

Report

Seddon Sewage Treatment Plant Consent Compliance Report 1 July 2016 - 30 June 2017

Prepared for Marlborough District Council

By CH2M Beca Limited

3 October 2017



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1 Introduction

The purpose of this report is to summarise and interpret the monitoring data collected from the Seddon Sewage Treatment Plant (STP) in respect of the requirements of Consent U060927. Condition 8 of this consent requires that an Annual Monitoring Report be prepared but does not specify an annual reporting period. The period 1 July 2016 to 30 June 2017 has been selected by Marlborough District Council (MDC), which generally aligns with other STP reporting requirements.

A copy of Consent U060927, which expired on 31 July 2017, is included in **Appendix A**. A new consent application was lodged in April 2017 seeking a 5 year term for the existing discharge while MDC completes investigations into alternative discharge solutions. Two submissions against this application were received and the application process is currently on hold pending the outcome of discussions with the submitters. Until this is resolved, the STP will continue to operate under the terms of the current consent.

The Seddon STP is operated by MDC and consists of a two-stage oxidation pond system with maturation cells. Treated wastewater is discharged into Starborough Creek, which is a tributary of the Awatere River. A map showing the oxidation pond and sampling locations is included in **Appendix B**.

The STP was last upgraded in 1997. The upgrade included removing accumulated sludge from the pond, installing a low-permeability clay liner and sub-dividing the tertiary pond into a series of five ponds.

Only those consent conditions that have numerical or qualitative monitoring requirements are assessed. For clarity, consent conditions are quoted in *italics*.

2 Consent Conditions

2.1 Consent Purpose

Consent U060927 allows for the discharge of up to 750m³/day from the Seddon STP to Starborough Creek.

2.2 Condition 2 – Maximum Discharge

The discharge shall be up to 750 cubic metres per day (averaged over any one week) of treated wastewater from the Seddon Sewage Treatment Plant only.

Table 2-1 shows the discharge flow monitoring results for the STP for the current consent compliance monitoring period, as well as the past five years. Readings from the outlet flow meter were recorded for the 2016/2017 monitoring period.

The measured average and maximum daily discharge flow rates from the STP in 2016/17 were 98.0 m³ and 351.0 m³, respectively. Therefore, the 750 m³/day limit was not exceeded and compliance with the requirements of Condition 2 were achieved. The daily discharge readings are shown in **Appendix C**.

Table 2-1 also shows that the maximum daily discharge has been reasonably consistent over the past seven annual monitoring periods. There was a significant increase in average daily discharge rates in the 2012/2013 reporting period and this has remained high in subsequent years.

Table 2-1 – Annual average and maximum daily discharges from Seddon STP

Year (1 July – 30 June)	Average Daily Discharge (m ³ /day)	Maximum Daily Discharge (m ³ /day)
2010/2011	48.1	334.0 on 24 July 2010
2011/2012	38.6	365.5 on 22 March 2012
2012/2013	95.0	385.6 on 21 April 2013
2013/2014	75.7	414.6 on 29 November 2013
2014/2015*	72.5	376.4 on 4 June 2015
2015/2016	88.0	381.6 on 23 September 2015
2016/2017	98.0	351.0 on 13 April 2017

*Accurate flow data for 1 July – 5 September 2014 was not available due to grape vine wrappers blocking the flowmeter.

2.3 Condition 3 – Weekly Flow Readings

The consent holder shall install a flow meter, of such type that accurately measures the volume of wastewater discharged to Starborough Creek. Records shall be kept on a weekly basis and shall be provided to the Team Leader, Compliance at the Marlborough District Council on an annual basis.

A flow meter was installed in August 2008 to measure the daily treated wastewater flow discharged to Starborough Creek. Readings from this flowmeter are taken at least weekly and the records for the 2016/2017 monitoring year are summarised in Table 2-1 and presented in **Appendix C**. Therefore, compliance with this condition was achieved.

2.4 Condition 4 – Wastewater Sampling

The wastewater (post treatment, immediately before discharge) within the ponds shall be monitored using a grab sample at a frequency as defined in Condition 5. This grab sample shall be taken using best practice techniques by a person suitably qualified to take such samples.

See Section 2.5 for commentary. Grab samples are taken using standard procedures.

2.5 Condition 5 – Wastewater Sample Parameters

Grab samples (as required in Condition 4) shall be taken at regular three monthly intervals for the duration of the consent and shall be analysed for the following;

- a) *Biochemical Oxygen Demand*
- b) *Total Suspended Solids*
- c) *Conductivity*
- d) *Total Nitrogen*
- e) *Total Phosphorus*
- f) *E. coli*
- g) *Faecal Coliforms*
- h) *Dissolved Oxygen*
- i) *pH*

Grab samples of treated wastewater were taken from the outlet of the tertiary treatment pond in July 2016, October 2016, January 2017, and April 2017. Analysis for total phosphorus and conductivity was not undertaken in the July 2016 and January 2017 sample rounds, respectively. The omission of these analytics means that compliance with Conditions 4 and 5 was not fully achieved.

Carbonaceous biochemical oxygen demand (cBOD) was recorded as well as biochemical oxygen demand. It is noted that the use of cBOD is preferred when analysing wastewater samples as the test uses nitrification inhibitors to prevent nitrification in the sample, which would otherwise result in a higher oxygen demand. As nitrifying bacteria are more likely to be present in secondary treated wastewater, the cBOD test is considered more appropriate.

The wastewater sample results are set out in Table 2-2. The values for E-coli and Faecal Coliforms concentrations on 26 January 2017 were recorded as being >16,000. However, the lab has reported that the samples were analysed at temperatures greater than 8°C and therefore the results may not be reliable due to the potential for bacteria growth in the sample after collection.

Table 2-2 – Treated Wastewater parameters from grab samples taken in 2016/2017

Parameter	6 July 2016	4 October 2016	26 January 2017	24 April 2017
Carbonaceous biochemical oxygen demand (g/m ³)	31	34	26	15
Biological oxygen demand (g/m ³)	54	39	33	32
Total suspended solids (g/m ³)	77	32	60	39
Conductivity (mS/m at 25°C)	71.0	77.5	-	48.7
Total nitrogen (g/m ³)	40	41	30	15.3
Total phosphorus (g/m ³)	-	9.1	11.8	5.1
E. coli (MPN/100mL)	1400	23	>16000 ¹	45
Faecal coliforms (cfu/100mL)	1400	23	>16000 ¹	45
Dissolved oxygen (mg/l)	16.9	9.71	4.45 ²	9.82
pH	7.7	8.04	7.68 ²	8.67

1. Received at more than 8°C
2. Taken on 25 January 2017

2.6 Condition 6 – Starborough Creek Samples

Upstream and downstream water quality of Starborough Creek shall be monitored using a grab sample. The sites for this shall be;

Upstream; where State Highway 1 crosses Starborough Creek.

Downstream; 300 metres downstream of the discharge point, (or as close to that point as is practical, taking into account the ephemeral nature of Starborough Creek).

Compliance with this consent condition was achieved (see discussion in Section 2.7).

2.7 Condition 7 – Starborough Creek Sample Parameters

The samples required in Condition 6 shall be taken at regular three monthly intervals for the duration of the consent and shall be for the following;

- a) Biochemical Oxygen Demand
- b) Total Suspended Solids
- c) Conductivity
- d) Total Nitrogen
- e) Total Phosphorus
- f) E. coli
- g) Faecal Coliforms
- h) Dissolved Oxygen
- i) pH

Grab samples were taken at locations required by Condition 6 in July 2016, October 2016, January 2017 and April 2017. However, several departures from the required analysis were noted as follows: samples were not tested for total phosphorus in July 2016; and pH, dissolved oxygen

concentration, temperature, pH and water conductivity were not measured in January 2017. Therefore, compliance with the requirements of Condition 7 was not fully achieved. The results of the analysis carried out on the collected samples are set out in Table 2-3.

From Table 2-3, it can be seen that there is generally little or no change between upstream and downstream sample results. However, the relatively low concentration of dissolved oxygen at the downstream site in July 2016 is noted. The reason for this lower reading is unknown but has occurred in the past. The dissolved oxygen concentration recorded in the pond wastewater, on the same day in July, was higher than those recorded both upstream and downstream of the discharge. It seems therefore unlikely that the STP discharge is a major contributory factor in the low dissolved oxygen result in the creek. As the distance between the STP discharge point and the downstream sampling site is approximately 300m, the possibility of other sources of contamination between these sites cannot be fully discounted. Field meter measurement errors are also a possible explanation.

It is also noted that the total phosphorus concentration at the downstream site, in the October 2016 and January 2017 sampling rounds, was an order of magnitude higher than the upstream results. These higher results correlate with a higher total phosphorus concentration measured in the wastewater on the same day as the stream samples were taken (ie as compared with the April 2017 result).

While the E. coli and faecal coliform results at the upstream and downstream sites were a similar order of magnitude, downstream results tended to be higher in the October, January and April sampling rounds. It is also noted that the E. coli and faecal coliform counts are the same for all samples. This is unusual as, while E. coli are a subset of faecal coliforms and are prevalent in human wastewater, they are generally not the only species present. The bacterial analysis is carried out by Hill Laboratories; an IANZ-accredited laboratory who routinely perform these tests for many clients, including MDC's other sewage treatment plants, where this phenomenon is not observed. Hill Laboratories has previously advised that the same bacterial growth plates are used for both tests, with the faecal coliform count performed first, followed by the E. coli count. In this case, therefore, the similarity of the results is likely due to the level of accuracy of the testing procedure.

Table 2-3 – Starborough Creek water sample parameters from grab samples taken in July and October 2016 and April 2017

Parameter	6 July 2016		4 October 2016		26 Jan 2017		27 April 2017	
	U/S	D/S	U/S	D/S	U/S	D/S	U/S	D/S
Biochemical oxygen demand (g/m ³)	<2.0	2.0	<2.0	<2.0	<2.0	4.0	<2.0	<2.0
Total suspended solids (g/m ³)	<3.0	6.0	<3.0	39.0	<3.0	3.0	6.0	9.0
Conductivity (mS/m at 25°C)	105	103	67.8	71.4	-	-	557.0	578.0
Total nitrogen (g/m ³)	3.6	5.1	1.46	2.3	2.4	3.9	9.6	9.1
Total phosphorus (g/m ³)	-	-	0.04	0.31	0.06	1.76	0.09	0.12
E. coli (MPN/100mL)	<18	<18	17	49	110	330	220	350
Faecal coliforms (cfu/100mL)	<18	<18	17	49	110	330	220	350
Dissolved oxygen (mg/l)	9.41	4.78	7.88	6.95			8.91	9.67
Temperature (°C)	7.3	8.0	14.2	14.4	-	-	14.8	14.6
Dissolved oxygen saturation (temperature corrected) (%)	78.3	40.2	75.8	67.1	-	-	87.4	93.0
pH	7.07	7.01	7.84	7.81	-	-	7.08	7.23

2.8 Condition 8 – Annual Monitoring Report

An annual monitoring report shall be prepared tabulating and providing comparison/analysis of the sampling results, discussing (at the least) trends over time.

This annual monitoring report has been prepared and submitted to fulfil the requirements of Condition 8.

2.8.1 Weekly measurement of Pond DO and pH

Sampling of Pond Dissolved Oxygen (DO) and pH is not required by this consent. However, wastewater DO concentrations and pH are generally measured weekly by MDC at the outlet of the tertiary pond. Continued low DO readings can indicate poor pond health which may cause odour nuisance. Measured DO concentrations ranged from 0.79 to 29.3 mg/l in 41 readings taken over the 2016/17 monitoring period. Only one measurement was recorded below 2 mg/l (ie 0.79 mg/l at 9:30 am on 11 January 2017). The reading was measured early in the day and so can be considered to be within the natural daily diurnal variation of pond DO.

The upper end of the measured DO values is quite high, but not as high as in previous years.

The pH of the tertiary pond over the 2016/2017 monitoring period ranged between 6.24 and 10.95, which is typical of pond systems with longer retention times. The low faecal coliform concentrations in the final wastewater recorded in October 2016 and April 2017 (see Table 2-2), may be due, in part, to the higher pH and DO that can occur in ponds due to rapid photosynthesis by pond algae.

2.8.2 Management for Fisheries Purposes

While Consent U060927 does not impose receiving water quality limits, Starborough Creek discharges into the Awatere River downstream of the Seddon STP. The Wairau/Awatere Resource Management Plan (WARMP) requires the Awatere River (and tributaries), below Medway Bridge, to be managed for fisheries purposes. Under this plan, eight standards are listed to achieve water quality sufficient for fisheries purposes. These are:

1. *No conspicuous oil or grease films or foams or floatable or suspended material*

No evidence of oil or grease films, or foam was recorded by MDC at the time of sampling. However, vineyard wrappings were noted at the tertiary pond outlet. While it is most likely that these wrappings blew into the pond from nearby vineyards, it is also possible that some debris entered the STP through the sewerage system.

The Cawthron *Ecological Effect of Seddon Sewage Discharge (2012 Survey)* stated that no films, scums, foams or fungal growths were visible on the water surface at the downstream sampling locations during the February 2012 survey.

2. *No conspicuous change in colour or visual clarity*

Turbidity and black disk monitoring are not required by the consent and the colour and visual clarity in Starborough Creek is only observed when sampling occurs. MDC will continue to monitor the colour and clarity of samples taken within the creek to determine whether there are any trends towards greater discoloration in the downstream samples.

The wastewater total suspended solids (TSS) concentrations (as shown in Table 2-2) are unlikely to cause a conspicuous change in background clarity in the creek. As shown in Table 2.3, all TSS concentrations recorded in the upstream sites were very low (i.e. most <3.0 g/m³). While most downstream sites also had similar readings, one higher measurement was recorded on 4 October 2016 at 39 g/m³. This may be sufficient to have an effect on visual clarity, particularly if base flows in the creek were low.

Cawthron (2007) notes that during the 2006 survey, discoloration of the creek water was obvious between 5m upstream and 10m downstream of the discharge due to the presence of algae. However, the 2012 survey showed that water clarity had generally improved downstream of the discharge, to at least the clarity of the upstream sites (Cawthron, 2012).

3. No objectionable odour shall be emitted

No complaints regarding odour from Starborough Creek were received during the period 1 July 2016 to 30 June 2017.

4. Shall not be rendered unsuitable for consumption by farm animals

Although there is no numeric interpretation of this standard, guidance is provided by the ANZECC (2000) guidelines for animal drinking water quality. An assessment of the most relevant guidelines is included for completeness.

Pathogens and parasites - *Drinking water for livestock should contain less than 100 thermotolerant coliforms [also known as faecal coliforms] /100 mL (median value).*

The faecal coliforms concentrations measured in Starborough Creek during 2016/17 are shown in Table 2-3. Faecal coliform concentrations above 100 cfu/100 ml were recorded at the upstream and downstream sites on 26 January and 24 April 2017 (ie upstream 110 and 220 cfu/100 ml, respectively, and downstream 330 and 350 cfu/100mL, respectively). As the values were higher at the downstream site, there is likely to be some influence from the STP discharge. The upstream sites are likely to be impacted by runoff from animal sources.

Nitrate and nitrite - *Nitrate concentrations less than 400 mg/L in livestock drinking water should not be harmful to animal health. Stock may tolerate higher nitrate concentrations in drinking water provided nitrate concentrations in feed are not high. Water containing more than 1500 mg/L nitrate is likely to be toxic to animals and should be avoided. Concentrations of nitrite exceeding 30 mg/L may be hazardous to animal health.*

As nitrate concentrations are not measured in Starborough Creek, a direct comparison with the above guideline was not possible. However, treatment ponds are not typically significant sources of nitrate as conditions are not generally conducive to nitrification. It is noted that the total nitrogen concentrations, at both upstream and downstream samplings sites in 2016/17 (see Table 2-3), were well below the WARMP guideline values for livestock drinking water.

5. Any significant effects on aquatic life

Light penetration

The creek is ephemeral by nature and vegetation overhanging the creek also reduces light penetration. While wastewater TSS concentrations can vary, light penetration into the receiving water will be most affected by other factors.

Ammonia Toxicity

Table 2-2 shows that total nitrogen concentrations at the STP effluent during 2016/17 ranged between 15.3 – 41 mg/l. Neither the STP wastewater, nor Starborough Creek, are required by the consent to be tested for ammonia concentrations. However, ammonia will comprise a significant proportion of the total nitrogen in the STP discharge, particularly during the winter period when the potential for nitrification is lowest.

The *Seddon Sewage Treatment Plant Consent Compliance Report July 2010 - June 2011* (CH2M Beca 2011), states that, based on limited sampling carried out during that monitoring period, ammonia concentrations in Starborough Creek were below the ANZECC (2000) freshwater guideline of 0.90g/m³ (95% level of protection for aquatic species at pH of 8). During this reporting period, an Issues and Options Report was prepared with one of the aims being to identify upgrade methods for reducing total nitrogen in the STP discharge.

Particulate Organic Matter

Cawthron (2007) noted that *“Observations by Cawthron staff during the biological surveys suggest the discharge causes a build-up of organic material on the stream bed of Starborough Creek to approximately 300m downstream of the discharge”*.

Cawthron (2012, pg.21) stated that *“The presence of bloodworm midges downstream of the discharge in the two past surveys has been indicative of quite severe organic enrichment and sedimentation”*. However, it was also noted in page 21 of the 2012 report that *“Worms, which inhabit organic-rich sediments, were not a feature of the 2012 survey”*.

There have been no further Starborough Creek surveys carried out by Cawthron since 2012.

6. The temperature shall not be changed by more than 3°C and shall not exceed 20°C.

No temperatures above 20 °C were recorded in Starborough Creek in the 2016/17 period. The difference between upstream and downstream temperatures never exceeded 3 °C.

Cawthron (2012) noted that the creek water temperature measured within the discharge plume, on 15 February 2012, was similar to both the upstream and downstream sample location temperatures. This result is consistent with previous surveys.

7. The dissolved oxygen shall exceed 80% of saturation.

The only dissolved oxygen saturation results that were above 80% were those recorded on 27 April 2017. In the samples taken in 2016, the saturation in the upstream samples was consistently higher, but this was reversed in the April 2017 samples, where the downstream value was higher.

8. Shall not be rendered unsuitable for human consumption of fish due to presence of contaminants

The 2007 Cawthron report found that eels were the only fish present in Starborough Creek that could be harvested for human consumption. This report also concluded that as the Seddon STP receives mainly domestic sewage, potentially toxic chemical contaminant concentrations would be low, and unlikely to significantly affect these fish. Any flesh tainting substances, such as copper, zinc and phenols in stormwater, entering the sewage network would be significantly reduced through the ponds.

The fish survey was not repeated in the 2012 ecological assessment (Cawthron, 2012).

2.8.3 Management for Contact Recreation

Starborough Creek is not required to be managed for contact recreation purposes under the WARMP. However, there is some potential for human contact with creek water where public access is possible (ie where it runs through gravels before discharging into the Awatere River). Contact recreation does occur in the Awatere river. There are three standards in the Plan to help protect water quality for contact recreation:

Visual Clarity – *shall not be so low as to be unsuitable for bathing.*

Due to the shallow, overgrown and generally inaccessible nature of Starborough Creek, it is unlikely to be used for bathing. There are more accessible and attractive recreation opportunities in the Awatere River.

Microbiological Contaminants – *the median concentration of enterococci of at least 20 samples taken throughout the bathing season shall not exceed 33 per 100 mL, nor shall any sample exceed 107 enterococci per 100 ml. The bathing season is defined as the period of 1 November to 1 April inclusive.*

Consent U060927 does not require enterococci concentrations to be measured in either the wastewater or in Starborough Creek. Therefore, no direct comparison can be made with the WARMP guideline. The *Microbiological Water Quality Guidelines for Marine and Freshwater Areas* (MfE, 2003) do not recommend the use of enterococci as an indicator organism for pond-derived wastewater, because there is evidence that enterococci from sources other than wastewater can replicate in ponds.

The MfE guidelines use *E. coli* as the faecal contamination indicator organism for freshwater. These guidelines recommend a weekly sampling regime over the bathing season, generally referring to the dates between 1 November and 31 March in any year. Four categories are presented that assess the microbiological results based on five years of historical data (at least 100 samples). This categorisation is then used to determine the suitability of the water source for bathing. As *E. coli* concentrations have not been measured weekly between November and March for five years, no direct comparison with the MfE guidelines can be made. However, results from the July, October and April 2016/17 samples indicate that *E. coli* concentrations at both the upstream and downstream sites can exceed the MfE guideline surveillance (or acceptable for bathing) levels of <260 *E. coli*/100mls. This indicates that the creek may not be always suitable for contact recreation, upstream or downstream of the STP discharge point.

Biological Growths – *There shall be no undesirable growths and seasonal maximum cover of stream or river beds by periphyton as filamentous growths or mats (more than 3mm thick) shall not exceed 40%, and the biomass on the bed shall not exceed 100mg chlorophyll a/m².*

The 2006 ecological survey (Cawthron, 2007) showed growths of bed algae to be sparse in Starborough Creek and concluded that this was likely due to a high level of shading, smothering of the creek bed by sediment and low water clarity.

The 2012 ecological survey (Cawthron, 2012) found one blue-green alga with toxin-producing potential (in very low abundance), at the site 10m downstream of the discharge. No cyanobacterial benthic algal mats of the genus *Phormidium* were found. Cawthron (2012, pg.27) stated that “*While there is potential for the oxidation pond to “seed” pools in Starborough Creek, it seems this is unlikely to be a concern to human and animal health unless there is an algal bloom event occurring in the oxidation pond coupled with low flows in Starborough Creek.*”

2.8.4 Summary of Starborough Creek Water Quality Monitoring Results

From an analysis of the Starborough Creek water monitoring results, compliance was achieved with some of the WARMP requirements for management of the creek for fisheries purposes.

Starborough Creek is not required to be managed for contact recreational purposes under the WARMP. Limited monitoring results show that bathing would not be adversely affected by lack of visual clarity or undesirable biological growths. However, *E. coli* concentrations measured during 2016/17 indicate that the creek, both upstream and downstream of the discharge, may not always meet the MfE (2003) acceptable for bathing guideline.

Cawthron (2012) reports that dissolved organic nitrogen (DIN) and dissolved reactive phosphorus (DRP) concentrations exceeded ANZECC nutrient guidelines at all of the sites measured in Starborough Creek. While this result was consistent with previous ecological surveys, in 2012 extensive macrophyte plant growth was also visible both upstream and downstream of the discharge. This is attributed to decreased shading of the creek from a reduced number of willow trees.

The Cawthron (2012) ecological assessment stated that the Starborough Creek upstream sampling site had high background nutrient and faecal coliform concentrations and that the STP “*discharge did not appear to be further reducing water quality in the 2012 survey*”.

Table 2-4 provides a summary of compliance with WARMP requirements.

Table 2-4 - Summary of WARMP Results

Description	Comment
<i>No conspicuous oil or grease films or foams or floatable or suspended material</i>	No evidence of oil or grease films or foams or debris was recorded in the creek.
<i>No conspicuous change in colour or visual clarity</i>	No conspicuous change in colour or visual clarity was observed.
<i>No objectionable odour shall be emitted</i>	No odour complaints have been received.
<i>Shall not be rendered unsuitable for consumption by farm animals</i>	Faecal coliform concentrations recorded downstream of the discharge were below the ANZECC (2000) guideline for livestock drinking water. However, two of the three upstream site concentrations were above the guideline, most likely due to animal contamination in runoff.
<i>Any significant effects on aquatic life</i>	No significant ecological effects have been noted by Cawthron during regular surveys.
<i>The temperature shall not be changed by more than 3°C and shall not exceed 20°C</i>	No increase in temperature greater than 3 °C between downstream and upstream. No temperatures were recorded as being greater than 20 °C.
<i>The dissolved oxygen shall exceed 80% of saturation</i>	Only the samples taken on 26 April 2017 had dissolved oxygen saturation above 80 %.
<i>Shall not be rendered unsuitable for human consumption of fish due to presence of contaminants</i>	Only eels are found in the creek and there is no indication that they are unsuitable for human consumption.
Recreational purposes	The creek is not generally suitable for bathing due to its shallow, inaccessible nature. E. coli concentrations are sometimes higher than MfE (2003) bathing water guidelines upstream and downstream of the discharge point.

2.9 Condition 9 – Ecological Assessment

That within 6 months of the granting of this consent an ecological assessment of the effect that the discharge is having on Starborough Creek shall be undertaken by a suitably qualified and experienced scientific provider. This assessment shall include (but not be limited to) assessments on the effect of the discharge on the water quality and in-stream and surrounding ecology,

downstream of the discharge point. This assessment shall also provide an assessment of the risk (if any) that this discharge poses to the wider environment, and to human health and stock contacting Starborough Creek.

This consent condition was fulfilled by the preparation of the Cawthron (August 2007) report *Ecological Effect of Seddon Sewage Discharge and Assessment of Effects in Relation to the Marlborough District Council Water Quality Plan*.

2.10 Condition 10 – Ecological Assessment

The ecological assessment required in Condition 9 shall be repeated within 6 months of the 3rd anniversary of the granting of this consent.

The required ecological assessment was carried out in February 2012 (one year later than required). The results are presented in the appended Cawthron (2012) report *Ecological Effect of Seddon Sewage Discharge (2012 Survey)*.

2.11 Condition 11 – Reports

All sampling results (and associated report) and the reports produced as part of the ecological assessment shall be provided to the Team Leader, Compliance at the Marlborough District Council within 2 weeks of receipt by the consent holder.

This Annual Monitoring report has been written to fulfil this consent condition.

2.12 Condition 12 – Options for Improvement

That within 12 months of the granting of this consent the consent holder shall provide the Council with options for the improvement and/or alteration of the discharge to Starborough Creek. The primary purpose of this plan shall be to reduce the environmental effect on Starborough Creek and of the discharge in general. A preferred option shall be provided with a staged approach (including timeline) for these proposed works to be implemented. These options shall take into account (but not be limited to) the concerns and issues raised through the cultural impact assessment provided with the application.

The review of options was completed by MDC on 19 August 2008, therefore compliance was achieved.

2.13 Condition 13 – Operation and Maintenance

That the Seddon Wastewater plant shall be maintained and operated in a condition that minimises (as much as practicable) the environmental effect of the discharge on Starborough Creek.

Based on the available upstream and downstream water quality monitoring data, the Seddon STP discharge has only a limited and localised impact on the Starborough Creek receiving environment. Therefore, it is considered that compliance with this condition has been achieved.

2.14 Condition 14 – Warning Sign

A warning sign highlighting the presence of the discharge shall be placed and maintained in the bed of the Awatere River in such a place that people are made aware of the potential contamination of water in the vicinity.

This condition has been fulfilled as a warning sign has been placed where Starborough Creek enters the Awatere River bed.

2.15 Discharge to Air

2.15.1 Condition 3

Upon the notification of the occurrence of the discharge of an objectionable odour from the site, the consent holder shall;

- (a) Take all reasonable steps to stop the discharge of objectionable odour from the site.*
- (b) Record the details of the complaint, including factors such as weather and wind direction.*
- (c) Inform (as soon as is practicable) the Team Leader, Compliance, Marlborough District Council, of the complaint and the steps taken to stop/reduce the level of the discharge.*

No odour complaints were received in 2016/17.

2.15.2 Condition 4

In the event that there are more than 4 complaints in any one calendar year regarding the discharge of objectionable odour from the site, the consent holder shall employ an independent professional to investigate the potential cause and to provide options to reduce the incidences of objectionable odour. The results of the investigation shall be in writing and shall be provided to the Team Leader Compliance, Marlborough District Council, upon request.

The requirement to obtain an independent professional assessment of STP odour was not activated, as there were no odour complaints during the period 1 July 2016 to 30 June 2017.

3 Summary

Based on the monitoring results recorded in 2016/17, the only identifiable non-compliance with a quantitative consent condition was the incomplete analysis of the required wastewater and receiving water parameters, which occurred in January 2017 and also in October 2016. It is recommended that samples taken are collected and analysed according to consent requirements.

Discharge flow was measured for the entire monitoring period and no odour complaints were received.

Consent U060927 does not include receiving water quality limits. However, the Wairau/Awatere Resource Management Plan (WARMP) requires the Awatere River (and tributaries), below Medway Bridge, be managed for fisheries purposes. Under this plan, eight standards are listed to achieve water quality sufficient for fisheries purposes.

Starborough Creek was found to generally meet a majority of the requirements of these eight standards, with the exception of the dissolved oxygen percentage saturation, where only the April 2017 results were above the recommended minimum of 80%. In regard to livestock water supply requirements, faecal coliform measurements, for both upstream and downstream sites, had two samples with concentrations greater than 100 cfu/100mL.

Although Starborough Creek is not required to be managed for contact recreation purposes under the WARMP, there is some potential for human contact where the public can access the creek. Sampling shows that E. coli concentrations can be higher than MfE (2003) recreational guidelines for bathing upstream and downstream of the discharge. However, it is unlikely that this represents a significant risk to the public, as access is difficult and the water is generally too shallow to be considered suitable for bathing.

It is noted that Consent U060927 expired on 31st July 2017. MDC has applied for a 5 year term for the existing discharge while MDC completes investigations into alternative discharge solutions. The STP will continue to operate under the terms of the current consent until the new consent is granted.

4 Conclusions

The Seddon STP continues to perform well, producing a wastewater quality that is considered typical for the current pond design and layout. The STP does not produce any noticeable odours. The requirements of Consent U060927 were generally met over the 2016/17 monitoring period. However, analysis of all wastewater and receiving water samples, as required by the consent, is recommended.

References

ANZECC (2000). *Water Quality Guidelines. Volume 3 – Primary Industries, Chapter 9.3 livestock drinking water quality guidelines.*

Cawthron (2007). *Ecological Effect of Seddon Sewage Discharge and Assessment of Effects in Relation to the Marlborough District Council Water Quality Plan*, received by Marlborough District Council.

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CH2M Beca (2011). *Seddon Sewage Treatment Plant Consent Compliance Report July 2010 - June 2011.*

MfE (2003). *Microbiological Water Quality Guidelines for Marine and Freshwater Areas*. Ministry for the Environment.

WARMP (2009). *Wairau Awatere Resource Management Plan*. Marlborough District Council

Appendix A

Consent U060927

Conditions for U060927 Marlborough District Council – Seddon Treatment Ponds

Discharge to Starborough Creek

1. This consent shall expire on 31 July 2017.
2. That the discharge shall be up to 750 cubic metres per day (averaged over any one week) of treated wastewater from the Seddon Waste Treatment Plant only.
3. The consent holder shall install a flow meter, of such a type that accurately measures the volume of wastewater discharged to Starborough Creek. Records shall be kept on a weekly basis and shall be provided to the Team Leader, Compliance at the Marlborough District Council on an annual basis.
4. That the wastewater (post treatment, immediately before discharge) within the ponds shall be monitored using a grab sample at a frequency as defined in Condition 5. This grab sample shall be taken using best practice techniques by a person suitably qualified to take such samples.
5. Grab samples (as required in condition 4) shall be taken at regular three monthly intervals for the duration of the consent and shall be analysed for the following:
 - a) Biochemical Oxygen Demand
 - b) Total Suspended Solids
 - c) Conductivity
 - d) Total Nitrogen
 - e) Total Phosphorus
 - f) E.coli
 - g) Faecal Coliforms
 - h) Dissolved Oxygen
 - i) pH
6. Upstream and Downstream water quality of Starborough Creek shall be monitored using a grab sample, the sites for this shall be;

Upstream; where State Highway 1 crosses Starborough Creek.

Downstream; 300 metres downstream of the discharge point, (or as close to that point as is practical, taking into account the ephemeral nature of Starborough Creek).

7. The samples required in condition 6 shall be taken at regular three monthly intervals for the duration of the consent and shall be for the following;
 - a) Biochemical Oxygen Demand
 - b) Total Suspended Solids
 - c) Conductivity
 - d) Total Nitrogen
 - e) Total Phosphorus
 - f) E.coli
 - g) Faecal Coliforms
 - h) Dissolved Oxygen
 - i) pH
8. An annual monitoring report shall be prepared tabulating and providing comparison/analysis of the sampling results, discussing (at the least) trends over time.
9. That within 6 months of the granting of this consent an ecological assessment of the effect that the discharge is having on Starborough Creek shall be undertaken by a suitably qualified and experienced scientific provider. This assessment shall include (but not be limited to) assessments on the effect of the discharge on the water quality and in-stream and surrounding ecology, downstream of the discharge point. This assessment shall also provide an assessment of the risk (if any) that this discharge poses to the wider environment, and to human health and stock contacting Starborough Creek.
10. The ecological assessment required in condition 9 shall be repeated within 6 months of the 3rd anniversary of the granting of this consent.
11. All sampling results (and associated report) and the reports produced as part of the ecological assessment shall be provided to the Team Leader, Compliance at the Marlborough District Council within 2 weeks of receipt by the consent holder.
12. That within 12 months of the granting of this consent the consent holder shall provide the Council with options for the improvement and/or alteration of the discharge to Starborough Creek. The primary purpose of this plan shall be to reduce the environmental effect on Starborough Creek and of the discharge in general. A preferred option shall be provided with a staged approach (including time line) for these proposed works to be implemented. These options shall take into account (but not be limited to) the concerns and issues raised through the cultural impact assessment provided with the application.

13. That the Seddon Wastewater plant shall be maintained and operated in a condition that minimises (as much as practicable) the environmental effect of the discharge on Starborough Creek.
14. A warning sign highlighting the presence of the discharge shall be placed and maintained in the bed of the Awatere River in such a place that people are made aware of the potential contamination of water in the vicinity.
15. In accordance with Section 128 of the Resource Management Act 1991, the Marlborough District Council may review the conditions of this resource consent. This review may be conducted six monthly in the months of February and August, for the duration of the consent, for the following purposes:
 - a. To review the effectiveness of the existing resource consent conditions in avoiding or mitigating any adverse effects on the environment from the exercise of this resource consent and, if necessary, to avoid, remedy or mitigate such effects by way of further or amended conditions; or
 - b. To review the adequacy of and necessity for monitoring the effect of the discharge on the environment; or
 - c. To require the consent holder to adopt the best practicable option to remove or reduce adverse effects on the surrounding environment.

The consent holder may be charged for actual and reasonable costs associated with this review.

Discharge to Air

1. This consent shall expire on 31 July 2017.
2. The discharge of objectionable odour to air from the Seddon Waste Water Treatment Plant site (the site) shall be minimised as much as practicable. This shall include taking preventative steps to minimise the instances and intensity of the discharge of objectionable odour from the site.
3. Upon the notification of the occurrence of the discharge of an objectionable odour from the site, the consent holder shall;
 - a) Take all reasonable steps to stop the discharge of objectionable odour from the site.
 - b) Record the details of the complaint, including factors such as weather and wind direction.

- c) Inform (as soon as is practicable) the Team Leader, Compliance, Marlborough District Council, of the complaint and the steps taken to stop/reduce the level of the discharge.
4. In the event that there are more than 4 complaints in any one calendar year regarding the discharge of objectionable odour from the site, the consent holder shall employ an independent professional to investigate the potential cause and to provide options to reduce the incidences of objectionable odour. The results of the investigation shall be in writing and shall be provided to the Team Leader Compliance, Marlborough District Council, upon request

Appendix B

Oxidation Pond and Sampling Locations



Appendix C

Flow Monitoring Data

Jul-16	Seddon Flow (m³/day)	Aug-16	Seddon Flow (m³/day)	Sep-16	Seddon Flow (m³/day)	Oct-16	Seddon Flow (m³/day)	Nov-16	Seddon Flow (m³/day)	Dec-16	Seddon Flow (m³/day)
1	120.50	1	114.51	1	91.78	1	102.32	1	61.28	1	34.51
2	120.20	2	126.15	2	87.88	2	128.60	2	92.98	2	55.39
3	119.51	3	139.10	3	88.20	3	116.96	3	101.83	3	76.78
4	122.83	4	138.51	4	98.90	4	78.46	4	83.87	4	53.83
5	109.06	5	107.40	5	122.15	5	81.82	5	126.60	5	49.38
6	115.41	6	180.63	6	131.47	6	77.40	6	145.30	6	67.14
7	125.04	7	180.85	7	96.23	7	87.77	7	93.49	7	43.54
8	142.01	8	146.47	8	94.95	8	73.18	8	120.18	8	61.25
9	135.20	9	119.59	9	115.86	9	65.57	9	100.28	9	119.36
10	125.31	10	114.10	10	95.36	10	63.03	10	97.56	10	113.73
11	113.39	11	111.65	11	100.45	11	61.46	11	108.60	11	75.20
12	108.70	12	104.46	12	100.96	12	24.85	12	298.38	12	178.94
13	113.63	13	162.07	13	84.73	13	41.86	13	239.47	13	158.27
14	208.51	14	150.18	14	70.33	14	47.85	14	33.46	14	95.27
15	159.21	15	150.79	15	58.21	15	151.49	15	258.93	15	60.95
16	111.54	16	120.75	16	41.65	16	116.93	16	239.71	16	32.27
17	111.77	17	103.44	17	116.85	17	81.34	17	132.49	17	27.28
18	112.57	18	97.75	18	200.60	18	66.68	18	106.04	18	37.93
19	96.88	19	98.33	19	125.39	19	68.97	19	76.28	19	36.89
20	93.68	20	97.16	20	93.38	20	60.58	20	46.90	20	27.06
21	96.36	21	99.09	21	80.94	21	175.95	21	44.69	21	32.88
22	97.16	22	112.70	22	76.90	22	117.90	22	38.77	22	36.56
23	121.96	23	124.77	23	67.79	23	71.98	23	31.89	23	92.06
24	204.41	24	137.81	24	63.40	24	54.40	24	24.45	24	68.25
25	166.18	25	145.11	25	102.08	25	88.55	25	24.71	25	58.08
26	117.61	26	134.78	26	156.24	26	145.25	26	51.11	26	40.73
27	95.95	27	137.48	27	152.52	27	106.10	27	61.96	27	23.87
28	111.01	28	118.44	28	112.07	28	41.56	28	50.44	28	4.00
29	105.96	29	111.54	29	119.65	29	70.21	29	33.95	29	0.21
30	107.15	30	100.07	30	134.51	30	85.16	30	30.39	30	25.21
31	105.52	31	91.89			31	62.83			31	114.16

Seddon Flow		Seddon Flow		Seddon Flow		Seddon Flow		Seddon Flow		Seddon Flow	
Jan-17	(m³/day)	Feb-17	(m³/day)	Mar-17	(m³/day)	Apr-17	(m³/day)	May-17	(m³/day)	Jun-17	(m³/day)
1	78.21	1	28.32	1	64.64	1	62.26	1	19.50	1	97.38
2	52.14	2	49.27	2	50.39	2	56.84	2	13.69	2	106.60
3	47.13	3	83.22	3	59.03	3	82.81	3	17.25	3	112.00
4	72.03	4	69.90	4	45.00	4	212.80	4	8.19	4	104.08
5	96.03	5	55.26	5	48.35	5	316.71	5	5.78	5	95.74
6	60.78	6	28.09	6	57.96	6	335.70	6	6.02	6	97.30
7	62.02	7	13.75	7	82.94	7	292.47	7	5.21	7	92.29
8	52.00	8	7.44	8	113.11	8	169.27	8	4.06	8	84.82
9	42.93	9	12.76	9	77.35	9	119.83	9	2.79	9	83.48
10	43.05	10	52.85	10	47.65	10	103.30	10	3.07	10	89.76
11	15.90	11	51.31	11	53.78	11	94.64	11	155.35	11	94.38
12	46.98	12	54.99	12	135.53	12	241.99	12	178.23	12	103.49
13	88.89	13	67.17	13	115.49	13	351.02	13	122.97	13	102.25
14	47.09	14	57.24	14	171.85	14	354.18	14	95.70	14	90.79
15	48.60	15	46.59	15	201.84	15	348.46	15	97.13	15	82.19
16	40.51	16	48.17	16	127.62	16	276.87	16	92.65	16	81.33
17	31.97	17	142.60	17	83.16	17	183.13	17	119.00	17	91.98
18	22.60	18	356.60	18	31.22	18	142.14	18	324.35	18	105.51
19	13.47	19	346.76	19	9.93	19	126.25	19	248.87	19	110.27
20	58.28	20	197.03	20	4.54	20	115.38	20	157.10	20	96.42
21	69.63	21	112.95	21	5.89	21	98.86	21	116.32	21	92.52
22	129.49	22	79.05	22	174.72	22	91.69	22	99.17	22	95.80
23	183.35	23	41.08	23	142.90	23	86.88	23	94.77	23	91.83
24	132.02	24	19.45	24	91.96	24	79.11	24	92.90	24	190.54
25	109.28	25	46.09	25	73.19	25	85.69	25	92.70	25	167.13
26	58.72	26	56.82	26	131.90	26	83.65	26	86.71	26	127.82
27	37.51	27	51.19	27	127.60	27	74.79	27	81.52	27	106.79
28	25.26	28	75.84	28	92.36	28	73.84	28	123.46	28	98.19
29	31.69			29	93.85	29	72.78	29	123.40	29	103.36
30	41.44			30	100.76	30	51.00	30	107.79	30	105.26
31	32.85			31	87.04			31	99.29		