Green/Ok	9.3	8.8	9.4	Green/Ok	overcast	none	0
3/07/2020	1,823	1,510	6.8	0.5	14.3	28	1/2	0.42	8.2	8.5	10.3	Green/Ok	8.1	8.5	12.3	Green/Ok	fine	none	2
4/07/2020	1,779	2,793	/	/	/	17	2		/	/	/	Green/Ok	/	/	/	Green/Ok	overcast	none	8
5/07/2020	1,786	2,277	/	/	/	0	2		/	/	/	Green/Ok	/	/	/	Green/Ok	fine	none	1
6/07/2020	1,815	2,065	6.9	0.4	14.6	49	2/3	0.41	8.1	14.2	10.2	Green/Ok	8.3	14.3	10.2	Green/Ok	showers	none	1
7/07/2020	2,003	2,173	6.9	0.1	14.4	22	3	0.42	7.8	11	10.8	Green/Ok	8	11	12.3	Green/Ok	fine	none	0
8/07/2020	2,201	2,290	7.1	0.5	14	23	3/4	0.40	7.6	10.7	7.3	Green/Ok	7.8	10.5	8.8	Green/Ok	drizzle	none	6
9/07/2020	1,973	1,927	7.2	0.3	13.6	24	4	0.41	7.6	8.1	6.9	Green/Ok	7.8	8.7	8	Green/Ok	fine	none	8
10/07/2020	1,937	1,784	6.9	0.4	13.7	25	4/5	0.42	7.9	8	9.9	Green/Ok	8	8.6	11.8	Green/Ok	fine	none	11
11/07/2020	1,866	2,205	/	/	/	16.1	5		/	/	/	Green/Ok	/	/	/	Green/Ok	fine	none	1
12/07/2020	1,864	1,965	/	/	/	18.9	5		/	/	/	Green/Ok	/	/	/	Green/Ok	fine/rain	none	0
13/07/2020	2,046	2,136	6.9	0.3	14.5	33.5	5/1	0.42	8.4	11	11.8	Green/Ok	8.9	11.5	12.6	Green/Ok	fine	none	0
14/07/2020	2,031	2,082	7.5	0.2	14	22.8	1	0.41	7.6	9.7	7	Green/Ok	8	9.7	10.9	Green/Ok	fine	none	9
15/07/2020	1,907	1,943	6.9	0.1	13.9	25.1	1/2	0.40	7.8	9.3	10.4	Green/Ok	7.8	9.4	11.1	Green/Ok	fine	none	1
16/07/2020	1,843	1,827	7	0.1	13.5	23.6	2	0.43	7.9	8.1	9.9	Green/Ok	8.2	8.3	11.5	Green/Ok	overcast	none	0
17/07/2020	1,837	1,775	7	0.1	13.9	24.5	2/3	0.40	7.8	9.5	10.2	Green/Ok	8.1	9.4	11.8	Green/Ok	fine	none	0
18/07/2020	1,766	1,775	/	/	/	0	3										fine	none	0
19/07/2020	1,838	1,755	/	/	/	20.8	3										fine	none	0
20/07/2020	1,750	1,711	6.9	0.2	14.3	31.7	3/4	0.42	7.9	10.2	11.2	Green/Ok	8	10.3	12.5	Green/Ok	fine	none	1
21/07/2020	1,996	1,854	6.8	0.2	14.2	22.9	4	0.40	7.9	13.2	8.9	Green/Ok	7.8	13.3	7.2	Green/Ok	overcast	none	0
22/07/2020	1,837	2,209	6.8	0.2	14.1	0	4/5	0.47	7.8	11.2	9.6	Green/Ok	7.9	13.2	9.8	Green/Ok	overcast	none	2
23/07/2020	1,833	1,999	7.8	0.1	14.2	24	5	0.44	9.2	10.9	9.6	Green/Ok	9.6	11.1	8.7	Green/Ok	fine	none	12
24/07/2020	1,774	1,796	6.9	0.2	13.6	0	5/1	0.46	8.5	10.2	11.5	Green/Ok	8	10.1	11.5	Green/Ok	fine	none	4
25/07/2020	1,801	1,709	/	/	/	0	1										fine	none	0
26/07/2020	1,763	1,500	/	/	/	24	1										fine	none	0
27/07/2020	1,671	1,446	6.9	0.2	13.6	23.5	1/2	0.42	8.3	9.5	11.7	Green/Ok	8.5	8.2	13.2	Green/ok	fine	none	0
28/07/2020	1,607	1,446	6.9	0.3	13.7	19.8	2	0.42	8.2	8.8	11.2	Green/Ok	8.7	8.8	14.2	Green/Ok	fine	none	0
29/07/2020	1,572	1,950	7.1	0.1	14	25.7	2/3	0.40	7.9	13.8	11.4	Green/Ok	8.6	13.7	13.8	Green/Ok	overcast	none	0
30/07/2020	1,592	1,702	7	0.1	14.1	21.8	3	0.42	8.3	10.8	18.6	Green/Ok	8.5	10.4	17.8	Green/Ok	fine	none	0
31/07/2020	1,578	1,611	7.1	0.1	14.1	21	3	0.42	8.1	10.9	18.4	Green/Ok	8.7	10.6	17.9	Green/Ok	fine	none	0
1/08/2020	1,565	1,549	/	/	/	20	3										overcast	none	0
2/08/2020	1,646	1,516	/	/	/	29	3										overcast	none	0
3/08/2020	1,573	1,555	7	0.1	13.8	22.3	3/4	0.43	7.9	10.4	11.5	Green/Ok	8.1	10.5	12	Green/Ok	overcast	none	0
4/08/2020	1,497	1,526	7	0.1	14.2	23.9	4	0.39	8	10.4	9.2	Green/Ok	7.9	10.3	6.9	Green/Ok	overcast	none	0
5/08/2020	1,530	1,487	7.1	0.2	15.4	26.4	4/5	0.43	8.1	11.9	8.9	Green/Ok	7.7	11.3	7.4	Green/Ok	fine/sunny	none	0
6/08/2020	1,577	1,473	7.1	0.2	14.7		5	0.41	7.7	11.7	8.4	Green/Ok	8.1	11.6	11.2	Green/Ok	fine/sunny	none	3
7/08/2020	1,613	1,609	7	0.2	14.2	21.9	5/1	0.42	8.2	12.9	11.4	Green/Ok	8.2	11.9	10.4	Green/Ok	showers	none	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
8/08/2020	1,649	1,578	/	/	/	24.2	1		/	/	/	Green/Ok	/	/	/	Green/Ok	showers	none	0
9/08/2020	1,629	936	/	/	/	25.4	1		/	/	/	Green/Ok	/	/	/	Green/Ok	fine	none	6
10/08/2020	1,593	1,426	7	0.1	14.5	24.1	1/2	0.40	8	11.7	8.7	Green/Ok	8.3	12	13.4	Green/Ok	fine/sunny	none	1
11/08/2020	1,486	2,050	7.2	0.1	14.9	22.7	2	0.41	8.4	12.9	9.8	Green/Ok	8.2	12.8	11.2	Green/Ok	overcast	none	1
12/08/2020	1,530	1,718	7.1	0.1	14.9	28.5	2/3	0.40	8.3	12.7	9.9	Green/Ok	8	12.7	12.2	Green/Ok	Fine	none	0
13/08/2020	1,489	1,390	7.3	0.1	13.7	21.1	3	0.40	8.1	10.5	7.6	Green/Ok	8.2	10.6	8.7	Green/Ok	overcast	none	0
14/08/2020	1,529	1,292	7.1	0.2	14.2		3/4	0.42	8.4	10.3	8.5	Green/Ok	8.3	10.8	8.9	Green/Ok	fine	none	2
15/08/2020	1,597	1,398	/	/	/	0	4		/	/	/	Green/Ok	/	/	/	Green/Ok	fine	none	0
16/08/2020	1,547	986	/	/	/	45.3	4		/	/	/	Green/Ok	/	/	/	Green/Ok	fine	none	0
17/08/2020	1,528	961	7	0.1	14.9	26.3	4/5	0.44	8.4	10.8	11.2	Green/Ok	8.4	12.9	12.8	Green/Ok	fine	none	0
18/08/2020	1,454	1,127	7.1	0.1	13.7		5	0.40	8.8	8.8	14.1	Green/Ok	8.9	8.9	13.9	Green/Ok	fine	none	0
19/08/2020	1,569	1,382	7.1	0.2	13.9	24	5/1	0.38	8.6	10.5	11.8	Green/ok	8.4	10	12.7	Green/Ok	overcast	none	0
20/08/2020	1,570	2,363	7.1	0.2	14.1		1	0.38	8.8	10.4	11.2	Green/Ok	8.4	10.2	11.3	Green/Ok	overcast	none	1
21/08/2020	1,924	2,531	7.2	0.1	14	22	1/2	0.42	8.4	10.2	12.2	Green/Ok	8.6	10.4	13.2	Green/Ok	overcast	none	0
22/08/2020	1,738	2,320	/	/	/	/	2		/	/	/	/	/	/	/	/	overcast	none	6
23/08/2020	1,714	1,966	/	/	/	/	2		/	/	/	/	/	/	/	/	overcast	none	19
24/08/2020	1,087	2,114	7.1	0.1	14.9		2/3	0.42	8.5	13.7	12.7	Green/Ok	8.7	13.9	15.8	Green/Ok	rain /overcast	none	1
25/08/2020	2,073	2,381	7.2	0.1	14.9	17.2	3	0.41	8.3	13.9	12.5	Green/ok	8.2	13.8	15.4	Green/ok	rain/ overcast	none	11
26/08/2020	1,868	2,347	6.9	0.1	14.7	27.2	3/4	0.41	8.1	13	11	Green/ok	8	13	10.2	Green/ok	overcast	none	2
27/08/2020	1,730	2,183	7	0.1	14.8		4	0.34	8.1	13.2	11.1	Green/ok	8.1	13.3	10.4	Green/ok	Fine	none	10
28/08/2020	1,723	1,837	7	0.2	14.3	21	4/5	0.38	8.3	11.3	11.8	Green/ok	8.3	11.8	11.2	Green/ok	overcast/snow	none	0
29/08/2020	1,773	1,780	/	/	/	29	5		/	/	/	/	/	/	/	/	Overcast	none	0
30/08/2020	1,760	1,742	/	/	/		5		/	/	/	/	/	/	/	/	Fine	none	0
31/08/2020	1,637	1,707	6.9	0.1	14.9	45.6	5/1	0.38	8	12.7	7.4	Green/ok	8.1	12.8	7.5	Green/ok	Overcast/snow	none	0
1/09/2020	1,713	1,624	7	0.1	15.1	18.8	5	0.40	7.9	13.6	7.7	Green/ok	7.8	13.6	7.8	Green/ok	overcast	none	0
2/09/2020	1,656	1,452	7.2	0.1	14.9		5/1	0.40	8	12.6	6.6	Green/ok	8.1	12.9	9.6	Green/ok	overcast/drizzle	none	0
3/09/2020	1,671	1,524	7	0.1	15	20.2	1	0.42	7.8	12.9	7.2	Green/ok	7.9	13.1	10.2	Green/ok	fine/sunny	none	3
4/09/2020	2,155	1,443	6.9	0.1	14.4		1/2	0.40	8.2	11.1	13.9	Green/ok	8.3	11.6	16.1	Green/ok	fine/sunny	none	0
5/09/2020	1,743	1,199	/	/	/	26.6	2		/	/	/	Green/ok	/	/	/	Green/ok	rain	none	0
6/09/2020	1,843	1,654	/	/	/	24	2		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
7/09/2020	2,070	1,833	6.9	0.2	15	23.6	2/3	0.42	7.9	12.8	10	Green/ok	8.1	13	11.5	Green/ok	fine/sunny	none	7
8/09/2020	1,856	1,990	6.9	0.2	14.6	23.7	3	0.39	8.1	11.8	12.8	Green/ok	8.3	12.3	13.8	Green/ok	overcast/sunny	none	8
9/09/2020	1,717	1,839	7	0.1	14.2	24.4	3/4	0.42	8	11.8	8.7	Green/ok	8.1	11.9	11.6	Green/ok	Rain	none	1
10/09/2020	2,575	1,780	7	0.1	14.7	24.8	4	0.41	7.8	12.5	6.9	Green/ok	7.9	12.4	7.3	Green/ok	Rain	none	0
11/09/2020	2,745	1,980	7.1	0.1	14.4		4/5	0.40	8	11.8	7.6	Green/ok	8	11.9	8.4	Green/ok	overcast/wet	none	0
12/09/2020	2,191	2,762	/	/	/		5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	28
13/09/2020	1,959	2,027	/	/	/	43.1	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
14/09/2020	1,923	73	7	0.1	14.8	25.8	5/1	0.38	8.1	13.1	6.5	Green/ok	8.1	13.1	8.2	Green/ok	overcast	none	0
15/09/2020	1,917	2,216	6.9	0.1	15.2		1	0.41	7.6	13.9	6.9	Green/ok	8.3	13.9	7.9	Green/ok	fine/windy	none	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
16/09/2020	1,956	1,979	6.9	0.1	14.9	20	1/2	0.42	7.9	13.8	7.4	Green/ok	8.2	13.8	8.1	Green/ok	Fine/Windy	none	0
17/09/2020	1,824	1,848	7	0.1	14.7		2	0.38	8.4	13.4	6.8	Green/ok	8.3	13.2	7.8	Green/ok	Overcast/windy	none	2
18/09/2020	2,661	2,110	7	0.2	14.7		2/3	0.38	8.3	13.2	7.2	Green/ok	8.3	13.3	8.2	Green/ok	Rain	none	0
19/09/2020	2,226	2,654	/	/	/	28	3					Green/ok				Green/ok	Overcast	none	0
20/09/2020	2,454	2,660	/	/	/		3					Green/ok				Green/ok	Fine	none	24
21/09/2020	1,887	2,082	7	0.2	14.5		3/4	0.42	8.2	13.6	6.9	Green/ok	8	13.5	7.2	Green/ok	Overcast/rain	none	3
22/09/2020	1,834	1,895	7	0.2	14.1		4	0.44	8.1	13.4	6.7	Green/ok	8.2	13.6	6.9	Green/ok	Overcast	none	1
23/09/2020	2,640	1,917	6.9	0.2	13.8	29.8	4	0.43	7.1	15.3	6.5	Green/ok	7.2	15.4	6.3	Green/ok	Rain	none	0
24/09/2020	2,594	2,801	6.7	0.3	15.5	20.5	4	0.44	7.3	15.2	3.5	Green/ok	7.2	15.2	5.8	Green/ok	Overcast	none	3
25/09/2020	2,570	2,801	6.8	0.1	15.2	24	4	0.35	7.2	14.6	2.6	Green/ok	7.3	14.8	2.5	Green/ok	Fine/Overcast	none	24
26/09/2020	2,459	2,617				24	4	0.33				Green/ok				Green/ok	Rain/Fine	none	0
27/09/2020	4,699	2,801					4					Green/ok				Green/ok	Rain/Overcast	none	1
28/09/2020	3,435	2,827	6.9	3.5	14.1	39.6	4/1	0.40	7.6	12.9	8.3	Green/ok	7.8	13.2	8.6	Green/ok	Windy/Overcast	none	0
29/09/2020	2,978	2,828	6.8	3.4	13.6	30.9	1	0.41	7.9	12.9	8.3	Green/ok	8.1	11.1	12.4	Green/ok	fine	none	33
30/09/2020	2,666	2,804	6.9	2.8	14.2	23.5	1/2	0.42	8.5	10.9	13.9	Green/ok	8.9	11.6	18.5	Green/ok	fine/sunny	none	0
1/10/2020	2,471	2,804	6.8	1.3	14.5	23.1	2	0.40	8.8	11.9	14.5	Green/ok	8.7	12.3	16.2	Green/ok	fine/sunny	none	0
2/10/2020	2,217	2,802	7.2	0.6	15.1	25.6	2/3	0.40	8	14	11.2	Green/ok	7.2	14.2	14.3	Green/ok	overcast	none	0
3/10/2020	2,147	2,804	/	/	/	21.2	3					Green/ok				Green/ok	overcast	none	0
4/10/2020	2,102	2,731	/	/	/	26.7	3					Green/ok				Green/ok	overcast/fine	none	1
5/10/2020	1,978	2,148	7	0.2	16.1	24	3/4	0.40	7.7	17	6.4	Green/ok	8	16.8	7.5	Green/ok	fine/sunny	none	0
6/10/2020	1,860	2,313	7	1.5	15.1	17.7	4	0.35	7.5	17.1	4.6	Green/ok	8	17.1	5.1	Green/ok	overcast	none	0
7/10/2020	1,850	2,527	7.1	1	16	29.7	4/5	0.40	7.6	16.5	4.9	Green/ok	8.1	16.5	7.3	Green/ok	overcast	none	0
8/10/2020	1,855	2,488	7	0.2	16.1	14.7	5	0.41	7.6	15.9	5.7	Green/ok	8.3	16.2	10.6	Green/ok	fine	none	0
9/10/2020	1,821	1,873	7.2	0.2	15.5	26	5	0.42	7.9	15.7	7.6	Green/ok	8.8	15.6	17.3	Green/ok	fine	none	0
10/10/2020	1,778	1,605	/	/	/	0	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
11/10/2020	1,779	1,597	/	/	/	44.1	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	2
12/10/2020	1,982	1,597	7.1	0.1	16.1	27	5/3	0.45	7.3	16	4.5	Green/ok	7.6	15.8	4.6	Green/ok	wet	none	2
13/10/2020	1,951	1,826	7	0.2	16.4	23.2	3	0.42	7.2	16	1	Green/ok	7.3	15.7	0.9	Green/ok	overcast	none	15
14/10/2020	1,862	2,056	7.1	2.1	16.6	20.2	3	0.43	7.5	16.8	6.1	Green/ok	7.6	16.7	6.1	Green/ok	fine	none	3
15/10/2020	1,748	1,080	7	2.3	16.1	0	3	0.41	7.6	15	4.8	Green/ok	7.6	15.4	6.4	Green/ok	Cloudy	none	0
16/10/2020	1,703	1,543	7.4	3.5	16.1	29.5	3	0.51	8.4	16.2	16.4	Green/ok	8.2	15.9	11.7	Green/ok	sunny	none	0
17/10/2020	1,630	757	/	/	/	23.2	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast/rain	none	0
18/10/2020	1,729	2,131	/	/	/	18	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	1
19/10/2020	1,613	659	7.5	2.9	16.9	35	3/5	0.46	8.4	17	11	Green/ok	8.3	16.8	10.5	Green/ok	rain	none	1
20/10/2020	1,699	2,333	7.4	2.5	16.7	24.3	5	0.38	8.2	16.9	11.4	Green/ok	8	16.7	9.8	Green/ok	overcast	none	0
21/10/2020	1,750	2,350	7	2	16.4	21.8	5/1	0.41	7.8	16.1	9.7	Green/ok	7.7	16	7.3	Green/ok	overcast	none	1
22/10/2020	1,681	814	7.1	2.5	16.9	25.5	1/3	0.38	8	17.2	11.5	Green/ok	7.7	17.1	8	Green/ok	fine	none	0
23/10/2020	1,673	2,459	7.7	0.3	18	23.2	3	0.50	8.3	20.1	16.1	Green/ok	8.5	21	19.7	Green/ok	fine	none	0
24/10/2020	1,639	2,002	/	/	/	21	3		/	/	/	Green/ok	/	/	/	Green/ok	fine/sunny	none	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
25/10/2020	1,528	1,611	/	/	/	25.5	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast/drizzle	none	0
26/10/2020	1,655	1,406	7.2	0.1	17.8	8.1	3	0.38	8.1	17	8.9	Green/ok	8.3	17.3	11.2	Green/ok	overcast	none	0
27/10/2020	2,278	1,607	7	0.1	17.9	44.9	3	0.44	7.7	19.6	6.3	Green/ok	7.9	19.9	7.6	Green/ok	rain	none	34
28/10/2020	1,849	2,583	7	0.2	16.7	16.8	3/4	0.40	8	17.4	7.4	Green/ok	8.4	17.4	6.1	Green/ok	overcast	none	1
29/10/2020	1,754	2,094	7	0.4	17.8	22.8	4	0.40	8.5	19.5	14.2	Green/ok	8.5	19.6	17.1	Green/ok	overcast	none	2
30/10/2020	1,680	1,818	6.9	0.2	17.4	21.6	4/5	0.41	8.1	18.6	8.5	Green/ok	7.9	18.5	10.4	Green/ok	drizzle	none	0
31/10/2020	1,681	1,601	/	/	/	27.1	5		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	2
1/11/2020	1,837	1,148	/	/	/	23.7	5		/	/	/	Green/ok	/	/	/	Green/ok	fine/windy	none	0
2/11/2020	1,754	1,499	7	0.2	17.5	0	5/1	0.38	8	18.2	8.2	Green/ok	8.4	18.1	10.5	Green/ok	overcast	none	0
3/11/2020	1,665	1,660	7.1	0.2	17	49.5	1	0.42	7.5	16.8	4.8	Green/ok	8	17	9.2	Green/ok	drizzle	none	6
4/11/2020	1,724	1,688	7.1	0.1	17.3	20.5	1/2	0.44	7.8	17.2	6.4	Green/ok	8.1	17.3	10.2	Green/ok	overcast	none	0
5/11/2020	1,729	1,644	7	0.1	17.5	28.2	2	0.42	7.9	17	6.8	Green/ok	8.3	17.1	11.1	Green/ok	overcast	none	0
6/11/2020	1,732	1,703	6.9	0.2	18.3	25.2	2/3	0.40	7.4	20	3.8	Green/ok	8.1	19.8	10.4	Green/ok	fine	none	3
7/11/2020	1,730	1,649	/	/	/	19	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	4
8/11/2020	1,808	1,441	/	/	/	32.1	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	2
9/11/2020	1,678	1,441	7.1	0.1	18.4	21	3/4	0.42	7.6	17.4	4.3	Green/ok	8.2	17.2	9.2	Green/ok	overcast	none	0
10/11/2020	1,670	772	7	0.1	18	25	4	0.44	7.5	16.5	7.2	Green/ok	8	16.8	10.1	Green/ok	overcast	none	2
11/11/2020	1,767	2,010	7	0.2	17.2		4/5	0.42	8.1	16.5	12.9	Green/ok	8.3	16.4	13.9	Green/ok	fine	none	0
12/11/2020	1,687	1,720	7	0.1	17.4	20	5	0.42	8.2	16.7	11.2	Green/ok	8	17.1	11.2	Green/ok	fine	none	0
13/11/2020	1,614	1,520	6.8	0.2	18.1	26.1	5	0.42	7.9	19.5	6.6	Green/ok	7.7	19.1	5	Green/ok	fine	none	0
14/11/2020	1,738	1,451	/	/	/	0	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
15/11/2020	1,691	1,422	/	/	/		5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
16/11/2020	1,612	1,439	7	0.2	18.8		5	0.42	8	21.1	7.2	Green/ok	7.6	20.8	2.2	Green/ok	rain	none	1
17/11/2020	1,601	1,408	6.9	0.1	18.6	20.6	5	0.38	8.3	21	14.2	Green/ok	7.5	20.4	3.4	Green/ok	overcast	none	1
18/11/2020	2,021	1,615	6.9	0.1	18.8	27.1	5/1	0.44	8.5	21	14.5	Green/ok	7.7	20.9	4.2	Green/ok	rain	none	19
19/11/2020	1,718	1,638	6.8	0.4	18.1	25.5	1	0.42	7.8	18.4	10.7	Green/ok	7.1	20.6	9.6	Green/ok	overcast/fine	none	0
20/11/2020	1,681	95	6.9	2.6	18.6	26.6	1	0.45	8.1	19.5	15	Green/ok	7.4	20.6	9.6	Green/ok	fine	none	0
21/11/2020	1,580	2,265	/	/	/	16.5	1		/	/	/	Green/ok	/	/	/	Green/ok	overcast/drizzle	none	1
22/11/2020	1,701	1,934	/	/	/	23.9	1		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	2
23/11/2020	1,933	1,059	6.9	0.4	18.7	28.3	1/3	0.40	8.2	19.2	16.3	Green/ok	7.5	19.6	8.5	Green/ok	fine	none	0
24/11/2020	2,506	1,314	6.8	0.1	18.2	23.6	3	0.41	8.1	19.3	16.4	Green/ok	7.2	19.5	8.4	Green/ok	fine	none	0
25/11/2020	2,038	1,723	6.9	0.2	18.5	23.3	3/4	0.40	7.8	19.3	4.9	Green/ok	7.4	19.4	4.7	Green/ok	rain	none	24
26/11/2020	2,005	2,801	6.8	0.2	19	22.5	4	0.44	7.7	19.4	8.7	Green/ok	7.3	19.4	4.9	Green/ok	rain	none	12
27/11/2020	1,713	2,165	7.1	0.2	18.6	29.7	4/5	0.40	7.6	19.9	9	Green/ok	7.2	19.8	6	Green/ok	overcast	none	2
28/11/2020	1,767	1,274	/	/	/	17	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
29/11/2020	4,734	448	/	/	/	25.5	5		/	/	/	Green/ok	/	/	/	Green/ok	rain	none	53
30/11/2020	2,743	2,802	6.8	1.9	17.7	27.6	5/1	0.40	7	18.9	6	Green/ok	7.4	18.9	5.7	Green/ok	overcast/drizzle	none	13.5
1/12/2020	2,560	2,803	7.2	2	17.3	23.9	1	0.40	7.2	16.9	4	Green/ok	7.3	17	3.2	Green/ok	overcast/drizzle	none	1
2/12/2020	2,355	2,806	6.7	2.9	16.9	24.7	1/2	0.40	7.7	17.3	10.9	Green/ok	7.5	17	9.7	Green/ok	fine	none	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
3/12/2020	2,172	1,122	6.8	2.6	17.5	19.9	2	0.38	7.2	17.6	6.3	Green/ok	7.3	17.8	7.8	Green/ok	fine	none	1
4/12/2020	2,105	2,801	7	2.4	17.3		2/3	0.39	7.4	17.3	7.3	Green/ok	7.6	17.1	8.2	Green/ok	fine	none	1
5/12/2020	1,948	2,802	/	/	/		3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	2
6/12/2020	2,088	2,801	/	/	/	21.5	3		/	/	/	Green/ok	/	/	/	Green/ok	sunny	none	2
7/12/2020	2,257	2,542	6.8	1.1	17.7	30.1	3/4	0.42	7.2	18.2	4	Green/ok	7.3	18.1	6.5	Green/ok	Rain	none	16
8/12/2020	2,556	2,801	7	1.5	17.3		4	0.49	7.4	16.2	5.2	Green/ok	7.6	16	8.1	Green/ok	Rain	none	9
9/12/2020	2,815	2,801	6.9	0.2	17.3		4/5	0.46	7.2	18.2	0.6	Green/ok	7.2	18.4	0.9	Green/ok	overcast	none	11
10/12/2020	3,818	2,801	6.9	1.1	17.9		5	0.42	7.8	19.4	2.2	Green/ok	7.4	19.3	2.6	Green/ok	rain/overcast	none	18
11/12/2020	3,007	2,802	6.9	1.5	17.6	18	5	0.46	7.6	19	4.2	Green/ok	7.2	18.9	6.4	Green/ok	overcast	none	1
12/12/2020	2,789	2,801	/	/	/	0	5		/	/	/	Green/ok	/	/	/	Green/ok	fine/overcast	none	0
13/12/2020	2,544	2,801	/	/	/	48.9	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
14/12/2020	2,336	2,801	7.4	2.6	17.7	30.3	5/1	0.46	8.3	19.3	16.8	Green/ok	8.3	18.6	14.6	Green/ok	fine	none	0
15/12/2020	2,162	2,801	6.7	0.1	17.9	26.2	1	0.43	8.4	20.4	16.9	Green/ok	8.8	20.7	17.2	Green/ok	fine	none	0
16/12/2020	2,010	2,801	6.9	2.1	18.7	19.9	1/2	0.43	8.1	21.1	11.2	Green/ok	8.1	20.6	6.1	Green/ok	Overcast	none	0
17/12/2020	1,989	2,801	7.1	3.9	18.5	26.5	2	0.44	8.1	20.4	12.2	Green/ok	8.7	20.4	21	Green/ok	overcast/fine	none	0
18/12/2020	1,939	2,694	6.9	0.1	18.5	19.8	2/3	0.40	8.3	21.2	15.4	Green/ok	8.7	21.1	22	Green/ok	overcast/fine	none	0
19/12/2020	1,856	2,109	/	/	/	26.1	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
20/12/2020	1,863	1,818	/	/	/	25.2	3		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
21/12/2020	1,765	1,658	7.2	0.2	19.2	25	3/4	0.38	7.7	22.1	6.3	Green/ok	8.6	22.1	13.1	Green/ok	overcast/drizzle	none	0
22/12/2020	1,712	1,560	7	0.1	18.9		4	0.40	7.6	21.3	2.8	Green/ok	8.8	21.4	2.9	Green/ok	overcast/drizzle	none	2
23/12/2020	1,945	1,598	7	0.2	19		4/5	0.38	7.7	21.5	3.6	Green/ok	8.7	21.6	4.5	Green/ok	overcast	none	15
24/12/2020	2,368	1,799	6.8	0.2	18.9	17.5	5	0.38	7.2	19.3	1.3	Green/ok	7.2	19.4	0.3	Green/ok	rain	none	14
25/12/2020	2,123	2,035	6.8	2.6	19.3	22	5/1	0.27	7.1	19.5	0.5	Green/ok	7.3	19.7	3.1	Green/ok	fine	none	1
26/12/2020	2,067	2,570	/	/	/	22.1	1		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	2
27/12/2020	1,944	2,244	/	/	/	24.5	1		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
28/12/2020	1,895	1,871	6.7	0.1	18.2	21.7	1/2	0.40	7.7	18.3	11.8	Green/ok	8.1	18.5	10.1	Green/ok	overcast/fine	none	0
29/12/2020	1,833	1,741	6.8	0.1	18.4	20	2	0.38	7.8	18.4	7.9	Green/ok	8	18.6	8.4	Green/ok	fine	none	0
30/12/2020	1,814	1,613	7.5	0.3	18.6	31.2	2/3	0.40	8.4	19.2	15.8	Green/ok	8.4	19.3	12.4	Green/ok	fine/sunny	none	0
31/12/2020	1,732	1,561	6.8	0.3	19.4	21	3	0.38	8.4	21.2	17.5	Green/ok	8.5	21	14.9	Green/ok	fine/sunny	none	0
1/01/2021	1,666	1,495	6.9	0.3	19.7	26.6	3/4	0.38	8.3	21.8	13.6	Green/ok	8.4	21.8	14.6	Green/ok	fine	none	0
2/01/2021	1,631	1,416	/	/	/	23.6	4		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	1
3/01/2021	1,631	1,409	/	/	/	21.7	4		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	1
4/01/2021	1,712	1,395	6.9	0.3	20	25.4	4/5	0.38	7.5	22.1	1.7	Green/ok	7.2	22.3	1.5	Green/ok	overcast	none	0
5/01/2021	1,662	1,418	6.8	0.3	20.5	24.4	5	0.40	7.6	23	6.9	Green/ok	8.7	22.8	12.7	Green/ok	fine	none	0
6/01/2021	1,598	1,406	6.9	0.2	20.3	16.5	5	0.42	7.6	22.8	6.3	Green/ok	8.2	22.6	10.9	Green/ok	overcast	none	0
7/01/2021	1,842	1,184	6.8	0.3	21.1	27	5	0.50	7.2	24.3	2.2	Green/ok	7.4	24.1	3	Green/ok	overcast	none	22
8/01/2021	2,054	1,079	6.9	1.9	21.2	25.2	5/2	0.42	7.1	22.9	2.8	Green/ok	7.3	23.1	1.6	Green/ok	overcast	none	7
9/01/2021	1,705	2,608	/	/	/	0	2		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	1
10/01/2021	1,630	111	/	/	/	0	2		/	/	/	Green/ok	/	/	/	Green/ok	Fine	none	1

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
11/01/2021	1,650	1,891	7	2.2	21.4	46.8	2	0.44	7.9	22.7	13.6	Green/ok	7.2	21.8	3.3	Green/ok	Fine	none	0
12/01/2021	1,588	2,334	6.9	2.1	23	24.5	2	0.40	8.1	23.1	11.2	Green/ok	7.4	23	5.6	Green/ok	overcast	none	0
13/01/2021	1,580	324	6.8	0.2	21	24	2	0.48	7.8	24.5	9.9	Green/ok	8.5	25.3	21.5	Green/ok	fine	none	0
14/01/2021	1,584	1,552	6.9	0.2	21.1	25	2	0.35	7.7	23.4	7.5	Green/ok	8	23.1	8.1	Green/ok	Fine	none	0
15/01/2021	1,554	1,602	6.9	1.3	22.5	22.7	2/4	0.48	7.1	25.1	5.9	Green/ok	8.1	25.7	10.5	Green/ok	fine	none	0
16/01/2021	1,543	2,053	/	/	/	21.3	4		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
17/01/2021	1,693	1,705	/	/	/	31.1	4/5		/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	14
18/01/2021	1,584	1,868	6.8	0.1	20.1	26.8	5	0.43	7.6	20.1	8.5	Green/ok	7.6	20.5	8.8	Green/ok	overcast	none	0
19/01/2021	1,586	1,442	6.8	0.1	20.1	21.3	5	0.41	7.7	19.5	5.5	Green/ok	7.7	19.9	7.1	Green/ok	fine	none	3
20/01/2021	1,610	1,403	6.8	0.3	19.4	26.7	5/2	0.36	7.5	16.8	4.3	Green/ok	7.4	17.5	4.1	Green/ok	rain/hail	none	4
21/01/2021	1,585	1,413	7	0.1	18.6	27.9	2	0.41	7.9	15.8	6.9	Green/ok	8.1	16.5	7.7	Green/ok	overcast/drizzle	none	1
22/01/2021	1,665	1,412	6.9	0.3	19	9.8	2/3	0.42	8.1	16.8	7.4	Green/ok	7.9	17.1	6.6	Green/ok	fine/sunny	none	0
23/01/2021	1,594	1,408	/	/	/	23.6	3		/	/	/	Green/ok	/	/	/	Green/ok	fine/sunny	none	2
24/01/2021	1,650	1,451	/	/	/	0	3		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	1
25/01/2021	1,701	1,429	6.8	0.2	20.1	0	3	0.42	7.3	20.2	3.4	Green/ok	7.6	20.1	6.5	Green/ok	overcast/fine	none	0
26/01/2021	1,587	1,148	6.8	0.2	20.5	23.8	3/4	0.40	7.1	21.6	1.2	Green/ok	7.2	21.3	1.8	Green/ok	overcast	none	0
27/01/2021	1,410	1,199	7	0.2	20.9	26.8	4/5	0.42	7.2	22.6	0.9	Green/ok	7.2	22.4	1.7	Green/ok	overcast	none	0
28/01/2021	1,276	1,191	7	0.2	20.9	14.9	5	0.38	7.3	22.3	1.1	Green/ok	7.3	22.5	1.2	Green/ok	overcast	none	0
29/01/2021	1,439	1,132	7	0.3	20.2	15.4	5	0.45	7.6	19.2	9	Green/ok	7.4	19.4	6.9	Green/ok	overcast/fine	none	0
30/01/2021	1,495	1,094	/	/	/	0	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
31/01/2021	1,524	1,502	/	/	/	49.1	5		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
1/02/2021	1,476	1,366	6.7	0.1	20.8	34.2	5	0.44	7.8	21.3	10.4	Green/ok	8	21.1	14.9	Green/ok	fine/sunny	none	0
2/02/2021	1,419	1,289	6.8	0.1	20.8	25.3	5	0.39	7.8	21.4	8.7	Green/ok	8.2	21	11.8	Green/ok	fine/sunny	none	0
3/02/2021	1,448	1,188	6.7	0.1	20.7	7.6	5/1	0.48	7.9	22.7	9.2	Green/ok	8	23.8	22.7	Green/ok	sunny	none	0
4/02/2021	1,450	1,177	6.7	0.1	20.8	2	1	0.38	7.2	21.5	6.8	Green/ok	8.1	23.4	18.6	Green/ok	sunny	none	0
5/02/2021	1,453	1,133	6.8	0.1	20.5		1	0.38	7.6	21.5	8.6	Green/ok	8.2	23.1	13.6	Green/ok	sunny	none	0
6/02/2021	1,495	929	/	/	/		0		/	/	/	Green/ok	/	/	/	Green/ok	sunny	none	0
7/02/2021	1,489	15	/	/	/	51	0		/	/	/	Green/ok	/	/	/	Green/ok	sunny	none	0
8/02/2021	1,515	2	6.9	2	20.9		0	0.46	7.4	22.5	3.5	Green/ok	8.2	22.1	9.6	Green/ok	fine	none	0
9/02/2021	1,356	1,027	6.8	2.1	20.7	21.2	0	0.50	7.5	23.1	6.4	Green/ok	8.1	22.9	12.2	Green/ok	overcast	none	0
10/02/2021	1,625	2,538	7.1	0.9	22.1	31.2	3	0.42	7.1	22.1	0.9	Green/ok	7.3	22.1	0.5	Green/ok	rain	none	1
11/02/2021	1,468	2,312	6.7	0.2	19.7	19.7	3	0.38	7.3	18.9	2	Green/ok	7.6	18.2	1.9	Green/ok	fine	none	17
12/02/2021	1,394	1,969	6.7	0.2	20.6	1.1	3	0.42	8.4	12.2	18.8	Green/ok	8.1	21	11.4	Green/ok	fine	none	0
13/02/2021	1,431	1,064	/	/	/	0	4		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
14/02/2021	1,402	441	/	/	/	0	4		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
15/02/2021	1,498	1,365	6.8	1.1	21.4	0	4	0.42	7.9	21.6	9.4	Green/ok	7.9	21.5	7.2	Green/ok	fine	none	0
16/02/2021	1,689	126	6.8	1.7	20.8	0	4	0.48	7.7	20.4	9	Green/ok	6.7	20.7	7.5	Green/ok	overcast	none	11
17/02/2021	1,436	1,418	6.9	1.5	19.6	0	4	0.38	8.1	17.7	11.2	Green/ok	7.9	17.9	6.1	Green/ok	fine	none	0
18/02/2021	1,405	2,801	7.2	0.1	19.9	30.9	2	0.48	8.2	18.5	12.7	Green/ok	7.8	17.8	7.9	Green/ok	fine	none	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
19/02/2021	1,392	2,176	7	1.1	20	5.6	2	0.40	8	19	9.3	Green/ok	8.1	19.2	12.3	Green/ok	fine	none	0
20/02/2021	1,393	1,700	/	/	/	0	2		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
21/02/2021	1,453	1,385	/	/	/	0	2		/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
22/02/2021	1,319	1,212	6.7	0.1	20.9	0	2/3	0.41	7.9	21.1	7.6	Green/ok	7.8	21	7.4	Green/ok	fine	none	0
23/02/2021	1,316	1,130	6.8	0.1	20.8	0	3	0.42	7.8	21.3	7.5	Green/ok	7.7	21.2	7.5	Green/ok	Fine	none	0
24/02/2021	1,370	1,084	6.7	0.1	20.7	0	3/4	0.42	7.9	21.2	7.6	Green/ok	7.8	21.3	7.6	Green/ok	Fine	none	0
25/02/2021	1,284	1,024	6.6	0.1	21.8	0	4	0.45	7.7	23.1	9.9	Green/ok	7.4	22.8	6.3	Green/ok	Fine	None	0
26/02/2021	1,355	1,057	6.7	0.1	21.4	0	4	0.46	7.7	22.2	8.6	Green/ok	7.5	22.1	6.8	Green/ok	Fine	None	0
27/02/2021	1,401	1,109	/	/	/		4										Fine	None	0
28/02/2021	1,407	1,132	/	/	/		4										Fine	None	0
1/03/2021	1,375	985	6.7	0.1	21.8	0	4	0.42	7.3	23	5.1	Green/ok	7.5	22.9	5.4	Green/ok	Fine	None	1
2/03/2021	1,298	943	7.2	0.2	22.4	0	4	0.38	7.2	22.4	0.6	Green/ok	7.2	22.5	0.6	Green/ok	fine	none	1
3/03/2021	1,355	959	6.8	0.3	21.8	32	4	0.42	7.3	23.2	3.5	Green/ok	7.2	23.1	3.2	Green/ok	fine	none	2
4/03/2021	1,340	6	6.8	0.2	21.9	21.1	4	0.40	7.2	22.7	2.4	Green/ok	7	23.1	1.9	Green/ok	overcast	none	1
5/03/2021	1,349	221	6.9	0.3	20.9	23.5	4	0.40	7.3	19.8	3.7	Green/ok	7.2	20.1	2.7	Green/ok	fine/overcast	none	0
6/03/2021	1,384	2,289	6.8	0.4	20.8	20	4	0.40	7.4	19.9	3.8	Green/ok	7.2	20.1	4.7	Green/ok	overcast/ drizzle	none	7
7/03/2021	1,536	1,910	6.9	0.2	19.9	18.7	4	0.40	7.7	18.2	2.4	Green/ok	7.7	18.2	1.6	Green/ok	rain	none	5
8/03/2021	1,426	1,641	6.8	0.1	20.1	26.8	4/5	0.42	7.8	18.2	7.1	Green/ok	8	18.6	12.5	Green/ok	fine	none	0
9/03/2021	1,360	1,249	6.8	0.4	20.3	21	5	0.41	7.5	19.4	7.4	Green/ok	7.8	19.3	11.8	Green/ok	fine	none	0
10/03/2021	1,391	1,411	7	0.1	20.6	0	5/1	0.08	7.6	19.8	2.2	Green/ok	7.8	19.9	8.4	Green/ok	overcast/rain	none	9
11/03/2021	1,793	1,728	6.8	0.2	20	44	1	0.38	7.2	18.8	0.5	Green/ok	7.1	18.6	1.1	Green/ok	Overcast	none	11
12/03/2021	1,522	1,089	7	0.2	20.1	12.2	1	0.46	7.5	18.2	1.5	Green/ok	7.6	18.4	7.2	Green/ok	fine	none	0
13/03/2021	1,610	1,031	/	/	/	30.7	1	0.32	/	/	/	Green/ok	/	/	/	Green/ok	Fine	none	0
14/03/2021	1,555	910	/	/	/	18	1/2	0.33	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
15/03/2021	1,491	1,030	6.9	0.2	19.9	26	2	0.44	7.4	19.8	0.4	Green/ok	8.4	19.2	13.5	Green/ok	Fine	none	0
16/03/2021	1,329	1,209	6.8	0.3	20.1	26.5	2	0.46	7.1	20.1	0.6	Green/ok	7.7	19.9	6.3	Green/ok	Rain	none	0
17/03/2021	1,502	2,411	6.8	0.3	19.5	13.2	2/3	0.46	7.2	18.8	2.7	Green/ok	7.8	18.6	9.8	Green/ok	Fine	none	0
18/03/2021	1,539	1,341	6.8	0.1	19.3	25.1	3	0.40	7.2	18.8	2.7	Green/ok	7.4	17.5	4.8	Green/ok	fine	none	0
19/03/2021	1,406	1,696	6.9	0.1	18.9	19.3	3/4	0.35	7.2	16.3	5.7	Green/ok	7.3	16.3	7.7	Green/ok	fine	none	0
20/03/2021	1,563	1,256	/	/	/	27.1	4	0.31	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
21/03/2021	1,428	833	/	/	/	11.2	4	0.29	/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
22/03/2021	1,483	1,125	6.9	0.3	18.8	31.3	4/5	0.44	7.6	17.5	6.6	Green/ok	7.7	16.9	5.4	Green/ok	fine	none	0
23/03/2021	1,414	1,861				18.7	5	0.48	7.5	18.1	6.8	Green/ok	7.6	18.2	6.5	Green/ok	fine	none	0
24/03/2021	1,360	1,401				21.2	5/1	0.42	7.5	17.5	4.4	Green/ok	7.3	17.4	7.3	Green/ok	fine	none	0
25/03/2021	1,442	1,348	7.9	0.2	19.7	28.9	1	0.43	7.3	19.2	5	Green/ok	7.7	19.5	9.7	Green/ok	fine	none	0
26/03/2021	1,453	1,127	6.9	0.2	19.3	13.4	1	0.34	7.4	17.9	4.4	Green/ok	7.4	17.7	2.6	Green/ok	fine	none	0
27/03/2021	1,467	1,302	/	/	/	23.7	1	0.33	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
28/03/2021	1,398	1,223	/	/	/	20.9	1	0.33	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
29/03/2021	1,429	1,390	7	0.3	20.2	22	1/2	0.44	8.1	20.6	14.1	Green/ok	7.4	20.2	3.6	Green/ok	overcast	none	4

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
30/03/2021	1,501	1,424	7.1	0.3	20.3	23.5	2	0.44	8.1	20.6	11.5	Green/ok	7.5	20.1	1.7	Hazy green/ok	rain	none	9
31/03/2021	1,685	1,602	7.1	0.3	20.3	19.5	2/3	0.42	7.8	20.7	8.3	Green/ok	7.4	20.4	2.4	Hazy green/ok	overcast/rain	none	23
1/04/2021	2,101	1,397	7	0.4	19.6	26.1	3	0.46	7.7	19.1	9.2	Green/ok	7.2	19.3	7.2	Green/ok	overcast/drizzle	none	4
2/04/2021	1,601	1,529	6.8	0.4	18.8		3/4	0.38	7.7	16.3	8.4	Green/ok	7.4	16.5	4.6	Green/ok	overcast	none	2
3/04/2021	1,595	2,445	/	/	/	0	4	0.31	/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
4/04/2021	1,574	2,008	/	/	/	46.9	4	0.31	/	/	/	Green/ok	/	/	/	Green/ok	overcast	none	0
5/04/2021	1,598	1,612	7	0.4	18.8	20.2	4/5	0.38	7.6	16.9	4.4	Green/ok	7.8	16.9	4.7	Green/ok	overcast/drizzle	none	2
6/04/2021	1,592	1,539	7.2	0.4	19.4	0	5	0.42	7.4	18.4	3.9	Green/ok	7.5	18.4	3.2	Green/ok	fine	none	2
7/04/2021	1,529	1,448	6.9	0.2	19.2	0	5/1	0.42	8	17.6	9.7	Green/ok	8	17.9	8.7	Green/ok	overcast	none	2
8/04/2021	1,499	1,370	6.9	0.2	19.1	23.3	1	0.42	8.1	18.3	11.7	Green/ok	8	17.9	11.4	Green/ok	overcast	none	2
9/04/2021	1,460	1,336	/	/	/	0	1/2	0.42	8	18.1	9.8	Green/ok	7.9	18	10.7	Green/ok	fine/overcast	none	2
10/04/2021	1,566	1,396	/	/	/	16.8	2	0.31	/	/	/	Green/ok	/	/	/	Green/ok	rain	none	4
11/04/2021	1,619	1,523	/	/	/	19.8	2	0.31	/	/	/	Green/ok	/	/	/	Green/ok	rain	none	5
12/04/2021	1,574	1,590	6.8	0.2	19.2	0	2/3	0.50	7.5	18.9	3.4	Green/ok	7.6	19.1	5.3	Green/ok	fine	none	0
13/04/2021	1,515	1,493	6.9	0.2	19.3	22.9	3	0.42	7.4	19.1	2.5	Green/ok	7.4	18.6	1.6	Green/ok	overcast	none	4
14/04/2021	1,546	1,378	7.1	0.1	18.9	0.1	3/4	0.44	7.8	18.2	4.6	Green/ok	8	18.3	6.8	Green/ok	fine	none	2
15/04/2021	1,482	1,378	7.1	0.2	18.3	29.5	4	0.42	7.6	16.3	3.3	Green/ok	7.6	16.6	4.6	Green/ok	overcast	none	2
16/04/2021	1,587	1,420	7	0.2	18.7	30.5	4/3	0.46	7.7	17	4.2	Green/ok	7.9	17	5.5	Green/ok	fine	none	1
17/04/2021	1,630	1,450	/	/	/	4.9	3	0.31	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	1
18/04/2021	1,677	1,517	/	/	/	0	3	0.31	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	1
19/04/2021	1,549	1,422	7.1	0.1	18	56.4	3	0.45	8	16.2	7.5	Green/ok	8.1	16.2	7	Green/ok	fine/overcast	none	0
20/04/2021	1,428	1,357	7.1	0.1	18.1	5.8	3	0.46	8.1	16.6	8.1	Green/ok	8.2	16.5	6.9	Green/ok	Overcast	none	1
21/04/2021	1,591	1,508	7.2	0.2	18.4	0	3/4	0.46	8.3	17.3	6.6	Green/ok	8.2	17.6	9.5	Green/ok	overcast	none	4
22/04/2021	1,544	1,336	7.1	0.4	18.2	0	4	0.44	7.9	17.3	6.7	Green/ok	8	16.3	6.2	Green/ok	fine	none	0
23/04/2021	1,469	1,542	7.4	0.3	18.2	26.7	4/5	0.40	7.8	16.5	3.3	Green/ok	7.8	16.4	5.6	Green/ok	overcast	none	1
24/04/2021	1,542	1,423	/	/	/	0	5	0.31	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	1
25/04/2021	1,494	1,345	/	/	/	27.7	5	0.31	/	/	/	Green/ok	/	/	/	Green/ok	fine	none	0
26/04/2021	1,553	1,359	7.1	0.1	18.1	18.1	5	0.44	7.5	16.5	3.7	Green/ok	7.7	16.6	6	Green/ok	fine	none	0
27/04/2021	1,606	1,454	7.2	0.4	17.5	30.1	5	0.38	7.6	14.3	2.6	Green/ok	7.9	15.1	5.9	Green/ok	fine	none	0
28/04/2021	1,534	1,401	7	0.2	17.3	18.5	5/1	0.48	7.5	14.4	2.2	Green/ok	8.3	14.9	12.6	Green/ok	fine	none	3
29/04/2021	1,524	1,377	7	0.2	16.8	23.3	1	0.46	7.5	14	3	Green/ok	8.1	14.4	10.8	Green/ok	fine	none	0
30/04/2021	1,530	1,480	7.1	0.1	17.2	18.9	1/2	0.46	7.5	14	3	Green/ok	8.1	14.4	10.8	Green/ok	fine	none	0
1/05/2021	1,478	1,193	/	/	/	0	2	0.31	/	/	/	Green/ok	/	/	/	Green/ok	Fine	None	0
2/05/2021	1,572	1,002	/	/	/	37.3	2	0.48	/	/	/	Green/ok	/	/	/	Green/ok	Fine	None	0
3/05/2021	1,485	1,388	7.1	0.2	16.8	27.3	2/3	0.40	7.5	12.1	1.2	Green/ok	8.1	12.4	8.9	Green/ok	Fine	None	0
4/05/2021	1,413	1,677	7.2	0.3	16.8	20.8	3	0.49	7.6	13.2	2.2	Green/ok	8.1	13.3	9.3	Green/ok	Fine	None	0
5/05/2021	1,335	1,566	7.2	0.2	16.9	0	3/4	0.42	7.6	13.6	2.5	Green/ok	8.1	13.4	6.7	Green/ok	Overcast	None	0
6/05/2021	1,341	1,148	7.2	0.2	16.8	43	4	0.40	7.5	13.4	2.8	Green/ok	8	13.2	7.2	Green/ok	Fine	None	0
7/05/2021	1,389	1,129	7.2	0.3	17.5	14.1		0.40	7.5	14.6	1.4	Green/ok	8.5	15.8	8.5	Green/ok	Fine	None	0

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
8/05/2021	1,421	1,393	/	/	/	0		0.31	/	/	/	Green	/	/	/	Green/ok	fine	None	0
9/05/2021	1,454	1,380	/	/	/	41.2		0.31	/	/	/	Green	/	/	/	Green/ok	Rain	None	5
10/05/2021	1,494	1,501	7.3	0.2	18.3			0.48	7.5	16.9	1.9	Green	7.7	16.5	2.3	Green/ok	Rain	None	4
11/05/2021	1,553	1,484	7	0.3	18	36.2		0.40	7.3	16.9	0.7	Green	7.4	16.8	0.5	Green/ok	Overcast	None	1
12/05/2021	1,604	1,438	7.1	0.3	17.8	29.5	2	0.43	7.5	15.9	2.1	Green	7.6	16.1	2.7	Green/ok	Overcast	None	0
13/05/2021	1,624	1,502	7	0.3	16.5	18.5	3	0.41	8.1	13.3	2.4	Green	8	13.5	3.7	Green/ok	Fine	None	0
14/05/2021	1,670	1,583	7	0.2	15.7	23.7	5	0.43	7.5	11	1.8	Green	8	11.5	7.4	Green/ok	Fine	None	0
15/05/2021	1,673	1,581	/	/	/	0	2	0.31	/	/	/	Green	/	/	/	Green/ok	overcast/rain	None	4
16/05/2021	1,596	1,519	/	/	/	44.9	2	0.32	/	/	/	Green	/	/	/	Green/ok	overcast/rain	None	1
17/05/2021	2,055	1,845	7	0.4	16.8	26.2	3	0.49	7.4	14.2	4.1	Green	7.8	14.2	8.8	Green/ok	overcast/rain	None	21
18/05/2021	1,823	2,310	7.1	0.2	16.4	22.1	4	0.42	7.7	13	5.5	Green	7.8	13.2	5.9	Green/ok	Overcast	None	4
19/05/2021	1,733	1,914	7.1	0.3	15.3	0	5	0.44	8	11.6	8.2	Green	8.2	11.9	8.6	Green/ok	Clear	None	0
20/05/2021	1,622	1,698	7.2	0.2	15.4	44	6	0.44	8.2	12.1	8.6	Green	8	11.2	7.8	Green/ok	Fine	None	0
21/05/2021	1,552	1,515	7.1	0.1	15.6	25.1	2	0.46	8	11.8	7.2	Green	8.1	11.3	6.5	Green/ok	Fine	None	0
22/05/2021	1,692	1,523	/	/	/	19.9	6	0.33	/	/	/	Green	/	/	/	Green/ok	Fine	None	0
23/05/2021	1,630	1,509	/	/	/	23.8	1	0.33	/	/	/	Green	/	/	/	Green/ok	Fine	None	0
24/05/2021	1,583	1,686	7.2	0.2	15.8	13.1	5	0.40	7.7	11.9	5	Green	7.9	12.1	7.3	Green/ok	Fine	None	0
25/05/2021	1,499	1,458	7.2	0.2	15.5	34.6	1	0.39	7.6	10.9	3.4	Green	7.6	11.3	4.9	Green/ok	Fine	None	0
26/05/2021	1,655	1,532	7.3	0.1	15.4	15.7	4	0.46	7.9	10.3	7	Green	8.6	11.3	14.3	Green/ok	Fine	None	0
27/05/2021	1,519	1,378	7.1	0.1	15	34.6	5	0.41	7.9	9	7.3	Green	7.9	9.7	11.7	Green/ok	Fine	None	0
28/05/2021	1,484	1,449	7.2	0.2	15.2	25.2	6	0.38	7.7	10	5.7	Green/ok	7.9	10.5	8.8	Green/ok	overcast	None	0
29/05/2021	1,544	1,437	/	/	/	0	1	0.04	/	/	/	Green/ok	/	/	/	Green/ok	Overcast	None	0
30/05/2021	1,523	1,370	/	/	/	32.8	1	0.04	/	/	/	Green/ok	/	/	/	Green/ok	Overcast	None	1
31/05/2021	1,924	1,604	7.2	0.1	15.7	43.7	2	0.42	7.7	11.3	5.3	Green/ok	7.7	11.1	5.6	Green/ok	Rain	None	15
1/06/2021	1,605	2,094	7.1	0.2	15.3	15.8	2	0.44	7.7	10.6	4.6	Green/Ok	7.7	10.7	4.7	Green/Ok	Rain	None	15
2/06/2021	1,519	1,663	6.8	0.1	15.7	22.8	3	0.49	7.9	12.4	9.7	Green/Ok	7.8	12.4	9.3	Green/Ok	Fine	None	0
3/06/2021	1,603	1,617	7.2	0.2	15.3	13.6	4	0.48	8	11.4	10.4	Green/Ok	8.1	11.1	11.4	Green/Ok	Fine	None	0
4/06/2021	1,457	1,410	7	0.1	15.3	24.9	5	0.41	7.9	11	8.2	Green/Ok	8.2	11.1	9	Green/Ok	Rain	None	3
5/06/2021	1,638	1,558	/	/	/	1	6	0.31	/	/	/	Green/Ok	/	/	/	Green/Ok	Overcast	None	0
6/06/2021	1,505	1,472	/	/	/	26.5	1	0.33	/	/	/	Green/Ok	/	/	/	Green/Ok	Overcast	None	0
7/06/2021	1,585	1,438	7.1	0.1	15.1	20.1	2	0.35	8.1	11.2	6	Green/Ok	8	11.3	8.2	Green/Ok	Cloudy	None	0
8/06/2021	1,420	1,408	7.4	0.2	16	28	2	0.43	7.9	13.2	9.1	Green/Ok	7.8	12.6	6.7	Green/Ok	fine	None	0
9/06/2021	1,451	1,424	7.3	0.2	15.8	16.2	2	0.47	8	12.5	8.6	Green/Ok	8.7	13.5	19.4	Green/Ok	Overcast	none	0
10/06/2021	1,440	1,439	7.1	0.1	16	30	2	0.40	7.8	12.7	7.1	Green/Ok	7.7	12.8	7.2	Green/Ok	overcast	None	0
11/06/2021	1,387	1,284	7.4	0.1	16.1	0	3	0.39	7.6	12.8	4.3	Green/Ok	7.6	12.6	5.4	Green/Ok	fine	none	0
12/06/2021	1,486	1,386	/	/	/	0	4	0.42	/	/	/	Green/Ok	/	/	/	Green/Ok	overcast	none	1
13/06/2021	1,388	1,283	/	/	/	47	5	0.46	/	/	/	Green/Ok	/	/	/	Green/Ok	overcast	none	0
14/06/2021	1,730	1,479	7.1	0.1	16.5	0	6	0.39	7.6	14.5	4	Green/Ok	7.6	14.2	5.6	Green/Ok	overcast	none	15
15/06/2021	1,491	1,888	7.2	0.1	16.6	48	2	0.43	7.5	14.7	2.2	Green/Ok	7.4	14.5	1.3	Green/Ok	overcast	none	1

SampleDate	InFlow	EffFlow	Splitter pH	Splitter DO	Splitter Temp	BPVol	Cells	Time	pHA	TempA	DOA	ColourA	pHB	TempB	DOB	ColourB	Weather	Odour	Rainfall
16/06/2021	1,643	1,664	7.1	0.1	16.4	0	3	0.46	7.5	14.6	2.3	Green/Ok	7.5	14	2.2	Green/Ok	overcast	none	1.5
17/06/2021	1,798	1,450	7.1	0.1	16.1	42	4	0.40	7.6	14.1	3.9	Green/Ok	7.5	14.3	3.5	Green/Ok	oc fine	none	9
18/06/2021	1,859	2,091	7.1	0.2	15.9	15	5	0.44	7.7	13.9	5.9	Green/Ok	7.6	13.9	6.1	Green/Ok	overcast	none	9
19/06/2021	1,886	1,938	/	/	/	23	6	0.33	/	/	/	Green/Ok	/	/	/	Green/Ok	overcast	none	10
20/06/2021	1,757	2,007	/	/	/	0	2	0.33	/	/	/	Green/Ok	/	/	/	Green/Ok	overcst	none	0.5
21/06/2021	1,798	1,388	7	0.2	14.8	48	3	0.47	7.7	12.1	3.2	Green/Ok	7.2	12	6.2	Green/Ok	overcast	none	0
22/06/2021	1,893	2,233	7.1	0.2	15	22	4	0.40	7.7	10.3	5.7	Green/Ok	7.7	10.6	0.3	Green/Ok	overcast	none	0
23/06/2021	1,848	2,023	7.1	0.3	14.8	0	5	0.42	7.8	10.1	7	Green/Ok	7.3	10.6	7.6	Green/Ok	overcast	none	2.5
24/06/2021	1,643	1,694	7.2	0.2	14.5	45	6	0.44	7.9	10.2	7.6	Green/Ok	7.5	10.2	6.7	Green/Ok	overcast	none	0
25/06/2021	1,632	1,740	7	0.1	15	25	3	0.40	7.8	11	6.9	Green/Ok	7.4	10.9	4.2	Green/Ok	oc rain	none	1.5
26/06/2021	2,168	1,831	/	/	/	13.5	4	0.31	/	/	/	Green/Ok	/	/	/	Green/Ok	rain	none	12
27/06/2021	3,574	2,443	/	/	/	34	5	0.50	/	/	/	Green/Ok	/	/	/	Green/Ok	rain	none	0.5
28/06/2021	2,851	2,801	7	0.2	14.8	22	6	0.44	7.8	12.7	7	Green/Ok	7.8	12.9	4.4	Green/Ok	oc windy	none	0
29/06/2021	2,677	2,801	7.2	0.2	13.4	23.5	6	0.41	7.9	9.2	7.4	Green/ok	7.7	9.9	4.7	Green/ok	OC/ Rain	none	7
30/06/2021			6.8	0.7	14.2		2	0.45	7.8	9.9	10.5	Green/ok	7.4	9.7	8.7	Green/ok	Overcast	none	

Pond A Effluent																
SampleDate	SiteID	LogNo	BOD	SBOD	SCBOD	SSolids	DO	pH	AmmN	NitraN	Nitrite	DRP	TotalP	TN	Faecal	EColi
3/07/2020	Pond A E	202715	31.8	4.6	6	46.6	10.3	8.2							63,000	25,000
15/07/2020	Pond A E	202869	41	3.1	1.3	60	10.4	7.8							26,000	21,000
23/07/2020	Pond A E	202998	37.7	3.1	2.1	67.4	9.6	9.2	22.1	0.2		3.5	3.7	37	116,000	100,000
28/07/2020	Pond A E	203055	54	4.5	3.2	79	11.2	8.2							104,000	76,000
4/08/2020	Pond A E	203149	55	4.4	3.5	74.4	9.2	8							33,000	33,000
10/08/2020	Pond A E	203221	53.5	5.7	4.4	75.8	8.7	8	23.9	0.2		3.6	4.2	37	97,000	78,000
19/08/2020	Pond A E	203350	76.5	5.2	3.9	95.8	11.8	8.6							92,000	80,000
28/08/2020	Pond A E	203518	62.2	16.6	12.9	63.2	11.8	8.3							48,000	15,000
2/09/2020	Pond A E	203576	80.5	8.3	5.5	108.8	6.6	8	22.6	0.3		3.4	4.5	34	117,000	80,000
10/09/2020	Pond A E	203689	61.8	6.1	4	66.2	6.9	7.8							10,600	6,100
15/09/2020	Pond A E	203739	52.7	8.4	5.9	66.6	6.9	7.6							19,000	13,000
25/09/2020	Pond A E	203909	35.2	6.2	4.2	39.8	2.5	7.3							5,200	2,600
6/10/2020	Pond A E	204059	36.7	5.5	3.5	42.4	4.6	7.5	18.6	0.2		3.5	3.4	23	48,000	34,000
12/10/2020	Pond A E	204127	26.3	4.9	2.8	33.2	4.5	7.3							13,200	12,000
22/10/2020	Pond A E	204267	41	5.9	1.6	50.4	11.5	8							52,000	42,000
28/10/2020	Pond A E	204328	39.1	4.4	1.9	58	7.4	8							32,000	21,000
2/11/2020	Pond A E	204402	47.3	11.6	1.3	65.8	8.2	8							44,000	19,000
13/11/2020	Pond A E	204580	26.3	6.7	4.4	46	6.6	7.9	26.5	0.3		4.1	5.2	35	3,600	2,300
17/11/2020	Pond A E	204635	35	5.4	3.6	63.4	14.2	8.3							110,000	83,000
25/11/2020	Pond A E	204766	30.3	5.1	3.9	56.8	4.9	7.8							92,000	63,000
1/12/2020	Pond A E	204860	21.6	4.9	1.8	36.6	4	7.2							46,000	33,000
7/12/2020	Pond A E	204975	33.5	3.9	2	36.6	4	7.2	22.9	0.2	0.015	2.8	3.9	25	37,000	32,000
16/12/2020	Pond A E	205187	17.1	6.1	4.2	42.2	11.2	8.1							8,500	6,000
24/12/2020	Pond A E	205341	48	5.2	2.9	65	1.3	7.2							37,000	18,000
5/01/2021	Pond A E	210043	19.5	5.5	1.4	29.6	6.9	7.6							15,000	9,000
11/01/2021	Pond A E	210145	27.9	3.8	1.4	46	13.6	7.9							14,000	10,000
20/01/2021	Pond A E	210297	30.2	3.8	1.8	46.2	4.3	7.5							75,000	47,000
28/01/2021	Pond A E	210434	36.3	4.5	1.3	41.4	1.1	7.3	24.2	0.3	0.035	4.4	5.7	67	34,000	29,000
2/02/2021	Pond A E	210509	20.9	5.8	2.2	40.8	8.7	7.8							6,000	5,000
11/02/2021	Pond A E	210667	21.1	5.2	2.2	44.4	2	7.3							22,000	8,000
17/02/2021	Pond A E	210767	51.6	5.9	1.4	71.2	11.2	8.1	21.2	0.3	0.075	3.8	4.5	29	50,000	32,000
22/02/2021	Pond A E	210833	35.9	5.4	2.2	61.6	7.6	7.9							21,000	11,000
2/03/2021	Pond A E	210971	21.5	5.5	4.8	25	0.6	7.2							1,300	1,100
11/03/2021	Pond A E	211139	37	4.8	3.2	93.2	0.5	7.2							26,000	19,000
18/03/2021	Pond A E	211255	12.1	7.3	2.2	32	3.9	7.2	28.1	0.4	<0.015	5.4	6	36	3,200	2,600
22/03/2021	Pond A E	211293	15.8	8.9	1.5	28	6.6	7.6	32.3	0.4	<0.015	5.2	6	35	1,200	500
7/04/2021	Pond A E	211552	25.6	5.3	1.8	57.2	9.7	8	27.4	0.3		4.3	15.8	37	61,000	38,000
13/04/2021	Pond A E	211633	38	7.8	2.2	44.2	2.5	7.4	30.9	0.3		4.9	6.9	38	77,000	49,000
23/04/2021	Pond A E	211788	28.1	5.9	1.6	35.6	3.3	7.8	30.8	0.3		4.4	5.2	35	29,000	13,000
27/04/2021	Pond A E	211826	15.1	5.9	1.7	14.6	2.6	7.6	32.3	0.3		4.8	5.4	36	2,700	1,700
3/05/2021	Pond A E	211922	13.2	7.2	1.3	23.4	1.2	7.5	39.8	0.2		5.5	6.1	43	48,000	32,000
11/05/2021	Pond A E	212045	12.2	5	2	13.6	0.7	7.3	40.6	0.2		5.8	6.2	45	32,000	23,000
19/05/2021	Pond A E	212166	15.1	3	1.8	18.2	8.2	8	38.5	0.9		4.6	5.3	43	94,000	74,000
27/05/2021	Pond A E	212291	14.7	4.3	2.5	24	7.3	7.9	37.8	0.3		4.2	4.8	44	17,000	10,000
1/06/2021	Pond A E	212354	18.7	6.7	3.9	28.6	4.6	7.7	36.2	0.3		3.7	4.5	40	160,000	130,000
10/06/2021	Pond A E	212502	23.7	3.8	2.5	38	7.1	7.8	37.3	0.2		4	4.4	43	23,000	14,000
18/06/2021	Pond A E	212611	28.7	2.3	1.6	48.4	5.9	7.7	35.7	0.3		4.3	5.1	38	56,000	39,000
22/06/2021	Pond A E	212654	26.6	3.8	3	33.2	5.7	7.7	32.7	0.3		4.1	4.9	40	51,000	47,000

Pond B Effluent																
SampleDate	SiteID	LogNo	BOD	SBOD	SCBOD	SSolids	DO	pH	AmmN	NitraN	Nitrite	DRP	TotalP	TN	Faecal	EColi
3/07/2020	Pond B E	202716	31.7	3.7	5.2	53.2	12.3	8.1							36,000	21,000
15/07/2020	Pond B E	202870	48.4	4.6	2.7	61	11.1	7.8							77,000	58,000
23/07/2020	Pond B E	202999	37.5	4.4	3.3	66.2	8.7	9.6	25.2	<0.2		3.1	3.7	33	97,000	80,000
28/07/2020	Pond B E	203056	67.4	6.9	4.9	73	14.4	8.7							81,000	62,000
4/08/2020	Pond B E	203150	40.9	9.1	6.8	55.6	6.9	7.9							23,000	13,000
10/08/2020	Pond B E	203222	51.4	6.1	4.1	77.8	13.4	8.3	25.6	0.2		4.7	4	37	90,000	72,000
19/08/2020	Pond B E	203351	56.5	4.6	3.2	79.8	12.7	8.4							118,000	60,000
28/08/2020	Pond B E	203519	45.3	6.8	4.8	62	11.2	8.3							16,000	11,000
2/09/2020	Pond B E	203577	56.7	6.6	5.1	85.8	9.6	8.1	24.8	0.3		3.2	4.4	34	64,000	46,000
10/09/2020	Pond B E	203690	42.8	5.5	5	58.6	7.3	7.9							7,600	4,500
15/09/2020	Pond B E	203740	47.9	8.5	5.9	63	7.9	8.3							20,000	18,000
25/09/2020	Pond B E	203910	32.3	5.5	3.7	39	2.6	7.2							2,900	1,600
6/10/2020	Pond B E	204060	46	5	2.4	56.2	5.1	8	14.5	<0.2		2.5	3.3	25	25,000	11,000
12/10/2020	Pond B E	204128	37.9	7.2	5.3	48.6	4.6	7.6							19,000	13,000
22/10/2020	Pond B E	204268	22.8	6.6	0.9	40.4	8	7.7							24,000	18,000
28/10/2020	Pond B E	204329	30.7	3.6	0.8	56.8	6.1	8.4							36,000	23,000
2/11/2020	Pond B E	204403	41.7	13	1.1	64.6	10.5	8.4							62,000	27,000
13/11/2020	Pond B E	204581	37.4	6.9	1.2	53	5	7.7	22.7	0.4		5	4.8	33	5,100	3,700
17/11/2020	Pond B E	204636	30.5	4.7	1.5	43.8	3.4	7.5							19,000	17,000
25/11/2020	Pond B E	204747	21.4	5.2	3.3	34.8	4.7	7.4							34,000	20,000
1/12/2020	Pond B E	204861	14.6	4.3	1.8	25	3.2	7.3							36,000	20,000
7/12/2020	Pond B E	204976	38	7.9	6.3	25.8	6.5	7.3	25.6	0.2	0.039	2.6	4.1	25	36,000	25,000
16/12/2020	Pond B E	205188	30.9	6.5	4.2	67.6	6.1	8.1							32,000	26,000
24/12/2020	Pond B E	205342	20.5	6.5	2.4	45.4	0.3	7.2							34,000	14,000
5/01/2021	Pond B E	210044	22.8	5.1	1.3	45	12.7	8.7							18,000	11,000
11/01/2021	Pond B E	210146	17.3	4	1.3	40.8	3.3	7.2							25,000	9,000
20/01/2021	Pond B E	210298	20.8	4.4	1.5	50.8	4.1	7.4							80,000	64,000
28/01/2021	Pond B E	210435	14.2	6.9	3.8	33.2	1.2	7.3	15.8	0.3	0.153	3.8	4.9	21	14,000	11,000
2/02/2021	Pond B E	210510	26.8	3.8	1.9	49.4	11.8	8.2							6,300	3,900
11/02/2021	Pond B E	210668	19.3	6.1	1.4	41.6	1.9	7.6							33,000	17,000
17/02/2021	Pond B E	210768	26.5	6.4	2.9	52.6	6.1	7.9	17.9	0.3	0.075	4.1	4.9	23	37,000	31,000
22/02/2021	Pond B E	210834	31.4	5	0.3	47.6	7.4	7.8							7,400	4,800
2/03/2021	Pond B E	210972	24.8	3.9	1.1	52.6	0.6	7.2							27,000	19,000
11/03/2021	Pond B E	211140	19.1	2.8	2.1	36	1.1	7.1							3,700	3,200
18/03/2021	Pond B E	211256	36.3	5.1	2.2	44.2	4.8	7.4	24.3	0.4	0.033	4.6	5.4	30	28,000	24,000
22/03/2021	Pond B E	211294	24.5	2.6	0.8	31.8	5.4	7.7	26.5	0.3	0.021	5	5.9	31	19,000	6,000
7/04/2021	Pond B E	211553	30.6	4.4	1.3	52.8	8.7	8	26.4	0.3		4.8	18	36	72,000	42,000
13/04/2021	Pond B E	211634	24.1	2.9	1.2	48.4	1.6	7.4	27.3	0.3		4.5	5.6	37	19,000	9,000
23/04/2021	Pond B E	211789	28.7	5.5	1.8	34	4.1	7.8	29.6	0.3		4.9	5.4	32	1,400	800
27/04/2021	Pond B E	211827	25.2	5.5	2.4	29	5.9	7.9	27.2	0.3		4.3	5.5	37	13,000	9,000
3/05/2021	Pond B E	211923	25.8	5.6	1.7	40.4	8.9	8.1	32.6	0.3		4.6	5.5	40	90,000	54,000
11/05/2021	Pond B E	212046	22	4.1	2	42.4	0.5	7.4	32.5	0.4		4.7	5.5	44	51,000	35,000
19/05/2021	Pond B E	212167	28.7	4	1.8	51.8	8.6	8.2	33	0.9		3.9	5.1	39	74,000	63,000
27/05/2021	Pond B E	212292	17	4.4	1.5	62	11.7	8	31.1	0.6		4.3	5.1	36	6,800	6,000
1/06/2021	Pond B E	212355	48.3	6.2	1.7	54.6	4.7	7.7	30.8	0.8		3.9	4.5	43	93,000	30,000
10/06/2021	Pond B E	212503	53	16.3	7.4	39.4	7.2	7.7	28.1	0.5		4.2	5.3	40	8,800	4,800
18/06/2021	Pond B E	212612	25.6	6.7	2.4	51.8	6.1	7.6	28.8	0.7		4	5.2	33	34,000	18,000
22/06/2021	Pond B E	212655	84.7	6.2	2.5	43.2	0.3	7.5	28.4	0.8		3.9	4.7	35	69,000	50,000

Bores and Spring Monitoring Data

Sample Date	SiteID	Depth	Temp	pH	DRP	Cond	BOD	AmmN	NitraN	Nitrite	Chlori	TP	FColi	EColi	TN	TN45FILT
22/07/2020	1	3.7	13.7	6	0.07	0.08	2.1	0.02	0.3	<0.015	9	0.03	6	6	1	-
27/08/2020	1	3.8	12.8	6.8	0.03	0.08	1.4	<0.02	0.3	<0.015	8	<0.05	<1		<1	-
8/09/2020	1	4.1	12	6.8	0.01	0.08	1.4	<0.02	<0.2	<0.015	7	<0.05	1	1	1	-
16/10/2020	1	3.1	10.8	6.6	0.03	0.09	0.7	<0.02	0.3	<0.015	13	<0.05	<1	*	1	-
11/11/2020	1	3.8	10.8	6	0.01	0.08	0.3	<0.02	0.5	<0.015	8	<0.05	<1	<1*	2	-
21/12/2020	1	4	11.4	6.4	0.01	0.09	<0.5	<0.02	0.3	<0.015	9	<0.05	1	1	1	-
14/01/2021	1	3.9	23.4	7.8	0.02	0.08	0.2	<0.02	<0.2	<0.015	6	<0.05	1	<1	<1	-
12/02/2021	1	4.5	12.7	6.3	<0.05	0.08	0.6	<0.02	<0.2	<0.015	7	<0.05	1	1	1	-
10/03/2021	1	4.24	13.3	5.9	<0.05	0.08	0.2	<0.02	<0.2	<0.015	8	<0.05	<1	<1 *	<1	-
8/04/2021	1	4.1	14.2	6.4	<0.05	0.08	0.8	0.04	0.3	<0.015	9	<0.05	1	1	<1	-
25/05/2021	1	3.9	15.5	6.1	<0.05	0.08	1.8	0.02	0.3	<0.015	8	<0.05	<1	<1	6	-
9/06/2021	1	4.2	15.5	6.1	<0.05	0.07	0.5	0.02	<0.2	<0.015	9	<0.05	<1	<1	<1	-
22/07/2020	2	3	14.5	7	0.46	0.21	0.9	0.02	5.8	<0.015	15	0.46	9	9	5	-
27/08/2020	2	2.5	14.3	7.4	0.5	0.2	0.5	<0.02	4.5	<0.015	16	0.51	<1		1	-
8/09/2020	2	3.1	13.9	5.7	0.49	0.22	1.2	0.02	4.4	<0.015	18	0.41	2	2	4	-
16/10/2020	2	3.1	13.6	6	0.48	0.22	0.8	0.02	2.2	<0.015	14	0.57	5	5	2	-
11/11/2020	2	3.1	13	5.6	0.54	0.19	0.3	0.02	2.2	<0.015	16	0.59	6	4	4	-
21/12/2020	2	3.5	13	6.5	0.42	0.1	<0.5	<0.02	0.7	<0.015	9	0.46	3	1	1	-
14/01/2021	2	3.39	14.4	6.1	0.52	0.18	0.3	<0.02	2.6	0.016	14	0.55	<1	<1	3	-
12/02/2021	2	3.5	13.9	5.5	0.57	0.17	0.2	<0.02	2.2	<0.015	13	0.58	1	<1	2	-
10/03/2021	2	3.49	14.9	5.4	0.57	0.19	0.4	0.03	2.8	<0.015	18	0.58	4	2	4	-
8/04/2021	2	3.3	14.8	5.5	0.61	0.18	0.5	0.03	2.7	<0.015	18	0.61	3	1	3	-
25/05/2021	2	3.2	15.3	5.9	0.54	0.21	<0.5	<0.02	5.8	<0.015	18	0.57	1	1	<1	-
9/06/2021	2	3.4	15.1	6	0.51	0.19	2.6	0.02	5.5	<0.015	16	0.55	14	13	6	-
22/07/2020	3	3	11.9	6.3	0.51	0.11	1	<0.02	1.5	<0.015	10	0.51	34	30	2	-
27/08/2020	3	3.7	11.6	7.1	0.49	0.09	2.8	<0.02	0.8	<0.015	9	0.51	1	1	<1	-
8/09/2020	3	3.2	10.3	6.2	0.5	0.09	1.4	<0.02	1.2	<0.015	8	0.45	2	2	2	-
16/10/2020	3	3.4	10.3	6	0.41	0.11	0.2	<0.02	1.2	<0.015	10	0.46	30	17	1	-
11/11/2020	3	3.1	10.8	5.8	0.52	0.08	3.1	0.03	0.7	<0.015	7	0.53	<1	<1 *	3	-
21/12/2020	3	3.4	13.4	6	0.53	0.19	0.5	<0.02	3.3	<0.015	16	0.55	1	1	4	-
14/01/2021	3	3.6	13.8	6.2	0.42	0.08	<0.1	<0.02	0.3	<0.015	7	0.51	<1	<1	<1	-
12/02/2021	3	3.6	15.7	6.6	0.46	0.09	1.2	<0.02	0.3	<0.015	8	0.48	2	1	<1	-
10/03/2021	3	5.6	16.3	5.5	0.45	0.08	0.3	0.02	0.2	<0.015	8	0.45	1	1	<1	-
8/04/2021	3	3.3	17.2	5.5	0.45	0.09	0.2	0.03	0.8	<0.015	11	0.44	12	7	1	-
25/05/2021	3	3.3	15.1	6.1	0.31	0.16	5.2	0.04	3.1	<0.015	14	0.31	9	7	3	-

Bores and Spring Monitoring Data

Sample Date	SiteID	Depth	Temp	pH	DRP	Cond	BOD	AmmN	NitraN	Nitrite	Chlori	TP	FColi	EColi	TN	TN45FILT
9/06/2021	3	3.4	14.5	6.1	0.3	0.16	<0.1	0.02	3.6	<0.015	15	0.31	2	1	4	-
22/07/2020	4	3.1	14.4	5.8	0.16	0.12	0.5	<0.02	1.8	<0.015	9	0.15	1	1	2	2
27/08/2020	4	3.5	14.1	7.2	0.08	0.1	0.6	<0.02	0.9	<0.015	9	0.07	<1	-	1	1
8/09/2020	4	2.9	14.2	5.9	0.15	0.14	1.1	<0.02	2.7	<0.015	12	0.17	<1	<1	3	3
16/10/2020	4	2.9	13.6	6	0.15	0.12	<0.1	<0.02	1.6	<0.015	10	0.19	<1	*	2	1
11/11/2020	4	2.8	13.2	5.6	0.16	0.13	0.1	<0.02	1.9	<0.015	11	0.15	1	<1	5	4
21/12/2020	4	3.3	12.9	6.1	0.15	0.12	0.5	<0.02	1.6	<0.015	10	0.15	2	1	2	2
14/01/2021	4	3.47	14.7	6.8	0.05	0.09	0.2	<0.02	0.6	<0.015	8	0.3	1	1	1	1
12/02/2021	4	3.3	12.7	5.7	0.15	0.1	1.1	<0.02	0.8	<0.015	8	0.14	<1	* (<1)	1	<1
10/03/2021	4	4.03	12.9	5.5	0.17	0.11	0.2	<0.02	1.4	<0.015	10	0.15	1	1	2	1
8/04/2021	4	3.2	13.5	5.5	0.15	0.11	0.3	<0.02	1.5	<0.015	11	0.15	1	1	2	<1
25/05/2021	4	3.2	14.1	6	0.17	0.12	0.5	<0.02	2.4	0.032	10	0.17	<1	<1	2	2
9/06/2021	4	3.2	14.2	6.1	0.15	0.1	<0.1	0.02	1.7	<0.015	9	0.16	<1	<1	3	2
22/07/2020	5	2.8	13.7	5.8	0.26	0.32	1.1	<0.02	8.2	0.027	26	0.28	10	10	9	7
27/08/2020	5	2.5	13.2	6.5	0.28	0.23	0.8	<0.02	3.5	<0.015	20	0.29	1	1	1	<1
8/09/2020	5	3	12.9	6.4	0.31	0.24	1.3	<0.02	3.8	<0.015	20	0.27	<1	<1	4	4
16/10/2020	5	2.6	13.6	6	0.26	0.28	<0.1	<0.02	4.5	0.024	19	0.38	1	1	5	5
11/11/2020	5	2.5	13.9	5.6	0.36	0.25	0.4	<0.02	0.2	0.023	21	0.37	12	12	5	4
21/12/2020	5	3	15.1	6	0.79	0.27	1.2	<0.02	0.8	<0.015	22	0.99	35	25	2	1
14/01/2021	5	2.8	17.1	5.9	1.61	0.22	<0.1	<0.02	0.3	<0.015	19	1.76	<1	<1	1	1
12/02/2021	5	2.8	16.9	5.6	0.95	0.21	1.1	0.03	<0.2	<0.015	16	1.79	15	13	1	<1
10/03/2021	5	2.77	16.8	5.5	1.36	0.19	0.6	0.04	<0.2	<0.015	16	1.46	<1	<1	1	<1
8/04/2021	5	2.8	16.6	5.6	1.02	0.22	1.3	0.06	0.2	<0.015	20	1.01	1	1	<1	<1
25/05/2021	5	2.7	15.6	5.9	0.53	0.25	0.9	0.03	1.8	0.017	24	0.54	5	5	2	2
9/06/2021	5	2.8	15.1	6	0.48	0.28	0.4	0.02	3.7	0.03	25	0.57	7	4	5	4
22/07/2020	6	3.1	11.7	6.4	0.05	0.07	1	<0.02	<0.2	<0.015	8	0.03	5	5	<1	-
27/08/2020	6	3.9	14.2	7.4	0.03	0.07	0.7	0.02	0.2	<0.015	8	<0.05	<1	-	<1	-
8/09/2020	6	3	10.3	6.5	0.02	0.08	1.5	<0.02	0.2	<0.015	8	<0.05	11	11	<1	-
16/10/2020	6	3.2	10.5	6.5	0.02	0.08	0.3	<0.02	<0.2	<0.015	8	<0.05	2	2	1	-
11/11/2020	6	3	10.4	6.2	0.03	0.07	0.2	<0.02	<0.2	<0.015	7	<0.05	1	1	3	-
21/12/2020	6	3.1	12.5	6.8	0.03	0.08	<0.5	<0.02	<0.2	<0.015	10	<0.05	2	2	<1	-
14/01/2021	6	3.6	15.6	6.3	0.04	0.07	<0.1	<0.02	<0.2	<0.015	6	0.09	<1	<1	<1	-
12/02/2021	6	3.2	14.1	6.2	0.01	0.08	0.8	<0.02	<0.2	<0.015	6	<0.05	<1	* (<1)	<1	-
10/03/2021	6	3.51	14.5	5.9	<0.05	0.08	0.2	0.02	<0.2	<0.015	8	0.46	1	1	<1	-
8/04/2021	6	3.4	16.1	6	<0.05	0.07	0.3	<0.02	0.3	<0.015	6	<0.05	<1	<1 *	<1	-

Bores and Spring Monitoring Data

Sample Date	SiteID	Depth	Temp	pH	DRP	Cond	BOD	AmmN	NitraN	Nitrite	Chlori	TP	FColi	EColi	TN	TN45FILT
25/05/2021	6	3.2	15.6	6.5	<0.05	0.07	<0.5	0.03	<0.2	<0.015	7	<0.05	2	2	<1	-
9/06/2021	6	3.4	15.1	6.5	<0.05	0.07	0.1	0.02	<0.2	<0.015	7	<0.05	<1	<1	1	-
22/07/2020	7	3	9.5	6.5	0.02	0.07	1.2	<0.02	<0.2	<0.015	7	0.02	1	1	<1	-
27/08/2020	7	3.3	14.5	6.9	0.04	0.07	1.8	<0.02	<0.2	<0.015	8	<0.05	3	3	<1	-
8/09/2020	7	3.3	9.7	6.4	0.02	0.07	1.6	<0.02	<0.2	<0.015	7	<0.05	1	1	1	-
16/10/2020	7	3.4	10.6	6.1	0.02	0.07	0.9	<0.02	<0.2	<0.015	9	0.05	3	3	<1	-
11/11/2020	7	3.5	12.2	5.9	0.02	0.07	0.2	<0.02	<0.2	<0.015	7	<0.05	<1	<1*	2	-
21/12/2020	7	3.6	13.8	6.7	0.02	0.07	<0.5	<0.02	<0.2	<0.015	7	<0.05	1	1	1	-
14/01/2021	7	3.5	13.5	6.1	0.02	0.08	<0.1	<0.02	<0.2	<0.015	6	0.05	<1	<1	<1	-
12/02/2021	7	3.8	16.7	6.2	0.03	0.08	0.8	<0.02	<0.2	<0.015	6	<0.05	3	1	<1	-
10/03/2021	7	3.78	17.9	6	<0.05	0.08	0.4	<0.02	<0.2	<0.015	8	<0.05	5	5	<1	-
8/04/2021	7	3.4	15.8	6	<0.05	0.07	0.1	0.02	<0.2	<0.015	7	<0.05	<1	<1 *	<1	-
25/05/2021	7	3.4	13	6.6	<0.05	0.06	0.8	0.02	<0.2	<0.015	7	<0.05	<1	<1	<1	-
9/06/2021	7	3.7	11.5	6.6	<0.05	0.07	0.4	0.02	<0.2	<0.015	7	<0.05	1	1	<1	-
22/07/2020	4a	3.4	14	5.8	0.05	0.1	0.6	<0.02	0.7	<0.015	9	0.05	<1		1	-
27/08/2020	4a	3.8	14.3	6.7	0.16	0.11	0.6	<0.02	1.6	<0.015	10	0.25	<1		1	-
8/09/2020	4a	3.3	14.2	6.2	0.05	0.1	1.3	<0.02	0.9	<0.015	9	<0.05	<1	<1	1	-
16/10/2020	4a	3.4	14.2	6	0.05	0.1	0.1	<0.02	0.7	<0.015	8	0.06	<1	*	<1	-
11/11/2020	4a	3.2	13.7	5.7	0.05	0.09	0.1	<0.02	0.8	<0.015	9	<0.05	<1	<1*	3	-
21/12/2020	4a	3.4	13.1	6.2	0.05	0.09	0.5	<0.02	0.7	<0.015	9	0.05	1	<1	1	-
14/01/2021	4a	3.22	13.1	5.6	0.14	0.11	<0.1	<0.02	1.3	<0.015	8	0.16	<1	<1	1	-
12/02/2021	4a	3.5	13.3	6.9	0.05	0.09	1.2	0.02	0.5	<0.015	9	<0.05	<1	* (<1)	1	-
10/03/2021	4a	3.48	12.6	5.7	<0.05	0.09	0.3	<0.02	0.6	<0.015	9	<0.05	<1	<1*	1	-
8/04/2021	4a	3.2	12.8	5.6	0.05	0.09	0.6	<0.02	0.6	<0.015	10	<0.05	<1	<1 *	<1	-
25/05/2021	4a	3.4	13.2	6.1	<0.05	0.09	1	0.02	1	<0.015	8	<0.05	<1	<1	<1	-
9/06/2021	4a	3.4	14.4	6.3	0.06	0.1	<0.1	<0.02	0.7	<0.015	8	0.06	1	1	1	-
22/07/2020	Spring	-	13	5.9	0.02	0.1	2.1	<0.02	0.7	<0.015	9	0.01	<1	-	<1	-
27/08/2020	Spring	-	13.6	6.4	0.02	0.09	1.5	<0.02	0.7	<0.015	9	<0.05	1	1	<1	-
8/09/2020	Spring	-	13.8	6.7	0.01	0.09	3.1	<0.02	0.6	<0.015	8	<0.05	1370	1370	1	-
16/10/2020	Spring	-	14	5.8	0.01	0.1	2.4	<0.02	0.7	<0.015	9	<0.05	<1	*	1	-
11/11/2020	Spring	-	14.5	6.5	0.02	0.09	0.8	<0.02	0.7	<0.015	8	<0.05	34	29	3	-
21/12/2020	Spring	-	15.3	6.6	0.01	0.09	1.7	<0.02	0.7	<0.015	10	<0.05	28000	28000	1	-
14/01/2021	Spring	-	25.4	7.2	0.01	0.09	2.1	<0.02	0.5	<0.015	7	0.06	9200	7000	1	-
12/02/2021	Spring	-	16.5	7.7	0.03	0.04	2.7	<0.02	0.5	<0.015	7	<0.05	9000	9000	<1	-
10/03/2021	Spring	low	16.1	6.8	<0.05	0.09	3.3	0.04	0.6	<0.015	9	<0.05	520	500	<1	-

APPENDIX

B

NETWORK MANAGEMENT
IMPROVEMENT PROGRAMME

Appendix B

Wastewater Network Management Improvement Programme

In 2019 KCDC engaged consultant Morphum (with hydraulic modeller HAL) to commence a network performance investigation, with the intent of developing a Network Containment Standard and an asset investment programme.

	Task	Work Programme	Status
2019/20 financial year	Update the wastewater network models	Update the models with current population forecasts (Ōtaki) and join the Paraparaumu and Waikanae networks to the storm basin (WPR).	Completed
	Business as usual - existing and future system performance	Use the wastewater models to predict issue areas arising over the next 50 years by adding population growth, pipe degradation and climate change.	Completed
	Develop a draft wet weather containment performance standard for 2021 Long Term Plan consultation	Undertake a Cost/Benefit analysis to consider the costs related to achieve a range of containment standards (in the future) to ensure the containment standard is justified and affordable. Council will seek to optimise the costs by considering a range of options for every containment standard.	Completed
	Draft wastewater network improvement programme for 2021 Long Term Plan consultation	Develop a proposed works program that will meet the draft containment performance target. Program (timing) of the works based on milestone models. Provide detailed scoping required for all urgent projects (first 5 years) Identify areas which require flow gauging or other investigations before project are implements to confirm (detailed) scope and when.	Advanced
	Integrated private property inspection policy for wastewater and stormwater	As part of the Stormwater Strategy, Council will be developing a Bylaw to provide guidance and responsibilities for property owners to maintain their stormwater systems. The Bylaw will provide ability to require property owners to correct any illegal stormwater to wastewater systems	Ongoing
2020/21 financial year	Renewal Strategy	Develop a renewal strategy and processes to identify, justify, scope and programme future network renewals including condition based renewal as well as performance based (I/I) renewals.	First draft
	Monitoring Strategy	(including the use of pump station data, temporary flow gauging, etc.)	Partly developed
	Emergency Response Strategy	Undertake a comprehensive risk assessment to develop response strategy	Not yet developed
	Waste Water Strategy	Include and consolidate all wastewater objectives, target, and processes into a single strategy. Including:	Q3-4 of financial year
	Pump station performance monitoring tool	Using critical pump stations, undertake a review of their performance to enable a high level review of Inflow and Infiltration rates and other performance attributes. Once data proven, develop flow analysis tool to monitor the I/I rates in each wastewater pump station catchment.	Q3-4 of financial year
	Comprehensive I&I assessment	Undertake a detailed I&I assessment for dry and wet weather. Needs a model that has reliable dry and wet weather calibration which need to be confirmed first recalibration might be possible based on outcomes of Pump Station performance assessments.	Q4 of financial year

Task	Work Programme
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2021/22 financial year	Pilot I&I programme	Set up and implement a pilot programme for reducing I&I in a target area. This could include detailed investigation to target high priority areas, private property inspections and work on public laterals.	TBC
	Pump station failure risk assessment	Review pump stations against risks on the failure against some good industry practices such as (1) power, (2) need for emergency storage and (3) the need for designated overflow locations.	TBC
	Wastewater catchment plans (WWCP)	Capture the knowledge of the wastewater network performance, issues and solutions in an accessible report or web based application. This will allow overlay with other asset areas such as flooding. The WWCP can get progressively be updated with results from the issues and actions register.	TBC
	Overland flow mapping	Map location overland flow paths. Overland flow is a known cause of inflow of stormwater into gully traps and leaky pipes and also reason for deliberate cross connections.	TBC
	Develop a network discharge consent	Investigate a network discharge consent application for planned wastewater overflows.	TBC
	Planning improvement projects register	Consolidate all 'planning' / 'asset management' recommendations, from reports as they arise, into one register, including the ability to track.	TBC
	Issues and actions register	Develop a register that can track issues to solutions. This would include the ability to link issues to solutions, to assign 'case manager', the ability to move issues into planning phase and then implementation. Issues can be raised by planning (e.g. performance assessments), operational staff and community.	TBC
	Bench mark	Undertake the next benchmarking projects using another method/provider.	TBC

APPENDIX

C

KCDC-GWRC LETTER

27 August 2021

Joshua Knowles
Environmental Protection Officer
Greater Wellington Regional Council
100 Cuba Street Te Aro
Wellington 6011

Dear Joshua,

Response to GWRC Letter “Request for an explanation about the concentration of Ammoniacal Nitrogen (NH₄-N) in both ponds A and B” - Consent File No. WGN160002

Thank you for your letter dated 10 August 2021 and, subsequently, your time extension to us via email to submit a response by 30 August.

GWRC raised an information request about the effluent quality from each Oxidation Ponds A & B at Council’s Otaki Wastewater Treatment Plant (WWTP).

The Council is taking the necessary actions to resolve this issue as quickly as possible. The Council has commissioned independent investigation work through Cardno, consequent to the high ammonia issues identified early this year from the Otaki WWTP.

This investigation has acknowledged that the high NH₄-N values in the ponds that have raised interest were primarily due to:

- 1) inefficient performance of the Oxidation ponds (high sludge volume in the ponds)
- 2) Wet weather and winter months
- 3) Inadequate dissolved oxygen (DO) in the ponds
- 4) illegal Tradewaste discharges

The Council acknowledged improvement work in the Long Term Plan (LTP 2021) to improve WWTP performance. Once the Council receives the feedback from the market, a progress update on the implementation plan will be provided to the GWRC.

We note that the Condition 43 Annual Report will be due this year in September, covering the period 1 July 2020 thru 30 June 2021 for a wide range of aspects of plant performance.

However, we include below *your questions* in the letter of 10 August and our comments in reply in the interim.

Information request

The observations above provide a summary of the information I have. Before we decide on any actions and/or outcomes, I invite you to provide me with a written explanation by 24 August 2021 of the events surrounding this incident and any other information you think is relevant. To assist you with this, I have listed some questions below:

- 1. Are the pond samples provided in the 3- monthly operation Report to end of June 2021 - Otaki WWTP taken immediately prior to the wastewater being discharged to the discharge area?*

Condition 16 of WGN160002 states, “The consent holder shall monitor monthly the pond effluent quality at the outlet to the land discharge and treatment area”, and declares key indices for which to analyse.

With the recent upgrades to the Land Disposal Treatment Area (LDTA) and Effluent Pumping Station, new sample points were installed to correctly sample a “Combined A&B” sample close to the LDTA (in the Effluent Pumping Station discharge pipework). Until now, we have had to rely on combining the analysis data from samples at the outlet of each of Oxidation Ponds A & B; we now collect both sets of samples, and report both data sets. This was discussed in the FY2019/20 Annual Report, Section 5.4.

However, analysis of the data gathered, so far, at the combined sample point has raised doubts as to how representative this data is (i.e. how well-combined discharge data correlates to the Oxidation Pond A & B effluent quality samples). We have now taken samples from further points in the treated effluent flow stream; analysis is underway, and we will keep you up to date on what we discover.

- 2. Why is the Ammoniacal Nitrogen (NH₄-N) in the ponds elevated above the parameters in condition 17?*

Condition 17(D) of WGN160002 requires that treated effluent results “prior to discharge to the discharge area” must not exceed 23 g/m³ Ammoniacal Nitrogen (NH₄-N) for more than 8 out of 12 consecutive samples, or 30 g/m³ Ammoniacal Nitrogen (NH₄-N) in more than 2 out of 12 successive samples.

The Advice Note to Condition 17 indicates that this is based on “samples required by Condition 16”.

Condition 16 requires monitoring pond effluent quality (at the outlet to the LDTA (as your Question1)) once a month and declares key indices for which to analyse, including Ammonia.

In the light of concerns raised about Ammonia (NH₄) spikes in the prior annual analysis of monthly sample series, Council declared in good faith the weekly sampling being undertaken, in both annual reporting and ongoing 3-monthly reporting. It is, therefore, not appropriate to analyse the data series in respect of Conditions 16 and 17, as they stand in your table and are based on a more frequent data collection cycle than “monthly”.

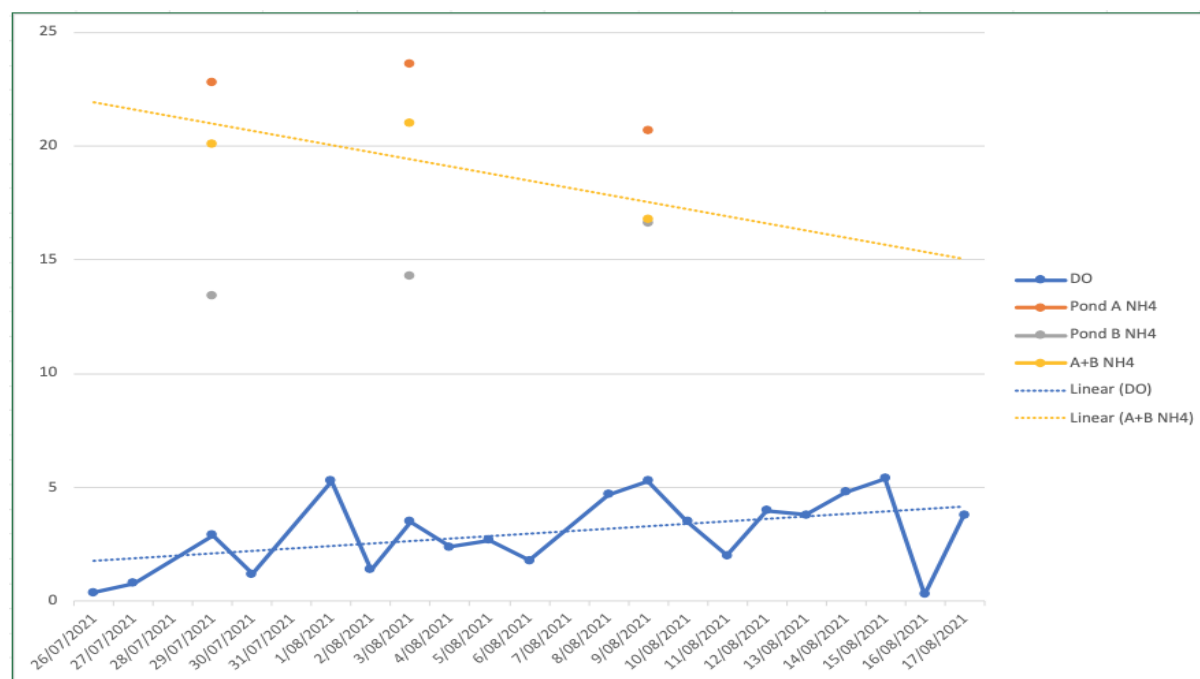
In this case, you depict the equivalent of three non-combined, consecutive monthly samples exceeding 23g/m³ in each pond (and so within constraints); and in one pond (Pond A), the potential for three consecutive samples exceeding 30g/m³, and in the other pond (Pond B) the

worst case of two consecutive samples exceeding 30g/m³ and the more likely scenario of one consecutive sample exceeding 30g/m³.

However, we have discussed Ammonia levels as an ongoing issue. On review of the nature of this type of enhanced process oxidation-pond-based WWTP, and having reviewed performance at the Otaki WWTP site with the support of our consultant, we note:

- Ammoniacal Nitrogen levels are higher in the winter months and at lower pond temperatures.
- High rainfall periods also coincide with reduced plant performance.
- It is possible that long-term retention of solid material in oxidation ponds may release Ammonia from any remaining volatile organic content if allowed to accumulate.
- Pond capacity must be optimised by regular removal of accumulated solids - a risk in any pond-based plant and often not visible to daily/ weekly operator inspection.
- Dissolved Oxygen levels in the ponds have been found to be inversely proportional to Ammonia levels, and can change rapidly when an intrusive Tradewaste is discharged illegally.
- It now seems the existing aeration equipment in the ponds is at its design limits.
- In our report for the compliance year 2019/20, we also indicated evidence of significant influent pollution events, including (and related to a local manufacturer supplier on Riverbank Road, Otaki.):
 - obvious cleaning products (foams, colouring)
 - probable algae removal treatments (affecting oxygenation in Ox Ponds A&B).
- Figure 1 depicts the steady current improvement in NH₄ value, as the DO value rose in the last month, affirming that DO levels are important to NH₄ treatment and that recovery is underway.

Figure 1 - Ammonia (NH4) – Recent Water Quality Samples at Outlet of Ox Ponds A & B



3. What corrective actions have been implemented to reduce Ammoniacal Nitrogen (NH4-N) in the ponds since this non-compliance was raised in the Greater Wellington Compliance Monitoring Assessment for the Otaki Wastewater Treatment Plant dated 26 February 2021?

The inference may be drawn from the fifth paragraph of your letter, entitled “Incident Summary”, that GWRC raised the question of elevated Ammonia/ Ammoniacal Nitrogen in the Compliance Monitoring Assessment and that Council did not respond. The analysis of this point is covered in the KCDC-raised Annual Report for this plant for 2019/20, for example.

In our Annual Report for 2019/20, we discussed in Section 4.1 the relevant asset investment planning developed to date that, as other T/As, we were assembling the next 30-Year Long Term Plan. We offer an update on performance optimisation at the Otaki WWTP as follows.

Ongoing performance monitoring and the Otaki Condition & Capacity Study Report (Cardno, June 2020) has guided the Council in its definition of activities in its new district-wide Long Term Plan (“LTP-21”) and Wastewater Activity Management Plan (AMP-21) for the next 30 years.

Table 1 below outlines the asset management and plant optimisation planning related to Years 1 and 2 of LTP-21. In addition to the described works are renewals works planned in Years 1-5 in sludge handling and clarification system and ongoing optimisation of the LDTA to support the renewed effluent discharge consent and the related LDTA Optimisation Report.

The operations team have trialled increased top-water levels in the Oxidation Ponds (A & B) by raising the discharge weir to offer a temporary volume increase. Aeration trials using local mechanical aeration (such as portable re-circulating pumps) have reinforced the process sensitivity to Dissolved Oxygen levels to counter seasonal variations and oxygen-hungry intruders.

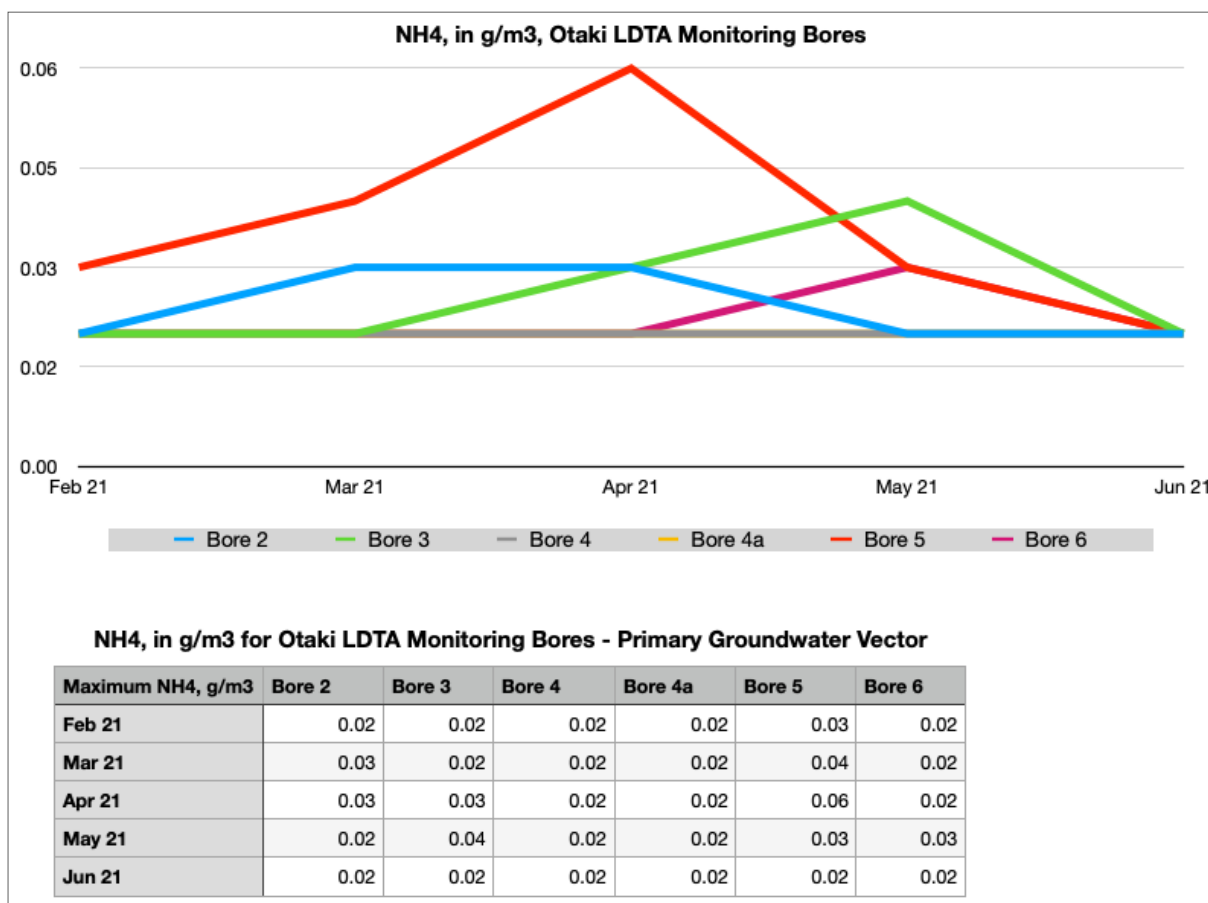
4. *What steps have been taken to remedy adverse environmental effects arising from this non-compliance?*

We are not aware of any studies commissioned by either GWRC or KCDC on the possible adverse environmental effects of the exceedance of indices indicated in Conditions 16 and 17. The targeting of any possible remedy is also, thus, hard to define.

However, we may report to GWRC as per the environmental monitoring regime. The results from Condition 18 samples elevated at the groundwater sample bores, sited in the fields to the west of the LDTA, for Nitrate Nitrogen and Ammonia Nitrogen. With this letter is supplied a .pdf file of monthly performance sampling data for all LDTA field sample bores (February thru June 2021). The values for “NH₄” and Nitrates as “NO₃” are in found in the tables columns 6 and 7. Condition 19 (the finite trigger condition ref. Condition 17) relates only to water quality in Bore 4 and 5 samples - and only covers E.coli and Soluble Inorganic Nitrogen targets/ triggers (for which the latter is offered as 11.3 g/m³ as N).

Figure 2, below, depicts a plot of the primary vector bore samples for NH₄ (in-line with the perceived “plume” vector in groundwater that we have discussed), as sourced from the attached bore sample tables. On this scale of value, any fluctuations offer only a marginal indication of change. Primarily, the NH₄ concentrations are very low in our groundwater after LDTA treatment.

Figure 2 - Ammonia (NH₄) - Monthly Samples Taken from LDTA Monitoring Bores



Note: the majority of values depicted above as “0.02” g/m³ are in fact recorded in KCDC Laboratory records as “<0.02” g/m³, as they do not register at the scale of analysis undertaken.

5. *What measures will be put in place (and by what date) to bring ammoniacal nitrogen down to consented levels, and prevent further breaches of this consent parameter?*

Ongoing monitoring and local process experimentation have indicated some minor operational improvements are of value, including localised aeration. However, the more comprehensive capital (Capex) upgrades that are planned will be much more effective in improving resilience, capacity, and performance.

Table 1, below, summarises the current position on planned optimisation work in KCDC’s LTP-2021 and the level of progress to date.

In general terms, the works are planned for the years FY2021/22 and FY2022/23. We are happy to continue providing a similar worksheet periodically as we progress through the cyclic reporting periods.

Table 1 - Planned Activities to Optimise KCDC Otaki WWTP Performance

Process/ Scheme	Planned Activity & Long Term Plan Context (LTP-21, July-21-on)	Progress
Oxidation Pond A & B - Capacity	Removal of accumulated solids. Moneys included LTP-2021: i. Years 1 and 2 of LTP-21 (totalling \$1.2M) ii. Cycling survey events and sludge removal activity has been given funding throughout Years 1-30.	A full ultrasound scan and mapping of A & B Ponds floors were undertaken last year. A draft RfQ has been created for pond solids removal. Contact with the market in September 2021. Scheme funding to be brought forward to Year 1, as required. Market testing will define the programme.
Aeration Basin - Maintenance, capacity	Removal of grit/ inert solid particles. Funding in Years 2 & 3 of LTP-2021.	A full ultrasound scan and mapping of the aeration basin floor was undertaken last year. Solids removal to roll on from above work in Year 2.
Oxidation Ponds and Aeration Basin - online monitoring and alarm annunciation	Automation of DO Monitoring - a key indicator, c/w early remote warning of contamination. Funding from minor works to install online DO Monitoring (all ponds), pH (Aerated Pond), Pond Level (Ox Ponds A & B).	Equipment Procured. Cable trenching/ ducting installed. Installation to be by in-house electrician – September/ October.
Cascade/ Splitter Box (feeds Ox Ponds A&B) - Aeration	Aeration to be enhanced by air blower sparge at base of the cascade.	Equipment procured, including the blower. Cable trenching/ ducting installed (as above).

Process/ Scheme	Planned Activity & Long Term Plan Context (LTP-21, July-21-on)	Progress
		Installation to be by an in-house electrician – September/ October.
Inlet Works - Resilience	Robustness of process of solids capture - replace screening equipment, manage seismic resilience and growth. Identified in Years 1 & 2 of LTP-21	Replacement drum screen procured in FY2020/21 - delivery September 2021. Draft Consultant pricing received. Requires tender docs for installation this/ next financial year. Programme will develop with market engagement.
Optimisation of Aeration Basin Performance	A study with consultant Cardno partnered with key operators for their education, to address extension of retention time in the Aerated Basin (by recirculation): <ul style="list-style-type: none"> - improved solids reduction (biological reduction of volatile organic content) - improved solids removal at Clarifier 	KCDC is developing a consultant engagement for this work. NB: Aeration requirements may be re-defined by this work.
Optimisation of Pond Performance - All, Aeration	Design and procure aeration equipment: <ul style="list-style-type: none"> - replace aged mechanical aerators with jet aeration - worst-case population growth outstrips aeration capacity in 2027 - re-deploy or procure mechanical aerators for Ox Ponds A & B? - review flow currents in the pond (avoidance of short-circuiting) - review the possibility of series-connection of Ponds A&B. Funding in Years 1 & 2 (and 4 & 5) of LTP-21	Ops have for some time experimented with mechanical aeration, using recirculation pumps, and have seen a benefit. Procurement paused to take in results of the study in the above section, otherwise expected in FY2021/22.

Process/ Scheme	Planned Activity & Long Term Plan Context (LTP-21, July-21-on)	Progress
Tradewaste Agreements Programme	Ongoing Activity to manage harm from discharges to our wastewater reticulation.	District-wide Bylaw up to date. Register of all of-risk dischargers is operative. Five key agreements for District agreed to be developed in FY2021/22 – Soapbox (cleaning product manufacturer/ supplier), Otaki is one.

We hope this answers your current questions. We would gladly offer more information as required. We will also discuss this Plant performance and this consent further in our imminent annual reporting. If you have any questions, please contact the below signed on (027) 555 4870.

Yours sincerely,



Richard Millican - Specialist Engineer Water and Wastewater

CC: Ramesh Sharma- Water & Wastewater Assets Manager

Attachments:

Electronic File “Otaki WWTP LDTA Bore Samples Feb-Jun 2021” (.pdf, KCDC Aug21)