Hawea Wastewater Treatment Plant

Annual Report 2017 - 2018

December 2018

QUEENSTOWN LAKES DISTRICT COUNCIL

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DOCUMENT CONTROL SHEET

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1. Background

The Hawea oxidation pond started operation in 1988 and treats wastewater from wastewater originating from the Hawea township and the Timsfield subdivision. Discharge Permits RM10.308.01 and RM10.308.02 were issued by the Otago Regional Council (ORC) on the 15 November 2010 and took effect immediately.

The Hawea oxidation pond is located adjacent to the true left bank of the Hawea River, approximately 600m south of the intersection of Domain Road and Cemetery Road. The legal description of the land at the point is discharge is Lot 1 DP 20555. The map reference for the oxidation ponds is NZMS 260 G40: 128-137.

The wastewater is discharged to land via a spray irrigation system and a low pressure disposal trench.

Veolia operates and maintains the oxidation ponds as part of the 3-Waters operations and maintenance contract.

Figure 1-1 : Hawea oxidation pond and reticulation

2. Purpose and Scope of Report

The purpose of this report is to report to the ORC in accordance with Condition 13 of Resource Consent RM10.308.02 and covers the period 1 December 2017 to 30 November 2018 (refer to Table 2-1).

The scope of the Annual Report comprises of the following:

- Summary of the yearly analytical results of the wastewater from the ponds, and an interpretation of the wastewater quality results in context of Resource Consent RM10.308.02 trigger levels;
- Comments on compliance with the conditions of the discharge permits;
- Summary of any malfunctions or breakdowns and the corrective action taken; and
- Summary of any complaints received, the validity of each complaint and the corrective action taken.
- Condition 13 of RM10.308.02 also requires "*details of the cut and carry operation, including the calculations for nitrogen loading in the spray irrigation land, number of harvests, dry matter and total nitrogen content of the harvest and nitrogen balance for this site*". This has been addressed within a separate report, as described in Condition 12.

Table 2-1 : Discharge Permits

Consent No.	Description	Issue Date	Expiry Date	Conditions
RM10.308.01	To discharge contaminants to air for the purpose of discharging treated wastewater.	15 Nov 2010	12 Nov 2022	Refer to Appendix A
RM10.308.02	To discharge contaminants to land for the purpose of discharging treated wastewater.	15 Nov 2010	12 Nov 2022	Refer to Appendix A

3. Monitoring Requirements

Resource Consent RM10.308.02 Condition 10 requires that the wastewater discharged from the outlet of the oxidation pond is sampled for a total of six parameters on a monthly frequency (Table 3-1). Condition 9 requires that a record of daily volumes of wastewater discharged to the disposal field is kept.

Table 3-1 : Wastewater Quality Parameters to be Analysed

Parameter	Frequency	Resource Consent Trigger Level	Reporting Requirements
Flow (wastewater)	Daily	N/A	Annual
Total Nitrogen	Monthly*	Mean: 35 mg/L 95th percentile**: 40 mg/L	Monthly
Ammoniacal Nitrogen	Monthly*	Mean: 25 mg/L 95th percentile**: 30 mg/L	Monthly
Total Phosphorus	Monthly*	Mean: 8 mg/L 95th percentile**: 10 mg/L	Monthly
BOD_5	Monthly*	N/A	Monthly
Total Suspended Solids	Monthly*	N/A	Monthly
Escherichia coli	Monthly*	95th percentile: 250,000 cfu/100 mL	Monthly

**Last week of each month ** Rolling 12 month 95th percentile*

All sample collection for the wastewater prior to discharge is carried out by Watercare to the required Standards specified in Condition 11 (Watercare Laboratory Services is IANZ accredited to NZS/ISO/IEC 17025).

Resource Consent RM10.308.02 does not require any surface water monitoring and analysis.

4. Results, Discussion and Resource Consent Compliance

4.1 *Wastewater Discharge to Land*

The results of the wastewater quality monitoring for the 2017/18 sampling period is presented in tabular format in Appendix B.

A copy of the laboratory results received from Watercare Laboratories for the 2017/18 period is presented in Appendix C.

The daily wastewater flow rates (m^3/day) from the oxidation pond are tabulated in Appendix D and graphically represented in Figure 4-1. Appendix D also provides the breakdown of wastewater volumes discharged via the trench method and the spray irrigation method.

The wastewater discharge flow rate is consented to a maximum of 775 cubic metres per day. Discharge volumes greater than this were recorded on 23/05/18, 11/09/18, 12/09/18 and 17/09/18. The elevated volumes recorded in September were due to a trench valve that was opened manually and then not closed completely. This was noticed when a pond low level alarm was activated on 12/09/18, and after being resolved the pond then took about four days to return to normal operating level with little to no discharge. Further investigative work was undertaken on 17th and 18th September. A Scada alarm has now been added to alert the operator when the discharge exceeds 600 m^3.

The annual average was 240 m^3/day for the 2017/18 monitoring period.

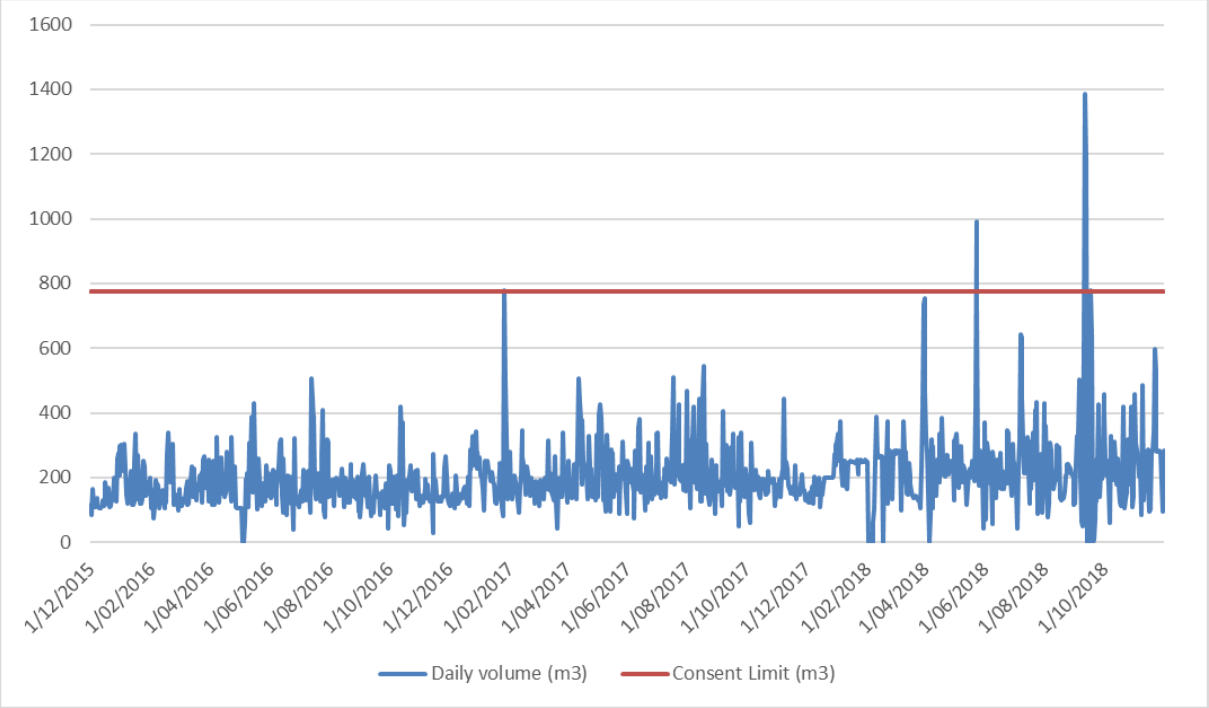

Figure 4-1: Wastewater Discharge Outlet Flow

The treated wastewater from the outlet is required to have a representative sample analysed for a total of six parameters (total ammoniacal nitrogen, total phosphorus, total nitrogen, total suspended solids, BOD5 and E. *coli*) as per Resource Consent RM10.308.02. Those parameters that have consent limits in Resource Consent RM10.308.02 are presented in tabular (refer to Table 4-1) and graphical (Figure 4-2 and 4-7) format.

Table 4-1: Summary of Wastewater Monitoring Results for 2017/18

Parameter	Consent Limit	Rolling Percentile mg/L	Annual Mean mg/L	Max mg/L	Min mg/L
Total Nitrogen	Mean: 35 mg/L 95th percentile*: 40 mg/L	57	39	58	22
Total Phosphorus	Mean: 8 mg/L 95th percentile*: 10 mg/L	8	7	8.2	6.0
Ammoniacal Nitrogen	Mean: 25 mg/L 95th percentile*: 30 mg/L	43	24	43	<0.4
E. *coli*	95th percentile: 250,000 cfu/100 mL	104,150	38,175	130,000	3,000

** Rolling 12 month 95th percentile*

The rolling 12 month 95th percentile for E. *coli* remained well within the consent limit of 250,000 CFU/100ml during the 2017/18 monitoring period (refer to Figure 4-2). The maximum concentration of E. *coli* over the year was 130,000 cfu/100 mL with an annual mean of 38,175 cfu/100 mL.

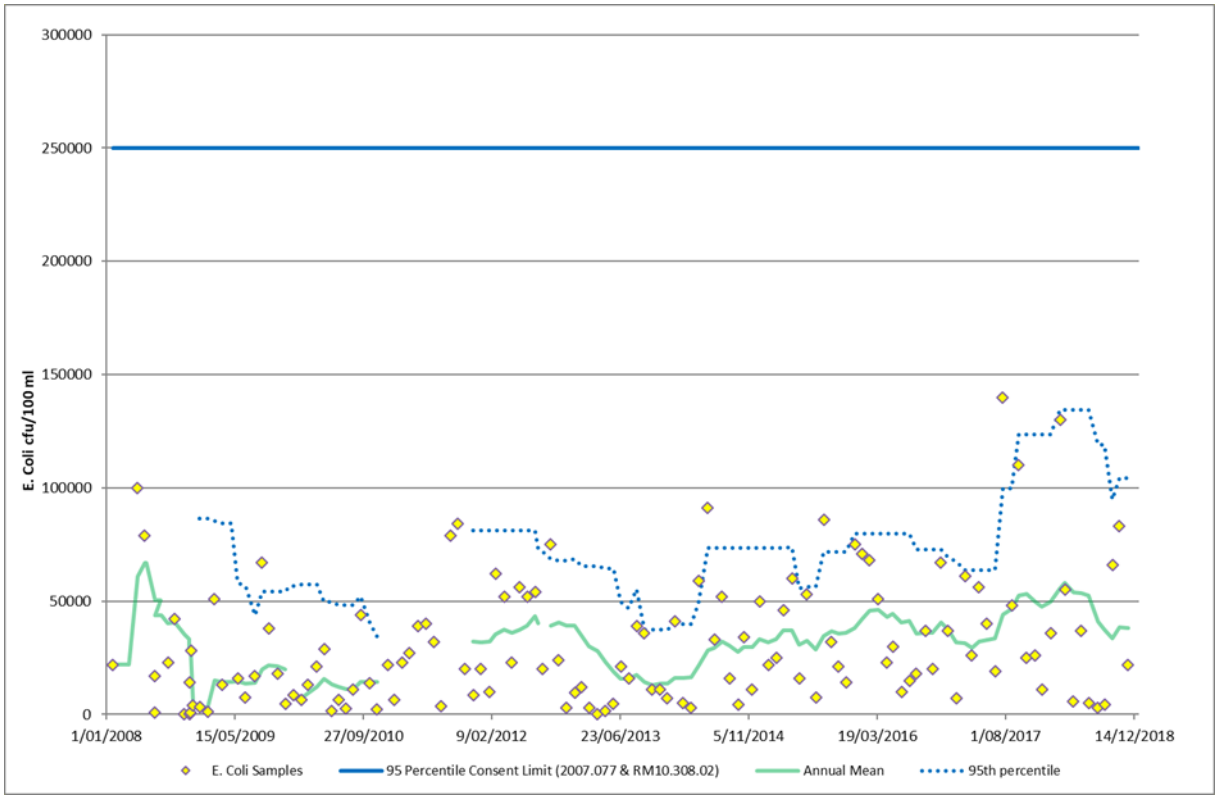

Figure 4-2: E. *coli* in Wastewater

The rolling 12 month 95th percentile of 43 mg/L for total ammoniacal nitrogen exceeded the consent limit (30 mg/L) in the 2017/18 monitoring period (refer to Figure 4-3). The annual mean of 24 mg/L was within the consent limit of 25 mg/L for the 2017/18 monitoring period.

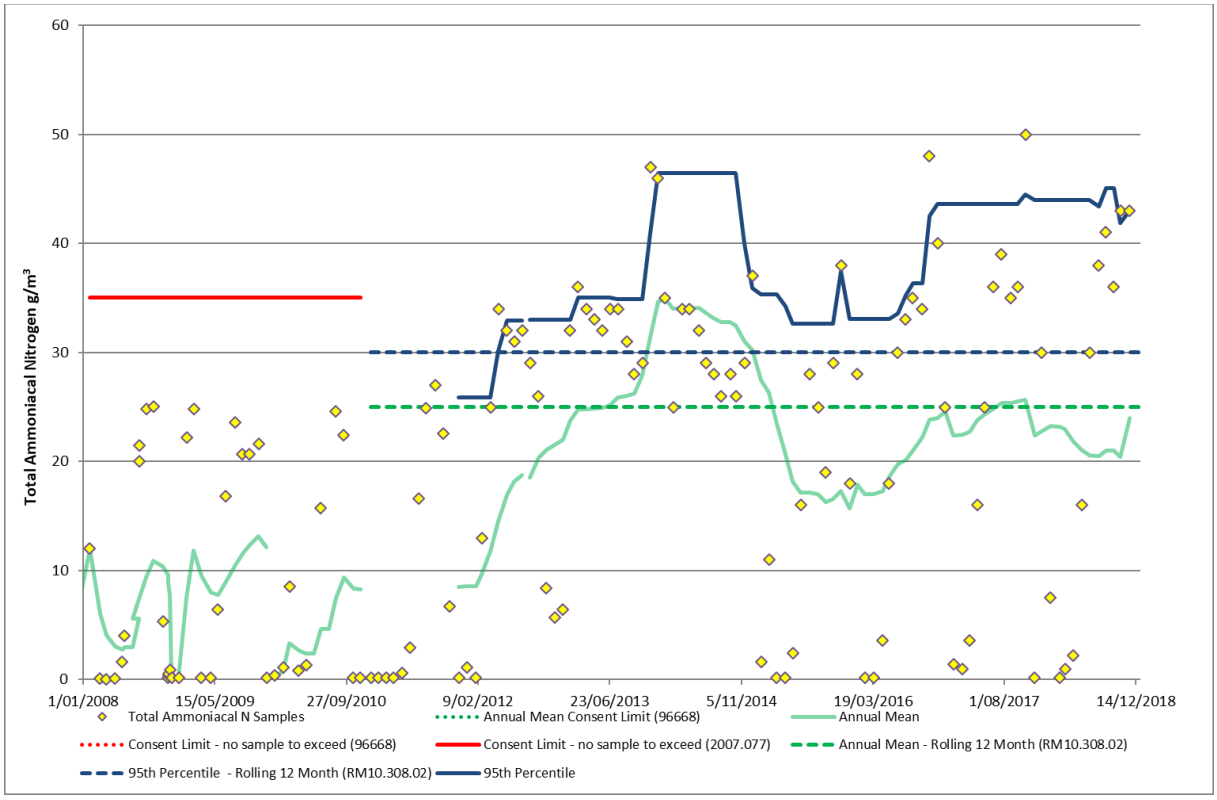

Figure 4-3: Total Ammoniacal Nitrogen in Wastewater

The rolling 12 month 95th percentile of 57 mg/L for total nitrogen exceeded the consent limit (40 mg/L) in the 2017/18 monitoring period (refer to Figure 4-4). The maximum concentration of total nitrogen over the year was 58 mg/L with an annual mean of 39 mg/L.

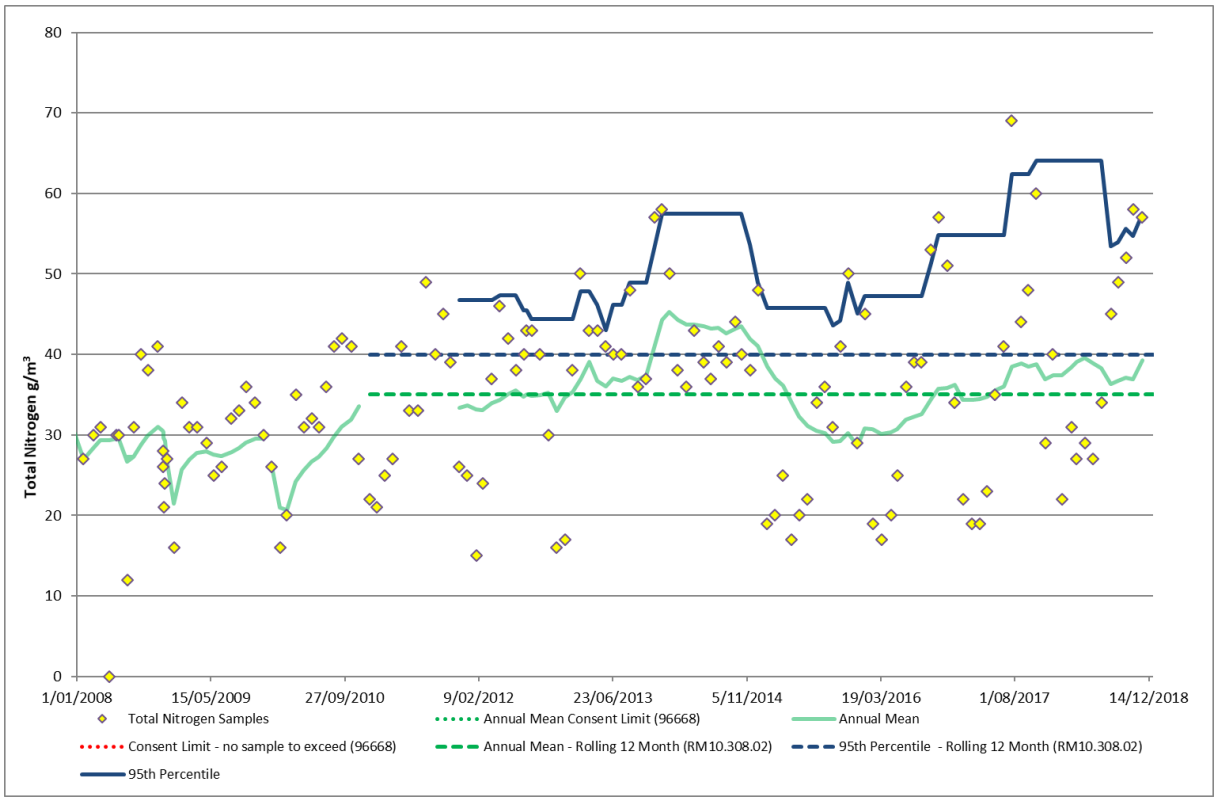

Figure 4-4: Total Nitrogen in Wastewater to Land

Total suspended solids, total phosphorus and BOD_5 are consistent with the results in previous years (refer to Figure 4-5 to 4-7). Total phosphorus remained compliant with the rolling 95th percentile and the annual mean. There are no consent limits for total suspended solids and BOD_5. Previous Resource Consent (96668) trigger levels are presented in the graphs as reference for the years the trigger levels are applicable to.

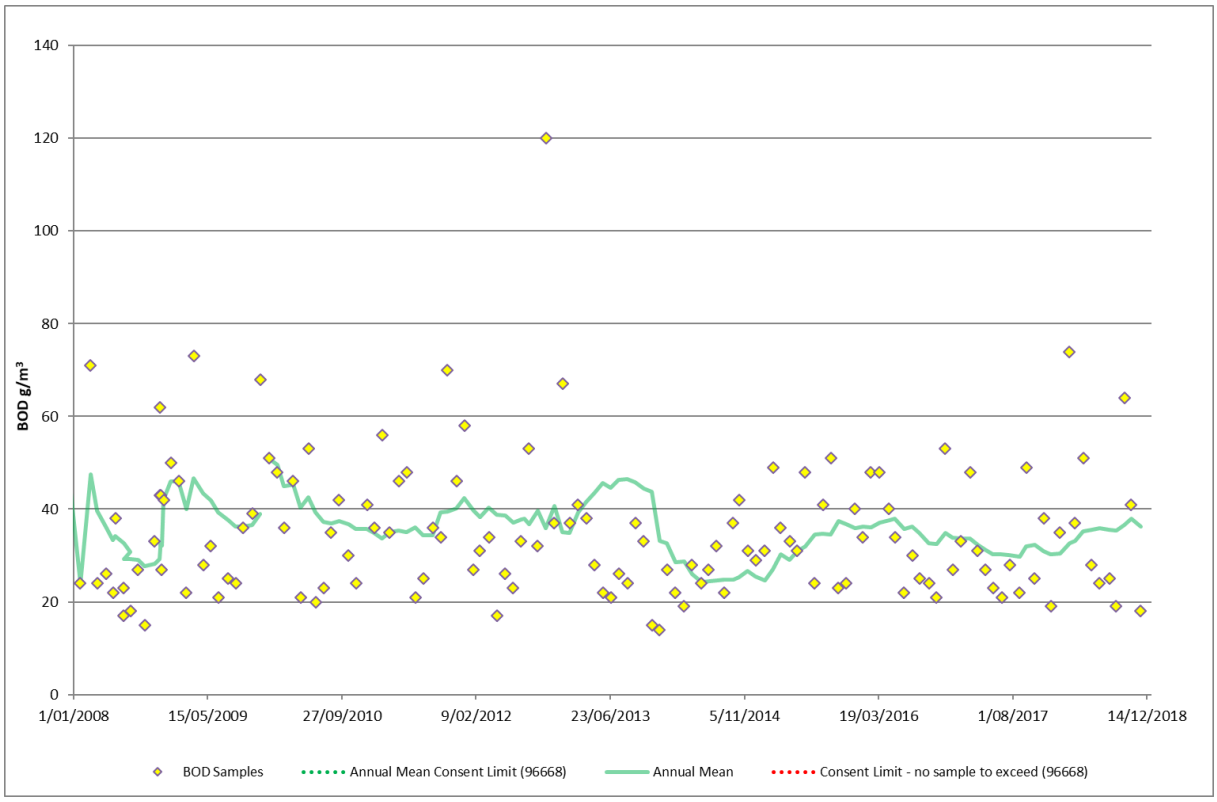

Figure 4-5: BOD_5 in Wastewater to Land

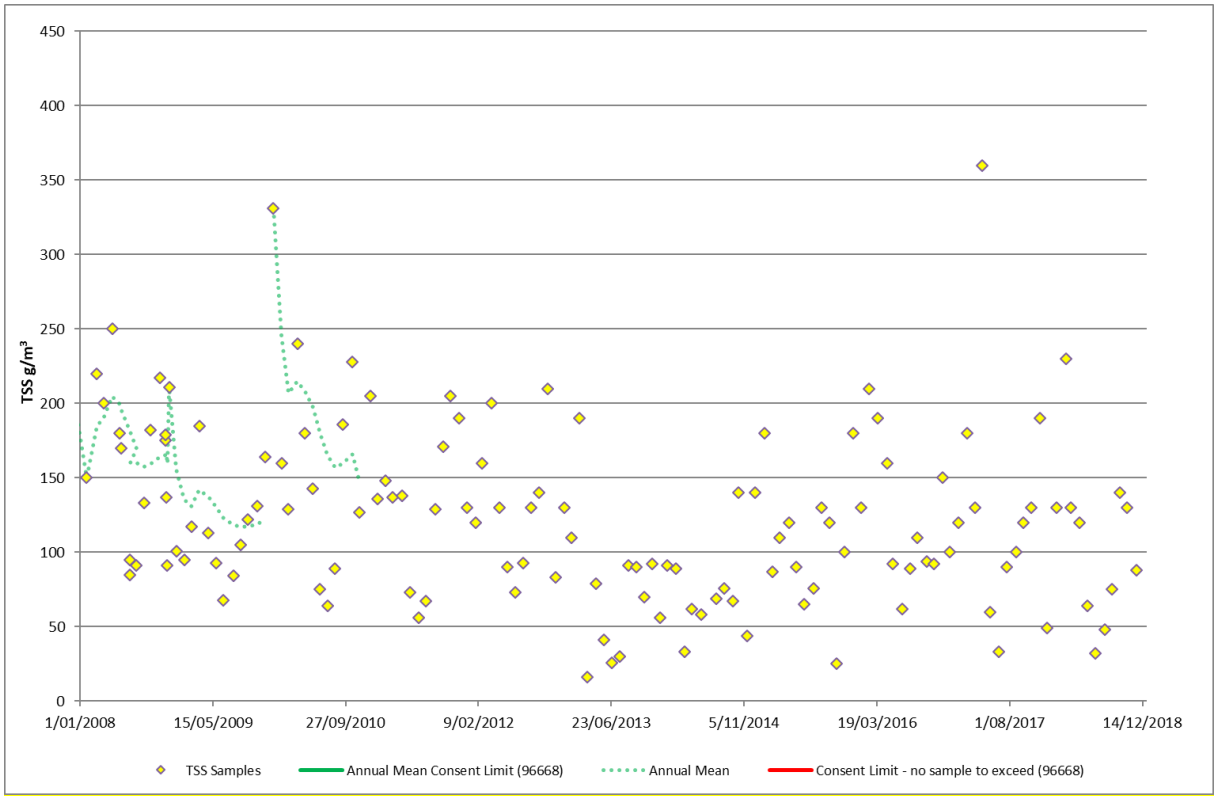

Figure 4-6: Total Suspended Solids in Wastewater to Land

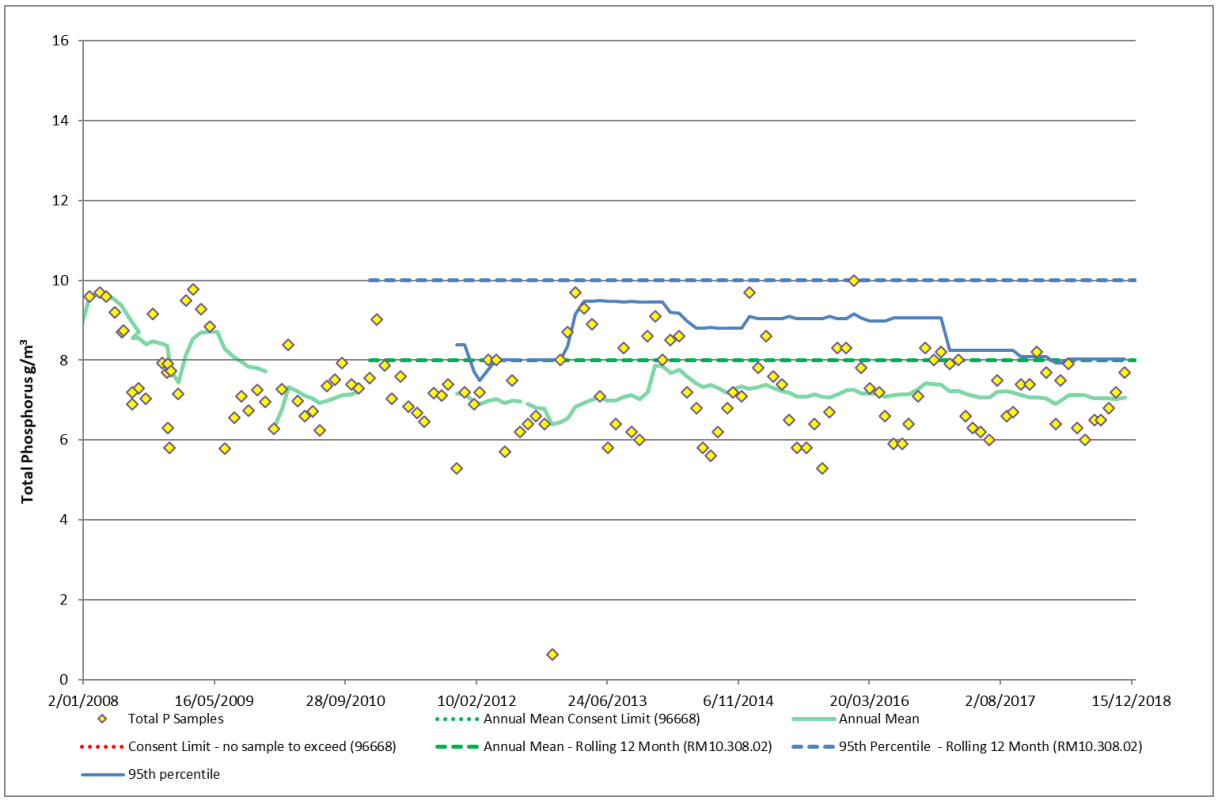

Figure 4-7: Total Phosphorus in Wastewater to Land

4.2 *Spray Irrigation System*

Condition 12 of Resource Consent RM10.308.02 requires that a nitrogen mass balance for the spray irrigation land application area is prepared annually. This is to include the following:

- *The nitrogen mass balance shall consist as a minimum the total nitrogen applied to land and crop removal of nitrogen.*
- *The total nitrogen applied to the spray irrigation land shall be estimated from the total volume of wastewater applied and the average of monthly concentration of total nitrogen in the land applied wastewater.*
- *The crop removal of nitrogen from the spray irrigation land shall be estimated by obtaining dry matter content and total nitrogen content after each crop/plant harvest.*
- *The nitrogen mass balance from condition 12(a) and any other factors such as ammonia volatilisation and denitrification shall be used to calculate the mass of nitrogen leached from the site, using a model acceptable to the consent authority.*

This information is presented in a separate report completed by Lowe Environmental Impact Ltd.

4.3 *Resource Consent Requirements and Compliance*

Compliance with Resource Consents RM10.308.01 and RM10.308.02 is displayed in Tables 4-2 and 4-3 by condition.

Table 4-2: Discharge to Air Permit RM.10.308.01 Conditions

Condition #	Clause Condition	Comments	Compliance
1	This consent shall only be exercised in conjunction with Discharge Permit RM10.308.02.		**Achieved**
2	The discharge to air shall be as described in the consent application submitted to the Consent Authority on 31 August 2010 and any subsequent information provided.		**Achieved**
3	Wind cloth shall be installed on the western, southern and eastern-most boundaries of the area on which treated wastewater is to be applied by spray irrigation. This wind cloth shall be maintained until the screen foliage required under condition 4 is fully established.	Installed prior to 1 December 2012.	**Achieved**
4	Suitable screening foliage, that shall be at least 3 metres high but not exceed 6 metres in height, shall be planted on the western, southern and eastern-most boundaries of the area on which treated wastewater is applied by spray irrigation.	Planted and irrigated prior to 1 December 2012.	**Achieved**
5	A weather station shall be installed in an appropriate location to record, as a minimum, rainfall and wind conditions at the site where treated wastewater is to be applied by spray irrigation.	Installed in August 2011.	**Achieved**
6	The spray irrigation system shall not be operated in conditions where wind speed, as measured at the on-site station installed under condition 5, exceeds 29.9 km/hour.	Control system installed to meet this condition.	**Achieved**
7	The consent holder shall keep a record of any complaints received regarding discharges of odour from the site. The record shall, as a minimum, include the following: (a) the time and place at which the complaint was generated; (b) the nature of the complaint; (c) operating conditions at the time of the complaint, including any malfunctioning or breakdown of control equipment; (d) wind and weather conditions at the time of the complaint; and (e) corrective action taken by the consent holder to minimise the risk and extent of the recurrence of the causes of the complaint. The consent holder shall submit a copy of the written record of the complaint to the consent authority within two weeks after any complaint occurring, together with the details of the corrective actions taken.	No odour complaints recorded for the 2017/18 year.	**Achieved**
8	There shall be no discharge of odour, as a result of the exercise of this consent, that is noxious, dangerous, offensive or objectionable to the extent that it causes an adverse effect beyond the boundary of the site, in the opinion of an authorised officer of the Consent Authority.	No odour complaints recorded for the 2017/18 year.	**Achieved**

**Conditions 1 and 9 are 'general' resource consent conditions that do not require compliance monitoring*

Table 4-3: Discharge to Land Permit RM10.308.02 Conditions

Condition #	Clause Condition	Comments	Compliance
2	The volume of effluent discharged shall not exceed 775 cubic metres per day.	Refer to Appendix D. Generally compliant, with one day in May 2018, and three days in September 2018 recorded at elevated volumes.	**Non-compliant**
3	The distance the site boundary from any part of the wastewater treatment and disposal system shall no less than 5 metres.	Compliant.	**Achieved**
4	By no later than 1 December 2012, the consent holder shall ensure that the trench utilised for wastewater disposal: a) is at least 150 metres long and 2 m wide in total; and b) is intermittently dosed; and c) is not used for the disposal of wastewater for more than 4 months in total in any one calendar year.	The trench is utilised for more than 4 months per calendar year.	**Non-compliant**
5	By no later than 1 December 2012, the consent holder shall install and commission a spray irrigation system for the land application of treated wastewater. The spray irrigation system shall meet the following criteria: (a) the total area on which treated wastewater is applied by spray irrigation shall be no less than 2.5 hectares; (b) treated wastewater shall be applied evenly by spray irrigation to the area defined in appendix I only; (c) the area on which treated wastewater is applied by spray irrigation shall be fenced with a 2 metre high deer fence with appropriate signage warning the general public of the hazard; (d) a weather station shall be installed in an appropriate location to record, as a minimum, rainfall and wind conditions at the site where treated wastewater is to be applied by spray irrigation; (e) wastewater shall not be applied to land by spray irrigation system during the hours outside of 11 pm to 5 am; (f) nozzle pressure must not exceed 400 kilopascals (kpa); (g) there shall be no irrigation of treated wastewater using k-line irrigation systems.	Spray irrigation system installed 5 December 2012. The system was commissioned 20 December 2012 after pump failures. This extension (to January 2013) was agreed upon with Sarah Ibbotson and Martin King of the ORC. The spray irrigation continues to operate within this criteria.	**Achieved**
6	The area on which treated wastewater is to be applied using spray irrigation shall be planted in high growth and nitrogen uptake vegetation (such as Lucerne or ryegrass) and shall be managed as far as practicably possible to optimise nutrient removal. A minimum of three harvests per year shall be undertaken.	Harvests were undertaken in January and March 2018. In October 2018 the area was re-sown with Rye Grass.	**Non-compliant**
7	The total nitrogen applied to the spray irrigation area shall not exceed 1,223 kilograms of nitrogen per hectare per year.	The nitrogen mass balance is provided in a separate report.	**Achieved**
8	The treatment and disposal system shall be constructed and installed in accordance with the details and plans supplied with the consent application submitted to the consent authority on 31 August 2010, and attached to this consent as appendix I.	Spray irrigation system installed 5 December 2012.	**Achieved**

Condition #	Clause Condition	Comments	Compliance
9	The consent holder shall install a flow meter on the outlet pipe from the treatment system and continually measure and record the daily volume (based on a no more than weekly average) of effluent being discharged to the disposal field. The consent holder shall forward the record for the previous 12-month period to the consent authority by 1 December each year, and upon request.	Refer to Appendix D.	**Achieved**
10	(A) from the first exercise of this consent, the consent holder shall collect representative samples of the treated wastewater from the outlet of the oxidation pond in the last week of each month. The samples shall be analysed for: (i) five day total biochemical oxygen demand (bod_5); and (ii) total suspended solids; and(iii) total nitrogen; and (iv) total Ammoniacal nitrogen; and (v) total phosphorous; and (vi) *Escherichia coli.* (b) from the first exercise of this consent, wastewater discharged from the oxidation pond shall comply with the following criteria: | | Mean* | 95th percentile (mg/l)* | | Ammoniacal nitrogen | 25 (mg/l) | 30 (mg/l) | | Total nitrogen | 35 (mg/l) | 40 (mg/l) | | Total phosphorous | 8 (mg/l) | 10 (mg/l) | | Escherichia coli | - | 2.5 x 10^5 cfu/100 ml | *the mean and 95th percentile applies to a rolling 12 month period. (c) the analytical sample results from the sampling under condition 9(a) of this consent shall be submitted to the consent authority by 1 Dec each year &upon request.	Refer to Appendices B and C for all results. Elevated results recorded for 95th percentile and annual mean for total nitrogen and for the 95th percentile for ammoniacal nitrogen.	**Non-compliant**
11	All sampling techniques shall be acceptable to the consent authority. All analysis carried out in connection with this consent shall be performed by a laboratory that meets ISO 17025 standards, or otherwise as specifically approved by the consent authority.	Sampling and lab analysis performed monthly by Watercare Laboratories to meet required standards.	**Achieved**
12	The following information shall be provided in writing to the consent authority by 1 December each year, and upon request, following the commencement of the exercise of the consent: (a) the nitrogen mass balance for the spray irrigation land application area, which shall be determined annually. the nitrogen mass balance shall consist as a minimum the total nitrogen applied to land and crop removal of nitrogen. (b) the total nitrogen applied to the spray irrigation land shall be estimated from the total volume of effluent applied and the average of monthly concentration of total nitrogen in the land applied effluent. (c) the crop removal of nitrogen from the spray irrigation land shall be estimated by obtaining dry matter content and total nitrogen content after each crop/plant harvest. (d) the nitrogen mass balance from condition 12(a) and any other factors such as ammonia volatilisation and denitrification shall be used to calculate the mass of nitrogen leached from the site, using a model acceptable to the consent authority	The nitrogen mass balance is presented in a separate report.	**Achieved**
13	The consent holder shall forward an annual report in writing to the consent authority by 1 December each year. The annual report shall cover the preceding 12 month period (from 1 December the preceding year until 30 November of the current year) and shall report on compliance with this consent. As a minimum, the report shall include: (a) a summary of all analytical results for the year; and (b) a summary of the year's monitoring results, in context of previous years' results; and (c) comments on compliance with the conditions of this discharge permit; and (d) a summary of any complaints received, the validity of each complaint and the corrective action taken; and (e) a summary of any malfunctions of breakdowns and the corrective action taken; and (f) details of the cut and carry operation, including the calculations for nitrogen loading in the spray irrigation land, number of harvests, dry matter and total nitrogen content of the harvest and nitrogen balance for this site. (g) any other issues considered relevant by the consent holder.	Annual Report submitted for the period 1 December 2017 – 30 November 2018 in December 2018. Please note that the unrealistic wording of this condition requires an annual report to be submitted only one day following the end of the monitoring period.	**Achieved**
14	By no later than 1 December 2012, the consent holder shall prepare and forward to the consent authority an operations and management manual for the wastewater treatment and disposal system to ensure its effective and efficient operation at all times. The system shall be operated in accordance with this manual, which shall be updated as appropriate. The manual and include, as a minimum,: (a) a brief description of the treatment and disposal system, including a site map indicating the location of the treatment and disposal system, points of discharge and any monitoring sites; (b) key operational matters, including weekly, monthly and annual maintenance checks; (c) monitoring requirements and procedures including a nitrogen balance sheet for the purpose of managing nitrogen inputs and outputs including nitrogen leaching losses; (d) a management plan for the cut and carry operation including procedures for harvesting grass from the site, and maximising grass growth and nitrogen uptake by grass such as soil tests, supplementary nutrient additions and pest and weed control; (e) management and dosing of trenches (f) contingency plans in the event of system malfunctions or breakdowns; and (g) the means of receiving and dealing with any complaints; and (h) emergency contact phone numbers.	The first O&M manual was sent to the ORC on the 7 May 2008, with an updated O&M manual sent 8 August 2008. A revised O&M manual by VW was sent to the ORC in April 2010 with the Annual Report 2009/10. Updated O&M Manual submitted to the ORC on 6th December 2017.	**Achieved**
15	No ponding or surface run-off of effluent shall occur as a result of the exercise of this consent.	No ponding or surface run-off of wastewater.	**Achieved**
16	There shall be no odour emission resulting from the treatment and disposal system that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised.	No odour complaints received within the 2017/18 year.	**Achieved**
17	This permit does not authorise the discharge of sludge to land or water.	No sludge discharged to land or water.	**Achieved**

**Conditions 1 is a 'general' resource consent conditions that do not require compliance monitoring*

4.4 *WWTP Performance & Future Works*

Veolia is the 3-waters (water, wastewater and storm water) operators and maintenance contractor for QLDC. In the 1 December 2017 to 30 November 2018 period there were no major breakdowns. Veolia manages programmed maintenance and work orders/ requests for service for breakdowns, as shown in Appendix E.

As detailed in section 4.1 of the report, in September 2018 a trench valve was manually opened and then when it was closed, it did not close completely. This results in larger than usual discharge volume, with the contractor only alerted by a low level pond alarm. A new alarm has now been established to alert the operator when the discharge volume exceeds 600m^3.

In October 2018 the spray irrigation area was re-sown in Rye Grass, to replace the Lucerne which was being overtaken by weeds.

During the 2016/17 year it was discovered that the spray irrigation discharge was controlled to a limit of 105 m^3/day, with the remainder being discharged to the trench. This was investigated further, and in December 2017 this system control was amended to allow greater spray irrigation discharge volumes. This is now operated such that all discharge can generally occur to the spray irrigation area over the summer months.

As stated in previous reports, it has been determined that the plant is not suitable for the current resource consent conditions. There is no design basis for the oxidation pond to remove nutrients reliably. QLDC are currently considering the option of using a biological additive in the pond as a short-term solution to improve nitrogen levels, until the wastewater can be diverted to the Wanaka WWTP.

QLDC is committed to implementing a long term solution, and the QLDC Long Term Plan includes budget for this in 2021 – 2023. A business case for this project has now been approved, demonstrating that conveying the wastewater from Hawea to the Wanaka WWTP is financially and environmentally beneficial. Detailed design on this project is scheduled to commence in 2019.

5. Summary and Conclusions

The interpretation of and conclusion about, the monitoring results from the Hawea WWTP and consent compliance are as below.

The volume of wastewater discharged generally remained below the consent limit of 775 m^3/day, with four days recorded in excess of this, on 23/05/18, 11/09/18, 12/09/18 and 17/09/18. The elevated volumes recorded in September were due to a trench valve that was opened manually and then not closed completely. This was noticed when a pond low level alarm was activated on 12/09/18, and after being resolved the pond then took about four days to return to normal operating level with little to no discharge. Further investigative work was undertaken on 17th and 18th September. A Scada alarm has now been added to alert the operator when the discharge exceeds 600 m^3.

The annual average was 240 m^3/day.

The rolling 12 month 95th percentile of 43 mg/L for total ammoniacal nitrogen exceeded the consent limit (30 mg/L) throughout the 2017/18 monitoring period, but complied with the annual mean limit.

The rolling 12 month 95th percentile of 57 mg/L for total nitrogen exceeded the consent limit (40 mg/L) in the 2017/18 monitoring period. The annual mean consent limit was also exceeded.

The results for E. *coli* remained below the consent limit. Total phosphorus, total suspended solids and BOD5 are consistent with results from previous years. Total phosphorus was compliant with consent limits, while total suspended solids and BOD5 do not have consent limits.

Compliance with Resource Consents RM10.308.01 and RM10.308.02 was achieved in the 2017/18 monitoring year for a number of the consent conditions, however some issues still remain, similar to previous years. The monitoring results for total nitrogen and total ammoniacal nitrogen were elevated above consent limits, as in previous years.

The N Mass Balance Report produced by Lowe Environmental Impact recommends regular monitoring of aeration performance and alkalinity levels in the pond to determine if this is the reason for low nitrification, with alkalinity added if considered necessary. The report also recommends increased use of the spray irrigation, and increased harvest frequency.

During the 2016/17 year it was discovered that the spray irrigation discharge was controlled to a limit of 105 m^3/day, with the remainder being discharged to the trench. This was investigated further, and in December 2017 this system control was amended to allow greater spray irrigation discharge volumes. This is now operated such that all discharge can generally occur to the spray irrigation area over the summer months.

Harvesting frequency should also be increased. Harvests have been infrequent during recent years due to the difficulty finding a contractor willing to complete the work. This is because the disposal area is small in comparison to other competing jobs, and the above ground sprinkler system makes harvesting the block challenging. The Lucerne was also being overtaken by weeds, eventually resulting in a harvest that was of too poor quality to sell.

Two harvests occurred in the 2017/18 period, then the spray irrigation area was re-sown with Rye Grass, with the aim of improving growth and increasing harvest potential.

There were no odour complaints recorded for the Hawea oxidation ponds during the 2017/18 year.

The longer term solution for Hawea wastewater compliance, is to convey the wastewater to the Wanaka WWTP. This has been budgeted for in 2021-2023, with detailed design to commence in 2019.

Glossary of Terms

BOD	Biological Oxygen Demand (BOD) measures the rate of oxygen uptake by micro-organisms in a sample of water at a temperature of 20°C and over an elapsed period of five days in the dark.
cfu	Colony Forming Units (cfu) is a measure of the concentration of bacteria usually expressed as per 100 millimetre sample.
COD	The Chemical Oxygen Demand (COD) test is commonly used to indirectly measure the amount of organic compounds in water. Most applications of COD determine the amount of organic pollutants found in surface water (e.g. lakes and rivers), making COD a useful measure of water quality. It is expressed in milligrams per litre (mg/L), which indicates the mass of oxygen consumed per litre of solution.
Conductivity	An indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
Wastewater	Discharge from the WWTP (in this case, treated wastewater).
g/m³	grams per cubic meter, equivalent to milligrams per litre (mg/L). In water this is also equivalent to parts per million (ppm).
pH	pH is a numeric measure of the acidity or basicity of a solution. It is defined as the cologarithm of the activity of dissolved hydrogen ions (H^+). Neutral is pH 7. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength, for example, a pH of 4 is 10 times more acidic than a pH of 5.
Resource Consent	refers to Section 87 of the RMA. Resource consents include land use consents, coastal permits, water permits and discharge permits.
RMA	Resource Management Act 1991 and subsequent amendments.
WWTP	Wastewater Treatment Plant (WWTP) is the process of removing contaminants from wastewater and household sewage, both runoff and domestic. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce a waste stream (or treated wastewater) and a solid waste or sludge suitable for discharge or reuse back into the environment.

Appendix A Resource Consents

Consent No. RM10.308.01

Our Reference: A296715

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Queenstown Lakes District Council

Address: 10 Gorge Road, Queenstown

To discharge contaminants to air for the purpose of discharging treated wastewater.

For a term expiring: 12 November 2022

Location of consent activity: Lake Hawea, approximately 600 metres south of the intersection of Domain Road and Cemetery Road

Legal description of consent location: Lot 1 DP 20555

Map Reference: NZTM E1302846 N5052016 NZ260 G40 128 137

Conditions

Specific

1. This consent shall only be exercised in conjunction with Discharge Permit RM10.308.02.

2. The discharge to air shall be as described in the consent application submitted to the Consent Authority on 31 August 2010 and any subsequent information provided

3. Wind cloth shall be installed on the western, southern and eastern-most boundaries of the area on which treated wastewater is to be applied by spray irrigation. This wind cloth shall be maintained until the screen foliage required under Condition 4 is fully established.

4. Suitable screening foliage, that shall be at least 3 metres high but not exceed 6 metres in height, shall be planted on the western, southern and eastern-most boundaries of the area on which treated wastewater is applied by spray irrigation.

5. A weather station shall be installed in an appropriate location to record, as a minimum, rainfall and wind conditions at the site where treated wastewater is to be applied by spray irrigation.

6. The spray irrigation system shall not be operated in conditions where wind speed, as measured at the on-site station installed under Condition 5, exceeds 29.9 km/hour;

Performance Monitoring

7. The consent holder shall keep a record of any complaints received regarding discharges of odour from the site. The record shall, as a minimum, include the following:
(a) The time and place at which the complaint was generated;
(b) The nature of the complaint;
(c) Operating conditions at the time of the complaint, including any malfunctioning or breakdown of control equipment;
(d) Wind and weather conditions at the time of the complaint; and
(e) Corrective action taken by the consent holder to minimise the risk and extent of the recurrence of the causes of the complaint.

The consent holder shall submit a copy of the written record of the complaint to the Consent Authority within two weeks after any complaint occurring, together with the details of the corrective actions taken.

General

8. There shall be no discharge of odour, as a result of the exercise of this consent, that is noxious, dangerous, offensive or objectionable to the extent that it causes an adverse effect beyond the boundary of the site, in the opinion of an authorised officer of the Consent Authority.

9. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent, for the purpose of:
(a) Determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
(b) Ensuring the conditions of this consent are consistent with any National Environmental Standards; or
(c) Requiring the consent holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent.

Notes to Consent Holder

1. *If you require a replacement consent/permit upon the expiry date of this permit, any new application should be lodged at least 6 months prior to the expiry date of this permit. Applying at least 6 months before the expiry date may enable you to continue to exercise this permit until a decision is made, and any appeals are resolved, on the replacement application.*

Issued at Dunedin this 15th day of November 2010
Marian Weaver
RM Procedural Specialist

Our Reference: A296715

Consent No. RM10.308.02

DISCHARGE PERMIT

Pursuant to Section 104B of the Resource Management Act 1991, the Otago Regional Council grants consent to:

Name: Queenstown Lakes District Council

Address: 10 Gorge Road, Queenstown

To discharge contaminants to land for the purpose of discharging treated wastewater.

For a term expiring: 12 November 2022

Location of consent activity: Lake Hawea, approximately 600 metres south of the intersection of Domain Road and Cemetery Road

Legal description of consent location: Lot 1 DP 20555

Map Reference: NZTM E1302846 N5052016 NZ260 G40 128 137

Conditions

Specific

1. The discharge shall only be treated domestic wastewater, as described in the consent application submitted to the Consent Authority on 31 August 2010 and any subsequent information provided.

2. The volume of effluent discharged shall not exceed 775 cubic metres per day.

3. The distance the site boundary from any part of the wastewater treatment and disposal system shall no less than 5 metres.

4. By no later than 1 December 2012, the consent holder shall ensure that the trench utilised for wastewater disposal:
   a) is at least 150 metres long and 2 m wide in total; and
   b) is intermittently dosed; and
   c) is not used for the disposal of wastewater for more than 4 months in total in any one calendar year.

5. By no later than 1 December 2012, the consent holder shall install and commission a spray irrigation system for the land application of treated wastewater. The spray irrigation system shall meet the following criteria:
   (a) The total area on which treated wastewater is applied by spray irrigation shall be no less than 2.5 hectares;
   (b) Treated wastewater shall be applied evenly by spray irrigation to the area defined in Appendix I only;
   (c) The area on which treated wastewater is applied by spray irrigation shall be fenced with a 2 metre high deer fence with appropriate signage warning the general public of the hazard;

(d) A weather station shall be installed in an appropriate location to record, as a minimum, rainfall and wind conditions at the site where treated wastewater is to be applied by spray irrigation;
(e) Wastewater shall not be applied to land by spray irrigation system during the hours outside of 11 pm to 5 am; (f) Nozzle pressure must not exceed 400 kilopascals (kPa);
(g) There shall be no irrigation of treated wastewater using K-Line irrigation systems.

6. The area on which treated wastewater is to be applied using spray irrigation shall be planted in high growth and nitrogen uptake vegetation (such as Lucerne or Ryegrass) and shall be managed as far as practicably possible to optimise nutrient removal. A minimum of three harvests per year shall be undertaken.

7. The total nitrogen applied to the spray irrigation area shall not exceed 1,223 kilograms of nitrogen per hectare per year.

Performance Monitoring

8. The treatment and disposal system shall be constructed and installed in accordance with the details and plans supplied with the consent application submitted to the Consent Authority on 31 August 2010, and attached to this consent as Appendix I.

9. The consent holder shall install a flow meter on the outlet pipe from the treatment system and continually measure and record the daily volume (based on a no more than weekly average) of effluent being discharged to the disposal field. The consent holder shall forward the record for the previous 12-month period to the Consent Authority by 1 December each year, and upon request.

10. (a) From the first exercise of this consent, the consent holder shall collect representative samples of the treated wastewater from the outlet of the oxidation pond in the last week of each month. The samples shall be analysed for:
(i) Five day total biochemical oxygen demand (BOD_5); and
(ii) Total suspended solids; and (iii) Total nitrogen; and (iv) Total Ammoniacal nitrogen; and (v) Total phosphorous; and (vi) *Escherichia coli.*

(b) From the first exercise of this consent, wastewater discharged from the oxidation pond shall comply with the following criteria:

	Mean*	95th Percentile (mg/L)*
Ammoniacal Nitrogen	25 (mg/L)	30 (mg/L)
Total Nitrogen	35 (mg/L)	40 (mg/L)
Total Phosphorous	8 (mg/L)	10 (mg/L)
Faecal Coliforms	-	2.5 x 10^5 cfu/100 mL

*The mean and 95th percentile applies to a rolling 12 month period.

(c) The analytical sample results from the sampling under Condition 9(a) of this consent shall be submitted to the Consent Authority by 1 December each year, and upon request.

11. All sampling techniques shall be acceptable to the Consent Authority. All analysis carried out in connection with this consent shall be performed by a laboratory that meets ISO 17025 standards, or otherwise as specifically approved by the Consent Authority.

12. The following information shall be provided in writing to the Consent Authority by 1 December each year, and upon request, following the commencement of the exercise of the consent:

(a) The nitrogen mass balance for the spray irrigation land application area, which shall be determined annually. The nitrogen mass balance shall consist as a minimum the total nitrogen applied to land and crop removal of nitrogen.
(b) The total nitrogen applied to the spray irrigation land shall be estimated from the total volume of effluent applied and the average of monthly concentration of total nitrogen in the land applied effluent.
(c) The crop removal of nitrogen from the spray irrigation land shall be estimated by obtaining dry matter content and total nitrogen content after each crop/plant harvest.
(d) The nitrogen mass balance from Condition 12(a) and any other factors such as ammonia volatilisation and denitrification shall be used to calculate the mass of nitrogen leached from the site, using a model acceptable to the Consent Authority

13. The consent holder shall forward an annual report in writing to the Consent Authority by 1 December each year. The annual report shall cover the preceding 12 month period (from 1 December the preceding year until 30 November of the current year) and shall report on compliance with this consent. As a minimum, the report shall include:

(a) A summary of all analytical results for the year; and
(b) A summary of the year's monitoring results, in context of previous years' results; and
(c) Comments on compliance with the conditions of this discharge permit; and
(d) A summary of any complaints received, the validity of each complaint and the corrective action taken; and
(e) A summary of any malfunctions of breakdowns and the corrective action taken; and
(f) Details of the cut and carry operation, including the calculations for nitrogen loading in the spray irrigation land, number of harvests, dry matter and total nitrogen content of the harvest and nitrogen balance for this site.
(g) Any other issues considered relevant by the consent holder.

14. By no later than 1 December 2012, the consent holder shall prepare and forward to the Consent Authority an Operations and Management Manual for the wastewater treatment and disposal system to ensure its effective and efficient operation at all times. The system shall be operated in accordance with this manual, which shall be updated as appropriate. The manual and include, as a minimum,:
(a) A brief description of the treatment and disposal system, including a site map indicating the location of the treatment and disposal system, points of discharge and any monitoring sites;
(b) Key operational matters, including weekly, monthly and annual maintenance checks;
(c) Monitoring requirements and procedures including a nitrogen balance sheet for the purpose of managing nitrogen inputs and outputs including nitrogen leaching losses;
(d) A management plan for the cut and carry operation including procedures for harvesting grass from the site, and maximising grass growth and nitrogen uptake by grass such as soil tests, supplementary nutrient additions and pest and weed control;
(e) Management and dosing of trenches
(f) Contingency plans in the event of system malfunctions or breakdowns; and
(g) The means of receiving and dealing with any complaints; and
(h) Emergency contact phone numbers.

General

15. No ponding or surface run-off of effluent shall occur as a result of the exercise of this consent.

16. There shall be no odour emission resulting from the treatment and disposal system that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised

17. This permit does not authorise the discharge of sludge to land or water.

18. If the consent holder:
(a) discovers koiwi tangata (human skeletal remains), waahi taoka (resources of importance), waahi tapu (places or features of special significance) or other Maori artefact material, the consent holder shall without delay:
(i) notify the Consent Authority, Tangata whenua and New Zealand Historic Places Trust and in the case of skeletal remains, the New Zealand Police.
(ii) stop work within the immediate vicinity of the discovery to allow a site inspection by the New Zealand Historic Places Trust and the appropriate runanga and their advisors, who shall determine whether the discovery is likely to be extensive, if a thorough site investigation is required, and whether an Archaeological Authority is required.
Any koiwi tangata discovered shall be handled and removed by tribal elders responsible for the tikanga (custom) appropriate to its removal or preservation. Site work shall recommence following consultation with the Consent Authority, the New Zealand Historic Places Trust, Tangata whenua, and in the case of skeletal remains, the New Zealand Police, provided that any relevant statutory permissions have been obtained.
(b) discovers any feature or archaeological material that predates 1900, or heritage material, or disturbs a previously unidentified archaeological or heritage site, the consent holder shall without delay:
(i) stop work within the immediate vicinity of the discovery or disturbance and
(ii) advise the Consent Authority, the New Zealand Historic Places Trust, and in the case of Maori features or materials, the Tangata whenua, and if required, shall make an application for an Archaeological Authority pursuant to the Historic Places Act 1993 and
(iii) arrange for a suitably qualified archaeologist to undertake a survey of the site. Site work shall recommence following consultation with the Consent Authority.

19. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the consent holder of its intention to review the conditions of this consent within three months of each anniversary of the commencement of this consent, for the purpose of:
(a) determining whether the conditions of this consent are adequate to deal with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the consent; or
(b) ensuring the conditions of this consent are consistent with any National Environmental Standards; or
(c) requiring the consent holder to adopt the best practicable option, in order to remove or reduce any adverse effect on the environment arising as a result of the exercise of this consent.

Notes to Consent Holder

1. *If you require a replacement consent/permit upon the expiry date of this permit, any new application should be lodged at least 6 months prior to the expiry date of this permit. Applying at least 6 months before the expiry date may enable you to continue to exercise this permit until a decision is made, and any appeals are resolved, on the replacement application.*

Issued at Dunedin this 15th day of November 2010
Marian Weaver
RM Procedural Specialist

Appendix I – Area on which Treated Wastewater is to be applied using Spray Irrigation

Appendix B Effluent Results Tables

			Total Suspended	BOD5	Total Phosphorus			Total Nitrogen			Total Kjedahl N	Ammoniacal Nitrogen			Nitrate N -Nitrite N	Faecal coliforms	*E. Coli*		Dissolved
			g/m³	g/m³	mg/L			g/m³			g/m³	g/m³			g/m³	cfu/100 mL	cfu/100 mL		g/m³
	@ 20°C	Annual Mean	Mean	Mean	Mean	percentile		Mean	percentile		Annual Mean	Mean	percentile		Mean	95th percentile	Mean	95th percentile	Mean
Consent Limit RM10.308.02					8	10		35	40			25	30					250,000	
19/12/2016			100	27 *34*	8.2	7	9	34	36	55		25.0	25	44			37,000	37,250	69,350	
20/01/2017			120	33 *34*	7.9	7	8	22	34	55		1.4	22	44			7,000	31,917	67,450	
23/02/2017			180	48 *34*	8.0	7	8	19	34	55		1.0	22	44			61,000	31,333	63,700	
22/03/2017			130	31 *32*	6.6	7	8	19	35	55		3.6	23	44			26,000	29,250	63,700	
19/04/2017			360	27 *31*	6.3	7	8	23	35	55		16.0	24	44			56,000	32,000	63,700	
19/05/2017			60	23 *30*	6.2	7	8	35	36	55		25.0	24	44			40,000	32,833	63,700	
21/06/2017			33	21 *30*	6.0	7	8	41	36	55		36.0	25	44			19,000	33,583	63,700	
20/07/2017			90	28 *30*	7.5	7	8	69	39	62		39.0	25	44			140,000	44,000	99,850	
25/08/2017			100	22 *30*	6.6	7	8	44	39	62		35.0	25	44			48,000	46,500	99,850	
20/09/2017			120	49 *32*	6.7	7	8	48	39	62		36.0	25	44			110,000	52,583	123,500	
20/10/2017			130	25 *32*	7.4	7	8	60	39	64		50.0	26	45			25,000	53,000	123,500	
23/11/2017			190	38 *31*	7.4	7	8	29	37	64		*0.2*	22	44			26,000	49,583	123,500	
20/12/2017			49	19 *30*	8.2	7	8	40	37	64		30	23	44			11,000	47,417	123,500	
23/01/2018			130	35 *31*	7.7	7	8	22	37	64		8	23	44			36,000	49,833	123,500	
28/02/2018			230	74 *33*	6.4	7	8	31	38	64		*0*	23	44			130,000	55,583	134,500	
20/03/2018			130	37 *33*	7.5	7	8	27	39	64		1	23	44			55,000	58,000	134,500	
20/04/2018			120	51 *35*	7.9	7	8	29	40	64		2	22	44			5,600	53,800	134,500	
21/05/2018			64	28 *36*	6.3	7	8	27	39	64		16	21	44			37,000	53,550	134,500	
20/06/2018			32	24 *36*	6.0	7	8	34	38	64		30	21	44			5,200	52,400	134,500	
26/07/2018			48	25 *36*	6.5	7	8	45	36	53		38	21	43			3,000	40,983	119,000	
21/08/2018			75	19 *35*	6.5	7	8	49	37	54		41	21	45			4,300	37,342	119,000	
20/09/2018			140	64 *37*	6.8	7	8	52	37	56		36	21	45			66,000	33,675	94,800	
16/10/2018			130	41 *38*	7.2	7	8	58	37	55		43	20	42			83,000	38,508	104,150	
20/11/2018			88	18 *36*	7.7	7	8	57	39	57		43	24	43			22,000	38,175	104,150	

Appendix C Watercare Laboratory Certificates

Watercare
Laboratory Services

Auckland	Invercargill	Queenstown
52 Aintree Ave, PO Box 107028, Auckland Airport,	142 Esk Street, PO Box 747, Invercargill, 9840	74 Glenda Drive, PO Box 2614, Wakatipu,
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Fax: (09) 539 7601	(03) 214 4041	

www.watercarelabs.co.nz clientsupport@water.co.nz

Certificate of Analysis
Laboratory Reference:171220-091

Attention:	Operations .	*Final Report:*	**253711-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**01-Jan-2018**
Address:		*Received Date:*	**21-Dec-2017**
Client Reference:	**Hawea Ponds Monthly December 2017**		
Purchase Order:	**PO527893**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**171220-091-1**
Client Sample ID:	
Sample Date/Time:	20/12/2017
Description:	Hawea Effluent (RM 10.308.02)

General Testing		
Ammoniacal Nitrogen (as N)	mg/L	30
CBOD5	mg/L	19
Total Nitrogen (as N)	mg/L	40
Total Phosphorus (as P)	mg/L	8.2
Total Suspended Solids	mg/L	49
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	11000

*Results marked with * are not accredited to International Accreditation New Zealand*

Where samples have been supplied by the client they are tested as received. A dash indicates no test performed.

Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher.

For more information please contact the Operations Manager

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

ilac-MRA IANZ ACCREDITED LABORATORY

Report Signatory 01/01/2018
 Marina Fisher KTP Signatory

Watercare Laboratory Services

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Certificate of Analysis
Laboratory Reference:180123-089

Attention:	Operations .	*Final Report:*	**257315-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**31-Jan-2018**
Address:		*Received Date:*	**24-Jan-2018**
Client Reference:	**Hawea Ponds Monthly January 2018**		
Purchase Order:	**PO7300021754**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**180123-089-1**
Client Sample ID:	
Sample Date/Time:	23/01/2018
Description:	Hawea Effluent (RM 10.308.02)

General Testing		
Ammoniacal Nitrogen (as N)	mg/L	7.5
CBOD5	mg/L	35
Total Nitrogen (as N)	mg/L	22
Total Phosphorus (as P)	mg/L	7.7
Total Suspended Solids	mg/L	130
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	36000

*Results marked with * are not accredited to International Accreditation New Zealand*

Where samples have been supplied by the client they are tested as received. A dash indicates no test performed.

Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher.

For more information please contact the Operations Manager

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

ilac-MRA IANZ ACCREDITED LABORATORY

Report Signatory 31/01/2018

Melissa Wall
KTP Signatory

Watercare Laboratory Services

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Certificate of Analysis
Laboratory Reference:180228-106

Attention:	Operations .	*Final Report:*	**262585-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**13-Mar-2018**
Address:		*Received Date:*	**01-Mar-2018**
Client Reference:	**Hawea Ponds Monthly February 2018**		
Purchase Order:	**PO7300023687**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**180228-106-1**
Client Sample ID:	
Sample Date/Time:	28/02/2018
Description:	Hawea Effluent (RM 10.308.02)

General Testing		
Ammoniacal Nitrogen (as N)	mg/L	<0.4
CBOD5	mg/L	74
Total Nitrogen (as N)	mg/L	31
Total Phosphorus (as P)	mg/L	6.4
Total Suspended Solids	mg/L	230
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	130000

*Results marked with * are not accredited to International Accreditation New Zealand*

Where samples have been supplied by the client they are tested as received. A dash indicates no test performed.

Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher.

For more information please contact the Operations Manager

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

ilac-MRA IANZ ACCREDITED LABORATORY

Report Signatory 13/03/2018

Marina Fisher
KTP Signatory

Watercare Laboratory Services

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Certificate of Analysis
Laboratory Reference:180320-077

Attention:	Operations .	*Final Report:*	**264568-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**27-Mar-2018**
Address:		*Received Date:*	**21-Mar-2018**
Client Reference:	**Hawea Ponds Monthly March 2018**		
Purchase Order:	**PO7300025582**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**180320-077-1**
Client Sample ID:	
Sample Date/Time:	20/03/2018
Description:	Hawea Effluent (RM 10.308.02)

General Testing		
Ammoniacal Nitrogen (as N)	mg/L	0.94
CBOD5	mg/L	37
Total Nitrogen (as N)	mg/L	27
Total Phosphorus (as P)	mg/L	7.5
Total Suspended Solids	mg/L	130
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	55000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher.

For more information please contact the Operations Manager

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

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Report Signatory 27/03/2018

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Certificate of Analysis
Laboratory Reference:180420-083

Attention:	Operations .	*Final Report:*	**268096-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**28-Apr-2018**
Address:		*Received Date:*	**21-Apr-2018**
Client Reference:	**Hawea Ponds Monthly April 2018**		
Purchase Order:	**PO7300027801**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**180420-083-1**
Client Sample ID:	
Sample Date/Time:	20/04/2018
Description:	Hawea Effluent (RM 10.308.02)

General Testing		
Ammoniacal Nitrogen (as N)	mg/L	2.2
CBOD5	mg/L	51
Total Nitrogen (as N)	mg/L	29
Total Phosphorus (as P)	mg/L	7.9
Total Suspended Solids	mg/L	120
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	5600

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Operations Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

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Report Signatory 28/04/2018

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Certificate of Analysis
Laboratory Reference:180521-093

Attention:	Operations .	*Final Report:*	**272346-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**31-May-2018**
Address:		*Received Date:*	**22-May-2018**
Client Reference:	**Hawea Ponds Monthly May 2018**		
Purchase Order:	**PO7300029853**	*Quote Reference :*	**42**

Sample Details		WATERS
Lab Sample ID:		**180521-093-1**
Client Sample ID:		
Sample Date/Time:		21/05/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	16
CBOD5	mg/L	28
Total Nitrogen (as N)	mg/L	27
Total Phosphorus (as P)	mg/L	6.3
Total Suspended Solids	mg/L	64
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	37000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

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Report Signatory 31/05/2018

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Certificate of Analysis
Laboratory Reference:180620-127

Attention:	Operations .	*Final Report:*	**281734-0**	*Replaces Report*	**275791-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**20-Aug-2018**		
Address:		*Received Date:*	**21-Jun-2018**		
Client Reference:	**Hawea Ponds Monthly June 2018**				
Purchase Order:	**PO7300032395**	*Quote Reference :*	**42**		

Sample Details		WATERS
Lab Sample ID:		**180620-127-1**
Client Sample ID:		
Sample Date/Time:		20/06/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	30
CBOD5	mg/L	24
Total Nitrogen (as N)	mg/L	34
Total Phosphorus (as P)	mg/L	6.0
Total Suspended Solids	mg/L	32
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	5200

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

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ACCREDITED LABORATORY

Report Signatory 20/08/2018

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Certificate of Analysis
Laboratory Reference:180726-096

Attention:	Operations .	*Final Report:*	**280252-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**08-Aug-2018**
Address:		*Received Date:*	**27-Jul-2018**
Client Reference:	**Hawea Ponds Monthly july 2018**		
Purchase Order:	**PO7300034841**	*Quote Reference :*	**42**

Sample Details	WATERS
Lab Sample ID:	**180726-096-1**
Client Sample ID:	
Sample Date/Time:	26/07/2018
Description:	Hawea Effluent (RM 10.308.02)
General Testing	
Ammoniacal Nitrogen (as N) mg/L	38
CBOD5 mg/L	25
Total Nitrogen (as N) mg/L	45
Total Phosphorus (as P) mg/L	6.5
Total Suspended Solids mg/L	48
Microbiology	
Escherichia coli by Membrane Filtration	
Escherichia coli cfu/100 mL	3000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

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Report Signatory 08/08/2018

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Certificate of Analysis
Laboratory Reference:180821-089

Attention:	Operations .	*Final Report:*	**283129-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**30-Aug-2018**
Address:		*Received Date:*	**22-Aug-2018**
Client Reference:	**Hawea Ponds Monthly May 2018**		
Purchase Order:	**730032395**	*Quote Reference :*	**42**

Sample Details		WATERS
Lab Sample ID:		**180821-089-1**
Client Sample ID:		
Sample Date/Time:		21/08/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	41
CBOD5	mg/L	19
Total Nitrogen (as N)	mg/L	49
Total Phosphorus (as P)	mg/L	6.5
Total Suspended Solids	mg/L	75
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	4300

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

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Report Signatory 30/08/2018

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Certificate of Analysis
Laboratory Reference:180920-077

Attention:	Operations .	*Final Report:*	**286748-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**27-Sep-2018**
Address:		*Received Date:*	**21-Sep-2018**
Client Reference:	**Hawea Ponds Monthly May 2018**		
Purchase Order:	**730032395**	*Quote Reference :*	**42**

Sample Details		WATERS
Lab Sample ID:		**180920-077-1**
Client Sample ID:		
Sample Date/Time:		20/09/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	36
CBOD5	mg/L	64
Total Nitrogen (as N)	mg/L	52
Total Phosphorus (as P)	mg/L	6.8
Total Suspended Solids	mg/L	140
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	66000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

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Certificate of Analysis
Laboratory Reference:181016-089

Attention:	Operations .	*Final Report:*	**290204-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**24-Oct-2018**
Address:		*Received Date:*	**17-Oct-2018**
Client Reference:	**Hawea Ponds Monthly October 2018**		
Purchase Order:	**PO7300042604**	*Quote Reference :*	**42**

Sample Details		WATERS
Lab Sample ID:		**181016-089-1**
Client Sample ID:		
Sample Date/Time:		16/10/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	43
CBOD5	mg/L	41
Total Nitrogen (as N)	mg/L	58
Total Phosphorus (as P)	mg/L	7.2
Total Suspended Solids	mg/L	130
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	83000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Operations Manager.

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Report Signatory 24/10/2018

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Certificate of Analysis
Laboratory Reference:181120-099

Attention:	Operations .	*Final Report:*	**294647-0**
Client:	**VEOLIA WATER**	*Report Issue Date:*	**28-Nov-2018**
Address:		*Received Date:*	**21-Nov-2018**
Client Reference:	**Hawea Ponds Monthly November 2018**		
Purchase Order:	**PO89892**	*Quote Reference :*	**42**

Sample Details		WATERS
Lab Sample ID:		**181120-099-1**
Client Sample ID:		
Sample Date/Time:		20/11/2018
Description:		Hawea Effluent (RM 10.308.02)
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	43
CBOD5	mg/L	18
Total Nitrogen (as N)	mg/L	57
Total Phosphorus (as P)	mg/L	7.7
Total Suspended Solids	mg/L	88
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	22000

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Reference Methods
The sample(s) referred to in this report were analysed by the following method(s)

Analyte	Method Reference	MDL	Samples	Location
General Testing				
Ammoniacal Nitrogen (as N) by Colorimetry/Discrete Analyser	HMSO (1981) ISBN 0117516139	0.4 mg/L	All	Auckland
Carbonaceous Biochemical Oxygen Demand, CBOD5 by Electrode	APHA (online edition) 5210 B (modified)	0.5 mg/L	All	Auckland
Total Nitrogen (as N) by Persulphate Digestion and Flow Analysis	APHA (online edition) 4500-P J (modified), 4500-NO3 I	0.010 mg/L	All	Auckland
Total Phosphorus (as P) by Persulphate Digestion and Colorimetry/Discrete Analyser	APHA (online edition) 4500-P J (modified)	0.004 mg/L	All	Auckland
Total Suspended Solids by Gravimetry	In House based on APHA (online edition) 2540 D, E	1 mg/L	All	Auckland
Microbiology				
Escherichia coli by Membrane Filtration				
Escherichia coli	USEPA Method 1603	2 cfu/100 mL	All	Auckland

The method detection limit (MDL) listed is the limit attainable in a relatively clean matrix. If dilutions are required for analysis the detection limit may be higher. For more information please contact the Operations Manager.

Samples, with suitable preservation and stability of analytes, will be held by the laboratory for a period of two weeks after results have been reported, unless otherwise advised by the submitter.

Watercare Laboratory Services is a division of Watercare Services Limited .

ACCREDITED LABORATORY

Report Signatory 28/11/2018

Chandra Sharma
KTP Signatory

Appendix D Daily Effluent Flow Data

Date	Discharge to trench (m^3)	Irrigation discharge (m^3)	Total discharge (m^3)
1/12/2017	33	105	138
2/12/2017	20	105	125
3/12/2017	18	105	123
4/12/2017	49	105	154
5/12/2017	18	105	123
6/12/2017	65	105	170
7/12/2017	43	105	148
8/12/2017	10	110	120
9/12/2017	98	105	203
10/12/2017	54	105	159
11/12/2017	42	105	147
12/12/2017	60	105	165
13/12/2017	94	105	199
14/12/2017	61	105	166
15/12/2017	4	105	109
16/12/2017	47	105	152
17/12/2017	43	105	148
18/12/2017	75	105	180
19/12/2017	0	200	200
20/12/2017	0	200	200
21/12/2017	0	200	200
22/12/2017	0	200	200
23/12/2017	0	200	200
24/12/2017	0	200	200
25/12/2017	0	200	200
26/12/2017	0	200	200
27/12/2017	0	200	200
28/12/2017	7	200	207
29/12/2017	195	79	274
30/12/2017	32	207	239
31/12/2017	101	200	301
1/01/2018	110	200	310
2/01/2018	334	2	336
3/01/2018	252	0	252
4/01/2018	373	0	373
5/01/2018	22	200	222
6/01/2018	0	175	175
7/01/2018	0	247	247
8/01/2018	0	251	251
9/01/2018	0	252	252
10/01/2018	0	173	173
11/01/2018	0	163	163

12/01/2018	0	246	246
13/01/2018	0	249	249
14/01/2018	0	247	247
15/01/2018	0	251	251
16/01/2018	0	250	250
17/01/2018	0	250	250
18/01/2018	0	247	247
19/01/2018	0	244	244
20/01/2018	0	249	249
21/01/2018	0	254	254
22/01/2018	0	211	211
23/01/2018	0	252	252
24/01/2018	0	245	245
25/01/2018	0	256	256
26/01/2018	0	249	249
27/01/2018	0	249	249
28/01/2018	0	248	248
29/01/2018	0	254	254
30/01/2018	0	247	247
31/01/2018	0	252	252
1/02/2018	0	249	249
2/02/2018	0	1	1
3/02/2018	0	0	0
4/02/2018	0	0	0
5/02/2018	0	0	0
6/02/2018	0	0	0
7/02/2018	63	0	63
8/02/2018	16	85	101
9/02/2018	0	253	253
10/02/2018	0	389	389
11/02/2018	0	261	261
12/02/2018	0	268	268
13/02/2018	0	264	264
14/02/2018	0	263	263
15/02/2018	0	267	267
16/02/2018	0	266	266
17/02/2018	0	0	0
18/02/2018	0	255	255
19/02/2018	0	184	184
20/02/2018	0	264	264
21/02/2018	193	181	374
22/02/2018	21	97	118
23/02/2018	0	278	278
24/02/2018	0	282	282
25/02/2018	50	183	233
26/02/2018	37	97	134
27/02/2018	0	278	278

28/02/2018	0	284	284
1/03/2018	0	274	274
2/03/2018	0	283	283
3/03/2018	0	282	282
4/03/2018	0	277	277
5/03/2018	0	284	284
6/03/2018	0	280	280
7/03/2018	0	98	98
8/03/2018	0	281	281
9/03/2018	0	181	181
10/03/2018	0	375	375
11/03/2018	0	282	282
12/03/2018	0	281	281
13/03/2018	0	152	152
14/03/2018	147	0	147
15/03/2018	246	0	246
16/03/2018	203	0	203
17/03/2018	178	0	178
18/03/2018	158	0	158
19/03/2018	144	0	144
20/03/2018	136	0	136
21/03/2018	141	0	141
22/03/2018	143	0	143
23/03/2018	138	0	138
24/03/2018	140	0	140
25/03/2018	131	0	131
26/03/2018	132	0	132
27/03/2018	107	0	107
28/03/2018	232	0	232
29/03/2018	412	0	412
30/03/2018	738	0	738
31/03/2018	755	0	755
1/04/2018	461	0	461
2/04/2018	328	0	328
3/04/2018	273	0	273
4/04/2018	149	0	149
5/04/2018	0	0	0
6/04/2018	82	0	82
7/04/2018	319	0	319
8/04/2018	107	0	107
9/04/2018	298	0	298
10/04/2018	178	1	179
11/04/2018	237	0	237
12/04/2018	144	0	144
13/04/2018	256	0	256
14/04/2018	240	0	240
15/04/2018	185	0	185

16/04/2018	336	0	336
17/04/2018	208	0	208
18/04/2018	383	0	383
19/04/2018	258	0	258
20/04/2018	228	0	228
21/04/2018	202	0	202
22/04/2018	271	0	271
23/04/2018	268	0	268
24/04/2018	236	0	236
25/04/2018	211	0	211
26/04/2018	235	0	235
27/04/2018	253	0	253
28/04/2018	237	0	237
29/04/2018	247	0	247
30/04/2018	130	0	130
1/05/2018	315	0	315
2/05/2018	319	0	319
3/05/2018	335	0	335
4/05/2018	270	0	270
5/05/2018	167	0	167
6/05/2018	275	0	275
7/05/2018	297	0	297
8/05/2018	184	0	184
9/05/2018	227	0	227
10/05/2018	238	0	238
11/05/2018	229	0	229
12/05/2018	197	0	197
13/05/2018	117	0	117
14/05/2018	169	0	169
15/05/2018	218	0	218
16/05/2018	229	0	229
17/05/2018	200	0	200
18/05/2018	211	0	211
19/05/2018	251	0	251
20/05/2018	212	0	212
21/05/2018	188	0	188
22/05/2018	417	0	417
23/05/2018	993	0	993
24/05/2018	715	0	715
25/05/2018	235	0	235
26/05/2018	176	0	176
27/05/2018	284	0	284
28/05/2018	193	0	193
29/05/2018	206	0	206
30/05/2018	43	0	43
31/05/2018	181	0	181
1/06/2018	371	0	371

2/06/2018	72	0	72
3/06/2018	308	0	308
4/06/2018	281	0	281
5/06/2018	189	0	189
6/06/2018	181	0	181
7/06/2018	202	0	202
8/06/2018	58	0	58
9/06/2018	280	0	280
10/06/2018	253	0	253
11/06/2018	226	0	226
12/06/2018	136	0	136
13/06/2018	257	0	257
14/06/2018	169	0	169
15/06/2018	200	0	200
16/06/2018	212	0	212
17/06/2018	277	0	277
18/06/2018	165	0	165
19/06/2018	222	0	222
20/06/2018	164	0	164
21/06/2018	211	0	211
22/06/2018	218	0	218
23/06/2018	183	0	183
24/06/2018	346	0	346
25/06/2018	338	0	338
26/06/2018	199	0	199
27/06/2018	190	0	190
28/06/2018	142	0	142
29/06/2018	305	0	305
30/06/2018	207	0	207
1/07/2018	250	0	250
2/07/2018	181	0	181
3/07/2018	163	0	163
4/07/2018	42	1	43
5/07/2018	227	0	227
6/07/2018	313	0	313
7/07/2018	644	0	644
8/07/2018	631	0	631
9/07/2018	440	0	440
10/07/2018	321	0	321
11/07/2018	212	0	212
12/07/2018	215	0	215
13/07/2018	228	0	228
14/07/2018	326	0	326
15/07/2018	216	0	216
16/07/2018	118	0	118
17/07/2018	312	0	312
18/07/2018	163	0	163

19/07/2018	238	0	238
20/07/2018	339	0	339
21/07/2018	192	0	192
22/07/2018	408	0	408
23/07/2018	255	0	255
24/07/2018	433	0	433
25/07/2018	87	0	87
26/07/2018	118	0	118
27/07/2018	243	0	243
28/07/2018	273	0	273
29/07/2018	93	0	93
30/07/2018	174	0	174
31/07/2018	429	0	429
1/08/2018	343	0	343
2/08/2018	359	0	359
3/08/2018	239	0	239
4/08/2018	77	0	77
5/08/2018	118	0	118
6/08/2018	308	0	308
7/08/2018	282	0	282
8/08/2018	230	0	230
9/08/2018	173	0	173
10/08/2018	165	0	165
11/08/2018	186	0	186
12/08/2018	211	0	211
13/08/2018	301	0	301
14/08/2018	191	0	191
15/08/2018	202	0	202
16/08/2018	292	0	292
17/08/2018	137	0	137
18/08/2018	130	0	130
19/08/2018	134	0	134
20/08/2018	137	0	137
21/08/2018	157	0	157
22/08/2018	205	0	205
23/08/2018	214	0	214
24/08/2018	243	0	243
25/08/2018	243	0	243
26/08/2018	235	0	235
27/08/2018	227	0	227
28/08/2018	209	0	209
29/08/2018	209	1	210
30/08/2018	196	0	196
31/08/2018	117	0	117
1/09/2018	118	1	119
2/09/2018	244	0	244
3/09/2018	327	0	327

4/09/2018	328	0	328
5/09/2018	504	0	504
6/09/2018	199	0	199
7/09/2018	67	0	67
8/09/2018	63	0	63
9/09/2018	51	0	51
10/09/2018	619	0	619
11/09/2018	1384	0	1384
12/09/2018	1182	0	1182
13/09/2018	0	0	0
14/09/2018	0	0	0
15/09/2018	0	0	0
16/09/2018	7	0	7
17/09/2018	780	0	780
18/09/2018	643	0	643
19/09/2018	0	0	0
20/09/2018	9	0	9
21/09/2018	69	0	69
22/09/2018	254	0	254
23/09/2018	128	0	128
24/09/2018	242	0	242
25/09/2018	428	0	428
26/09/2018	139	0	139
27/09/2018	218	0	218
28/09/2018	195	0	195
29/09/2018	220	0	220
30/09/2018	456	0	456
1/10/2018	396	0	396
2/10/2018	251	0	251
3/10/2018	207	0	207
4/10/2018	252	0	252
5/10/2018	173	0	173
6/10/2018	61	0	61
7/10/2018	327	0	327
8/10/2018	202	0	202
9/10/2018	279	0	279
10/10/2018	191	0	191
11/10/2018	312	0	312
12/10/2018	252	0	252
13/10/2018	178	0	178
14/10/2018	259	0	259
15/10/2018	191	0	191
16/10/2018	173	0	173
17/10/2018	123	0	123
18/10/2018	114	0	114
19/10/2018	189	0	189
20/10/2018	420	0	420

21/10/2018	106	0	106
22/10/2018	133	0	133
23/10/2018	155	0	155
24/10/2018	155	0	155
25/10/2018	319	0	319
26/10/2018	257	0	257
27/10/2018	180	0	180
28/10/2018	418	0	418
29/10/2018	109	0	109
30/10/2018	144	0	144
31/10/2018	207	0	207
1/11/2018	457	0	457
2/11/2018	309	0	309
3/11/2018	283	0	283
4/11/2018	259	0	259
5/11/2018	204	0	204
6/11/2018	224	0	224
7/11/2018	86	0	86
8/11/2018	0	98	98
9/11/2018	299	185	484
10/11/2018	29	100	129
11/11/2018	5	275	280
12/11/2018	0	281	281
13/11/2018	0	279	279
14/11/2018	0	286	286
15/11/2018	0	180	180
16/11/2018	0	95	95
17/11/2018	0	101	101
18/11/2018	0	272	272
19/11/2018	0	287	287
20/11/2018	164	180	344
21/11/2018	598	0	598
22/11/2018	433	93	526
23/11/2018	1	284	285
24/11/2018	0	281	281
25/11/2018	0	279	279
26/11/2018	0	284	284
27/11/2018	0	275	275
28/11/2018	0	187	187
29/11/2018	0	96	96
30/11/2018	0	283	283

Appendix E Maintenance Records

Preventative Maintenance Task Schedule

PM Schedule	PM Description	Perform Every	Period
QTN-HWA-R-0006	1 Monthly Inspection - Hawea WWTP effluent irrigation insp	1	Months
QTN-QTN-R-0064	1 Monthly Inspection Maintenance - Grounds	1	Months
QTN-QTN-R-0110	1 Weekly Inspection/Validate - Online Analysers - Hawea WWTP	7	Days
QTN-HWA-R-0008	1 Weekly Inspections - Hawea WWTP	7	Days
QTN-QTN-R-0038	1 Yearly Compliance - Service Fire Extinguisher	1	Years
QTN-HWA-R-0002	1 Yearly Inspection - Hawea WWTP effluent irrigation	1	Years
QTN-QTN-R-0049	1 Yearly Inspection - Site Safety	1	Years
QTN-HWA-R-0003	1 Yearly Maintenance - Commission Hawea WWTP effluent irrigation	1	Years
QTN-HWA-R-0004	1 Yearly Maintenance - Decommission Hawea WWTP effluent irrigation	1	Years
QTN-WKA-R-0040	1 Yearly Maintenance - Hawea WWTP Ponds Aerator	1	Years
QTN-QTN-R-0003	2 Yearly Inspection - Electrical Panel	2	Years
QTN-HWA-R-0001	6 Monthly Inspection - Hawea WWTP effluent irrigation	6	Months

Manual Maintenance Tasks

Type	Date Completed	Description
Manual	10/01/2018 15:15	Hawea WWTP Repair Aerator #2 Dec 17
Manual	24/01/2018 11:29	Hawea WWTP - adjust irrigation controls 15/12/17
Manual	29/12/2017 13:53	Hawea Ponds - low irrigation flow alarm 29/12/17
Manual	21/02/2018 13:01	Hawea WWTP - irrigation flow alarm 20/1/18
Manual	30/01/2018 10:25	Hawea WWTP - windspeed not working 23/1/18
Manual	9/04/2018 10:53	Hawea WWTP - irrigation pump fault 12/3/18
Manual	9/04/2018 10:17	Hawea Ponds - high level alarm 25/3/18
Manual		Hawea Ponds - high level alarm 28/3/18
Manual	13/04/2018 7:56	Hawea Ponds - high level alarm 30/3/18
Manual	23/05/2018 14:22	Hawea WWTP SCADA pond level high 22/05/18
Manual	7/12/2018 15:53	Hawea WWTP Cut and Carry Harvest March 2018
Manual	7/12/2018 15:58	Hawea WWTP Irrigation field requires maintenance July 2018
Manual		Hawea WWTP Pond High Level Alarm 9/9/18