Laura Bowman

From: official information
Sent: Wednesday, 11 May 2022 4:23 pm
To: [redacted]
Cc: official information
Subject: Final Response: LGOIMA 258405 - [redacted] - Pukete Wastewater Treatment Plant (Pukete WWTP) with relation to NPS-UD.
Attachments: Attachment A_Pukete Wastewater Treatment plant - Resource consent 114674 - Condition 22 - Monitoring and Technology Review - 2021 - AMENDED.PDF

Kia Ora,

I refer to your **information request below**, Hamilton City Council is able to provide the following response.

1. **What is the "current design capacity" of the existing plant?**
   The current design capacity of the Pukete Wastewater Treatment Plant is 56,000,000 litres per day.

2. **Does the plant requiring any upgrade to meet either population or legal requirements and If so the cost?**
   Yes. The Pukete WWTP does require upgrades to meet population growth as well as increased legislative and regulatory requirements in terms of planned urbanisation as the city grows. Proposed costings to address the required upgrades can be found in the 2021-31 Long Term Plan.

3. **With HCC population significantly above the projections what is the "capacity" projections?**

   Hamilton City Council uses the peak of instantaneous flow (i.e. the highest flow measured during a given day) to determine the required capacity for the Pukete Wastewater Treatment Plant.

   The below projections were developed for Council's Long-Term Plan 2018-28 in 2018. This can be viewed here.

Year	Population equivalent projections
2018	229,942
2021	253,239
2031	285,372
2041	312,550

4. **Please provide the current "capacity tables" for both the "Design capacity" and "Metal concentrations."**

Preliminary treatment	Limited by screen capacity. Approximate maximum flow of 350,000 m^3/day
Primary treatment	Limited by primary tanks. Approximate maximum flow of 180,000 m^3/day
Secondary treatment	Limited by aeration tanks. Approximately 62,000 m^3/day average daily flow.
Tertiary treatment	Limited by UV disinfection capacity. Approximate max 90,000 m^3/day

   The Pukete Wastewater Treatment Plant was not specifically designed to target the removal of metals. The treatment process focuses on removing solids and other materials, which in turn will remove metals.

   The results for final effluent metal concentrations for metals which we test for are provided below:

Arsenic	<0.021 mg/kg
Cadmium	<0.0011 mg/kg
Chromium	<0.011 mg/kg
Copper	<0.011 mg/kg

Lead	<0.0021 mg/kg
Iron	<0.42 mg/kg
Nickel	<0.011 mg/kg
Zinc	0.038 mg/kg

5. **Long term options. Has there been any work undertaken since 1993 on long term options and if so what has been considered? A copy of any report would be sufficient.**

   Yes. Long term options have been reviewed since 1993. For further information, please refer to attachment A "The Monitoring and Technology Review". This is the most recent work Council have undertaken regarding long term options for the Pukete Wastewater Treatment Plant.

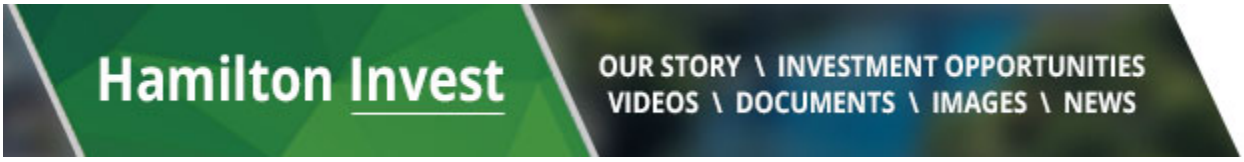
6. **Does the plant meet the current and future "clear water" legislation requirements? If not what is the alternative and costs.**

   The Pukete Wastewater Treatment Plant is compliant with all existing resource consents. These consents will expire in 2027. Council is currently working through the requirements for the renewal of these consents which will take into consideration any new legislation and regulatory requirements including the National Environmental Standards for Freshwater (Te Mana o te Wai).

You have the right to seek an investigation and review by the Ombudsman of this decision. Information about how to make a complaint is available at www.ombudsman.parliament.nz or freephone 0800 802 602.

Kind Regards,

Tatiyana
Official Information Team
Legal Services & Risk | People and Organisational Performance
Email: officialinformation@hcc.govt.nz



From: [redacted]
Sent: Wednesday, 23 March 2022 3:16 pm
To: official information <officialinformation@hcc.govt.nz>
Subject: Pukete Sewerage plant/ Information required

Good afternoon, Background.
I have undertaken background information on the plant from HCC library. This information goes back to 1960.

There are 2 particular report of relevance. HCC Treatment and Disposal W 51/1 and WOR 037/1 November 1993.

It appears that the plant was originally designed for HCC population of "up to" 250,000 but in 1993 was possible designed for up to 350,000.
Hamilton's population was projected to be 117,200 to 131,300 by 2016.
It refers to the heavy metal guidelines being breached.

Design capacity. Stage 1 Table 7.1 design capacity and table 5.9.3 concentrations units.
It refers to" consideration to evaluation of long term treatment disposal options".
It refers to " continuation of the status quo is not ideal from a Maori perspective."
"Offsite treatment would require some 84ha and is not available on or adjoining the Pukete plant"
"Slow rate irrigation scheme. Would require 900 to 1400 ha depending on the degree of pre-treatment".
The current resource consent expires in 2026/27

My questions are:

(1) What is the "current design capacity" of the existing plant
(2) Does the plant requiring any upgrade to meet either population or legal requirements and if so the cost?
(3) With HCC population significantly above the projections what is the "capacity" projections?
(4) Please provide the current "capacity tables" for both the "Design capacity" and "Metal concentrations."
(5) Long term options. Has there been any work undertaken since 1993 on long term options and if so what has been considered? A copy of any report would be sufficient.
(6) Does the plant meet the current and future " clear water " legislation requirements? If not what is the alternative and costs.

I appreciate that this is a significant amount of data. It is all legally required under the current requirement of both the NPS – UD new clean water legislation. I assume that most will be available.

Many thanks.

Kind Regards

[redacted]

HAMILTON CITY COUNCIL

RESOURCE CONSENT 114674
— CONDITION 22
MONITORING & TECHNOLOGY REVIEWTO
WAIKATO REGIONAL COUNCIL

30th September 2021

Hamilton City Council

Pukete WWTP
Wastewater Discharge Consent (114674) Monitoring& Technology Review 2021

Authors

Authors of the 2021 Monitoring & Technology Review are:

Shakyra Te Aho	Hamilton City Council – Compliance Officer

Monitoring & Technology Review (2021) was reviewed and developed by Hamilton City Council.

Reviewers

Gavin Pooley	Hamilton City Council – Regulatory Compliance, Team Leader
Parvati Patel	Hamilton City Council – City Waters, Assets Engineer
David Hight	Hamilton City Council – City Waters, Process Controller
Raewyn Simpson	Hamilton City Council – City Waters, Senior Planner
Jackie Collier	Hamilton City Council – Infrastructure, City Development, Strategic Manager

REVISION SCHEDULE

Rev No	Date	Description	Prepared By	Reviewed By	Approved By
Draft Revision	23.09.21	Draft documented circulated for comment	Shakyra Te Aho	Gavin Pooley	Emily Botje
HCC Comments	27.09.21	Comments on the Draft report included by Hamilton City Council	Shakyra Te Aho	Gavin Pooley	Emily Botje
Final Draft	28.09.21	Incorporation of comments and Appendices.	Shakyra Te Aho	Gavin Pooley	Emily Botje
Final	30.09.21	Final Document	Shakyra Te Aho	Gavin Pooley	Emily Botje

HAMILTON CITY COUNCIL

Pukete WWTP - Wastewater Discharge Consent (114674)Condition 22 - Monitoring & Technology Review 2021

CONTENTS

LIST OF TABLES

APPENDICES

1 Introduction

1.1 Purpose

This Report consists of a Monitoring and Technology Review in respect of Hamilton City Council's Pukete Wastewater Treatment Plant (WWTP) and the associated treated wastewater discharge to the Waikato River.

Consent condition of 114674 requires a review no later than 30 September 2009 and thereafter at 3 yearly intervals. This 2021 Report is the fifth (5 yearly) review.

This Report has been prepared in accordance with Condition 22 of Resource Consent 114674 permitting Hamilton City Council to discharge treated wastewater from a multi-port diffuser main outfall into the Waikato River. A copy of the Resource Consent Certificate is included in Appendix A.

1.2 Background

Hamilton is New Zealand's fourth largest city and is growing rapidly. The Pukete WWTP discharges secondary biologically treated and UV disinfected wastewater from Hamilton City (population 176,500 (June 2020) to the Waikato River. The Pukete WWTP is owned and operated by Hamilton City Council (HCC). The Pukete WWTP comprises of primary settlement, an activated sludge process incorporating biological nitrogen removal, clarification, and UV disinfection. Primary and waste activated sludge (WAS) generatedby the wastewater treatment plant is anaerobically digested with energy recovery included in the process.

The current upgrade of the Pukete Treatment Plant consists of converting the MLE process to 4 stage Barden Pho process.

The commencement of the Resource Consent 114674 requires, under Condition 22, that a Monitoring and Technology Review is undertaken every 3 years commencing 30 September 2009. This Report contains the fifth such review undertaken under this condition.

1.3 Scope of this review

The scope of work for this review is specified in consent condition 22 of Consent 114674, Discharge of treated wastewater to the Waikato River, which requires the consent holder to undertake a "The discharge consent for the Pukete Wastewater Treatment Plant was issued in 2007 for a term of 20 years. The consent expires in September 2027.

At the time of this report, two significant projects are underway that influence this report. This includes:

- Sub-regional Hamilton-Metro Wastewater Project (under Future Proof)
- Resource consent renewal project for Pukete Wastewater treatment

Sub-regional Hamilton-Metro Wastewater Project

This project relates to Future Proof Sub-regional 3 waters study and the Hamilton Metro Spatial Plan being delivered through the H2A Corridor Plan. Detailed design business case studies of how wastewater should be managed regionally, and the infrastructure required in a 10-, 30- and 100-year horizon is in progress. The design outcomes must give effect to Te Ture Whaimana o te Awa o Waikato and meet targets of Healthy Rivers Plan Change 1 while providing for regional growth. It should be noted that Waikato Regional Council has representation in this forum.

The assessments delivered under this project will inform the Resource Consent renewal project for Pukete Wastewater treatment. The 'Northern' design business case which considers Pukete Wastewater Treatment Plant is relevant to this report but is not scheduled to be completed until 2022.

Resource Consent Renewal Project for Pukete Wastewater Treatment

This project is in progress to renew consents at the wastewater treatment plant. HCC have identified and scoped the tasks required to prepare and lodge a new consent application prior to the expiry of existing consents. This is a large programme of technical work to be delivered over seven years that has been broken down into 26 key tasks. Many outputs of these tasks consider the requirements of condition 22 (noted in brackets) and includes:

- Review of legislation and statutory policy (ii)
- Existing effects (iii),
- Alternative treatment processes (iv) (vi)
- Alignment with Te Ture Whaimana, and iwi management plans
- Development of Best Practicable Options (v) (vi)
- Future effects and tangata whenua effects assessment (iii)
- Offsetting opportunities for residuals (iv) (v)
- Monitoring regime development (iii)
- Assessment of Effects (all)

In view of these significant projects underway and their project timelines, impending resource consent expiry in 2027, and providing information out of synchronisation with the above-mentioned projects, the scope of this review will be limited to providing high level information available against the condition requirements. More detailed and robust information will be submitted as part of the consent application AEE and best practicable option assessment.

1.4 Resource Consent Requirements

The current Resource Consents issued by Waikato Regional Council (WRC) for discharges to water and air, and for the outfall structure commenced on 18 September 2007 for a duration of 20 years. A copy of these consents is available on HCC file.

Resource Consent number 114674 for discharge of treated wastewater from Pukete WWTP into the Waikato River lists the contaminant concentration limits for water entering the outfall pipe. The discharge consent limits for a number of contaminants are further reduced after 19 September 2010

with additional phosphorous limits imposed from 01 January 2011. This Resource Consent allows a discharge of up to 224,000 m3/day of treated municipal wastewater into the Waikato River. This Consent expires on 18 September 2027.

In contrast to the previous consent that expired in 2006, the current Resource Consent provides for more stringent criteria for a number of parameters. These include:

- A reduction in mass load criteria of Total Nitrogen;
- An introduction of mass load criteria for Total Phosphorus;
- A reduction in the concentration for bacterial indicator criteria.

On 13 October 2016, a consent variation was granted to reflect limitations on nutrient removal due to temperatures in the shoulder season restricting effective denitrification. The variation amended the summer compliance period for TN and TP to be across the 26-week (six month) summer period from December-to-May inclusive, rather than at the end of each month of this 26-week period. The TN mass load limits were retained but the summer TP mass load limit was reduced from 100 kg/day to 95 kg/day. The number of exceedances was amended to "no more than 50% of the samples" to reflect median mass load limits, the number of samples to be collected was retained, trigger levels were introduced, and the calculation mean was changed to median.

The pertinent conditions of the Resource Consent relating to the quality of the treated wastewater discharged to the Waikato River are summarised in **Table 1-1** below.

Table 1-1: Summary of Treated Wastewater Requirements

Parameter	Sample type	Sample frequency	Unit	Effective Monthly Median	Quarterly Limit (2)
BOD concentration	24 hour flow composite	4 days/week	Mg/L	10(1)	50
SS concentration	24 hour flow composite	4 days/week	Mg/L	15(1)	100
BOD load	24 hour flow composite	4 days/week	kg/day	750(1)	2,400
SS load	24 hour flow composite	4 days/week	kg/day	700(1)	2,400
Total Nitrogen (December to May)	24 hour flow composite	4 days/week	kg/day	450(1)	
Total Nitrogen (June to November)	24 hour flow composite	1 day/week	kg/day	1,500(3)	
Total Phosphorous (December to May)	24 hour flow composite	4 days/week	kg/day	95(3)	
Total Phosphorous (June to November)	24 hour flow composite	1 day/week	kg/day	700(3)	
E. coli (4)	Grab	4 days/week	cfu/100ml	126(1)	2,000

(1) No more than 8 exceedances over a calendar month

(2) No more than three samples to exceed stated limit per quarter (Jan-Mar, Apr–Jun, July-Sep, Oct-Dec inclusive)

(3) Winter total nitrogen and total phosphorous medians are over the full 26 week period (Jun-Nov) with no more than 50% of the samples to exceed.

(4) Any E. coli result over 5,000 cfu/100ml requires additional sampling as per condition 13. Also, every three months a 24 hour diurnal profile (hourly samples) must have no more than 12 samples over 2,000 cfu/100ml.

The Resource Consent authorises the discharge of up to 224,000 m3/day of treated municipal wastewater into the Waikato River. The instantaneous flow rate at each UV channel and UV intensity within each UV bank shall be continuously monitored.

1.5 Annual Reports

Since the inception of Consent 114674 in September 2007, Annual Reports have been prepared by HCC, providing a review of plant operations in relation to the Conditions of the Consent. The Annual Reports cover a period 1 July through to 30 June and are submitted to WRC by 30 September, as required in Condition 17 of the Consent. This review contains information for the following period:

- 1 July 2018 – 30 June 2021

- In addition to the HCC annual reports, WRC also undertake Annual Compliance Audits of the Pukete WWTP in relation to all applicable consents. At the time of this review the following WRC audits are available1 July 2017 – 30 June 2018
- 1 July 2018 – 30 June 2019
- 1 July 2019 – 30 June 2020

In the year 2015/2016, HCC received an overall partial level of compliance from WRC. The main issue remaining were numerous exceedances in discharge concentrations of nitrogen and phosphorous. HCC was then granted a change to consent under S127 of the RMA in order to better control the discharge of phosphorus and nitrogen concentrations (**Section 1.4: Resource Consents Requirements**). Following on from this, HCC received an overall level of full compliance for the year 2017/18, and a high level of compliance during the years 2018/2019 and 2019/20. This current year, 2020/2021, the total phosphorus did not exceed the consent limit of 95kg/day and the total nitrogen did not exceed the consent limit indicating HCC achieved full compliance.

1.6 Description of the Pukete WWTP

Liquid Stream Treatment

The flow rate of the raw wastewater entering the Pukete WWTP is measured by electronic-magnetic flow meters located in a roadway at the south end of the treatment plant between the inlet structure and screenings building. The measured flow is screened through one of three Hydro-press inclined step screens, prior to aerated grit removal. Settleable solids are then removed as the wastewater flows through one of three rectangular primary sedimentation tanks (PST). The Interstage Pump Station (IPS) lifts the primary effluent to the activated sludge aeration basins. There are four activated sludge aeration basins operating in a 3- stage configuration plus one in a 4 stage barden pho configuration providing nitrification and denitrification. Mixed liquor from the aeration basins is split between five circular final clarifiers to separate the mixed liquor solids from the treated water. Mixed liquor solids are returned to the aeration basins and clarified effluent flows by gravity through ultra- violet disinfection units before discharge through an outfall pipeline into the Waikato River.

Solids Treatment

Screenings are washed and pressed to remove organic material and excess water prior to conveyance to

a bin which is then hauled to the landfill. Grit is pumped to a washer/classifier before being conveyed to the screening bin for disposal at the landfill. Primary sludge, oils, fats and grease removed in the primary sedimentation tanks are pumped to the sludge holding tank where it is blended with thickened waste activated sludge. Waste activated sludge is drawn from the return activated sludge line and thickened using gravity belt thickeners prior to being pumped to the sludge holding tank to be mixed with the primary sludge. Mixed primary and thickened waste activated sludge is then pumped to two acid phase anaerobic digesters operating in series. Partially digested sludge flows from the acid phase digesters to the mesophilic digesters to complete the digestion process. A drum thickener has been installed for recuperative thickening of the mesophilic digesters to increase the digester detention time. Digested sludge is dewatered by centrifuges and transported to a vermicomposting facility. Dewatering centrate is pumped to the primary sedimentation tanks for further treatment.

Odour Treatment

Foul air extracted from the preliminary treatment stage is treated in a Flocor plastic medium biological tower. Odour extracted from the thickening building and sludge holding tank is treated in the soil biofilters. A biofilter at the sludge dewatering plant treats air extracted from the building, centrifuges, conveyors and day tank.

Plant treatment by-passes

The WWTP has four controlled in plant treatment by-passes. The use of any bypass activates an alarm for technician response and a flow meter records details of the flow:

i. By-pass No.1 - Treatment bypass: Flow is diverted down an external bypass line to the Waikato River from the inlet structure of the plant. Any volume bypassed through the process has not undergone any treatment prior to being discharged to the Waikato River. This bypass is to cater for catastrophic events such as natural disasters. This bypass was used in 2013/14 (1 event) as a result of fibrous material build up on the inlet screens during a high rainfall event.

ii. By-pass no 2 - Secondary treatment bypass: Flow that has exceeded the design flow to the secondary treatment and the overflow volume is diverted down an internal bypass line after undergoing primary treatment. The portion of overflow volume has bypassed the secondary and UV treatment processes and merges with fully treated wastewater prior to being discharged to the Waikato River. This bypass was used in 2016/17 with 11 bypasses due to an extreme wet weather event. In the 2017/18 year there were 2 events due to rainfall and power outage events.

iii. By-pass no 3 - Aeration basin bypass: Flow has undergone primary treatment but has internally bypassed the aeration basins – the first stage of secondary treatment process and entered the clarifiers – the second stage of the secondary treatment process, prior to being UV disinfected and discharged to the Waikato River.

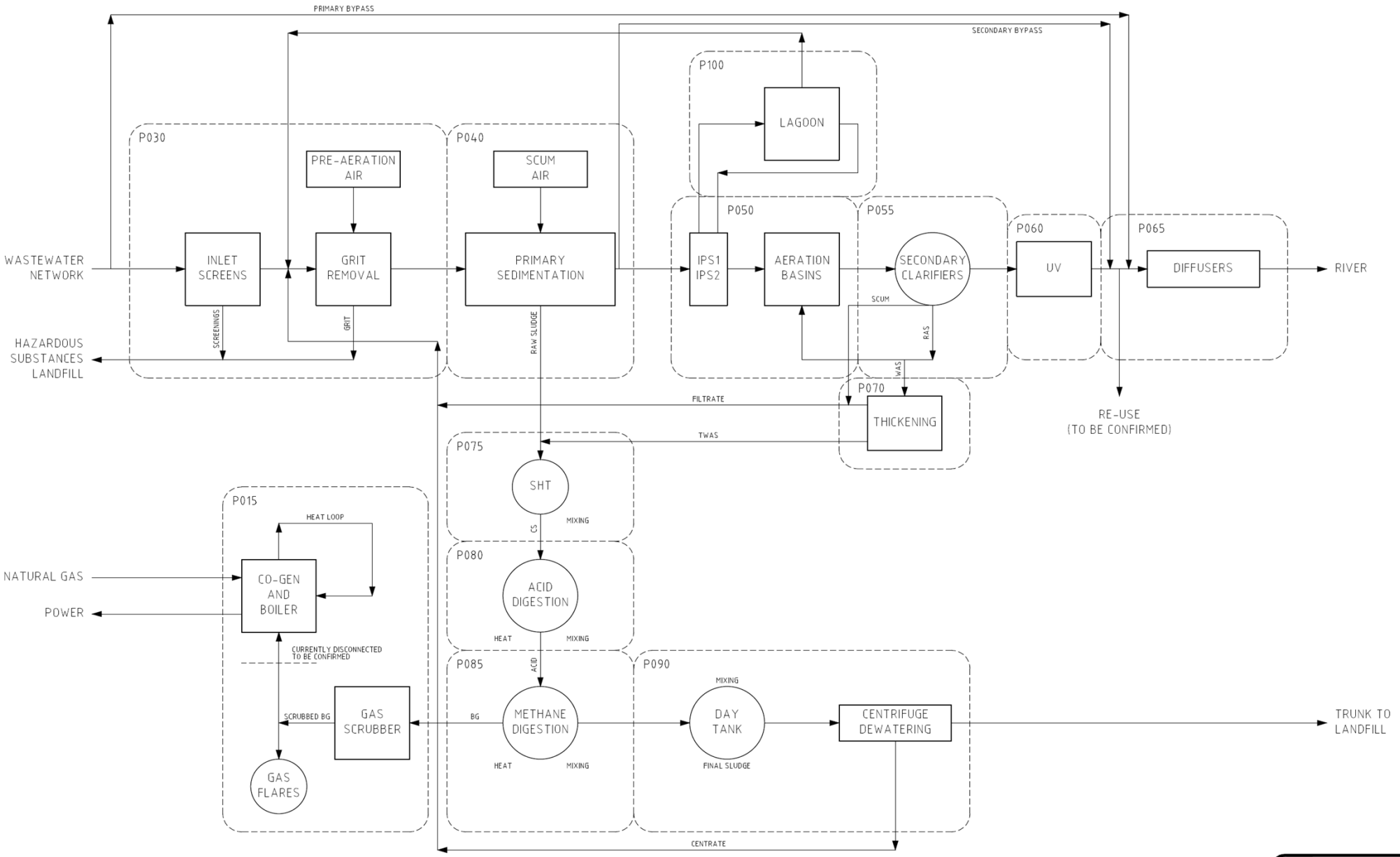
iv. By-pass no 4 - Outfall diffuser bypass: Flow has undergone full treatment processes but has internally bypassed the outfall diffuser and entered the emergency outfall line to be discharged to the Waikato River. This was utilised to test of the river outfall diffuser bypass line.

Receiving Environment

The Pukete discharge point is located in the ‘mid’ Waikato River section which is defined as being

between Karaapiro and Ngaaruawaahia. There are a large number of influences in this section of the river. The Waikato River Environmental Report Card of 2016 gave this section a 'C-' for water quality. The Waikato River Authority 5-year Report Card (released August 2021) has the mid river section showing a 44% deteriorating trend, 44% improving trend and 11% as likely improving as deteriorating trend for nine water quality indicators between the years of 2010-2019. Nitrogen is the parameter of concern with dissolved oxygen also showing a deteriorating or neutral trend. The Waikato Regional Council Water Quality Report for the calendar year 2019 (released August 2021) shows negligible difference between Narrows Bridge and Horotiu Bridge for Total Nitrogen and a small increase in Total Phosphorus.

Figure 1: Wastewater Treatment Plant Overview



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2 Monitoring and Technology Review

The monitoring and technology review has been undertaken in accordance with condition 22 of the Resource Consent. Condition 22 states:

"The consent holder shall submit to the Waikato Regional Council a Monitoring and Technology Review Report no later than 30 September 2009 and thereafter at three yearly intervals, for the duration of the consent. The scope of the assessment should address, but is not limited to, the following:

i. *Ongoing compliance with the requirements of this resource consent particularly in relation to any reported non-compliance with consent conditions.*

ii. *An assessment of compliance/consistency with any relevant national, or regional water quality policies, standards orguidelines in effect at the time.*

iii. *An assessment of the results of the permit holder's monitoring undertaken in accordance with resource consent, including the adequacy and scope of such monitoring.*

iv. *A summary of any major improvements made to the treatment or disposal system since the commencement of consent that are likely to have an effect on the exercise of this consent.*

v. *A summary of any residual actual or potential effects of the discharge, irrespective of whether those effects are in accordance with the conditions of the consent.*

vi. *Outline of significant technological changes and advances in relation to wastewater management, treatment, disposal and beneficial use technologies, which may be available to address any residual adverse effects of the discharge.*

vii. *An assessment of whether any such options or combination of options represent the Best Practicable Option to minimise the effects of the discharge and whether the permit holder intendsto incorporate such changes.*

viii. *Information relating to the use, development and success of alternative wastewater disposal techniques in New Zealand, in particular land-based disposal, and their relevance and possible application to Hamilton City's situation.*

Items *i*. to *viii*. are progressively addressed in the following sections of this Report.

2.1 Compliance with Conditions of Consent

i. "Ongoing compliance with the requirements of this resource consent particularly in relation to any reported non-compliance with consent conditions."

The progressive nature of the Consent provided for improved discharge quality through the implementation of Conditions 8 and 9 throughout the monitoring period.

This Monitoring & Technology Review is the fifth such document to be produced since the Consent was granted on the 18 September 2007. As such it is the second period that covers Conditions 7 (now replaced with condition 8), 8 and 9 related to discharge concentrations and mass load limits. **Tables 2-1.1, 2-1.2** and **2-2** highlights the summaries of the monitoring carried out at the Pukete WWTP and provide commentary on the results.

Condition 8: Compliance Summary over the period July 2018 to June 2021:
In the following table ✓ indicates compliance and ✗ 12/22 indicates non-compliance (number exceedances/number of samples)

Table 2-1.1: Condition 8 - Monthly Compliance Summary over the period July 2018 to June 2021

Compliance period	cBOD5 Conc. (mg/L)	cBOD5 Load (kd/day)	TSS Conc. (mg/L)	TSS Load (kg/day)	TN Summer load (kg/day)	TN Winter load (kg/day)	E. coli (Routine (cfu/100mL)	E. Coli (Diurnal (cfu/100 mL)
Monthly - no more than 8 of 16 results over:	10	750	15	700	450	1500	126	2000
Jul-18	✓	✓	✓	✓	n.a.	✓	✓	✓
Aug-18	✓	✓	✓	✓	n.a.	✓	✓	✓
Sep-18	✓	✓	✓	✓	n.a.	✓	✓	✓
Oct-18	✓	✓	✓	✓	n.a.	✓	✓	✓
Nov-18	✓	✓	✓	✓	n.a.	✓	✓	✓
Dec-18	✓	✓	✓	✓	✗ 13/19	n.a.	✓	✓
Jan-19	✓	✓	✓	✓	✓	n.a.	✓	✓
Feb-19	✓	✓	✓	✓	✓	n.a.	✓	✓
Mar-19	✓	✓	✓	✓	✓	n.a.	✓	✓
Apr-19	✓	✓	✓	✓	✓	n.a.	✓	✓
May-19	✓	✓	✓	✓	✓	n.a.	✓	✓
Jun-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Jul-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Aug-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Sep-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Oct-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Nov-19	✓	✓	✓	✓	n.a.	✓	✓	✓
Dec-19	✓	✓	✓	✓	✓	n.a.	✓	✓
Jan-20	✓	✓	✓	✓	✓	n.a.	✓	✓
Feb-20	✗9/17	✓	✓	✓	✓	n.a.	✓	✓
Mar-20	✗9/19	✓	✓	✓	✓	n.a.	✓	✓
Apr-20	✓	✓	✓	✓	✓	n.a.	✓	✓

Table 2-1.1: Condition 8 - Monthly Compliance Summary over the period July 2018 to June 2021

May-20	✓	✓	✗12/17	✗10/15	✓	n.a.	✓	✓
Jun-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Jul-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Aug-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Sep-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Oct-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Nov-20	✓	✓	✓	✓	n.a.	✓	✓	✓
Dec-20	✓	✓	✓	✓	✗ 9/18	n.a.	✓	✓
Jan-21	✓	✓	✓	✓	✓	n.a.	✓	✓
Feb-21	✓	✓	✓	✓	✓	n.a.	✓	✓
Mar-21	✓	✓	✓	✓	✓	n.a.	✓	✓
Apr-21	✓	✓	✓	✓	✓	n.a.	✓	✓
May-21	✓	✓	✓	✓	✓	n.a.	✓	✓
Jun-21	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-1.2: Condition 8 - Quarterly compliance summary over the period July 2018 to June 2021

Compliance period	cBOD5 Conc. (mg/L)	cBOD5 Load (kd/day)		TSS Conc. (mg/L)	TSS Load (kg/day)	TN Summer load (kg/day)	TN Winter load (kg/day)	E. coli (Routine)	E. coli (Diurnal)
Quarterly - no more than 3 of 48 results over:	50	2400	100	2400		450	1500	2000	n.a.
July Quarter 2018	✓	✓	✓	✓		n.a.	✓	✓	✓
September Quarter 2018	✓	✓	✓	✓		n.a.	✓	✓	✓
December Quarter 2018/19	✓	✓	✓	✓		<50% (52.3%)	n.a.	✓	✓
March Quarter 2019	✓	✓	✓	✓		<50% (80.4%)	n.a.	✓	✓
June Quarter 2019	✓	✓	✓	✓		n.a.	✓	✓	✓
September Quarter 2019	✓	✓	✓	✓		n.a.	✓	✓	✓
December Quarter 2019/20	✓	✓	✓	✓		>50%	n.a.	✓	✓
March Quarter 2020	✓	✓	✓	✗ 10/51		>50%	n.a.	✓	✓
June Quarter 2020	✓	✓	✓	✓		n.a.	✓	✓	✓

Table 2-1.2: Condition 8 - Quarterly compliance summary over the period July 2018 to June 2021

September Quarter 2020	✓	✓	✓	✓	n.a.	✓	✓	✓
December Quarter 2020/21	✓	✓	✓	✓	>50%	n.a.	✓	✓
March Quarter 2021	✓	✓	✓	✓	>50%	n.a.	✓	✓

Notes:

1. Where more than 8 results in the month exceeded the standard but these cases are not in breach as more than 16 samples were collected, and no more than half exceeded the standard. The condition was intended to work as an 'even handed' median equivalent, i.e. 8 of 16 samples are permitted above the standard.
2. Where more than 3 results in the quarter exceeded the standard but this case is not in breach as more than 48 samples were collected (66 samples). This condition was intended to work as an 'even handed' 95-percentile equivalent, i.e. 3 of 48 (rounded up) samples are permitted above the standard.
3. Diurnal *E. coli* sampling: no more than 12 of 24 samples collected over 24 hours to exceed 2000 cfu/100ml.
4. Effective monthly limits for Condition 7 terminated on 19 September 2010. September 2010 results are provided in both tables for completeness.

Condition 9 of the consent became operational from 1 January 2011 and is related to the monitoring of Total Phosphorus being discharged from the plant. HCC undertook monitoring of Total Phosphorus levels discharging from the plant prior to the requirement of the consent. Below are the Total Phosphorus below results from the compliance period of July 2018 to May 2021 (**Table 2-2).**

Condition 9 Compliance Summary over the period July 2018 to May 2021:

In the following table ✓indicates compliance and ✗ (12/22) indicates non-compliance (number exceedances/number of samples).

Table 2-2: Condition 9 - Compliance Summary over the period July 2018 to May 2021:

Compliance Period	Total Phosphorus (Summer) (kg/day)	Total Phosphorus (Winter) (kg/day)
Monthly -no more than 8 of 16 results over:	95	700
Jul-18	n.a.	✓
Aug-18	n.a.	✓
Sep-18	n.a.	✓
Oct-18	n.a.	✓
Nov-18	n.a.	✓
Dec-18	✓	n.a.
Jan-19	✓	n.a.
Feb-19	✓	n.a.
Mar-19	✓	n.a.
Apr-19	✓	n.a.
May-19	✓	n.a.

Jun-19	n.a.	✓
Jul-19	n.a.	✓
Aug-19	n.a.	✓
Sep-19	n.a.	✓
Oct-19	n.a.	✓
Nov-19	n.a.	✓
Dec-19	✓	n.a.
Jan-20	✓	n.a.
Feb-20	✓	n.a.
Mar-20	✓	n.a.
Apr-20	✓	n.a.
May-20	✓	n.a.
Jun-20	n.a.	✓
Jul-20	n.a.	✓
Aug-20	n.a.	✓
Sep-20	n.a.	✓
Oct-20	n.a.	✓
Nov-20	n.a.	✓
Dec-20	✓	✓
Jan-21	✓	✓
Feb-21	✓	✓
Mar-21	✓	✓
Apr-21	✓	✓
May-21	✓	✓

HCC submitted Management and Contingency Plans to WRC in 2019. It is considered that these demonstrate compliance with Conditions 19 and 20 of the Consent. The next review of the management plan is September 2022.

Condition 21 - HCC keep all complaints in an electronic register and reported to WRC via annual reports.

Condition 22 - will be met by completion of this Report.

Condition 23 - Hamilton City Council recognises the relationship of Waikato-Tainui with the Waikato River, including their economic, social, cultural and spiritual relationships.

The Waikato-Tainui/Hamilton City Council Co-Governance Forum supports Waikato-Tainui and Council to build a strong and mutually beneficial relationship, provide opportunities for collaboration that promote better wellbeing outcomes through agreed projects, and meet obligations to restore and protect the Waikato River. Through the co-governance body, regulatory compliance will see to set a permanent agenda for resource consent compliance where guidance and collaboration can be implemented around identifying ways to protect Te Awa o Waikato.

HCC are investigating opportunities to incorporate Maatauranga Maaori across 3 Waters Resource Consent monitoring activities – Wastewater Treatment, Stormwater and Water Treatment.

Condition 27 - In accordance with Condition 27 of the Consent, HCC has carried out annual investigations to demonstrate the uniformity of mixing at the discharge point from the plant. The 2018/19 annual report showed that further investigation was needed to ensure adequate mixing was occurring. The annual investigation of March 2020 was halted due to the announcement of Covid-19 which sent the nation into a lockdown, so an investigation was rescheduled for August 2020.

The 2020/21 report demonstrated that the diffuser achieves uniform mixing as the downstream DIN showed that all samples collected from across the main flow were within ±20% of the mean, and the samples from the left bank littoral margin were within the range of DIN concentrations calculated for the main flow which complies with Waikato Regional Council (WRC) resource consent 114674 Condition 27.

2.2 Consistency with Relevant Policies, Standards or Guidelines

ii. "An assessment of compliance/consistency with any relevant national, or regional water qualitypolicies, standards or guidelines in effect at the time"

Policies, Standards and Guidelines in effect at time of application

The Waikato Regional Council Hearings Committee accepted that the application was consistent with relevant policies, standards and guidelines in 2007 when the application was made. This included:

- Resource Management Act 1991 (RMA), section 107
- Waikato Regional Policy Statement (RPS)
- Proposed Waikato Regional Plan (PRP)
- Microbiological Water Quality for Marine and Freshwater Recreational Areas (MfE 2003),
- Australian and New Zealand Guidelines for Fresh Water and Marine Water Quality (ANZECC 2000),
- New Zealand Municipal Wastewater Monitoring Guidelines (NZWERF 2002).

Policies, Standards and Guidelines put into effect since the consent was granted

At the time of this report, there are now a number of Central Government, Regional and Local policies, plans and initiatives either in existence or proposed that will influence HCC's wastewater activities and future compliance. These include:

(1) Waikato River Settlement Act (2010) and Te Ture Whaimana o te Awa o Waikato (Vision & Strategy, 2013)

Directly relevant to this report on wastewater discharge performance, the Waikato – Tainui Raupatu Claims (Waikato River Settlement Act 2010) requires parties to:

a. recognise the significance of the Waikato River to Waikato-Tainui;
b. recognise the Vision and Strategy for the Waikato River (recognised in the second schedule of the act and the Waikato Regional Policy Statement)
c. recognise certain customary activities of Waikato-Tainui.
d. provide co-management arrangements for the Waikato River.

Te Ture Whaimana o te Awa o Waikato (Vision and Strategy) is the primary direction setting document for Waipa and Waikato Rivers, and has 13 objectives. The key objective in relation to this discharge being to protect and restore the river, to take a precautionary approach and recognise relationships of Waikato Tainui with the awa. These objectives are being taken into account as HCC progresses the two projects in Section 1.2

(2) Waikato Regional Policy Statement (Te Tauākī Kaupapahere Te-Rohe O Waikato) May 2016

Updated to include Te Ture Whaimana o te Awa o Waikato (Schedule 2)

(3) Waikato Regional Plan (Te Tauākī Kaupapahere Te-Rohe O Waikato) 2007 and Healthy Rivers Plan Change 1.

Policy and objectives and rules that seek to protect mauri and health of freshwater bodies.

On 22 October 2016 the Waikato Regional Council (WRC) notified Plan Change 1 - Waikato and Waipa River Catchments. Healthy Rivers/Wai Ora: Plan for Change', has a purpose of protecting and restoring the water quality in the Waikato and Waipa Rivers by managing discharges of nitrogen, phosphorus, sediment and bacteria. The key objective is to make the river swimmable and viable for food collection along the entire length of the river.

HCC is cognisant of proposed rules and targets and has begun considering what will be required over 10, 20- and 30-year time frame to give effect to Healthy Rivers Plan Change 1 and Te Ture Whaimana o te Awa o Waikato[1]. Targets, treatment and disposal methods to meet these targets are being taken into account as HCC progresses the two projects discussed in Section 1.2

(4) The National Policy Statement for Freshwater Management 2014 (revisions 2014 and 2020)

Regulation developed and revised to stop further degradation of freshwater resources, reverse past damage, address water allocation issues, and affects the way in which Council is allowed to abstract and discharge water. HCC will need to meet both NPSFWM and any WRP rules written to give effect to NPSFWM and Te Ture Whaimana o Te Awa o Waikato. Nationally, the requirement to give effect to Te Mana o te Wai (regionally local iwi prefer Te Mauri o te Wai), and to incorporate Maatauranga Maaori in management of freshwater, will need to be incorporated into assessment, planning and design in the future.

[1] At the time of this report, Plan Change 1 had yet to go to the Environment Court.

(5) National Environmental Standard for Sources of Human Drinking Water (2008)

Requires WRC to reduce the risk of contamination of drinking water sources by considering the effects of certain activities on drinking water sources when granting water permits or discharge permits upstream of takes for drinking water and including or amending rules in a regional plan in relation to permitted activities. A review is proposed in the future short term to support the Water Services Act.[2]

(7) Tai Tumu Tai Pari Tai Ao (Waikato-Tainui Environmental Plan 2013) and Te Rautaki Taamata Ao Turoa o Hauaa (Ngaati Hauaa Iwi Management Plan 2018).

These Iwi Management Plans reflect the need to protect and restore the river and have a number of policies, objectives and methods for freshwater management, land use planning and infrastructure development. These plans are being taken into account as HCC progresses the two projects in Section 1.2

(8) Australian New Zealand Guidelines for Fresh Water and Marine Water Quality (ANZECC 2018)

The 2000 Guidelines were revised in 2018 with updated Default Guidelines Values (DVG) for physical and chemical (PC) stressors as well as toxicant parameters posing risks to the environment and community. A new proposed revision in 2021 had submissions closing 3 August 2021, but any changes that need to be considered are yet to be published.

Future Acts, and regulations in development

The following will influence how the existing discharge performance is considered once they come into effect:

- Natural and Environment Bill (one of 3 Acts to replace the Resource Management Act)
- Water Service Act
- National Environment Standard – Wastewater and wastewater overflows (MfE, in development)
- Finalisation of Healthy Rivers Plan Change 1
- Waikato Regional Plan (Healthy Environment)

Studies and Recommendations

Waikato Independent River Scoping Study (2011)

This report noted that the two largest sources of phosphorus were Pukete Wastewater Treatment Plant and AFFCO freezing works, and that a priority action was to investigate better wastewater nutrient treatment. Hamilton city Council has been progressively upgrading the treatment plant, and the consent variation in October 2016 reduced phosphorus mass loading limits from 100 kg/day to 95 kg/day.

A recommended priority action for wastewater point source discharges was also for land disposal of all treated human sewage, a review of consent conditions, and investigation of better treatment methods. Treatment and disposal methods are being taken into account as HCC progresses the two projects discussed in Section 1.

Reports of the Land and Water Forum

[2] Currently a Bill but due to ascend to an Act in 2021.

The forum produced 4 reports and advice between 2012 to 2018. Advice recommended a national framework for freshwater objectives and limits, managing within limits, integrated decision-making, continuous improvement of management practices to improve water quality, and clearer rights to take and use water within set limits, management of urban issues, tools and approaches to assist the Crown's exploration of rights and interests with iwi, incorporation of Macroinvertebrate Community Index (MCI) as a mandatory measure of water quality, address nitrogen as a nutrient and provide for a better focus on "swimmability".

Some of the recommendations have already or will be reflected in central and regional direction on wastewater management and will be tested at the time of consent renewal.

2.3 Adequacy of Monitoring

iii. "An assessment of the results of the permit holder's monitoring undertaken in accordance with resource consent, including the adequacy and scope of such monitoring

HCC maintain Annual Reports of the Pukete WWTP. They run concurrently from July through to June of the following year inclusively. The reports contain information on the plant and compliance with the conditions of Resource Consent 114674.

In addition to providing an overall assessment of the plants performance over the preceding year they also contain results of the monitoring undertaken at the site including cBOD5, TSS, E. coli, Total Phosphorus (TP) and Total Nitrogen (TN) loadings of the discharge. Monthly monitoring results are prepared in addition to quarterly where required under the consent conditions.

The results for cBOD5, TSS, E. coli, TP and TN are generally in line with the treated wastewater characterisation given in the 2006 Assessment of Effects on the Environment (AEE) Report (MWH 2006) and most recent best practice guidelines referred to in the MWH WWTP Capacity Review (2015).

The annual treated wastewater eco-toxicity assessment (13 April 2021) showed total metals at the expected levels, volatile organic compounds, and semi-volatile organic compounds below trace levels (none detected) and WETT testing Limit: No toxicity EC50 value representing a river dilution of <15. "No toxicity" is defined as the EC50 value for the most sensitive of three test organisms shall represent an in-river dilution of no more than 15. Based on the supplied sample, the effluent complies with the consent condition.

Waikato Regional Council undertake annual audit reports of the Pukete WWTP in relation to all the active consents currently granted to HCC. In the year 2017/2018, HCC achieved an overall full level of compliance as a result of a successful annual audit carried out. Following on from this, in the years 2018/2019 and 2019/2020, HCC have also achieved an overall high level of compliance against all conditions with the Resource Consent 114674. It is anticipated that through significant and continued process and management improvements a full compliance status will be received for the 20/21 compliance period.

There have been developments internationally in the understanding of risks associated with some groups of compounds such as endocrine disrupting chemicals and pharmaceuticals. The 2002 Wastewater Monitoring Guidelines note endocrine disruptors as an emerging issue but do not provide monitoring recommendations for Endocrine Disruptors or other emerging contaminants at the time of this report.

2.4 Major Improvements

iv. "A summary of any major improvements made to the reticulation treatment or disposal system since the commencement of consent that are likely to have an effect on the exercise of this consent."

The Resource Consent 114674 commenced on the 18th of September 2007 and three complete HCC annual financial cycles has been completed within the review period.

As part of the 10-Year Plan 2021-31 planning processes, the capacity of the Pukete WWTP was reviewed and forecast figures from the Wastewater Network Master Plan were used to update the capacity assessment from 2015. Consideration was also given to what the future consent renewal may require of the treatment plant, provisionally membrane treatment has been included in the 10-Year Plan.

The timing of the infrastructure upgrades from the 2015 report have moved forward due to the accelerated growth rates that Hamilton is experiencing.

The inlet screens are programmed to be upgraded within the first three years of the current 10 Year Plan; analysis has identified that capacity of the existing structure will exceed its capacity.

Since the last review the first phase of Pukete 3 has been completed. An additional bioreactor, clarifier, interstage and RAS pump stations has been constructed. The new bioreactor is configured to 4-stage barden pho which will enable improved nitrogen removal. The new assets are currently undergoing performance validation, with the planning of the retrofit of the existing 4 bioreactors commencing this year. A new chemical storage and dosing facility has been constructed and commissioned.

As part of the 2021-31 10-Year Plan funding was approved to undertake master plans for the water and wastewater treatment plants. The goal is to consider the development of the plant holistically over the next 50 years, taking into account growth, renewals, process improvements, health and safety, operations and maintenance and to align with the Network Master Plans.

Infiltration and inflow (I&I) assessments and remediation has been ongoing. Through the government's water reform stimulus package, Council obtained funding to specifically address I&I from private infrastructure. Key catchments within the city with known I&I problems have been targeted:

- Temple view, 96 properties have been assessed and repaired
- Collins Road, 226 properties have been assessed and repaired
- Rimu/Rata 165 properties have been assessed and repaired

Once all the work is completed, flow analysis will be undertaken to determine the level of improvement.

Table 2.3 – Summary of Upgrades to Pukete Wastewater Treatment Plant since 2007 and Future

Upgrades

Description	Installation Year	Purpose of Upgrade
Plant Upgrades (2007-2009)		
Digester Mixing Upgrade	2007	Solids Treatment
Cogeneration Units Replaced	2008	Energy efficiency
Hydrogen Sulphide Scrubber	2008	Energy efficiency
Interstage Pump Station	2009	Increased Capacity
Clarifier #4 and Bioreactor #4	2009	Increased capacity. TSS, BOD, TN removal
UV Upgrade for Capacity	2009	Improved E. Coli removal
Automation Improvements (Upgraded SCADA hardware and software)	2009	Improved Control
Plant Upgrades (2016 to present)	2016+	
Fifth bioreactor (4 stage Bardenpho) and clarifier.	2021	Effluent treatment capacity. Bioreactor constructed in 4-stage Bardenpho configuration to enhance nitrogen removal
Additional interstage pump station	2021	To provide flows to the 5th reactor from the PSTs
New chemical storage and dosing facility.	2021	Consolidated facility for acetic acid and alum
Bioreactor 4 retrofitted to a 4 stage Biological Nutrient Removal process	Target 2023	In progress
New Inlet Facility	Target 2024	In progress
Future upgrades (in current LTP)	2021-2031	
Pukete 4 Upgrade	2024 - 2031	Capacity upgrades to PSTs, digestion and UV processes
Process Improvements to address climate change actions	2024-26	Climate change

2.5 Residual Effects of Discharge

v. "*A summary of any residual actual or potential effects of the discharge, irrespective of whetherthose effects are in accordance with the conditions of the consent*"

Residual Effects

The Assessment of Environmental Effects (AEE) Report carried out in 2006 concluded that the Hamilton treated wastewater discharge was having a number of minor adverse effects on the Waikato River, but that these were localised and could be avoided or mitigated by proposed upgrades to the WWTP. Many of the planned upgrades are complete which have increased the quality of the effluent.

Potential adverse residual effects of the WWTP discharge are summarised below and, for completeness, proposed mitigation measures and projects are included in the Table 2-4.

Table 2-4: Summary of Residual Effects

Actual or Potential Adverse Effect	Residual effects of discharge	Further proposed mitigation
Suspended solids, colour& clarity	No more than minor effect on receiving water due to suspended solids concentrations. With the exception of some exceedances in TSS levels in May and June 2020, there is generally compliance with Consent conditions and TSS concentrations have decreased due to mitigation measures put in place as part of plant upgrades, including clarifiers and bioreactors.	HCC is progressing investigations as part of 114674 consent renewal
Oil and grease	There are no conspicuous oil or grease films released or produced in river as a result of the discharge. The type of treatment at the WWTP precludes this residual effect.	Tradewaste & Wastewater Bylaw under review. Improved trade waste pre-treatment at source along with a proposed new tankered Waste Reception Facility
Dissolved oxygen depletion	River D.O. remains consistently above 80% saturation downstream as far as the Huntly-Tainui Bridge with a 5-year median of 95% (Waikato River Water Quality Data Report 2019).	Improved cBOD5 removal is expected to be achieved as a result of the Pukete 3 plant upgrade works. HCC is progressing investigations as part of 114674 consent renewal to determine any further mitigations required to remove organics from the discharge.
Temperature and pHchanges	The temperature change between Narrows Boat Ramp and Horotiu Bridge is minimal (0.3 degrees. There is no pH difference between the same locations. It is unlikely that there are residual temperature and pH effects of the discharge. (Waikato River Water Quality Data Report 2019).	None proposed

Table 2-4: Summary of Residual Effects

Deposition of bed sediments	Does not contribute to rates of sediment deposition to the extent that significant adverse effects on aquatic ecosystems are likely.	Improved TSS removal is expected to be achieved as a result of the Pukete 3 plant upgrade works.
Undesirable biological growths	Undesirable biological growths such as algae will be influenced by nutrients in the discharge. A May 2016 report prepared for Healthy Rivers Plan Change 1 (Nutrient limitation of algal biomass in the Waikato River) determined that there was strong evidence that algal biomass in the Waikato River is primarily limited by phosphorus (P), and not by nitrogen (N). TN and TP loads are consistently within the consented limits since 2018. HCC reduced Phosphorus loading consent limits in 2016. A number of reports have been produced by WRC since 2015 to inform Healthy Rivers Plan change targets. These targets are yet to be confirmed.	HCC is progressing investigations as part of 114674 consent renewal to determine if any further mitigations measures post Pukete 3 plant upgrade are required.
Eco-toxicity	Neither chemical analyses or whole effluent toxicity testing provide any evidence of toxic effects in the receiving waters after reasonable mixing. Improved TSS removal following the commissioning of a new bioreactor and clarifier have reduced levels of toxicity of the discharge.	HCC is progressing investigations as part of 114674 consent renewal.
Endocrine disruption	No evidence at this stage of any endocrine disrupting effect on river biota, and no national guidelines available yet for endocrine disrupting chemicals. The new bioreactor and clarifier have enhanced the activated sludge process and potentially increased removal of these chemicals. Activated sludge processes (such as that at Pukete WWTP) are known to achieve a major reduction in wastewater content of EDCs (reduces steroidal oestrogen content by 80-100%). Effective removal is achieved with long hydraulic retention and sludge retention times (sludge age). A minimum time sludge retention time of at least 10 to 12.5 days is suggested as the period required for the growth of organisms that decompose E2 and E1. (Koh, et al, 2008). Advance Oxidation Processes (AOPs) which use the action of oxidising hydroxyl radicals may also provide solutions, but disadvantages include toxic by-products and high operating costs. (Cesaro & Belgiomo, 2016).	HCC is progressing investigations as part of 114674 consent renewal. HCC understands that this in an emerging area of investigation and is monitoring central government for any direction on monitoring and mitigation. MBR (which have EDC treatment capabilities if nitrification and denitrification) will be investigated as part of AEE and best practicable option assessments prior to 2027.

Table 2-4: Summary of Residual Effects

Microbial health risk	The discharge would not, on its own cause the contact recreation standard in the River to be breached, but might in the worst case, contribute to a temporary exceedance of the single sample maxima in combination with other upstream sources of contamination into various contaminants including pathogens. The WWTP has very good microbial treatment.	Planned upgrades will reduce residual effects. HCC is progressing investigations as part of 114674 consent renewal.
River recreation values	There have been no complaints from River users about the outfall discharge, however, under Te Ture Whaimana o te Awa o Waikato and Healthy Rivers plan change, users such as waka ama groups and swimmers downstream of the WWTP will be seeking low microbiological risk for river swimmability. The WWTP has very good microbial treatment.	Planned upgrades will reduce residual effects. HCC is progressing investigations as part of 114674 consent renewal.
Maori cultural values	Some potential residual effect on Maori cultural values. The awa is an ancestor to iwi, and iwi are kaitiaki of the awa. Waikato Tainui and mana whenua seek the protection and restoration of the health and wellbeing of the river. Waikato Tainui and mana whenua seek that the river is swimmable, that it supports maahinga kai and spiritual practices are able to be carried out. Residual effects of the current discharge on cultural values are being explored.	On-going improvements as part of the existing Pukete 3 upgrade will improve quality. HCC are engaging with Waikato Tainui and manawhenua through specific forums on the projects listed in section 1.2 including consent renewal to understand any further mitigation measures required to give effect to Te Ture Whaimana o te awa o Waikato. Joint management agreements between iwi and HCC also improve transfer of concerns and discussion on mitigation measures.
Broader community perception	No evidence of significant adverse effects. Minor or residual effects will be mitigated to some extent by proposed reduction of microbial health risk (see above).	On-going improvements to the plant to treat wastewater quality will contribute to mitigation as well as community 'open days' and continued education initiatives. Community perception will be determined when they are consulted on Wastewater consent renewal.

Assessment of residuals against proposed Health Rivers Plan Change 1 Targets

In 2016, HCC engaged MWH Global (now part of Stantec) to undertake a high-level assessment of the Pukete WWTP treated wastewater discharge against the relevant short (10 year) and long term (80 year) numerical water quality targets proposed within the Plan Change. The purpose was to understand if the targets were achievable (with or without additional management procedures and/or mitigation measures at the wastewater treatment plant) taking into account projected growth of the City's population through to the year 2063. For the purpose of the assessment, it was assumed that the existing consent conditions did not change after 2027. The report concluded the following:

- After the year 2044, additional treatment processes could possibly/would probably be needed to achieve increased level of performance associated with the summer Total Nitrogen concentration limit (450kg/day).
- Even when plant is upgraded and is fully optimised for Total Nitrogen removal (i.e. re-configured to a 4-stage MLE activated sludge process), additional treatment processes may also be needed to continue to meet the existing (or a potentially lower) summer mass load limit for Total Nitrogen. These could include conventional or denitrifying sand filters, denitrifying moving bed biofilm reactors or the use of membrane filtration (either as a tertiary application or an integrated membrane bioreactor).
- If more stringent conditions were imposed in the future this would result in an acceleration of future capital works and potentially additional capital works being required.

Contaminants of Emerging Concern (CECs)

Contaminants range from many different chemicals, from pharmaceuticals to personal care products, to herbicides/pesticides as well as per- and polyfluoroalkyl substances (PFAS) etc. The performance of conventional secondary treatment WWTPs is mixed with regard to the removal of CECs. Compounds can be broken down by microbial actions, others are transferred to the solids stream (waste sludge), with typically 50 – 90 % removal from the liquid stream. Extraction procedures during the solid phase are difficult and expensive, with very little data on the effectiveness in comparison to other procedures used in the liquid phases, such as advanced oxidation processes and reverse osmosis. See also, discussion in Table 2.4 Endocrine Disruption.

Microplastics

Studies on Microplastics (particle size of less than 5mm) on the removal of microplastics by WWTPs concluded that WWTP treatment was effective and that discharges were a very minor source (Coney, et al, 2019). Up to 99% of microplastics entering a plant can be captured in screenings, grit and sludge streams. New regulations on microbeads (Waste Minimisation (Microbeads) Regulations 2017) prohibits the sale and manufacture of wash off products that contain microbeads.

PFAS (per and poly fluoroalkyl substances)

Manmade PFAS can be found in wastewater from firefighting foam, manufacturing processes in carpets, clothing and cookware, electroplaters, pulp and paper industry and household cleaning products.

Low concentrations of PFAs in wastewater (parts per trillions) has resulted in focus on alternative treatment methods including GAC (granular activated carbon), reverse osmosis-nano-filtration (RO/NF), anion exchange (AIX) and thermal treatment. Each method has its own advantages and disadvantages in what it can remove.

2.6 Available Technologies to Address any Residual Effects

vi. Outline of significant technological changes and advances in relation to wastewater management,treatment, disposal and beneficial use technologies, which may be

available to address any residual adverse effects of the discharge.

A number of possible technology/process advances were identified in the Resource Consents Application (Documentation Support Document Number 7, "Alternatives Assessment."). The AEE for the 2007 consent outlined the alternatives for wastewater management including wastewater treatment technology, wastewater reduction, locations, residuals management and off set mitigation.

The previous Monitoring & Technology Report (2018) lists available technologies to address residual effects. A summary of technologies (provided in previous reports) is documented in Appendix D.

The following available technologies to address residual effects associated with discharge quality have been drawn from the New Zealand Wastewater Sector Report (October 2020). See Table 2.5. This report was prepared (by GHD, Beca and Boffa Miskell) to inform MfE policy work on a new National Environmental Standard for wastewater discharges (and overflows).

Table 2.5: Summary of available technologies and residual effects

Technology	Description	Process Driver and Status at October 2020
Aerobic Granular Sludge (AGS) eg Nerada	Large Granules formed within the reactors to achieve simultaneous nitrogen and phosphorus removal.	Process intensification. Full scale, quite a number in operation overseas.
Membrane Aerated Biofilm Reactor (MABR)	Gas permeable membranes act as surface to facilitate attached growth media.	Process intensification. Full scale, most plants under design overseas, difficulty getting low nitrogen levels.
Mainstream deammonification	Replaces conventional nitrification and denitrification pathway, requires less oxygen and lower carbon requirements but is slow growing and may not suit NZ mild climate.	
Gel Encapsulation	Micro-organisms encapsulated in gel beads/cubes and dropped into bioreactors to maximise treatment performance.	Process intensification. Not yet used for municipal wastewater treatment, and process still under assessment.
Waste to protein	Uses purple phototrophic bacteria (PPB) to convert soluble organics, N and P from high strength wastewater into protein fish biomass, with opportunity for fishmeal replacement in aquaculture.	Novel process, resource recovery. Only at demonstration scale.
Algal bioreactors	Algae uptakes additional N and P to provide a biomass for use.	Low-cost upgrade for nutrient removal. Full scale in USA, Mediterranean, Melbourne

Table 2.5: Summary of available technologies and residual effects

High-rate anaerobic	High-rate lagoons, UASBs or anaerobic	Low-cost treatment system and

treatment	membrane bioreactors to treat raw wastewater, followed by trickling filer, algal ponds or activated sludge, and can recover nutrients form anaerobic outlet.	energy recovery. Many examples in India and Brazil.
Physical/Chemical treatment	Chemical addition, fine screening, sieve filtration or membrane filtration to maximise removal of organics and send to anaerobic digesters	Small footprint and low operating costs. Some examples overseas and significant research in this area.
Struvite recovery	Treat centrate with magnesium hydroxide to form struvite (MAP)	Form's fertiliser products. Full scale in US.

2.7 Best Practicable Option (BPO)

vii. An assessment of whether any such options or combination of options represent the Best

Practicable Option to minimise the effects of the discharge and whether the permit holder intendsto incorporate such changes.

Sub condition vii) of Condition 22 is framed around the representation of a Best Practicable Option (BPO) as set out in the Resource Management Act 1991(RMA).

> **best practicable option,** *"in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to –the nature of the discharge or emission and the sensitivity of the receiving environment toadverse effects; and*
> *(a) the financial implications, and the effects on the environment, of that option when compared withother options; and*
> *(b) the current state of technical knowledge and the likelihood that the option can be successfullyapplied."*

As HCC embarks on the two projects outlined in Section 1.2 (consent renewal and subregional wastewater studies), HCC will be carrying out a detailed review of options. HCC is in the beginning phases of assessing effects of its discharge, exploring technologies in preparation for options analysis, and is progressing collaboration with the subregion and iwi partners, as such, HCC does not see value in pre-empting the information that will be developed over the course of the next 3 years.

In support of the vision and objectives of Te Ture Whaimana o te Awa o Waikato, HCC will be seeking application of best available technology. Currently, this is seen as the technology to be applied at Pukekohe Wastewater Treatment Plant (due to be completed and commissioned in 2022).

The Pukekohe plant represents what will probably be considered the 'gold standard' for 'liquid stream' wastewater treatment in New Zealand. The plant will be capable of high level of nutrient, BOD, Solids and pathogen reduction, in addition to energy recovery and potential for other forms of resource recovery in future such as potable recycling, struvite etc. With a maximum population of 400,00 and flow of 100,000 m3/day, the plant could meet potentially meet the following levels:

Table 2.6: Summary of potential treated wastewater levels at the Pukekohe WWTP

Parameter	Limit/Unit	Parameter	Limit/Unit
NH4-N	< 1mg/L	cBOD5	<5 mg/L
NOx-N	< 4mg/L	TN	<5mg/L
TSS	<5 mg/L	TP	<0.5mg/L
E coli	< 10/100mL		

It should be noted that the plant is close to the outer limits of technology (LOT). When commissioned, the plant will target an effluent total nitrogen of 3 mg/litre. Unit processes include:

- 2 stage screening to 1 mm,
- a grit removal process in between screens
- MBR style activated sludge process in 4-Stage Bardenpho configuration,
- Supplementary carbon dosing, and
- Tertiary UV disinfection.

Limits of Technology

The current limits of technology for reliable nutrient removal sits at around 3mg/l total nitrogen (TN) and about 0.005mg/l total phosphorus (TP). Such low TP numbers can only be achieved with tertiary chemical precipitation. The limit of technology in terms of overall effluent quality and safety comes from the use of biological nutrient removal plants, followed by multi-barrier membrane processes including reverse osmosis for recycling. International examples include Singapore and Orange County, South Los Angeles where water source shortages drive the need for these technologies.

Ultra-high levels of performance in terms of quality can come at the cost of the use of a considerable amount of energy, release of greenhouse gases and consumption of other resources. Utilisation of the limits of technology is not always considered best practice in some circumstances. For example, integrated river catchment management should be considered and where appropriate staging and offsetting is provided for.

Potential Best Practical Option

HCC is not at the stage in the consenting project listed in **Section 1.2**, to be able to describe options being considered except for those upgrades listed in **Section 2.4, Table 2.3**. However, HCC has been provided information by consultants assisting with projects listed in **Section 1.2** on what a 'potential' best practice process and technology could be for wastewater treatment to meet high standards. These are outlined in the following table but is yet to undergo full analysis for applicability to the Pukete wastewater treatment site, including any size constraints:

Table 2.7 - Summary of potential Best Practical Option considerations

Stage	Installed Process	Performance capability
PRELIMINARY	First stage Screening	Remove non-biodegradable solids
	Grit removal	
	Septage receipt	
PRIMARY	Primary Clarifiers or filters	
SECONDARY	Second stage screening	Treat dissolved contaminants and remove nutrients. Protects MBR membranes and removes solids down to 1mm including hair
	BNR Activated sludge reactor	Biological oxidation of organic material, nitrogen and phosphorus to levels of: NH4-N <1mg/L NOx-N < 4mg/L TP<1mg/L
	Membrane based solids removal (MBR)	Retention of activated biomass within the system. Clarification of final effluent. Disinfection y physical removal of pathogenic bacteria and protozoa to levels of TSS <5mg/L CBOD5 5 mg/L 6 log bacteria removal 1-2 log10 viral removal
	Alkalinity or carbon dosing	Buffer pH 6.5-7.5 Supplement for denitrification TN <5mg/L TP <0.5mg/L

Table 2.7 - Summary of potential Best Practical Option considerations

TERTIARY	UV disinfection	Inactivate viruses and can kill bacteria

		3-4log10 viral inactivation
	Internal recycled effluent system for water efficiency	
SOLIDS PHASE		Not relevant to effluent quality
FUTURE POSSIBILITIES	Annamox and nitrite shunt for Nitrogen removal	
	Struvite crystallizer for phosphorus recovery	
	Reverse Osmosis, UV and Chlorine to allow further removal of contaminants suitable for potable/industrial reuse,	0 TSS and O pathogens

2.8 Alternative Disposal Techniques

viii. Information relating to the use, development, and success of alternative wastewater

disposal techniques in New Zealand, in particular land-based disposal, and their relevance and possible application to Hamilton City's situation.

This sub-condition viii) of Condition 22 relates to alternative wastewater disposal techniques being used in New Zealand including, in particular land-based disposal.

Consent applications were lodged in 2006. In that assessment HCC considered a wide range of alternatives for treated wastewater discharge and reuse which included some nineteen alternatives encompassing:

- discharge to water – one option namely discharges the Waikato River through the existing river outfall
- discharge to land - five options considered.
- discharge to both "water" and "to land" and "through land" - six options considered.
- treatedwastewater reuse – seven options considered.

These alternatives to point source discharge were summarised in Section 6 of the AEE and set out in detail in Support Documents No 2 (Terra 21 project) & 7 (Alternatives Assessment). A summary of alternative disposal techniques (provided in previous review reports) is documented in Appendix E.

In 2016, an assessment of 330 WWTP disposal methods showed that 11% was disposed to land and 13% was disposal via a combined land and water system (75% of WWTP's discharged directly to surface water) 50 % utilise in-stream and bank discharges and 23 % adopt a high-rate discharge to land system. Of the systems that utilise an irrigation approach, 11 % irrigate trees, 0 % dairy pasture, 11 % cut and carry, 6 % grazed pasture. (Lei, 2016). The wastewater sector report states that 107 (or 33%) WWTP's have land based discharge but in terms of population this is only 8% of the total. Only 6 'large' WWTP's of a total of 44 discharged to land.

A description of each application type and some examples of where it has been used in New Zealand is listed below:

Slow rate: Application to vegetated land surface where soil and plants provide supplementary wastewater treatment. Taupo, Whanagamata, Masterton, Leeston and Rolleston.

Rapid Infiltration: Controlled application of wastewater to earthen basis on high permeability soils. Motueka, Cambridge, Te Paerahi and Rotoiti-Rotomaa.

Overland Flow: Discharge to sloped land at high rates. Little experience in New Zealand but has been used in the past at Otaki and Oamuru.

Land Passage: Wastewater flows through or over stone rock beds before entering a water body. Morrinsville, Hastings, Napier, Te Awamutu, Te Puke. Rotorua proposes to use a land contact bed (reuse of a storage pond) to make the water 'mauri tau' neutral as it enters Lake Rotoroa. The basin is filled with koohatu (stones). Currently there is land disposal to forestry.

Deep Bore Injection: Treated wastewater pumped into the subsurface using deep bores at Russell.

Mixed systems: Land-based discharges used for some parts of the year and the rest of the year discharges to surface water, or simultaneously. Palmerston North proposes to divert 75% of highly treated municipal wastewater from Manawatu River when running at below half of its median flow, typically in summer, to irrigate designated land for crops. Land area capped at 760 ha. If further diversion, would need up to 2000 ha at a cost of approximately $460 million.

While number of land disposal systems are available and in increasing use in New Zealand, disposal options will be subject to volume, land availability, site constraints, and importantly soil characteristics. In general, Waikato soils tend to be claggy with river sands and gravels predominantly in areas adjacent to the Waikato River. Disposal options are widening to address cultural aspects of wastewater disposal and restoring mauri. HCC is progressing investigations as part of 114674 consent renewal. HCC is not at the stage in the projects listed in section 1.2, to be able to describe options being long listed and shortlisted for

the management of the City's wastewater.

Summary of Findings

The findings of this review are summarised as follows:

1. In the year 2017/2018, HCC achieved an overall full level of compliance as a result of a successful annual audit carried out. Following on from this, in the years 2018/2019 and 2019/2020, HCC have also achieved an overall high level of compliance against all conditions with the Resource Consent 114674. It is anticipated that through significant and continued process and management improvements a full compliance status will be received for the 20/21 compliance period.

2. HCC has assessed compliance legislation, standards, and guidelines. Te Ture Whaimana o te Awa o Waikato and Te Mana o Te Wai means that targets are being reset. HCC has assessed that upgrades will be necessary to reach those targets over time and is investigating what best practice can be applied taking into consideration the outer limits of technology that Pukekohe will be operating at.

3. HCC have undertaken a substantial improvement programme at the Pukete WWTP to improve the treatment process and quality of discharges including plant upgrades on the fifth bioreactor (4 stage Bardenpho) and clarifier, an additional interstage pump station and a new chemical storage and dosing facility. Further upgrades, such as the Bioreactor 4 retrofitted to a stage 4 biological nutrient removal process and the new inlet facility, are currently in progress and have set targets of installation for 2023/24, with future upgrades, Pukete 4 Upgrade, and an improvement in plant processes to address climate change actions proposed in the current long-term plan (2021-2031).

4. HCC recognises the relationship of Waikato-Tainui with the Waikato River, including their economic, social, cultural and spiritual relationships. The Waikato-Tainui/Hamilton City Council Co-Governance Forum supports Waikato-Tainui and Council to build a strong and mutually beneficial relationship, in order to provide opportunities for collaboration that promote better wellbeing outcomes through agreed projects, and meet obligations to restore and protect the Waikato River.

5. Monitoring of discharge concentrations and mass loadings has indicated that HCC is performing within the limits set out in the Consent. Where exceedances have been recorded these can be explained through high inflows into the plant, shock loadings and amendments to the influent characteristics. Planned plant investigations, maintenance and renewal programmes and upgrades have allowed for greater consistency of discharges and the increase in education of plant operators have ensured that corrective action is applied where necessary.

6. The monitoring has also indicated that discharges are in accordance with predictions that were prepared for the 2006 Assessment of Environmental Effects.

7. There are a wide range of proven technologies available including these to achieve advanced (high levels) of contaminant removal, and some further technologies that could be used to further mitigate residual effects of the river discharge. This review highlighted available technologies drawn from the New Zealand Wastewater Sector Report (October 2020) to inform MfE of policy work on a new national environmental standard for wastewater discharges (and overflows). Investigations for consent renewal will confirm what best practicable options will reduce residual effects, however, HCC is looking at Pukekohe as a higher standard that is feasible.

8. With the HCC Trade Waste and Wastewater Bylaw currently under review, HCC continue to implement and develop new strategies to limit specific contaminants entering the wastewater system.

9. The assessment of alternative wastewater disposal techniques has covered a wide range of possible approaches. While number of land disposal systems are available and in increasing use in New Zealand, disposal options will be subject to volume, land availability, site constraints, and importantly soil characteristics. In general, Waikato soils tend to be claggy with river sands and gravels

predominantly in areas adjacent to the Waikato River. Recent application in New Zealand of alternative disposal techniques has identified some, but limited, advancement in reuse and land-based disposal of treated wastewater and many still require a combination or land and discharge to water. The Fonterra Policy on human wastewater products including irrigation of treated human wastewater continues to be a significant limitation to land application inareas like the Waikato Region. Disposal options are widening to address cultural aspects of wastewater disposal and restoring mauri.

10. Currently, HCC is progressing investigations as part of 114674 consent renewal, however, is not at the stage in the projects listed in Section 1.2, to be able to state best practicable options. A shortlist will need to be developed to ensure the best suited infrastructure is implemented to manage the city's wastewater at the Pukete wastewater treatment site and sub regionally.

APPENDICES

Appendix A Resource Consent Certificate 114674
Appendix B Hamilton City Council Annual Report (2020-2021)
Appendix C Waikato Regional Council Consent Compliance Audit Report (2019/2020)
Appendix D Available Technologies and Best Practicable Option Considerations (Condition 22 vi & vii)
Appendix E Alternative Wastewater Disposal Techniques (Condition 22 viii)

Appendix A Resource Consent Certificate 114674

Waikato REGIONAL COUNCIL
Te Kaunihera ā Rohe o Waikato

Resource Consent Certificate

Private Bag 3038
Waikato Mail Centre
Hamilton 3240

waikatoregion.govt.nz
0800 800 401

Resource Consent Number: AUTH114674.01.02

File Number: 60 26 19A

Pursuant to the Resource Management Act 1991, the Waikato Regional Council hereby grants consent to:

Hamilton City Council (Water & Waste Services)
Private Bag 3010
HAMILTON 2020

(hereinafter referred to as the Consent Holder)

Consent Type:	Discharge permit
Consent Subtype:	Discharge to water
Activity authorised:	Discharge treated wastewater from a multi-port diffuser main outfall to the Waikato River to the south-east of the Hamilton Wastewater Treatment Plant; and to discharge the same to the Waikato River via a bypass outfall at times of planned maintenance
Location:	(Wastewater Treatment Plant) Pukete Rd - Hamilton
Map Reference:	NZMS 260 S14:072-832
Consent Duration:	Granted for a period expiring 20 years from the date of commencement of consent as defined in section 116 of the Resource Management Act 1991

Subject to the conditions overleaf:

CONDITIONS

General Conditions

1. The discharge shall be in undertaken in general accordance with the following document:

   (a) Resource Consents Applicati on: Assessment of Effects on the Environment. Application Edition: May 2006;

   unless inconsistent with the conditions below which shall prevail.

2. The consent holder shall ensure contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.

3. The discharges to water associated with this consent shall be managed and operated by an appropriately trained operator.

4. This resource consent is granted by the Waikato Regional Council subject to its officers or agents being permitted access to the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.

5. The consent holder shall pay to the Waikato Regional Council any administrative charge fixed in accordance with section 36 of the Resource Management Act 1991, or any charge prescribed in accordance with regulations made under section 360 of the Resource Management Act.

Discharge Volume Limits

6. The maximum volume of treated wastewater discharged shall not exceed 224,000 cubic metres per day.

Discharge Quality Limits

7. The consent holder shall ensure that for up to 36 months after the commencement of this consent, the quality of the discharge entering the outfall pipeline shall comply with the following concentration and mass load limits.

Constituent	*Sam ple type*	*Sam ple frequency*	*Sta ndards*
$cBOD_5$ concentration	24 hour flow weighted composite sampl e	4 days per week	Over each calendar month , no more than 8 exceedences over 20 g/m^3, and; Over each quarter (January to March , April to Jun e, July to September and October to December, inclusive) no more than 3 exceedences over SO g/ m^3.
cBODs ma ss load	24 hour flow weighted composite sample	**4** days per week	Over each calendar month, no more than 8 exceedences over 750 kg/ day, and; Over each quart er (January to March , April to June, July to Septemb er and October to December, inclusive) no more than 3 exceedences over 2400kg/day.
Suspended solids concentrat ion	24 hour flow weighted com posit e sample	4 days per week	Over each calendar month, no more than 8 exceedences over 30 g/m^3, and: Over each quart er (January to March, April to June, July to September and October to December , inclusive) no more than 3 exceedences over 100 g/m^3.
Suspended solids mass load	24 hour flow weighted composite sample	4 days per week	Over each calendar month, no more than 8 exceedences over 1425 kg/day, and Over each quarter (January to March , April to June , July to September and October to December, inclusive) no more than 3 exceedences over 4750 kg/day.

Constituent	*Sample type*	*Sample frequency*	*Standards*
114674 mass load	24 hour flow weighted composite sample	4 days per week	Over each calendar month from December-to-May inclusive, no more than 8 exceedences over 500 kg/day.
Total nitrogen winter mass load	24 hour flow weighted composite sample	1 day per week	Over each 26 week period from June-to-November inclusive, no more than 13 exceedences over 1700 kg/day.
E. coli routine	grab	4 days per week	Over each calendar month, no more than 8 exceedences over 800 cfu/100ml
E. coli diurnal	grab	Once every three months samples shall be collected at hourly intervals over a full 24 hour period	Over each 24 hour period no more than 12 exceedences over 8000 cfu/100ml

8. The consent holder shall ensure that no later than 36 months after the commencement of this consent, the quality of the discharge entering the outfall pipeline shall comply with the following concentration and mass load limits.

Constituent	*Sample type*	*Sample frequency*	*Standards*
$cBOD_5$ concentration	24 hour flow weighted composite sample	4 days per week	Over each calendar month, no more than 8 exceedences over 10 g/m^3, and; Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedances over 50 g/m^3.
$cBOD_5$ mass load	24 hour flow weighted composite sample	4 days per week	Over each calendar month, no more than 8 exceedences over 750 kg/day, and; Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedences over 2400 kg/day.
Suspended solids concentration	24 hour flow weighted composite sample	4 days per week	Over each calendar month, no more than 8 exceedences over 15 g/m^3, and: Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedences over 100 g/m^3.
Suspended solids mass load	24 hour flow weighted composite sample	4 days per week	Over each calendar month, no more than 8 exceedences over 700 kg/day, and Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedences over 2400 kg/day.
Total nitrogen summer mass load	24 hour flow weighted composite sample	4 days per week	Over each 26 week period from December-to-May inclusive, no more than 50% of the samples shall exceed 450 kg/day.
Total nitrogen winter mass load	24 hour flow weighted composite sample	1 day per week	Over each 26 week period from June-to-November inclusive, no more than 50% of the samples shall exceed 1500 kg/day.
E. coli routine	grab	4 days per week	Over each calendar month, no more than 8 exceedences over 126 cfu/100ml: and Over each quarter (January to March, April to June, July to September and October to December inclusive) no more than 3 exceedences over 2000 cfu/100ml
E. coli diurnal	grab	Once every three months samples shall be collected at hourly intervals over a full 24 hour period	Over each 24 hour period no more than 12 exceedences over 2000 cfu/100ml

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9. The consent holder shall ensure that by no later than 1 January 2011, the quality of the discharge entering the outfall pipeline shall comply with the following mass load limits:

114674

Constituent	*Sample type*	*Sample frequency*	*Standard(*)*
Total Phosphorus **Summer mass load**	24 hour flow weighted composite sample	days per week	Over each 26 week period from December to May inclusive, no more than 50% of the samples shall exceed 95 kg/day
Total Phosphorus **Winter mass load**	24 hour flow weighted composite sample	1 day per week	Over each 26 week period from June to November inclusive, no more than 50% of the samples shall exceed 700 kg/day

Monitoring of Discharge Flows

10. The consent holder shall continuously monitor the flow rate of treated wastewater entering the outfall pipe and shall record the daily total volume discharged.

Monitoring Location

11. The consent holder shall define a sampling location, or locations, for monitoring of parameters in conditions 7, 8 and 9. This location, or locations, shall be to the satisfaction of the Waikato Regional Council.

Monitoring Procedures

12. The consent holder shall take grab samples (between the hours of 10am and 4pm) and 24-hour flow weighted composite samples of treated wastewater on at least 4 days each week from the sampling location specified in condition 11 of this consent. The samples shall be analysed for the constituents and at the frequencies and detection limits listed within the conditions of this consent and within Schedule 1 attached to this resource consent.

Note 1: Whole effluent toxicity testing shall be conducted in accordance with Schedule 1 footnote vii unless varied with the written approval of Environment Waikato.
Note 2: All quality analyses of the wastewater discharged shall be undertaken by an JANZ accredited or equivalent laboratory. All methodologies adopted shall be appropriate for wastewater analyses and be to the satisfaction of Environment Waikato.

Risk Notification

13. The consent holder shall, on receipt of any treated wastewater f. *coli* result exceeding 5000 cfu/lOOml, ensure that an additional treated wastewater grab sample is taken immediately, and that a further two samples are taken at intervals of not less than two hours. All samples are to be tested for£. *coli* and, in the event any one of the three additional samples also exceeds5000 cfu/lOOml, the consent holder shall:

i) Notify the Waikato Regional Council and Medical Officer of Health of the Waikato District Health Board as soon as practicable and no later than 48 hours afterwards; and

ii) Record the reasons why the situation occurred, the actionstaken by the consent holder, and an assessment of what measures can be adopted in the future to minimise such occurrences, and, if requested, shall provide a report to the Group Manager, Waikato Regional Council and the Medical Officer of Health.

Additional Investigations:Viral and Organic Chemicals

14. The consent holder shall in 2012 and thereafter on a five yearly basis undertake an investigation into the likelihood of viral pathogens and organic chemicals (including but not limited to endocrine disrupting chemicals and steroidal hormones) entering the river water from the discharge. An analysis of the likely removal of viral pathogens and substances within each stage of the treatment

system (including bypasses) shall be made and based on actual results. The results of this investigation shall be compared with any relevant literature on the subject on removal of viral pathogens and organic chemicals within treated wastewater and their environmental fate/public health risk. A copy of the investigation and comparison

114674

shall be supplied to the Waikato Regional Council by 1 December each year the investigation is required to be undertaken.

UV Treatment

15. The consent holder shall, no later than 36 months after the commencement of this consent, ensure that:
    a) Measurements for each of the following parameters are recorded:
        i) the instantaneous flow rate at each UV channel in the disinfection facility,
        ii) the instantaneous UV intensity at 254nm within each UV Bank
    b) Continuous recorders for those items listed above in 15(a) are to be provided and maintained in good working order.
    c) An alarm system connected to a 24-hour manned station is to be provided and maintained, and shall be activated:
        i) when the power supply to the disinfection facility has been interrupted; or
        ii) in the event of any mechanical or electrical failure of the monitoring system specified in 15(a) or any other failure in the control system for the disinfection facility for more than 30 minutes.
    d) All recorded monitoring data specified in this condition is to be kept on site for a minimum of three years. The monitoring records shall be made available to the Waikato Regional Council and included within the annual monitoring report as detailed within condition 17 below.

Reporting

16. The consent holder shall provide to the Waikato Regional Council, via electronic means and on a monthly basis, a copy of the monthly data as required via conditions 7 or 8 (whichever is applicable) and 9, 10, 12 and 13. In the event that the median total nitrogen mass-load exceeds 450 kg/day and/or the median total phosphorus mass-load exceeds 95 kg/day in any summer month (Dec-May inclusive), the consent holder shall report on the reasons for that exceedance and any actions being undertaken to reduce the level in subsequent months to ensure compliance with conditions 8 and 9. In addition monthly data supplied to the Waikato Regional Council shall include details of any discharges from pump stations within the reticulation system stating the reason(s) for the discharge, nature of the discharge, duration of the discharge, estimated volume discharged, weather conditions at the time of the discharge and fate of the wastewater discharged.

17. The consent holder shall provide to the Waikato Regional Council a written report by 30 September each year, which addresses the following:
    i) A summary of the daily volume discharged;
    ii) A summary of the monitoring results required by conditions 7 or 8 (whichever is applicable), 9, 10, 15 of this consent, and a discussion of any environmentally important trends identified;
    iii) Comment on compliance with conditions 7 or 8 (which ever is applicable) and 9 of this resource consent;

iv) General comment on the functioning of the Tangata Whenua Wastewater Liaison Group;

v) Any reasons for non-compliance or difficulties in achieving compliance with the conditions of this resource consent;

vi) A record of bypass events, including volume, duration, causes, health risks and steps taken to avoid reoccurrence; and

vii) Any other issue considered relevant by the consent holder.

114674

18. The consent holder shall notify the Waikato Regional Council within 24 hours (where practicable) of the consent holder becoming aware of any non compliance with conditions of this resource consent, or of any accidental discharge, plant breakdown or other circumstance that is likely to result in an exceedance of the limits of this resource consent. The consent holder shall, within 10 working days of the incident occurring, provide a written report to the Waikato Regional Council, identifying the breach, possible causes and steps to ensure future compliance.

Management Plan

19. The consent holder shall provide the Waikato Regional Council with a Management Plan which details the procedures that will be implemented to operate in accordance with the conditions of this consent. This Plan shall be lodged with the Waikato Regional Council within one year of the commencement of this consent and shall be reviewed and updated 36 months following the commencement of this consent and thereafter on a three yearly basis. The consent holder shall undertake the treatment and disposal of treated wastewater generally in accordance with the Management Plan.

The Plan shall address, but is not limited to, the following:

i) a description of the wastewater treatment plant;

ii) a description of the sequence, timing and methods of construction of upgrades to the treatment plant;

iii) a description of routine inspection and maintenance procedures to be undertaken with respect to the treatment plant and discharge structures;

iv) an outline of the methods to be utilised to monitor the treatment plant in an operational sense including:

- monitoring of influent wastewater;
- monitoring of treatment performance;

v) specific management procedures for the efficient functioning of the treatment system;

vi) procedures for recording routine maintenance and all repairs that are undertaken;

vii) chain of command and responsibility, and notification protocols;

viii) description of alarms;

ix) trouble shooting procedures;

x) contingency measures in place to deal with unusual events;

xi) a bypass strategy that includes operating procedures and current planning to minimise the occurrence of bypass events as far as is practicable;

xii) other actions necessary to comply with the requirements of this resource consent; and

xiii) procedures for improving and/or reviewing the Management Plan.

The consent holder shall manage the wastewater treatment and discharge in accordance with the management plan outlined in this condition. Any changes to the management plan shall be notified in writing to the Waikato Regional Council.

Contingency Plan

20. The consent holder shall engage appropriately experienced persons to compile a plan that details contingency measures that will be put in place in the event of any bypasses, other extraordinary events or failure of any critical part of the treatment plant. This plan shall identify measures and notification protocols to be undertaken by the consent holder that will take into account any potential adverse effects on river users, including but not limited to downstream abstractors and the Medical Officer of Health. This plan shall be provided to the

114674

Waikato Regional Council within 3 months of the commencement of this consent to a standard acceptable to the Waikato Regional Council. Subsequently this contingency plan shall be updated at three yearly intervals with updated copies supplied to the Waikato Regional Council.

Complaints Register

21. The consent holder shall maintain and keep a complaints register for all complaints made about the treatment plant and discharge site received by the consent holder. The register shall record:

    i) the date, time and duration of the event/incident that has resulted in the complaint,

    ii) the location of the complainant when the event/incident was detected,

    iii) the possible cause of the event/incident,

    iv) any corrective action taken by the consent holder in response to the complaint.

The register shall be available to the Waikato Regional Council at all reasonable times. Details of all complaints received by the consent holder shall be forwarded to the Waikato Regional Council within 5 working days of the complaint being received, unless as otherwise authorised by the Waikato Regional Council.

Monitoring and Technology Review

22. The consent holder shall submit to the Waikato Regional Council a Monitoring and Technology Review Report no later than 30 September 2009 and thereafter at three yearly intervals, for the duration of the consent.

    The scope of the assessment should address, but not limited to, the following:

    i) Ongoing compliance with the requirements of this resource consent particularly in relation to any reported non-compliance with consent conditions;

    ii) An assessment of compliance/consistency with any relevant national, or regional water quality policies, standards or guidelines in effect at the time.

    iii) An assessment of the results of the permit holder's monitoring undertaken in accordance with the resource consent, including the adequacy and scope of such monitoring.

    iv) A summary of any major improvements made to the reticulation, treatment or disposal system since the commencement of consent that are likely to have an effect on the exercise of this consent.

    v) A summary of any residual actual or potential effects of the discharge, irrespective of whether those effects are in accordance with the conditions of the consent.

vi) Outline of significant technological changes and advances in relation to wastewater management, treatment, disposal and beneficial use technologies, which may be available to address any residual adverse effects of the discharge.

vii) An assessment of whether any such options or combination of options represent the Best Practicable Option to minimise the effects of the discharge and whether the permit holder intends to incorporate such changes.

viii) Information relating to the use, development and success of alternative wastewater disposal techniques in New Zealand, in particular land based disposal, and their relevance and possible application to Hamilton City's situation.

114674

Tangata Whenua Wastewater Liaison Group

23. The consent holder shall establish and retain for the duration of this consent a Hamilton City Council - Tangata Whenua Wastewater Liaison Group. The consent holder shall provide reasonable organisation and administrative support to facilitate the development and ongoing role of this Liaison Group. Membership of the Liaison Group shall be determined as a minimum in consultation with the Waikato Raupatu Trustee Company, Ngati Te Ata, Ngati Tamaoho Trust and the Turangawaewae Board ofTrustees.

i) The Liaison Group shall meet at least annually to exercisethe functions set out below.

ii) The Liaison Group shall establish its own meeting protocols having regard to the customary practices of tangata whenua and those established between the consent holder, Tainui, Nga Mana Toopu O Kirikiriroa or any other mana whenua group and shall operate in accordance with the principles of the Treaty of Waitangi, especially the principles of consultation, active participation and partnership.

iii) The functions of the Liaison Group shall include, but not be limited to, the following:

a) Review the general performance of Hamilton's Wastewater Treatment Plant and the discharge including any changes to its operation;

b) Review of the results of monitoring and the associated assessment of monitoring information carried out in accordance with the conditions of this consent.

c) Receipt of and comments on the Annual Report;

d) Receipt of and comments on the Management Plan;

e) Receipt of and comments on the Monitoring and Technology Review Report;

f) To make suggestions to the consent holder and/or Waikato Regional Council as to any physical measures and initiatives further needed to address actual or potential effects of the Hamilton City Council Wastewater Scheme;

g) To make suggestions as to any additional investigations, including those relating to land based disposal, the consent holder might undertake in respect of actual or potential effects;

h) To make recommendations to the Waikato Regional Council not later than one month prior to the dates specified in condition 24 on issues raised by tangata whenua relating to, amongst other matt ers, the Annual Plan, the Management Plan and the Monitoring and Technology Review, and how such issues were addressed by the applicant; and

i) Consideration of other issues raised by tangata whenua.

Review

24. The Waikato Regional Council may in January, February or March of 2013, 2018 and 2023 serve notice on the Consent Holder under Section 128 (1) of the Resource Management Act 1991, of its intention to review the conditions of this resource consent for the following purposes:

    i) to review the effectiveness of the conditions of this resource consent 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

    ii) if necessary and appropriate, to require the holder of this resource consent to adopt the best practicable option to remove or reduce adverse effects on the surrounding environment; or

    iii) to require the consent holder to assess the need for further treatment to improve pathogen removal within the treated wastewater discharge and if necessary reduce the *E.coli* limit as specified within condition 8 of this consent; or

114674

    iv) to require the consent holder to assess the need for further nutrient removal within the treated wastewater discharge over summer and winter and if necessary reduce the limits as specified within condition 8; or

    v) to require the consent holder, in conjunction with Waikato Regional Council staff, to assess the winter/summer definitions as defined within conditions 8 and 9 and if necessary change the definition of winter/summer as detailed within the conditions of this consent; or

    vi) to review the adequacy of and the necessity for monitoring undertaken by the consent holder; or

    vii) to respond to concerns raised by the Tangata Whenua Wastewater Liaison Group.

Claim under the Treaty of Waitangi Act

25. Within 12 months of the Crown settling any claim made under the provisions of the Treaty of Waitangi Act 1975 Waikato Regional Council may, following service of notice on the Consent Holder, commence a review of the conditions of this consent pursuant to s128(1)(a) of the RMA, for the purpose of ensuring that this consent is in alignment with the provisions of any such settled claim.

Outfall Structure

26. The discharge of treated wastewater to the Waikato River shall be via a multi-port in-river diffuser unless use of the by-pass outfall is authorised via condition 28 of this consent.

27. The consent holder shall demonstrate, on an annual basis, uniformity of mixing by sampling surface water at five points across the main flow of the river at a distance of 300 metres downstream of the outfall. Using appropriate methods to demonstrate wastewater mixing, the concentration in the five river samples shall be uniform within plus or minus 20 percent. The consent holder shall also demonstrate that the concentrations in the left bank littoral margin are within or less than the range of concentrations determined for the main flow.

By-pass Outfall for Inspection/Maintenance Events

28. In the event of planned inspections and/or maintenance of the main Waikato River outfall and/or the diffusers the consent holder may utilise the by-pass outfall for treated wastewater discharge direct to the Waikato River. The consent holder shall notify the Waikato Regional Council a minimum of ten working days in advance of the intention to utilise the by-pass outfall. This notification shall include information on the reason(s) for the proposed use of the outfall, the anticipated date(s) and duration of usage, and the proposed monitoring and mitigation measures, and notification and reporting procedures, that the consent holder will undertake. Written approval for the use shall be obtained from the Waikato Regional Council prior to any discharge from the by-pass outfall occurring.

Schedule I

Analysis	Monitoring Frequency				Sample type	Units	Detection Limit
	4 days per week	Monthly	Quarterly	Annually			
BOD,	"				composite	mg/L	1
Total suspended solids	"				composite	mg/L	1
E.coli (routine)	"				grab	cfu/l00ml	10
E.coli (diurnal)			"		grab	cfu/l00ml	10
Total Nitrogen	"				composite	mg/L	0.1
Ammonia-Nitrogen		,J			composite	mg/L	0.1
Nitrate-Nitrogen		"			composite	mg/L	0.1
Nitrite-Nitrogen		,J			composite	mg/L	0.1
Total Phosphorus					composite	mg/L	0.1
Dissolved Reactive Phosphorus		"			composite	mg/L	0.1
pH		,J			composite	pH	0.1
Alkalinity		,J			composite	mg CaCOs/L	0.1
Arsenic (Total)				"	composite	mg/L	0.005
Cadmium (Total)				"	composite	mg/L	0.0001
Chromium (Total)				,J	composite	mg/L	0.0005
Copper (Total)				"	composite	mg/L	0.0002
Lead (Total)				,J	composite	mg/L	0.0001
Mercury (Total)				,J	composite	mg/L	0.00008
Nickel (Total)				,J	composite	mg/L	0.0005
Zinc (Total)				"	composite	mg/L	0.001
voe				"	composite	mg/L	trace
svoc				"	composite	mg/L	trace
Whole effluent toxicity testing				"	composite		

Schedule Notes

(i) A "composite sample" is defined as a 24-hour flow weighted sample of the discharge.
(ii) A "grab sample" is defined as a random sample taken from the discharge flow.
(iii) The routine E. coli grab sample is to be taken on 4 days per week between the hours of 9am and 4pm.
(iv) The diurnal **E.** coli grab samples are to be collected at hourly intervals over a full 24-hour period, at least once every 3 months.
(v) The Total Nitrogen and Total Phosphorus monitoring is to be undertaken on 4 days each week during the months of December to May inclusive and on only **1** day each week for the remainder of the year.

Advice notes

1. In accordance with section 125 RMA, this consent shall lapse five (5) years after the date on which it was granted unless it has been given effect to before the end of that period.
2. Where a resource consent has been issued in relation to any type of construction (e.g. dam, bridge, jetty) this consent does not constitute authority to build and it may be necessary to apply for a Building Consent from the relevant territorial authority.
3. This resource consent does not give any right of access over private or public property. Arrangements for access must be made between the consent holder and the property owner.
4. This resource consent is transferable to another owner or occupier of the land concerned, upon application, on the same conditions and for the same use as originally granted (s.134-137 RMA).
5. The consent holder may apply to change the conditions of the resource consent under s.127 RMA.
6. The reasonable costs incurred by Waikato Regional Council arising from supervision and monitoring of this/these consents will be charged to the consent holder. This may include but not be limited to routine inspection of the site by Waikato Regional Council officers or agents, liaison with the consent holder, responding to complaints or enquiries relating to the site, and review and assessment of compliance with the conditions of consents.

Appendix C: Waikato Regional Council Consent Compliance Audit Report (2019/2020)

Site Compliance Report

Site No: REG602619

Site Owner: Hamilton City Council - City Waters

Site Name: Hamilton WWTP: Pukete Rd, Hamilton

Date: 30 July 2020

1 INTRODUCTION

The following resource consents are held for the site:

Resource Consent	Status	Description	Commenced	Expiry
AUTH108788.01.01	Current	Take up to 4,000 cubic metres per day of water from Waikato River for sewage plant operation purposes	27/08/2003	1/08/2023
AUTH109199.01.01	Current	Extend an existing box culvert by 24m, place up to 1083 c/m of clean fill material in a gully areas & undertake vegetation clearance & bed disturbance works in association with alignment of Pukete Rd, Hamilton	10/06/2003	17/04/2038
AUTH111029.01.02	Current	Retain biosolids on land at the existing Hamilton City Council Wastewater Treatment Plant	27/10/2004	31/08/2039
AUTH114674.01.02	Current	To change three conditions of Resource Consent AUTH114674.01.01 that authorises the discharge of treated wastewater to the Waikato River from Hamilton City Council Pukete Wastewater Treatment Plant.	18/09/2007	18/09/2027
AUTH114675.01.01	Current	Use existing river outfall structures in/on or over the bed of the Waikato River to the south-east of the Hamilton Wastewater Treatment Plant	18/09/2007	18/09/2027
AUTH114676.01.01	Current	Discharge contaminants to air from activities associated with the operation of the Hamilton WWTP	18/09/2007	18/09/2027
AUTH134278.01.01	Current	Discharge stormwater from Pukete WWTP to an unnamed tributary of the Waikato River.	2/02/2015	2/02/2039
AUTH137123.01.01	Current	To construct and maintain a pipe bridge and a vehicle access bridge in an unnamed tributary of the Waikato River, adjacent to the	31/08/2016	31/08/2051

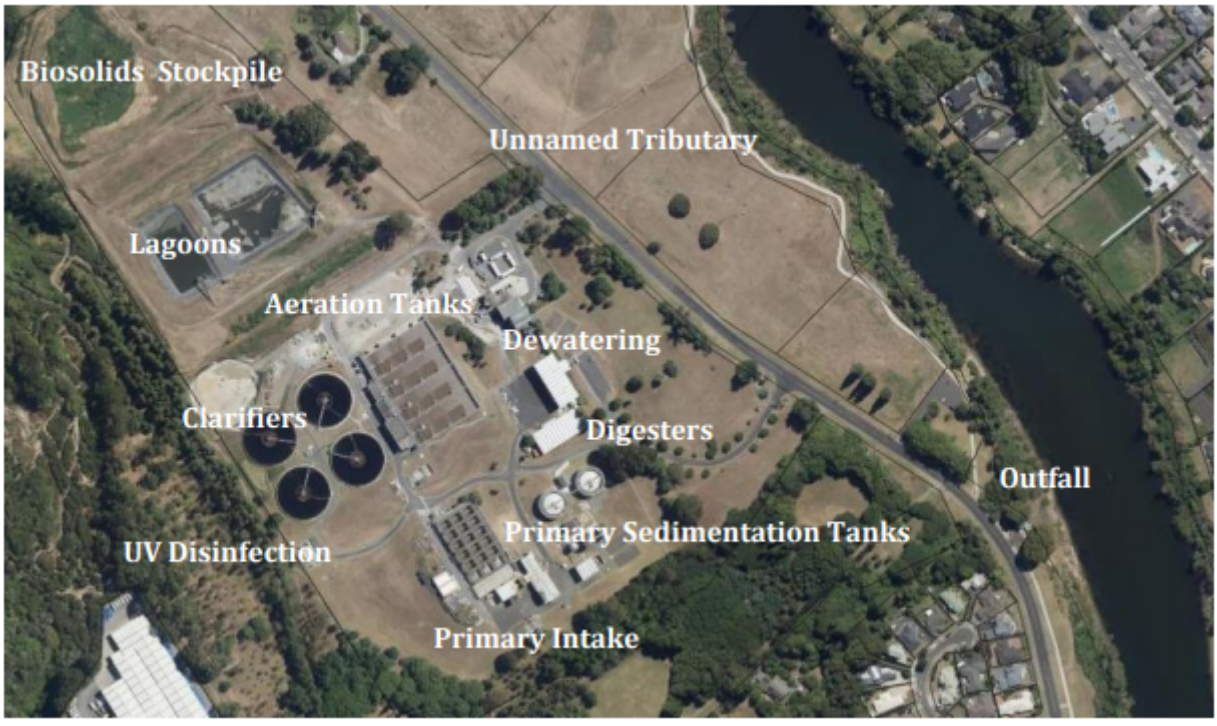
		Pukete Wastewater Treatment Plant, Hamilton		
AUTH138860.01.01	Current	Install a structure in the bed of a river including associated bed disturbance and earthworks in a high risk erosion area	30/11/2017	30/11/2052
AUTH141346.01.01	Current	Surface Water take for the purposes of de-watering works area's associated with the Peacocke Strategic Wastewater Project	13/05/2020	31/05/2025
AUTH141346.02.01	Current	Groundwater take for the purposes of de-watering associated with the Peacocke Strategic Wastewater Project	13/05/2020	31/05/2025

This report examines the level of compliance of Hamilton City Council - City Waters with the selected conditions of the resource consents.

2 BACKGROUND

The Pukete wastewater treatment plant (WWTP) receives treats and discharges municipal wastewater from the City of Hamilton with a population of 160,000. It also receives septage from the surrounding area. The consent holder is the Hamilton City Council who are responsible for the operation and upkeep of the city's 3 waters functions and networks. The WWTP is located north of the city centre in the suburb of Pukete adjacent to the Waikato river. The site is currently undergoing an upgrade as part of the planned Pukete III expansion to provide operational capacity for the city's growth.

The upgrade includes a new fifth aeration basin and a new fifth clarifier along with numerous other upgrades to various equipment and assets throughout the plant.

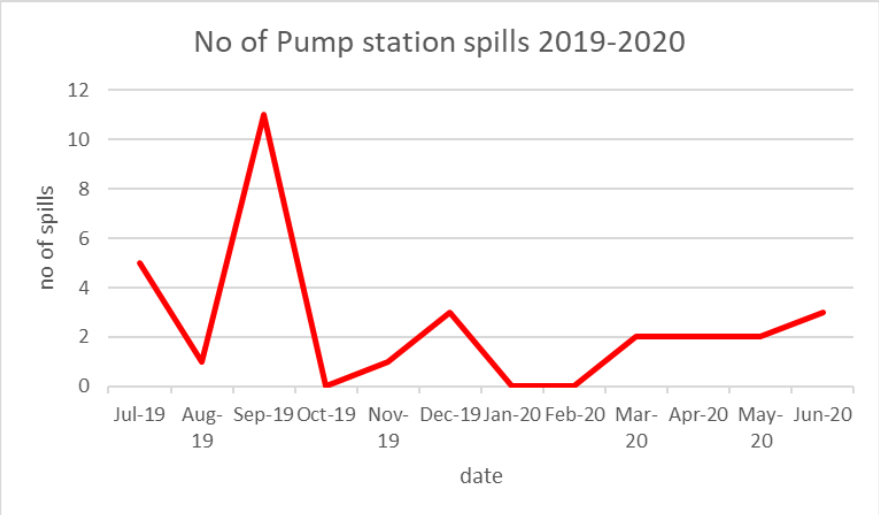


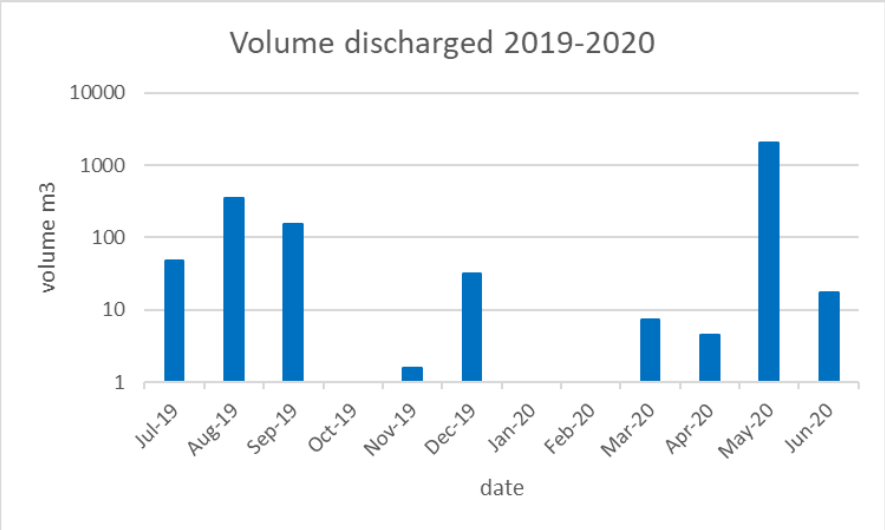
2.1 PREVIOUS COMPLIANCE HISTORY

Compliance Period	Compliance status awarded
1 July 2019 to 30 June 2020	High level of compliance
1 July 2018 to 30 June 2019	High level of compliance
1 July 2017 to 30 June 2018	Full compliance
1 July 2016 to 30 June 2017	Full compliance
1 July 2015 to 30 June 2016	Partial compliance
1 July 2014 to 30 June 2015	Partial compliance
1 July 2013 to 30 June 2014	Partial compliance
1 July 2012 to 30 June 2013	Partial compliance
1 July 2011 to 30 June 2012	Partial compliance

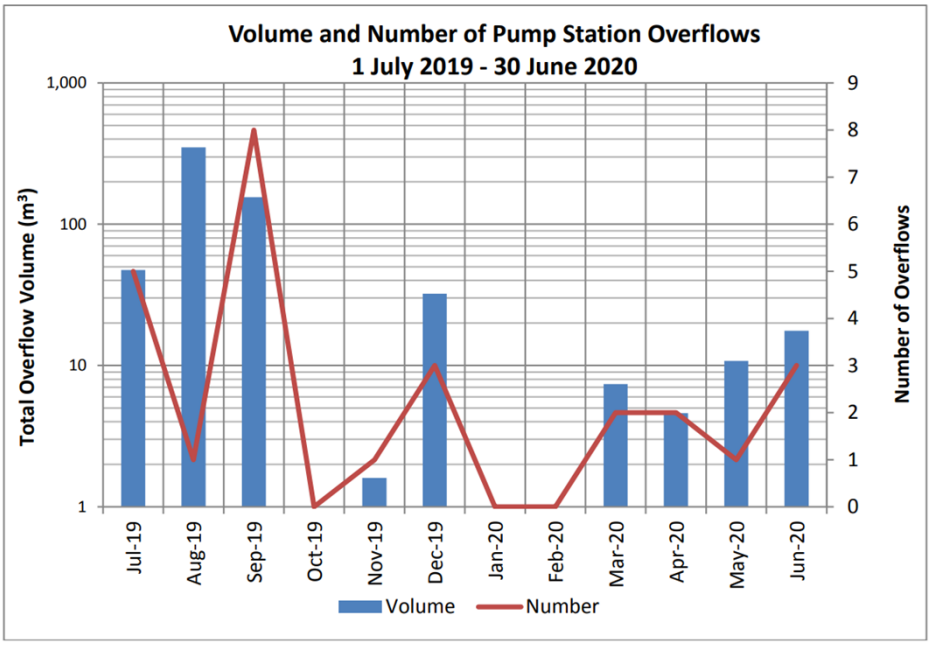
In the previous annual audit for the 2018-2019 compliance year the following required actions were noted for action by HCC. On 15/11/2019 HCC were advised of a High Level of Compliance assessment in relation to the 2018/19 audit. Based on the assessment, there was five actions required of HCC to be completed. HCC packaged up a response and this was submitted to WRC January 2020.

Resource consent	Condition Number	Action Required
AUTH108788.01.01	Water Regulation 6	Please provide water take data in an excel spreadsheet format or via telemetry to comply with regulation 6(b) – Due by next data submission date.
AUTH114674.01.02	27	Further investigation into this anomaly of the DIN sample results is required by HCC.
AUTH114675.01.01	8	Please investigate and provide a report into the efficient use of the diffuser array and its ability to discharge DIN adequately including any proposals to improve its performance. Due by 20 December 2019
AUTH134278.01.01	5	Provide WRC with an incident report including improvements and recommendations to prevent a similar occurrence of RAS sludge being discharged from site. Due by 20 December 2019
AUTH134278.01.01	6	Provide evidence of what HCC intends to do to reduce the risk of unauthorized spills and discharges from the site via the stormwater system. - Due by 20 December 2019





Waikato Regional Council data (above) and HCC data (below) on pump station spills



The HCC chart above does not appear to include the spill from Seddon wastewater pump station that occurred on 4 May 2020 when 2064m^3 of wastewater was discharged from the pump station to the Waitawhiriwhiri Stream.

3 COMPLIANCE ASSESSMENT

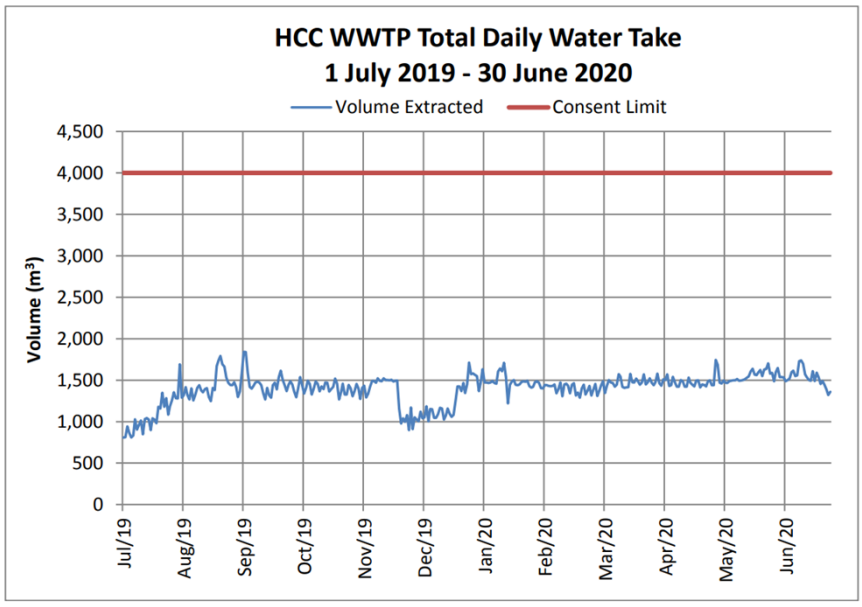
HCC has been authorised by Waikato Regional Council to undertake self-monitoring and submit their annual report for assessment by council monitoring staff. Any amendments or adjustments to the submitted annual report are discussed with HCC prior to finalising this audit.

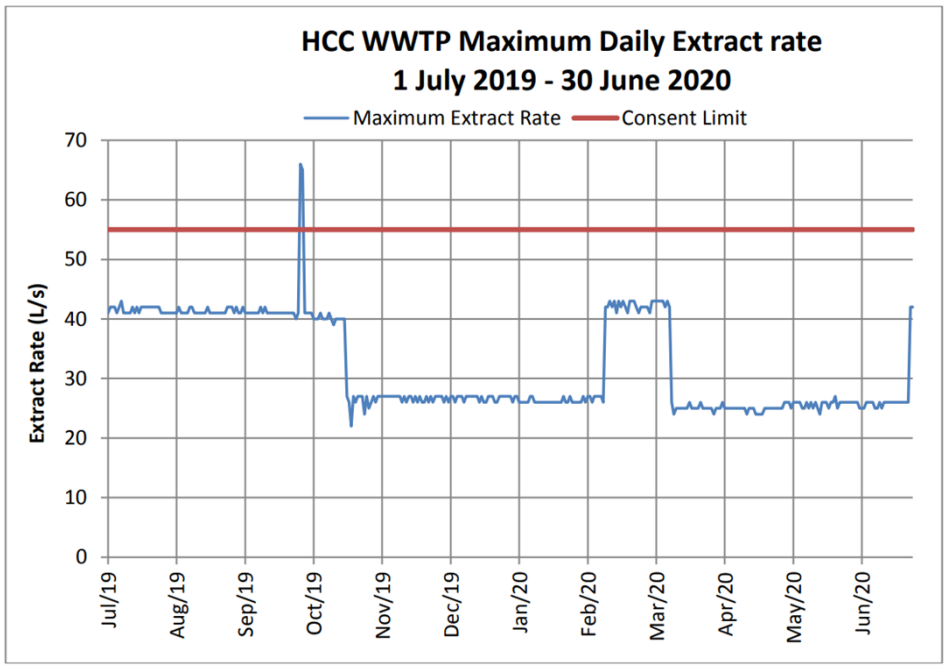
This compliance assessment has been undertaken based on the submitted annual report by the consent holder, monitoring data supplied throughout the compliance period and any site inspections undertaken. Some administration, duplicate or irrelevant conditions have been omitted for brevity.

This assessment covers the period from **1 July 2019 to 30 June 2020**. HCC submitted the annual report for these activities on 30 September 2020 (doc ref 17363016).

Please note that a description of the classification system used to describe compliance status is given in Appendix 1 of this report.

AUTH108788.01.01 - Surface water take

Activity Authorised: Take up to 4,000 cubic metres per day of water from Waikato River for sewage plant operation purposes		
Condition No.	**Description**	
1	The water take and associated structure shall be constructed, operated and maintained in accordance with the application for this resource consent and as identified in the resource consent conditions below.	
Evidence	The water take and associated structure has been constructed, operated and maintained in general accordance with the resource consent application and the conditions of this consent as outlined in the following sections. See annual report doc ref 16913004	
Status Reasoning		
Action Required		**Full compliance**
2	The maximum volume of water taken shall not exceed 4,000 cubic metres in any consecutive 24-hour period.	
Evidence	The maximum volume of water taken during the 2019/20 period was 1,842 m3 on 01/09/18.  	
Status Reasoning		
Action Required		**Full compliance**
3	The maximum abstraction rate shall not exceed 55 litres per second.	
Evidence	The maximum abstraction rate recorded over the 2019/20 period was 66 L/s which occurred 26th September 2019. On the 26 and 27th of September 2019, the AMIAD filter was recommissioned and an issue was identified. System has been improved. WRC notified 2/06/20.	



Status Reasoning	Identified error caused a non-compliant rate of take for a short period of time. Volumes taken remained compliant	
Action Required	No further action required as system has been improved to prevent a re-occurrence.	**Minor technical non-compliance**
4	The intake shall be screened with an aperture size not exceeding 5 millimetres in diameter.	
Evidence	The existing intake structure is a 3.24m2 concrete slab on the Waikato Riverbed with a 375mm pipe and 5mm diameter screen to convey water to a well chamber in front of the Outfall Building on Pukete Road. Water is pumped from this well to a small storage tank (approximately 140 m^3) within the Pukete Treatment Plant site.	
Status Reasoning		
Action Required		**Full compliance**
5	The intake pipe shall not impede the passage of fish both upstream and downstream.	
Evidence	DiveCo inspected the Raw water intake screen on the 1st of May 2020. The screen was cleared of weed and branches and cleaned. The Riverbed around the screen was also cleared of weeds. There was a 350mm clearance between the bottom of the screen and the river bed. No new damage was found on the screen.	
Status Reasoning		
Action Required		**Full compliance**
6 (a)	A water flow meter shall be installed to record the quantity of water taken on a cumulative basis. The meter shall have a reliable calibration to water flow, which shall be maintained to an accuracy of +/- 5%.	
Evidence	The electromagnetic flow meter was installed on 10/11/12 to record the quantity of water on a cumulative basis. This meter does a self-diagnostic calibration test every 40 seconds. The meter looks at the electronic values of all the components at that moment and compares them against the factory values at the time of the calibration test. If the values are within a certain tolerance, then the unit passes. If the values are out, the unit has a self-calibration mode that allows for electronic adjustment of electronic values to bring the flow meter back to factory specifications. The factory specifications are well within the +/- 5% accuracy tolerance. The meter should never need external calibration once it leaves the factory. Waikato Regional Council was provided with this explanation on 11/7/17 (HCC doc ref D-2444043).	
Status Reasoning		
Action Required		**Full compliance**

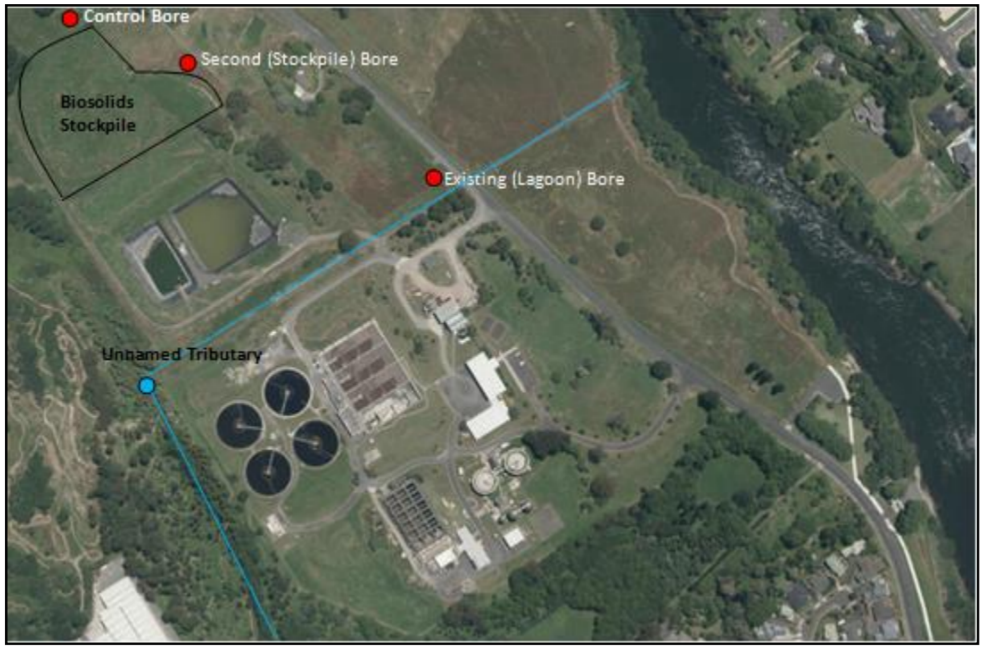
6 (b)	Access to the meter shall be provided to Waikato Regional Council staff at all reasonable times (8.00am to 5.00pm Monday to Friday).	
Evidence	Access to the meter by WRC can be gained at all reasonable times on request.	
Status Reasoning		
Action Required		**Full compliance**
7	The consent holder shall maintain a record of the daily pumping hours (the actual number and period of hours over which water was taken) and daily water usage (total daily volume) which shall be made available to the Waikato Regional Council at all reasonable times (8.00am to 5.00pm Monday to Friday). These records shall be forwarded to the Waikato Regional Council every six months from the date of commencement of this consent.	
Evidence	Records are kept of daily pumping hours and daily water usage. These records are accessible to WRC at all reasonable times on request and are forwarded on a six-monthly basis (by the 30 September and 31 March, annually). Refer to HCC doc ref D-3102710 (March to August 2019) and D-3323950 (September 2019 to February 2020) for six-monthly reports sent to WRC during the 2019/2020 reporting period. Reports sent to WRC 03/10/19 and 02/06/20. Refer to Appendix C for daily pumping hours and water usage data for the 2019/20 period. see tables	
Status Reasoning		
Action Required		**Full compliance**
8	The consent holder shall notify the Waikato Regional Council as soon as practicable and as a minimum requirement within 24 hours, of the consent holder becoming aware of the limits specified in condition 6 and 7 of this resource consent being exceeded and/or of any accidental discharge, plant breakdown, or other circumstances which are likely to result in the limits of this resource consent being exceeded. The consent holder shall, within five days of the incident occurring, provide a written report to the Waikato Regional Council, identifying the exceedance, possible causes, steps undertaken to remedy the effects of the incident and measures that will be undertaken to ensure future compliance.	
Evidence	There were no incidents as stipulated in this condition that required notification under this condition during the 2019/2020 period.	
Status Reasoning		
Action Required		**Not assessed**
9	The consent holder shall take all reasonable steps to ensure that the water abstracted under the consent is used efficiently. To this end, the consent holder shall investigate water conservation measures, in particular the reuse of treated wastewater, and provide a written report on this to the Waikato Regional Council by 2008.	
Evidence	Water conservation measures were investigated and the "Hamilton City Council – WWTP Water Audit and Alternative Supplies Study" was completed by Harrison Grierson Consultants Limited in November 2003 and was forwarded to WRC (HCC doc ref D-614196). Hamilton City Council engaged MWH to conduct an audit of water used at the plant as well as a review of the report written by Harrison Grierson. The final report was sent to WRC on 29/5/17 (HCC doc ref D-2407291).	
Status Reasoning		
Action Required		**Full compliance**
10	The consent holder shall be responsible for the structural integrity and maintenance of the intake structure and for any erosion control works that become necessary to preserve the integrity of the river bank and/or to control erosion as a result of the exercise of this resource consent. Note: A separate resource consent may be required as a result of the need to undertake erosion control works. Any such consent shall be obtained by the consent holder at their sole expense prior to any works being undertaken.	
Evidence	The intake structure was assessed last by DiveCo on 01/05/2020 (HCC doc ref D-3364343). The structural integrity of the intake structure was assessed. No new damage was found on the screen	
Status Reasoning		

Action Required		**Full compliance**
11	The consent holder shall ensure sub-contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.	
Evidence	All contractors completing site works at the Pukete Treatment Plant are made aware of their responsibilities and of all resource consent conditions by completing a site induction and a 'Permit to Work' prior to commencing any work on site.	
Status Reasoning		
Action Required		**Full compliance**
Water Regulation 6	Regulation 6: Permit holder must keep records of water taken (1) A permit holder must keep records that provide a continuous measurement of the water taken under a water permit, including water taken in excess of what the permit allows. Form of records (2) The records must comprise measurements (in cubic metres) of the volume of water taken— (a) each day; or (b) each week, but only if the permit holder has approval under regulation 9. (3) The records must be able to be combined to produce further records that cover each water year of the permit. (4) If no water is taken, the records must specify the volume of water taken as zero cubic metres. (5) The records must be kept in a format that, in the opinion of the regional council that granted the permit, is suitable for auditing. Manner in which records kept (6) The records must be kept using a device or system that— (a) measures the volume of water taken— (i) to within ±5% of the actual volume taken, for water taken by a full pipe; or (ii) to within ±10% of the actual volume taken, for water taken by another method (including by an open channel or a partially full pipe); and (b) is able to provide data in a form suitable for electronic storage; and (c) is suited to the qualities of the water it is measuring (such as temperature, algae content, and sediment content); and (d) is sealed and is as tamper-proof as practicable; and (e) is installed— (i) at the location from which the water is taken; or (ii) at the location specified by any approval granted under regulation 10 that is held by the permit holder; and (f) has been verified as accurate in accordance with regulation 7.	
Evidence	Daily water take volumes and pumping hours are recorded as required. Water take data is sent to WRC on a six-monthly basis, as required under Condition 7 of Resource Consent 108788. In addition to this, data covering the 1/7/19 to 30/6/20 period has been included in Appendix C of this report. March to August 19 sent to WRC 03/10/19, and August 19 – Feb 20 sent to WRC 02/06/2020. The flow meter is suited to the water it is measuring, provides data suitable for electronic storage, and is in a locked room within the confines of the Pukete Treatment Plant site. The flow meter conducts regular self-calibration tests to accurately measure the volume of water taken within +/- 5% at all times. Full explanation of the self-calibration of the meter is provided in Condition 6.	
Status Reasoning		
Action Required		**Full compliance**
Water Regulation 7	Regulation 7: Verification of device or system (1) This regulation specifies how a device or system that keeps records for a water permit must have been verified as accurate (verified) for the purposes of regulation 6(6)(f). (2) For records provided under regulation 8 for the permit's first water year, the device or system must have been verified before the end of that water year. (3) For records provided under regulation 8 for any later water year, the device or system must have been verified at any time in the 5-year period ending when that water year ends. (4) Verification must have been performed by a person who, in the opinion of the regional council that granted the water permit, is suitably qualified.	
Evidence	Prior to 2016, the raw water flow meter had not been verified as accurate in accordance with Regulation 7. Hamilton City Council commissioned MWH to verify the flow meter along with other meters at the Wastewater Treatment Plant in early 2016. The results of the test were not considered reliable due to the methodology used by MWH. Another attempt at verification in March by Flow services was also inaccurate. After changing the pipe work through the flow meter and therefore reducing inaccuracies of the estimation of flow, a further verification was conducted by Flow Services using an external ultrasonic flow meter. Results of this verification showed that the flow meter was reading within 1-2% of actual flow. Results and full explanation of the inaccuracies experienced were sent to WRC on 11/7/17 (HCC doc ref D-2444015).	
Status Reasoning		
Action Required		**Full compliance**
Water Regulation 8	Regulation 8: Permit holder must provide records and evidence to regional council (1) A permit holder must provide records that cover each water year of the permit to the regional council that granted the permit. (2) The records for a water year must be provided no later than 1 month after the end of the water year. (3) The records must comply with regulation 6. (4) The regional council may request evidence from the permit holder that the	

	device or system that kept the records has been verified as accurate in accordance with regulation 7. (5) The permit holder must provide the regional council with the evidence as soon as practicable after receiving the request. (6) The records or evidence must be provided— (a) in writing; or (b) electronically, if requested by the regional council.	
Evidence	Records are provided to WRC on a six-monthly basis as required under Condition 7 of Resource Consent 108788. In addition to this, data covering the 1/7/19 to 30/6/20 period has been included in Appendix C of this report. Records of water volumes are submitted within 1 month of years end in the current report. This report complies with all aspects of Regulation 6. Hamilton City Council provides data electronically in writing, which is submitted six monthly and annually as required.	
Status Reasoning		
Action Required		**Full compliance**
	Authorisation Compliance:	**Full compliance**

AUTH111029.01.02 - Land - sewage

Activity Authorised: Retain biosolids on land at the existing Hamilton City Council Wastewater Treatment Plant		
Condition No.	**Description**	
1	The retention of biosolids on land at the Hamilton City Council wastewater treatment plant site shall be undertaken in general accordance with the application for this resource consent, unless inconsistent with the resource consent conditions below.	
Evidence	The consent holder states in their annual report that: The retention of biosolids is undertaken in general accordance with the resource consent application and the conditions of this consent as outlined below.	
Status Reasoning		
Action Required		**Full compliance**
2	This resource consent shall commence on the expiry of resource consent number 960500 or upon the surrender of resource consent number 960500 whichever occurs first.	
Evidence	The consent holder states in their annual report that: Resource Consent 960500 expired on the 27th of October 2004 and resource consent 111029 commenced at that time.	
Status Reasoning		
Action Required		**Full compliance**
3	The consent holder shall ensure contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.	
Evidence	The consent holder states in their annual report that: All contractors completing site works at the Hamilton City Council Wastewater Treatment Plant are made aware of their responsibilities and of all resource consent conditions by completing a site induction and a 'Permit to Work' prior to commencing any work on site.	
Status Reasoning		
Action Required		**Full compliance**
4	The stockpiled biosolids shall be retained within the 2000 square metre site at the wastewater treatment plant at all times.	
Evidence	The consent holder states in their annual report that: All stockpiled biosolids are retained within the dedicated 2000m2 site located at the Wastewater Treatment Plant.	

	
Status Reasoning	
Action Required	**Full compliance**
5	No additional biosolids shall be added to the existing stockpiles on site except for additional biosolids from on-site lagoon de-sludging processes.
Evidence	The consent holder states in their annual report that: No new biosolids or additional biosolids from on-site lagoon de-sludging processes have been added to the stockpile during the 2019/2020 period.
Status Reasoning	
Action Required	**Full compliance**
6	There shall be no overland flow of stormwater from the stockpile area beyond the boundary of the wastewater treatment plant site.
Evidence	The consent holder states in their annual report that: There is no overland flow of stormwater from the stockpile area beyond the boundary of Pukete Treatment Plant site. All stormwater is diverted into the Pukete Treatment Plant sludge lagoons on site (see figure 1).
Status Reasoning	
Action Required	**Full compliance**
7	All stormwater drains on site shall be cleaned and maintained to the satisfaction of the Waikato Regional Council.
Evidence	The consent holder states in their annual report that: A regular maintenance programme is currently in place. All drains within the stockpile area are inspected regularly and maintained by an external contractor. Invoices are available on request. A regular maintenance programme is currently in place. All drains within the stockpile area are inspected regularly and maintained by an external contractor. Invoices are available on request.
Status Reasoning	
Action Required	**Full compliance**
8	Turning of stockpiled biosolids and re-contouring of the stockpile site may be undertaken on biosolids that have been stockpiled for at least two years.
Evidence	The consent holder states in their annual report that: There has been no turning or re-contouring of the stockpile area during 2019/2020 period

Status Reasoning		
Action Required		**Full compliance**
9	The maintenance of stockpiled biosolids, and rehabilitation of the stockpile area, shall be undertaken in such a manner that there shall be no discharge of odour, particulate matter or aerosols that causes an objectionable effect at or beyond the boundary of the wastewater treatment plant site.	
Evidence	The consent holder states in their annual report that: Maintenance within the stockpile area involves drain cleaning and spraying, fence and gate repair and mowing. All work is undertaken to ensure that an objectionable effect due to odour is not caused at or beyond the boundary of Pukete Treatment Plant. No odour complaints were received during the reporting period. WRC has not received any complaints or reports of odour beyond the site boundary in relation to this activity.	
Status Reasoning		
Action Required		**Full compliance**
10	If any complaints are received by the consent holder regarding dust, odour or other contaminants, the consent holder shall notify the Council of those complaints as soon as practicable. When/if complaints are received, the consent holder shall record the following details in a complaint log: (i) time and type of complaint including details of the incident, e.g. duration, any effects noted; (ii) name, address and contact phone number of the complainant (if provided); (iii) location from which the complaint arose; (iv) the weather conditions and wind direction at the time of complaint; (v) the likely cause of the complaint; (vi) the response made by the consent holder any corrective action undertaken by the consent holder in response to the complaint; and (vii) future actions proposed as a result of the complaint. The consent holder shall also record in the Complaints Log any complaints forwarded to it by the Regional Council or any Territorial Authority. The complaint log shall be made available to the Council at all reasonable times and a copy shall be forwarded to the Council by 30 September each year that this consent is current.	
Evidence	The consent holder states in their annual report that: There were no odour complaints in the 2019/2020 year. WRC has not received any complaints or reports of odour beyond the site boundary in relation to this activity.	
Status Reasoning		
Action Required		**Full compliance**
11	Complaints received by the consent holder which may infer non-compliance with the conditions of this consent shall be forwarded to the Waikato Regional Council within 5 days of the complaint being received.	
Evidence	The consent holder states in their annual report that: There were no odour complaints during the 2019/2020 year. All odour complaints are recorded in the council system, and forwarded to WRC within 5 days.	
Status Reasoning		
Action Required		**Full compliance**
12	The consent holder shall undertake the following monitoring; (a) Weekly monitoring of the stockpile site for stability, drainage, pests, odour and security; (b) Monthly monitoring of the existing bore for pH, Total Nitrogen, ammoniacal nitrogen, Total Phosphorus, and conductivity; (c) Annual monitoring of the existing bore for Arsenic, Chromium, Zinc, Nickel, Copper, Mercury, Lead and Cadmium; (d) Monthly monitoring at a second bore for pH, Total Nitrogen, ammonia, Total Phosphorus, and conductivity; (e) Annual monitoring at a second bore for Arsenic, Chromium, Zinc, Nickel, Copper, Mercury Lead and Cadmium.	
Evidence	The consent holder states in their annual report that: a) Weekly monitoring of the stockpile for stability, drainage, pests, odour and security is completed by the Compliance Team when practicable. HCC Asset Maintenance Team currently undertakes maintenance of the stockpile on a regular schedule. b) All monthly monitoring was undertaken as required by the IANZ accredited Shared Services Laboratory. See all results for the existing (lagoon) and second (stockpile) bore in the tables below. All results are submitted to WRC monthly as part of the Resource Consent 114674 and 111029 monthly report. (see tables) c) All annual metal/metalloid monitoring was undertaken as required by the IANZ accredited Shared Services Laboratory on 11/05/2020(Table 3). IANZ accredited Shared Services Pukete Treatment Plant full compliance	

	report for May 2020 and Hills Laboratories Analysis Report are available on request. d) All monthly monitoring was undertaken as required by the IANZ accredited Shared Services Laboratory. See all results for the existing (lagoon) and second (stockpile) bore in the tables below. All results are submitted to WRC monthly as part of the Resource Consent 114674 and 111029 monthly report. e) All annual metal/metalloid monitoring was undertaken as required by the IANZ accredited Shared Services Laboratory on 11/05/2020(Table 3). IANZ accredited Shared Services Pukete Treatment Plant full compliance report for May 2020 and Hills Laboratories Analysis Report are available on request.	
Status Reasoning		
Action Required		**Full compliance**
13	Within six months of the commencement of this consent the consent holder shall install a control bore up-gradient of the groundwater flow at the stockpile site. Prior to the construction and installation, the consent holder shall consult with the Waikato Regional Council over the location of this bore.	
Evidence	The consent holder states in their annual report that: A control bore was installed on the 6/7/05 and monitoring has commenced from this location following consultation with WRC.	
Status Reasoning		
Action Required		**Full compliance**
14	The consent holder shall monitor for arsenic within the control bore on an annual basis.	
Evidence	The consent holder states in their annual report that: Annual monitoring results for metals/metalloids for the control bore are shown in table 3.	
Status Reasoning		
Action Required		**Full compliance**
15	Each year that this consent is current the consent holder shall provide the Waikato Regional Council with an annual monitoring report by 30 September. The monitoring report shall contain the monitoring results as set out in conditions 12 and 14 of this consent and any other matters the consent holder considers necessary.	
Evidence	The consent holder states in their annual report that: Hamilton City Council provides an annual monitoring report within the Pukete Treatment Plant Annual Report as per the requirements of this condition. Annual report was submitted on 30 September 2020.	
Status Reasoning		
Action Required		**Full compliance**
16	The consent holder shall ensure that the exercise of this consent does not disturb sites of spiritual or cultural significance to Tangata Whenua. In the event that any archaeological remains are discovered the works, in the immediate vicinity, shall cease immediately and the Waikato Regional Council shall be notified within 48 hours. Works may recommence with the written approval of the Waikato Regional Council. Such approval shall only be given after the Waikato Regional Council has considered: i. Tangata Whenua interests and values; ii. The consent holder's interests; and iii. Any archaeological or scientific evidence.	
Evidence	The consent holder states in their annual report that: There have been no sites at the Pukete Treatment Plant that have been identified as being of spiritual or cultural significance to Tangata Whenua.	
Status Reasoning		
Action Required		**Full compliance**
17	The Waikato Regional Council may in the month either side of the fifth, tenth, fifteenth, twentieth, twenty fifth and thirtieth anniversary of the commencement of this consent, serve notice on the consent holder under section 128 (1) of the Resource Management Act 1991, of its intention to review the conditions of this resource consent for the following purposes: (a) to review the effectiveness of the conditions of this resource consent in avoiding or mitigating any adverse effects on the environment, in particular effects on groundwater quality, soil quality (adverse effects over and above those already considered), air quality and aesthetics, from the exercise	

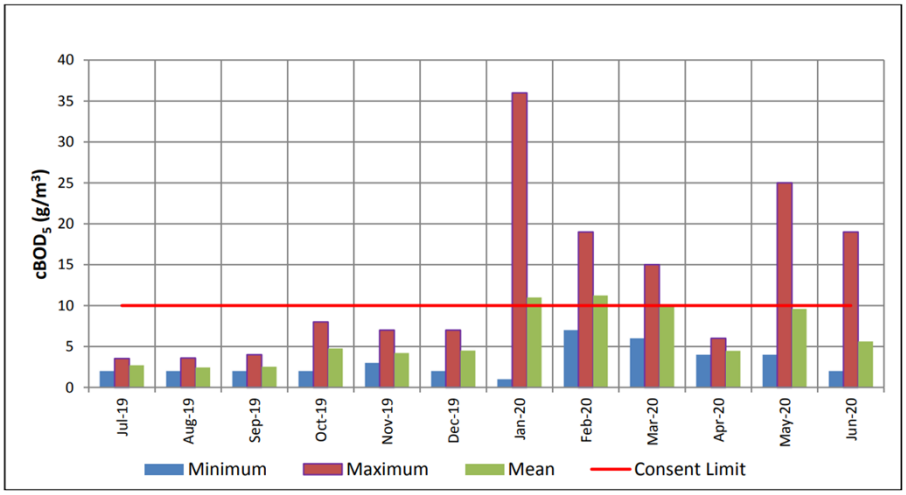
	of this resource consent and if necessary to avoid, remedy or mitigate such effects by way of further or amended conditions; or (b) if necessary and appropriate, to require the holder of this resource consent to adopt the best practicable option to remove or reduce adverse effects on the surrounding environment due to contaminants entering groundwater or air; or (c) to review the adequacy of and the necessity for monitoring undertaken by the consent holder; or (d) to require additional improvements to reduce the level of odour occurring from the site. Costs associated with any review of the conditions of this resource consent will be recovered from the consent holder in accordance with the provisions of section 36 of the Resource Management Act 1991.	
Evidence	This consent commenced in October 2004. The next review period will be September to November 2024.	
Status Reasoning		
Action Required		**Not assessed**
	Authorisation Compliance:	**Full compliance**

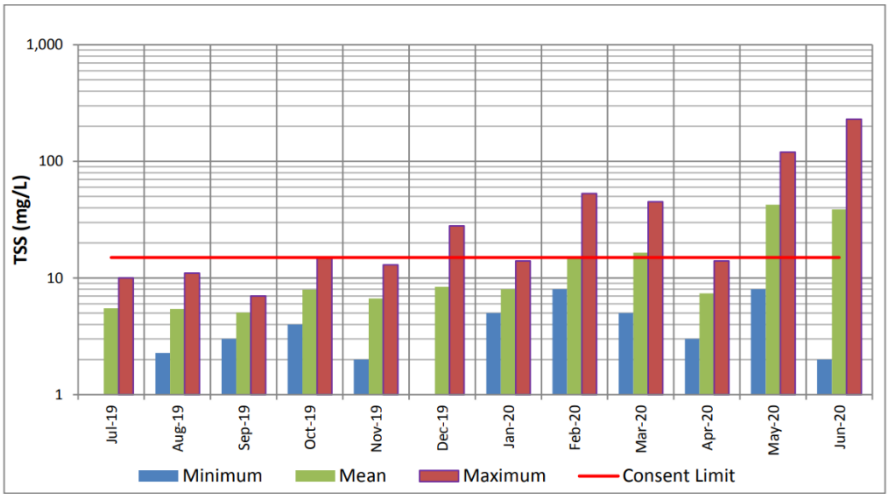
AUTH114674.01.02 - Water - sewage

Activity Authorised: To change three conditions of Resource Consent AUTH114674.01.01 that authorises the discharge of treated wastewater to the Waikato River from Hamilton City Council Pukete Wastewater Treatment Plant.		
Condition No.	**Description**	
1	The discharge shall be in undertaken in general accordance with the following document: (a) Resource Consents Application: Assessment of Effects on the Environment. Application Edition: May 2006; unless inconsistent with the conditions below which shall prevail.	
Evidence	The consent holder states in their annual report that: *The Pukete Treatment Plant operation is undertaken in general accordance with the document listed above and as assessed in the conditions below.*	
Status Reasoning		
Action Required		**Full compliance**
2	The consent holder shall ensure contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.	
Evidence	All contractors completing site works at the Hamilton City Council Wastewater Treatment Plant are made aware of their responsibilities and of all resource consent conditions by completing a site induction and a 'Permit to Work' prior to commencing any work on site	
Status Reasoning		
Action Required		**Full compliance**
3	The discharges to water associated with this consent shall be managed and operated by an appropriately trained operator.	
Evidence	The discharges to water of the Pukete Treatment Plant are managed and operated by appropriately trained operators.	
Status Reasoning		
Action Required		**Full compliance**
4	This resource consent is granted by the Waikato Regional Council subject to its officers or agents being permitted access to the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.	

Evidence	Access to the Pukete Treatment Plant by WRC officers can be gained at all reasonable times. Unless an onsite induction has been completed, WRC staff must be accompanied on the site to ensure HCC Health and Safety processes are adhered to.	
Status Reasoning		
Action Required		**Full compliance**
6	The maximum volume of treated wastewater discharged shall not exceed 224,000 cubic metres per day.	
Evidence	The maximum daily volume discharged was on 4 July 2019 when 85,954m3	
Status Reasoning		
Action Required		**Full compliance**
8	cBOD5 Over each calendar month, no more than 8 exceedances over 10 g/m^3, and; Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedances over 50 g/m^3. Suspended solids - Over each calendar month, no more than 8 exceedances over 15 g/m^3, and; Over each quarter (January to March, April to June, July to September and October to December, inclusive) no more than 3 exceedances over 100 g/m^3	
Evidence	$cBOD_5$	
Status Reasoning	cBOD5 had two months with an exceedance of one sample in each month of 19.0 and 15.0 g/m^3. There had been higher results (up to 36g/m3) during the year but not in excess of the 8 permitted exceedances. It is unlikely that these two minor exceedances would have any noticeable adverse effect on the receiving water. The cBOD5 load was on the limit in January 2020 with 8 exceedances during the month. The highest daily load was 1510kg/day whereas the mean average is usually in the range of 132 to 487kg/day.	

	$cBOD_5$ Concentration						
	No. Samples	Mean (g/m^3)	Minimum (g/m^3)	Maximum (g/m^3)	No. > 10g/m^3	No. > 50g/m^3	Quarterly
Jul-19	16	3	2	4	0	0	
Aug-19	19	2.4	2.0	3.6	0	0	0
Sep-19	17	2.5	2.0	4.0	0	0	
Oct-19	17	4.8	2.0	8.0	0	0	
Nov-19	18	4.2	3.0	7.0	0	0	0
Dec-19	18	4.5	2.0	7.0	0	0	
Jan-20	17	11.0	1.0	36.0	0	0	
Feb-20	17	11.2	7.0	19.0	9	0	0
Mar-20	19	10.0	6.0	15.0	9	0	
Apr-20	17	4.5	4.0	6.0	0	0	
May-20	17	9.6	4.0	25.0	6	0	0
Jun-20	18	5.6	2.0	19.0	2	0	



	Suspended solids – there were 4 exceedances above the limit of 8 that are permitted in May 2020. The maximum exceedance was 120g/m^3 amongst the 4 excessive samples. In the following month of June 2020 there was a single result of 230g/m^3 which was included within the 8 permitted exceedances of 15g/m^3 for the month. The suspended solids load was also returning 3 more exceeding samples than the permitted 8 with a maximum daily load of 11,800kg/day in June. There is a worrying upward trend in suspended solids maximum concentration for the period December 2019 through June 2020. This has since come right with the July and August sample results all coming back into compliance.  	
Action Required	HCC must investigate and take actions to prevent a re-occurrence of the exceedances and report on the increasing trend in TSS since December 2019.	**Low priority non-compliance**
10	The consent holder shall continuously monitor the flow rate of treated wastewater entering the outfall pipe and shall record the daily total volume discharged.	
Evidence		
Status Reasoning		
Action Required		**Full compliance**
11	The consent holder shall define a sampling location, or locations, for monitoring of parameters in conditions 7, 8 and 9. This location, or locations, shall be to the satisfaction of the Waikato Regional Council.	
Evidence	Monitoring locations for measuring parameters in conditions 7, 8 and 9 have been defined and meet the requirements of WRC.	
Status Reasoning		
Action Required		**Full compliance**
12	The consent holder shall take grab samples (between the hours of 10am and 4pm) and 24-hour flow weighted composite samples of treated wastewater on at least 4 days each week from the sampling location specified in condition 11 of this consent. The samples shall be analysed for the constituents and at the frequencies and detection limits listed within the conditions of this consent and within Schedule 1 attached to this resource consent. Note 1: Whole effluent toxicity testing shall be conducted in accordance with Schedule 1 footnote vii unless varied with the written approval of Environment Waikato. Note 2: All quality analyses of the wastewater discharged shall be undertaken by an IANZ accredited or equivalent laboratory. All methodologies adopted shall be appropriate for wastewater analyses and be to the satisfaction of Environment Waikato.	
Evidence	All samples are taken and analysed by the IANZ accredited Shared Services Laboratory as outlined in this condition and Schedule 1.	

Status Reasoning		
Action Required		**Full compliance**
13	The consent holder shall, on receipt of any treated wastewater E. coli result exceeding 5000 cfu/100ml, ensure that an additional treated wastewater grab sample is taken immediately, and that a further two samples are taken at intervals of not less than two hours. All samples are to be tested for E. coli and, in the event any one of the three additional samples also exceeds 5000 cfu/100ml, the consent holder shall: i) Notify the Waikato Regional Council and Medical Officer of Health of the Waikato District Health Board as soon as practicable and no later than 48 hours afterwards; and ii) Record the reasons why the situation occurred, the actions taken by the consent holder, and an assessment of what measures can be adopted in the future to minimise such occurrences, and, if requested, shall provide a report to the Group Manager, Waikato Regional Council and the Medical Officer of Health.	
Evidence	The consent holder states in their annual report that: Compliant E.coli results for the year 2019/20	
Status Reasoning		
Action Required		**Full compliance**
14	The consent holder shall in 2012 and thereafter on a five yearly basis undertake an investigation into the likelihood of viral pathogens and organic chemicals (including but not limited to endocrine disrupting chemicals and steroidal hormones) entering the river water from the discharge. An analysis of the likely removal of viral pathogens and substances within each stage of the treatment system (including bypasses) shall be made and based on actual results. The results of this investigation shall be compared with any relevant literature on the subject on removal of viral pathogens and organic chemicals within treated wastewater and their environmental fate/public health risk. A copy of the investigation and comparison shall be supplied to the Waikato Regional Council by 1 December each year the investigation is required to be undertaken.	
Evidence	The investigation into Viral Pathogens and organic chemicals was completed and submitted September 2019.	
Status Reasoning		
Action Required		**Full compliance**
15	The consent holder shall, no later than 36 months after the commencement of this consent, ensure that: a) Measurements for each of the following parameters are recorded: i) the instantaneous flow rate at each UV channel in the disinfection facility, ii) the instantaneous UV intensity at 254nm within each UV Bank b) Continuous recorders for those items listed above in 15(a) are to be provided and maintained in good working order. c) An alarm system connected to a 24-hour manned station is to be provided and maintained, and shall be activated: i) when the power supply to the disinfection facility has been interrupted; or ii) in the event of any mechanical or electrical failure of the monitoring system specified in 15(a) or any other failure in the control system for the disinfection facility for more than 30 minutes. d) All recorded monitoring data specified in this condition is to be kept on site for a minimum of three years. The monitoring records shall be made available to the Waikato Regional Council and included within the annual monitoring report as detailed within condition 17 below.	
Evidence	The condition specified became operative in September 2010. a) Measurements for instantaneous flow rate and UV intensity at 254nm within each UV bank. b) The measurements are recorded continuously by well-maintained instruments. c) The alarm system is in place with the required specifications and is connected with the on-call Duty Operator at the Plant. d) Due to the large amount of UV data and limited storage capacity, HCC is unable to keep this any longer than one year on the plants control system. Data prior to this is stored on a separate server. Data Trends UV Data for the 2019/20 year has been sent through with this report.	
Status Reasoning		
Action Required		**Full compliance**
16	The consent holder shall provide to the Waikato Regional Council, via electronic means and on a monthly basis, a copy of the monthly data as required via conditions 7 or 8 (whichever is applicable) and 9, 10, 12 and 13. In the event that the median total nitrogen mass-load exceeds 450 kg/day and/or the median total phosphorus mass-	

	load exceeds 95 kg/day in any summer month (Dec-May inclusive), the consent holder shall report on the reasons for that exceedance and any actions being undertaken to reduce the level in subsequent months to ensure compliance with conditions 8 and 9. In addition monthly data supplied to the Waikato Regional Council shall include details of any discharges from pump stations within the reticulation system stating the reason(s) for the discharge, nature of the discharge, duration of the discharge, estimated volume discharged, weather conditions at the time of the discharge and fate of the wastewater discharged.	
Evidence	Hamilton City Council provide WRC with data as required under condition 8, 9, 10, 12 and 13 in a monthly report. Pump station discharge incidents are reported to WRC as they occur and in the monthly summary. Data is recorded in a spreadsheet at WRC that has been compiled since April 2011.	
Status Reasoning		
Action Required		**Full compliance**
17	The consent holder shall provide to the Waikato Regional Council a written report by 30 September each year, which addresses the following: i) A summary of the daily volume discharged; ii) A summary of the monitoring results required by conditions 7 or 8 (whichever is applicable), 9, 10, 15 of this consent, and a discussion of any environmentally important trends identified; iii) Comment on compliance with conditions 7 or 8 (whichever is applicable) and 9 of this resource consent; iv) General comment on the functioning of the Tangata Whenua Wastewater Liaison Group; v) Any reasons for non-compliance or difficulties in achieving compliance with the conditions of this resource consent; vi) A record of bypass events, including volume, duration, causes, health risks and steps taken to avoid reoccurrence; and vii) Any other issue considered relevant by the consent holder.	
Evidence	An annual report is completed as per condition 17 requirements. Information and data about all the bypass events that occurred at the plant over 2019/20 are provided in Table 22.	
Status Reasoning		
Action Required		**Full compliance**
18	The consent holder shall notify the Waikato Regional Council within 24 hours (where practicable) of the consent holder becoming aware of any non-compliance with conditions of this resource consent, or of any accidental discharge, plant breakdown or other circumstance that is likely to result in an exceedance of the limits of this resource consent. The consent holder shall, within 10 working days of the incident occurring, provide a written report to the Waikato Regional Council, identifying the breach, possible causes and steps to ensure future compliance.	
Evidence	Notifications to WRC are completed within required time frames by HCC to Waikato Regional Council as per the requirements of Condition 18. All Pukete Treatment Plant notifications are logged electronically on the 'Wastewater Treatment Plant & Water Treatment Station – Notification Log' (HCC doc ref D-851868).	
Status Reasoning		
Action Required		**Full compliance**
19	The consent holder shall provide the Waikato Regional Council with a Management Plan which details the procedures that will be implemented to operate in accordance with the conditions of this consent. This Plan shall be lodged with the Waikato Regional Council within one year of the commencement of this consent and shall be reviewed and updated 36 months following the commencement of this consent and thereafter on a three-yearly basis. The consent holder shall undertake the treatment and disposal of treated wastewater generally in accordance with the Management Plan. The Plan shall address, but is not limited to, the following: i) a description of the wastewater treatment plant; ii) a description of the sequence, timing and methods of construction of upgrades to the treatment plant; iii) a description of routine inspection and maintenance procedures to be undertaken with respect to the treatment plant and discharge structures; iv) an outline of the methods to be utilised to monitor the treatment plant in an operational sense including: • monitoring of influent wastewater; • monitoring of treatment performance; v) specific management procedures for the efficient functioning of the treatment system; vi) procedures for recording routine maintenance and all repairs that are undertaken; vii) chain of command and responsibility, and notification protocols; viii) description of alarms; ix) trouble shooting procedures; x) contingency measures in place to deal with unusual events; xi) a bypass strategy that includes operating procedures and current planning to minimise the occurrence of bypass	

	events as far as is practicable; xii) other actions necessary to comply with the requirements of this resource consent; and xiii) procedures for improving and/or reviewing the Management Plan. The consent holder shall manage the wastewater treatment and discharge in accordance with the management plan outlined in this condition. Any changes to the management plan shall be notified in writing to the Waikato Regional Council.	
Evidence	A review of Management Plan was undertaken after one year, as per the requirements of Condition 19. Last review was September 2019, The next review of the management plan is September 2022.	
Status Reasoning		
Action Required		**Full compliance**
20	The consent holder shall engage appropriately experienced persons to compile a plan that details contingency measures that will be put in place in the event of any bypasses, other extraordinary events or failure of any critical part of the treatment plant. This plan shall identify measures and notification protocols to be undertaken by the consent holder that will take into account any potential adverse effects on river users, including but not limited to downstream abstractors and the Medical Officer of Health. This plan shall be provided to the Waikato Regional Council within 3 months of the commencement of this consent to a standard acceptable to the Waikato Regional Council. Subsequently this contingency plan shall be updated at three yearly intervals with updated copies supplied to the Waikato Regional Council.	
Evidence	The Contingency plans will be reviewed and updated to align with the upgrades & capital improvements happening at the WWTP.	
Status Reasoning		
Action Required		**Full compliance**
21	The consent holder shall maintain and keep a complaints register for all complaints made about the treatment plant and discharge site received by the consent holder. The register shall record: i) the date, time and duration of the event/incident that has resulted in the complaint, ii) the location of the complainant when the event/incident was detected, iii) the possible cause of the event/incident, iv) any corrective action taken by the consent holder in response to the complaint. The register shall be available to the Waikato Regional Council at all reasonable times. Details of all complaints received by the consent holder shall be forwarded to the Waikato Regional Council within 5 working days of the complaint being received, unless as otherwise authorised by the Waikato Regional Council.	
Evidence	All complaints received are investigated and logged onto the 'Wastewater Treatment Plant Complaints Register' electronic version (HCC doc ref D-814107). There were no odour complaints during the 2019/20 compliance year.	
Status Reasoning		
Action Required		**Full compliance**
22	consent holder shall submit to the Waikato Regional Council a Monitoring and Technology Review Report no later than 30 September 2009 and thereafter at three yearly intervals, for the duration of the consent. The scope of the assessment should address, but not limited to, the following: i) Ongoing compliance with the requirements of this resource consent particularly in relation to any reported non-compliance with consent conditions; ii) An assessment of compliance/consistency with any relevant national, or regional water quality policies, standards or guidelines in effect at the time. iii) An assessment of the results of the permit holder's monitoring undertaken in accordance with the resource consent, including the adequacy and scope of such monitoring. iv) A summary of any major improvements made to the reticulation, treatment or disposal system since the commencement of consent that are likely to have an effect on the exercise of this consent. v) A summary of any residual actual or potential effects of the discharge, irrespective of whether those effects are in accordance with the conditions of the consent. vi) Outline of significant technological changes and advances in relation to wastewater management, treatment, disposal and beneficial use technologies, which may be available to address any residual adverse effects of the discharge. vii) An assessment of whether any such options or combination of options represent the Best Practicable Option to minimise the effects of the discharge and whether the permit holder intends to incorporate such changes. viii) Information relating to the use, development and success of alternative wastewater disposal techniques in New Zealand, in particular land-	

	based disposal, and their relevance and possible application to Hamilton City's situation.	
Evidence	The next three yearly review is required to be submitted to WRC by 30/9/21.	
Status Reasoning		
Action Required		**Full compliance**
23	The consent holder shall establish and retain for the duration of this consent a Hamilton City Council – Tangata Whenua Wastewater Liaison Group. The consent holder shall provide reasonable organisation and administrative support to facilitate the development and ongoing role of this Liaison Group. Membership of the Liaison Group shall be determined as a minimum in consultation with the Waikato Raupatu Trustee Company, Ngati Te Ata, Ngati Tamaoho Trust and the Turangawaewae Board of Trustees. i) The Liaison Group shall meet at least annually to exercise the functions set out below. ii) The Liaison Group shall establish its own meeting protocols having regard to the customary practices of tangata whenua and those established between the consent holder, Tainui, Nga Mana Toopu O Kirikiriroa or any other mana whenua group and shall operate in accordance with the principles of the Treaty of Waitangi, especially the principles of consultation, active participation and partnership. iii) The functions of the Liaison Group shall include, but not be limited to, the following: a) Review the general performance of Hamilton's Wastewater Treatment Plant and the discharge including any changes to its operation; b) Review of the results of monitoring and the associated assessment of monitoring information carried out in accordance with the conditions of this consent. c) Receipt of and comments on the Annual Report; d) Receipt of and comments on the Management Plan; e) Receipt of and comments on the Monitoring and Technology Review Report; f) To make suggestions to the consent holder and/or Waikato Regional Council as to any physical measures and initiatives further needed to address actual or potential effects of the Hamilton City Council Wastewater Scheme; g) To make suggestions as to any additional investigations, including those relating to land based disposal, the consent holder might undertake in respect of actual or potential effects; h) To make recommendations to the Waikato Regional Council not later than one month prior to the dates specified in condition 24 on issues raised by tangata whenua relating to, amongst other matters, the Annual Plan, the Management Plan and the Monitoring and Technology Review, and how such issues were addressed by the applicant; and i) Consideration of other issues raised by tangata whenua.	
Evidence	Hamilton City Council recognises the relationship of Waikato-Tainui with the Waikato River, including their economic, social, cultural and spiritual relationships. Monthly scheduled meetings are held with Waikato Tainui representatives. Purpose of the catch up is to regularly meet to discuss work/ programmes /opportunities of interest. Where appropriate the meeting may be used to discuss specific matters, programmes, etc. Precursor to every meeting is an updated work schedule from HCC to Waikato Tainui and agenda to keep the conversations focused.	
Status Reasoning		
Action Required		**Full compliance**
24	The Waikato Regional Council may in January, February or March of 2013, 2018 and 2023 serve notice on the Consent Holder under Section 128 (1) of the Resource Management Act 1991, of its intention to review the conditions of this resource consent for the following purposes: i) to review the effectiveness of the conditions of this resource consent 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 ii) if necessary and appropriate, to require the holder of this resource consent to adopt the best practicable option to remove or reduce adverse effects on the surrounding environment; or iii) to require the consent holder to assess the need for further treatment to improve pathogen removal within the treated wastewater discharge and if necessary reduce the E.coli limit as specified within condition 8 of this consent; or iv) to require the consent holder to assess the need for further nutrient removal within the treated wastewater discharge over summer and winter and if necessary reduce the limits as specified within condition 8; or v) to require the consent holder, in conjunction with Waikato Regional Council staff, to assess the winter/summer definitions as defined within conditions 8 and 9 and if necessary change the definition of winter/summer as detailed within the conditions of this consent; or vi) to review the adequacy of and the necessity for monitoring undertaken by the consent holder; or vii) to respond to concerns raised by the Tangata Whenua Wastewater Liaison Group.	
Evidence	The next review period available to WRC is in 2023	

Status Reasoning		
Action Required		**Full compliance**
25	Within 12 months of the Crown settling any claim made under the provisions of the Treaty of Waitangi Act 1975 Waikato Regional Council may, following service of notice on the Consent Holder, commence a review of the conditions of this consent pursuant to s128(1)(a) of the RMA, for the purpose of ensuring that this consent is in alignment with the provisions of any such settled claim.	
Evidence		
Status Reasoning		
Action Required		**Not assessed**
26	The discharge of treated wastewater to the Waikato River shall be via a multi-port in-river diffuser unless use of the by-pass outfall is authorised via condition 28 of this consent.	
Evidence	Discharge of treated wastewater is via a multiport in-river diffuser. The diffuser was bypassed from the 11th of June and returned to operation on the 18th of June. The alternative river outfall was put into service to allow divers to enter the outfall line under the riverbed and complete an internal inspection of the pipework. WRC was notified on the 08/06/2020 HPE Doc: D-3330249.	
Status Reasoning		
Action Required		**Full compliance**
27	The consent holder shall demonstrate, on an annual basis, uniformity of mixing by sampling surface water at five points across the main flow of the river at a distance of 300 metres downstream of the outfall. Using appropriate methods to demonstrate wastewater mixing, the concentration in the five river samples shall be uniform within plus or minus 20 percent. The consent holder shall also demonstrate that the concentrations in the left bank littoral margin are within or less than the range of concentrations determined for the main flow.	
Evidence	The WWTP Whole Effluent Toxicity Testing and River Mixing Study was sampled for on the day of the Covid-19 lockdown announcement (Monday 23rd March), NIWA informed HCC that morning that they would be shutting down and wouldn't test the samples. May 2020 they contacted HCC again and said they might be able to test the collected samples retrospectively, but then discovered that the river samples hadn't been prepped properly before they shut down. They can do a sort of testing on it, but it won't be exactly as scoped. HCC have requested that the samples be rescheduled, and the samples were re-taken in August. The testing/ reporting is still in progress at NIWA and will be forwarded to WRC once received.	
Status Reasoning		
Action Required		**Minor technical non-compliance**
28	In the event of planned inspections and/or maintenance of the main Waikato River outfall and/or the diffusers the consent holder may utilise the by-pass outfall for treated wastewater discharge direct to the Waikato River. The consent holder shall notify the Waikato Regional Council a minimum of ten working days in advance of the intention to utilise the by-pass outfall. This notification shall include information on the reason(s) for the proposed use of the outfall, the anticipated date(s) and duration of usage, and the proposed monitoring and mitigation measures, and notification and reporting procedures, that the consent holder will undertake. Written approval for the use shall be obtained from the Waikato Regional Council prior to any discharge from the by-pass outfall occurring.	
Evidence	The diffuser was bypassed from the 11th -18th of June. The alternative river outfall was put into service to allow divers to enter the outfall line under the riverbed and complete an internal inspection of the pipework. WRC was notified on the 08/06/2020 HPE Doc: D3330249.	
Status Reasoning		

Action Required		**Full compliance**
	Authorisation Compliance:	**High level of compliance**

AUTH114676.01.01 - Air - odour

Activity Authorised: Discharge contaminants to air from activities associated with the operation of the Hamilton WWTP		
Condition No.	**Description**	
1	The treatment plant processes and equipment shall be maintained and operated in general accordance with the following document; (a) Resource Consents Application: Assessment of Effects on the Environment. Application Edition: May 2006; unless inconsistent with the conditions below which shall prevail.	
Evidence	The Pukete Treatment Plant is operated in general accordance with the document listed and as assessed in the conditions below.	
Status Reasoning		
Action Required		**Full compliance**
2	The consent holder shall ensure contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.	
Evidence	All contractors completing site works at the Pukete Treatment Plant are made aware of their responsibilities and of all resource consent conditions by completing a site induction and a 'Permit to Work' prior to commencing any work on site.	
Status Reasoning		
Action Required		**Full compliance**
3	This resource consent is granted by the Waikato Regional Council subject to its officers or agents being permitted access to the property at all reasonable times for the purpose of carrying out inspections, surveys, investigations, tests, measurements or taking samples.	
Evidence	Access to the Pukete Treatment Plant by WRC Officers can be gained at all reasonable times. WRC Officers must be accompanied on the site to ensure HCC Health and Safety procedures are adhered to, unless onsite induction has been completed.	
Status Reasoning		
Action Required		**Full compliance**
5	The consent holder shall operate, manage and maintain the Hamilton Wastewater Treatment Plant in a manner that employs the best practicable options to prevent or minimise the discharge of objectionable or offensive odours at or beyond the boundary of the wastewater treatment plant site.	
Evidence	No reports or complaints of odour have been received by WRC during this compliance period.	
Status Reasoning		
Action Required		**Full compliance**
6	The operation, management and maintenance of the Hamilton Wastewater Treatment Plant shall not result in an odour that is objectionable to the extent that it causes an adverse effect at or beyond the boundary of the subject property on which the treatment plant is located.	
Evidence	Site walkovers (odour walks) are carried out when the operation, management or maintenance of the plant poses a risk that objectionable odour may cause an adverse effect beyond the boundary. These occasions are highlighted in the notifications HCC send to WRC of any works that are to be carried out that may pose risk to (in this consent) odour. Site walkovers under this consent are recorded electronically (HCC doc ref D-2406284). There have been no adverse effects at or beyond the boundary caused by objectionable odour originating from the plant	

Status Reasoning		
Action Required		**Full compliance**
7	There shall be no discharge of gaseous emissions as a result of the activities authorised by this resource consent to the extent that it causes an adverse effect at or beyond the boundary of the subject property on which the treatment plant is located.	
Evidence	Site walkovers (odour walks) are carried out when the operation, management or maintenance of the plant poses a risk that objectionable odour may cause an adverse effect beyond the boundary. These occasions are highlighted in the notifications HCC send to WRC of any works that are to be carried out that may pose rick to (in this consent) odour. Site walkovers under this consent are recorded electronically (HCC doc ref D-2406284). There have been no adverse effects at or beyond the boundary caused by objectionable odour originating from the plant.	
Status Reasoning		
Action Required		**Full compliance**
8	The consent holder shall prepare an Odour Management Plan. This plan shall be lodged with the Waikato Regional Council within one year of commencement of this consent. The Odour Management Plan shall be reviewed and updated as a minimum on a three-yearly basis. This plan shall detail the methods and operational procedures adopted by the consent holder to ensure that the conditions of this consent are complied with. As a minimum the Odour Management Plan shall address the following; i) Details of the operating and maintenance regime for all ventilation systems, odour masking systems, Flocor Tower, liming, covering, storage and disposal of grit screenings, biogas flaring system, and the floating roof mesophilic digestors; and ii) Details of the operating and maintenance regime for the biofilter(s) including specification of the optimal operating range for pH, moisture content and back pressure, the monitoring regime for these parameters, the action that will be taken in the event of the filter becoming “out of range” for any of these parameters, and the maintenance procedures; and iii) Details of biosolids movement at the biosolids dewatering building including ingress, egress and covering of trucks and covering of stored biosolids stockpiles; and iv) Details of the odour complaints procedure, record keeping and response procedure.	
Evidence	The ‘Wastewater Treatment Plant Management Plan,’ reviewed in September 2019 (HCC doc ref D-3072538). The Odour Management Plan was integrated into this document so that all management for resource consents at Pukete were in one document. The Wastewater Treatment Plant Management Plan has been completed and forwarded to WRC on the 27th of September 2019.	
Status Reasoning		
Action Required		**Full compliance**
9	The consent holder shall maintain and keep a complaints register for all complaints made about the treatment plant and discharge site received by the consent holder. The register shall record: i) The date, time and duration of the event/incident that has resulted in the complaint, ii) Weather conditions at the time the event/incident was detected by the complainant; iii) The location of the complainant when the event/incident was detected, iv) The possible cause of the event/incident, v) Any corrective action taken by the consent holder in response to the complaint. The register shall be available to the Waikato Regional Council at all reasonable times. Details of all complaints received by the consent holder shall be forwarded to the Waikato Regional Council within 5 working days of the complaint being received unless agreed upon in writing by the Waikato Regional Council.	
Evidence	The complaints register with the required information is stored in hard copy and electronically (HCC doc ref D-814107), and is available to WRC to view at all reasonable times. There were no odour complaints in the 2019-2020 year.	
Status Reasoning		
Action Required		**Full compliance**
10	The consent holder shall notify the Waikato Regional Council of any incident, including mechanical or power failures, leading to a significant emission of odour from the treatment plant site, within 24 hours of the incident occurring. A written report shall be forwarded to the Waikato Regional Council within seven working days of the event occurring describing the incident, the reasons for it occurring, any complaints received, measures taken to avoid, remedy or mitigate its effects and measures (if any) undertaken to prevent a reoccurrence of the event, including any proposed changes to the Odour Management Plan.	
Evidence	All events and maintenance notifications that pose a risk for significant emission of odour are sent to WRC. All	

	Pukete Treatment Plant notifications are recorded and stored electronically (HCC doc ref D-851868). There were no odour complaints in the 2019-2020 year.	
Status Reasoning		
Action Required		**Full compliance**
	Authorisation Compliance:	**Full compliance**

AUTH134278.01.01 - Water - stormwater

Activity Authorised: Discharge stormwater from Pukete WWTP to an unnamed tributary of the Waikato River.	
Condition No.	**Description**
1	**General** The discharge shall be operated and maintained, in general accordance with: 1. The application for this resource consent provided under covering letter titled "Pukete Wastewater Treatment Plant – Application for Discharge of Stormwater" dated 28 October 2014 from MWH New Zealand Limited on behalf of Hamilton City Council (Waikato Regional Council EDRM ref number 3205411); b. as identified in the resource consent conditions below.
Evidence	The consent holder states in their annual report: The stormwater discharge operation is undertaken in general accordance with the resource consent application outlined in this condition (HCC doc ref D-1076094) and the following conditions of this consent.
Status Reasoning	
Action Required	**Full compliance**
2	The consent holder shall ensure contractors are made aware of the conditions of this resource consent and ensure compliance with those conditions.
Evidence	The consent holder states in their annual report: All contractors completing site works at Pukete Treatment Plant are made aware of their responsibilities and resource consent conditions by completing a site induction and a 'Permit to Work' prior to commencing any work on site.
Status Reasoning	
Action Required	**Full compliance**
5	The consent holder shall manage the stormwater system to prevent the discharge of concentrations of hazardous substances that may cause significant adverse effects on aquatic life. Note: For the purposes of condition 5, where a question arises as to whether the concentration of any particular hazardous substance breaches this condition, it shall be determined through the application of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000), and decided on the basis of its corresponding trigger value within the 95% level of protection range that is expressed in section 3.4 of these guidelines (or it may be determined through the application of any other appropriate guideline by, or on behalf of, the consent holder approved in advance by the Waikato Regional Council acting in a technical certification capacity).
Evidence	The consent holder states in their annual report: There has been no discharge of hazardous substances to the stormwater system in the year 2019/20. WRC have not received any complaints or reports of hazardous substances to the stormwater system in this

	compliance period.	
Status Reasoning		
Action Required		**Full compliance**
6	The consent holder shall manage the site to minimise the discharge of suspended solids from the stormwater system with an aim to achieve: 1. A discharge concentration of less than 100 grams per cubic metre suspended solids, except where the concentration of the unnamed tributary has a concentration of greater than 100 grams per cubic metre suspended solids; and 2. An increase in suspended solids concentration due to the discharges in the unnamed tributary of less than 10 percent.	
Evidence	The consent holder states in their annual report: (a) The discharge concentration was more than 100 grams per cubic metre at more than one occasion. (b) The percentage increase of suspended solids from both occasions were less than 10 percent. AECOM were engaged by Hamilton City Council (HCC) on 4 October 2019 to complete a review of the Pukete Wastewater Treatment Plan (WWTP) site stormwater network. The review builds on previous assessments and focusses on the control or containment of contaminated stormwater or spilled material. Stormwater runoff from non-operational areas of the site is generally clean provided the stormwater network is isolated from 'at risk' areas. The tasks completed for this project included: • Reviewing previous assessments and reports. • Carrying out a risk-based assessment of spill and contaminated discharge potential. • Assessment of mitigation options for preventing spills from discharging to the stormwater network and/or from the site to the environment. 18 • Preparation of a Stormwater Management Plan ('the Plan') to describe the site stormwater system, identify potential sources of risk and assess those risks, and outline measures that could control or lower the risk of a contaminated discharge from the site. This report is forwarded attached to this WWTP Annual report. (see doc ref 17361424)	
Status Reasoning	The condition states that the consent holder shall minimize the stormwater system with an "aim to achieve" a discharge of less than 100g/m3 and an increase between upstream and downstream of less than 10%. There were 2 occasions when sampling showed an elevated level of suspended solids at least at 2 sampling sites in December 2019 and one in August 2020. For this compliance period only the December 2019 result counts and this did not produce an increase anywhere near the allowed 10% increase at only 0.05% which is at a compliant level.	
Action Required	**HCC shall continue to manage the site to minimise the discharge of suspended solids from the stormwater system with an aim to achieve the required standards. HCC must implement the recommended preferred option 7 in the AECOM stormwater report to prevent any further occurrences of unauthorized discharges from the sites stormwater system.**	**Full compliance**
7	**Monitoring** The consent holder shall provide the Waikato Regional Council with a monitoring plan for approval by the Waikato Regional Council within three months of commencement of this consent. The monitoring plan shall include details of the parameters to be monitored, location and frequency of monitoring in accordance with this consent. The monitoring plan shall include, as a minimum, the following monitoring: **Frequency** **Locations to be sampled** **Parameters to be measured or analysed** Twice yearly, at times when there has been sufficient rainfall to enable a sample to be taken from the flow at	

	every sample location, with two samples at least two months apart each year. • Unnamed tributary of the Waikato River upstream of the site • Site A, western outlet at pipe • Site B, northern outlet at pipe • Site C, overland flow outlet at pipe • Unnamed tributary of the Waikato River downstream of Site C • suspended solids • faecal coliforms • ammoniacal nitrogen • rainfall • stream flow Notes: For the purpose of condition 7: • Sample location names are based on the descriptions and plans provided in the application documents described in condition 1 of this consent and as shown in the monitoring locations plan below in figure 1. • Activities on site that may affect sampling results could include observance of animal faecal matter, activities at the biosolids collection area, changes in use of the biosolids storage and lagoon areas, and/or unusual transportation movements. • Note any activities on site that may affect the results, whether the sample includes the first flush of stormwater.
Evidence	The consent holder states in their annual report: *The monitoring plan was provided to WRC as outlined in Condition 7 in the application for this consent (HCC doc ref D-1076094) and changes from monitoring of faecal coliforms to Escherichia coli counts were approved. • Upstream receives stormwater discharge mainly from the Pukete industrial area. • Sites A and B are solely stormwater discharge from Pukete Treatment Plant. • Site C and Downstream also contains discharges from external sources other than the Pukete Treatment Plant site. • The flow measurements are a gross measurement calculated from the dimensions of the culverts and velocity of flow.*
Status Reasoning	
Action Required	**Full compliance**
8	All sample analyses shall be undertaken in accordance with the methods detailed in the "Standard Methods For The Examination Of Water And Waste Water, 2012" 22nd edition by A.P.H.A. and A.W.W.A. and W.E.F., or any subsequent edition of this standard or other method approved in advance by the Waikato Regional Council acting in a technical certification capacity.
Evidence	The consent holder states in their annual report: All sample analysis was carried out by the IANZ accredited Shared Services Laboratory based at the Hamilton City Council Wastewater Treatment Plant. Sample analyses are undertaken in accordance with the methods detailed in Condition 8. Any analyses that the laboratory cannot perform are subcontracted to another IANZ accredited laboratory (R.J. Hill Laboratories).
Status Reasoning	
Action Required	**Full compliance**
9	The consent holder shall undertake the monitoring plan that has been developed as specified in condition 7 of this resource consent. The consent holder shall provide a written report annually by 30 September each year to the Waikato Regional Council that details the results of the monitoring undertaken in accordance with this consent and discusses the results of that monitoring including any trends in the data since the commencement of the consent. A copy of this report shall also be sent to the Environmental Office for Waikato Tainui.
Evidence	The consent holder states in their annual report: An annual report is submitted to Waikato Regional Council and

	Waikato Tainui as required. Annual report was submitted to WRC on 30 September 2020	
Status Reasoning		
Action Required		**Full compliance**
10	At any time after at least five years of monitoring data has been collected in accordance with condition 7 of this consent, the consent holder may provide a report to the Waikato Regional Council with a suggestion to modify the frequency and/or number of monitoring locations under condition 7. This report shall contain, as a minimum, all the data collected since the commencement of this consent, an analysis of those results including any trends and any reasons for the modifications suggested. The Waikato Regional Council may approve or decline the suggestion, or develop an alternative modified monitoring programme in consultation with the consent holder, after considering the results of monitoring to date, any trends in the data, and the consent holders reasons for any suggested modification to the monitoring condition. Any modification to the monitoring programme in condition 7 of this consent shall not take effect until it is approved in writing by an officer of the Waikato Regional Council in a technical certification capacity.	
Evidence	The consent holder states in their annual report: *All data collected under this condition since 2005 are provided in Appendix C and is illustrated in figures 4-6 above. Resource Consent 134278 commenced on 2/2/15, after it replaced consent 111553.*	
Status Reasoning		
Action Required		**Full compliance**
11	**Maintenance** All oil and grit interceptors shall be regularly inspected and maintained in good working order to allow for peak efficiency of stormwater contaminant removal at all times.	
Evidence	The consent holder states in their annual report: *The Pukete Treatment Plant site oil and grit interceptor is on a quarterly cleaning programme. Road sweeping, and cleaning of the catch pits last occurred on the 10/07/20 Invoices are available on request.*	
Status Reasoning		
Action Required		**Full compliance**
12	All oil and grit interceptors shall be desludged as necessary, and in particular within one month of receipt of notice in writing from the Waikato Regional Council to do so. All excavated sludge materials shall be disposed of at the expense of the consent holder at a site that is licensed to receive sludge materials.	
Evidence	The consent holder states in their annual report: *All oil and grit interceptors are desludged as required. Waikato Regional Council has not requested oil and grit interceptors to be desludged during the 2019/2020 period.*	
Status Reasoning		
Action Required		**Full compliance**
13	**Structural Integrity and Erosion Control** The stormwater discharge shall not cause conspicuous scouring or erosion at any point of discharge to the unnamed tributary or at the point of discharge to the Waikato River.	
Evidence	The consent holder states in their annual report: *Visual inspections have shown no scouring or erosion has been observed at any point of the tributary.*	

Status Reasoning		
Action Required		**Full compliance**
14	The consent holder shall be responsible for the structural integrity and maintenance of the stormwater infrastructure and for any erosion control works that become necessary to preserve the integrity and stability of the structures, the river banks at the outfall and/or to control erosion as a result of the exercise of this resource consent. The consent holder shall undertake regular inspection of the site during the term of this consent and shall keep a log of what maintenance has been undertaken. This log shall be made available to the Waikato Regional Council at all reasonable times. Note: A separate consent may be required as a result of the need to undertake erosion control works. Any such consent shall be obtained by the consent holder at their sole cost.	
Evidence	The consent holder states in their annual report: *Regular inspections are undertaken of the unnamed tributary and the stormwater outfall structures. Records are kept as required. There has been no requirement to undergo erosion control works under this condition for the 2019/2020 compliance period.*	
Status Reasoning		
Action Required		**Full compliance**
15	The outfall structures shall be maintained in a manner that ensures the structures do not compromise the stability and integrity of the bed and banks of the unnamed waterway or the Waikato River downstream of the structures.	
Evidence	The consent holder states in their annual report: *The unnamed tributary is concreted therefore it is highly unlikely that the structure and integrity of these is compromised by discharge from the stormwater outfall structures. Figure 7 in Condition 13 shows the discharge point of the unnamed tributary to the Waikato River. This illustrates that the banks at the point of discharge as well as downstream of this are well vegetated and have no integrity issues.* Visual checks by WRC staff from shore and boat have indicated no erosion or structural issues	
Status Reasoning		
Action Required		**Full compliance**
16	**Contingency Plan** The consent holder shall undertake an analysis of the environmental hazards associated with potential spills from the site that could contribute to an unauthorised discharge within 12 months of the commencement date of this consent. The hazard analysis shall include contingency plans to avoid discharges to the unnamed tributary of the Waikato River and shall include all areas of the site that are within the catchment of the wastewater treatment and stormwater system. The analysis shall include measures undertaken to minimise the risk of a spill and measures available to reduce the impact of a spill, should one occur. A review of the hazard analysis and contingency plans shall occur 3 yearly and be aligned with condition 20 of resource consent 114674 for the discharge from the site . A written updated report shall be provided to the Waikato Regional Council within one month of any review.	
Evidence	The consent holder states in their annual report: *A report was completed on the 'Assessment of Potential Environmental Hazards from Spills from the Hamilton City Council Wastewater Treatment Plant into the Stormwater System' (HCC doc ref D-19060). Aecom has reviewed the Pukete WWTP Stormwater and Spill management Plan, and this is forwarded to WRC alongside this report. 27 Contingency Plans were developed and implemented because of the above report. These are included in the Treatment Plants Quality Systems Manual / Standard Operating Procedures / Wastewater Contingency Plans / 11.17 Spills into the Stormwater System.*	
Status Reasoning		
Action Required		**Full compliance**

17	**Unauthorised discharges** The consent holder shall notify the Waikato Regional Council as soon as practicable, and as a minimum requirement within 24 hours, of any unauthorised contaminant discharge to the unnamed tributary or the Waikato River via the stormwater system. The consent holder shall, within 7 days of the discharge occurring, provide a written report to the Waikato Regional Council, identifying the extent of the discharge, possible causes, steps undertaken to remedy the effects of the discharge and measures that will be undertaken to ensure future compliance with this consent.	
Evidence	The consent holder states in their annual report: Refer condition 4	
Status Reasoning		
Action Required		**Full compliance**
	Authorisation Compliance:	**Full compliance**

4 SUMMARY OF COMPLIANCE

Based on the conditions selected for monitoring, compliance has been assessed as:

Authorisation	Authorisation Description	Compliance Status
AUTH108788.01.01	Take up to 4,000 cubic metres per day of water from Waikato River for sewage plant operation purposes	Full compliance
AUTH109199.01.01	Extend an existing box culvert by 24m, place up to 1083 c/m of clean fill material in a gully areas & undertake vegetation clearance & bed disturbance works in association with alignment of Pukete Rd, Hamilton	Not assessed
AUTH111029.01.02	Retain biosolids on land at the existing Hamilton City Council Wastewater Treatment Plant	Full compliance
AUTH114674.01.02	To change three conditions of Resource Consent AUTH114674.01.01 that authorises the discharge of treated wastewater to the Waikato River from Hamilton City Council Pukete Wastewater Treatment Plant.	High level of compliance
AUTH114675.01.01	Use existing river outfall structures in/on or over the bed of the Waikato River to the south-east of the Hamilton Wastewater Treatment Plant	Not assessed
AUTH114676.01.01	Discharge contaminants to air from activities associated with the operation of the Hamilton WWTP	Full compliance
AUTH134278.01.01	Discharge stormwater from Pukete WWTP to an unnamed tributary of the Waikato River.	Full compliance
AUTH137123.01.01	To construct and maintain a pipe bridge and a vehicle access bridge in an unnamed tributary of the Waikato River, adjacent to the Pukete Wastewater Treatment Plant, Hamilton	Not assessed
AUTH138860.01.01	Install a structure in the bed of a river including associated bed disturbance and earthworks in a high risk erosion area	

Overall Site Compliance: High Level of Compliance

5 DISCUSSION AND CONCLUSIONS

There have been some sample results that were over the permitted number of 8 for cBOD5 and SSlds concentrations and for SSlds daily load. The Sslds load exceedance was quite high at a maximum value of 11,800kg/day in June. This could have been related to the COVID-19 national lockdown or as a result of high sediment loads arriving at the plant following some heavy rainfall.

The consent compliance system is set up to allow for the fluctuations in flow rates and composition of the influent wastewater to the plant. This is highly variable at times and beyond the control of the consent holder to a large extent. The conditions allow for a set amount of sample results exceeded the set limit to take account of this variability in the quality of influent and subsequent capability of the treatment process to cope with these variances. On the occasions where the number of allowable "non-compliant" samples occurred the plant may have been experiencing the effects of a massive alteration in influent quality to the plant during the first complete COVID-19 lockdown. The ratio of commercial and domestic inflow streams would have changed markedly and dramatically overnight as businesses undertook deep cleans and shut down operations. Consequently the volumes of domestic inflow would have increased as everyone was required to stay home.

The concentration of non-compliant wastewater was not a major concern as the plant is permitted to analyse and report up to 8 samples per month of treated wastewater above the limits that are set and no maximum absolute level is listed. Having said this the upward trend of suspended solids in the discharge since December 2019 is a cause for concern and the consent holder should investigate and report on the reasons for this.

The plant biota was likely disturbed by a significant change in influent composition during the COVID-19 lockdown when the balance between industrial and domestic flow levels altered significantly. Despite investigations by HCC staff a definitive reason for the poor performance over this period was not conclusive. The plants effectiveness had however returned to full compliance in July.

There has also been some significant upgrade work ongoing at the plant which may have had some detrimental effect on the treated wastewater quality.

6 SUMMARY OF ACTIONS REQUIRED

The following actions are required to be undertaken:

Resource consent	Condition	Action Required
AUTH134278.01.01	6	HCC shall continue to manage the site to minimise the discharge of suspended solids from the stormwater system with an aim to achieve the required standards. HCC must implement the recommended preferred option 7 in the AECOM stormwater report to prevent any further occurrences of unauthorized discharges from the sites stormwater system.

7 RECOMMENDATIONS FOR WAIKATO REGIONAL COUNCIL

Due to the fact that the non-compliances were limited to two months and only just outside the number of off spec samples permitted by the consent, coupled with the significant dilution factor afforded by the Waikato River during the winter months (May & June) when these exceedances occurred, it is not considered that any significant adverse effects beyond those that are usually consented would have occurred. The site management has been investigating the cause of the elevated levels of suspended solids

and cBOD5 however the results of their investigation have proved inconclusive. The site is now operating at full compliance since July 2020.

I do not consider a compliance status of partial compliance and further enforcement is warranted at this time given the site's usual high standard of operation and compliance.

I recommend the site remains as a focus area 1 site and is monitored annually due to its inherent position as a priority 1 site.

Edward Prince **Date: 13 November 2020**
Senior Resource Officer - Infrastructure
Resource Use

7.1 Decision

I have reviewed this audit report and agree with the recommendations.

Hugh Keane **Date: 13 November 2020**
Team Leader- Infrastructure
Resource Use

APPENDIX 1

Compliance Status for Individual Conditions

Compliance Status	Description
Not assessed	Monitoring of this condition was not undertaken during this monitoringevent
High priority non-compliance	The non-compliance has the potential for, or has resulted in, significantadverse effects on the environment.
Medium priority non-compliance	There is non-compliance with limits or other direct controls on adverseeffects; and The non-compliance has the potential for, or has resulted in, a greater than minor increase in the level of effects authorised.
Low priority non-compliance	There is non-compliance with limits or other direct controls on adverseeffects; and The non-compliance has the potential for, or has resulted in, a less thanminor increase in the level of effects authorised; and/or There has been a significant technical non-compliance such as a failureto collect or supply self-monitoring data.
Minor technical non-compliance	There is non-compliance with a condition, or part of a condition, that does not directly control adverse effects; and The non-compliance was not significant in the management of effects. For example a short delay in supplying data or meeting a deadline for areport
Full Compliance	The condition has been complied with

Compliance status for individual consents and the entire site

Compliance Status	Description
Not assessed	Monitoring has not been undertaken at this site during the current financial year
Significant non-compliance	There has been a high priority non-compliance; and/or There have been several medium priority non-compliances.
Partial compliance	There has been a medium priority non-compliance; and/orThere have been several low priority non-compliances.
High level of compliance	There has been a low priority non-compliance; and/or There have been several minor technical non-compliances.
Full compliance	All conditions that include limits or other direct controls on adverseeffects have been complied with. A small number of minor technical non-compliances may have occurred.

Appendix D: Available Technologies and Best Practicable Option Considerations (Condition 22 vi & vii)

Actual or Potential Adverse Effect	Technology/Process Advance	What this Technology/Process would achieve?	Is this Technology/Process Advance consideration a Best Practicable Option (BPO) presently or in the near future?	Are HCC proposing to use this Technology/Process advance?		Targeted Focus Area
				Presently/or near future	Leave open for later review	
Suspended solids, colour & clarity	• Filtration (Sand filters and Cloth filters) • Membrane Filtration. (Microfiltration)	• Greater suspended solids removal with some related colour/clarity improvement. • Even greater suspended solids removal with related colour/clarity and microbiological improvement.	Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications. Refer section 2.5 & 2.6 of this Report.	• No • No	• Yes • Yes	
Oil and grease	• At source trade waste controls enhanced. • Aerated skimming chamber at WWTP Inlet. • Enhanced biological treatment together with filtration or membrane filtration.	Each process would result in some lowering of oil and grease levels in treated wastewater if this required.	• Yes • No • Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report.	• Yes • No • No	• Yes • Yes • Yes	
Dissolved oxygen	Enhanced biological treatment and nitrogen removal including filtration or membrane filter process.	A treated wastewater with lower $cBOD_5$ and greater nitrogen removal would result in a consequent reduction of (any) River dissolved oxygen depletion.	Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report.	No	Yes	
Temperature and pH	• Trade waste controls enhanced especially for pH control. • Chemical addition if pH adjustment needed but not considered necessary. Any pH problems should be addressed at trade waste source.	Closer at source (trade waste control of pH and if need be temperature would result in correction to treated wastewater if needed	• Yes, if appropriate for any specific trade waste discharge. • No – should not be needed.	• Yes • No	• Yes • Probably No	✔
Deposition of bed sediments	Refer to suspended solids removal as above.	Refer to suspended solids removal as above.	No – adverse environmental effects do not warrant further treatment particularly when economic factors are taken into account.	No	Yes	

Undesirable biological growths (target summer growth periods)	• Trade waste at source control of any significant nitrogen bearing wastewater particularly with levels of NBDON (non-biodegradable dissolved organic nitrogen) - similar for dissolved reactive phosphorus (DRP) / total phosphorus (TP). • Nitrogen removal, by advanced technology processes including biological nitrogen removal and de-nitrifying filters with additional carbon source. • DRP /TP removal by enhanced biological phosphorus removal (EBPR) as part of biological nutrient removal (BNR). • Chemical DRP/TP removal by addition of aluminium or iron salts to the biological process and/or as part of a tertiary treatment phase (e.g. denitrification filters) • Side stream treatment of sludge processing centrate and other liquid streams to remove ammonia.These technologies include both physical /chemical and biological processes (SHARON, BABE, ANAMMOX etc). It is noted	• Reduction in influent nitrogen load to WWTP. Thus, maximising WWTP nitrogen removal of the domestic wastewater component. • Reduction to TN in the treated wastewater near the lower end of technology achievement e.g. around 3.5 mg/L • Lower levels of DRP/TP in treated wastewater, but with a theoretical level of less than 0.2mg/L. Very low levels of DRP/TP can be achieved but at the cost of chemicals and other operating plus the adverse effects on sludge /biosolids if it is to be beneficially reused on land. • Lower levels of DRP/TP in treated wastewater, but with a theoretical level of less than 0.2mg/L. Very low levels of DRP/TP can be achieved but at the cost of chemicals and other operating plus the expected adverse effects on sludge /biosolids if it is to be beneficially reused on land. • Lower levels of TN in the treated wastewater and lower need for external carbon source.	• Yes, if a particular trade waste discharge also requires specific attention to the nitrogen compounds and/or DRP/TP. Trade waste charging mechanism is being reviewed to apply financial disincentives for nitrogen and phosphorus loads. • Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report. • No - HCC plan to optimise the Biological Plant operation once current expansions are complete as this, possibly along with input DRP/TP controls, could achieve the 2011 summer TP mass load limit without chemical DRP/TP removal. • Yes - currently planned to meet the summer 100 kg/day TP mass load, but being re-considered in terms of possible reduction in influent load from trade waste and also the ability of an optimised WWTP with current upgrade to achieve an adequate degree of DRP/TP removal to meet Resource Consent conditions. There are concerns with chemical DRP/TP removal that the sludge quality will be deteriorated by aluminium salts and other contaminants e.g. arsenic, thereby detracting or eliminating the potential beneficial reuse of biosolids. • Currently being considered but in early days o Yes, periodically review monitoring of treated wastewater discharge and effects on River discharge f investigation.	• Yes • No • No • Yes reconsi most method future load (10 • Yes cur considerati but being ered as to ppropriate o achieve ummer TP 0kg/day) ently under	• Yes on in t. • Yes • Yes depending importance of DRP/T terms of critical nutrien • Yes • Yes	✔ ✔ ✔

Actual or Adverse Effect Potential	Technology/Process Advance	What this Technology/Process would achieve?	Is this Technology/Process Advance considered a Best Practicable Option (BPO) presently or in the near future?	Are HCC proposing to use this Technology/Process advance Presently/or near future		Targeted Focus Area
				Presently/or near future	Leave open later review	
Eco-toxicity	• Additional at source trade waste control of any contaminants of concern and education/controls of any community discharged contaminants of eco-toxicity concern. • Further enhanced activated sludge type biological treatment incorporating longer sludge age processes. • Filtration and/or the more effective membrane filtration. • Advanced disinfection incorporating combinations of ultra violet irradiation coupled with hydrogen peroxide oxidation. • Ultra-Filtration (UF) and Reverse Osmosis (RO) following various combinations of the above technologies.	Lower levels of contaminants that can be shown to affect eco toxicity. This approach is to target/select the process or combination of processes to reduce contaminants of concern at source and/or to enhance the removal through the treatment processes. Match the technology to the degree of removal needed.	Yes, if a particular trade waste discharge so requires specific attention to contaminants of concern in this respect. Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report.	Yes No, but need to be kept abreast of latest NZ & international research in this respect including water reclamation plants in Queensland, Australia.	Yes Yes, but need to be kept abreast of latest NZ & international research in this respect.	✔
EDC's and other Micro Pollutants	As per Eco-toxicity above. Note however that EDC's are unlikely to be present in trade wastes other than animal processing and stock truck/yard trade wastes.	As per Eco-toxicity above. Note however that EDC's are unlikely to be present in trade wastes other than in some animal processing and stock truck/yard trade wastes.	Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report.	No, but need to be kept abreast of latest NZ & international research in this respect including water reclamation plants in Queensland, Australia.	Yes, but need to be kept abreast of latest NZ & international research in this respect.	
Microbial health risk	• Further enhanced UV irradiation including filtration as a preceding treatment step. • Membrane filtration followed by UV disinfection. • Advanced disinfection incorporating the above plus hydrogen peroxide oxidation. • Ultra-Filtration (UF) and Reverse Osmosis (RO) following various combinations of the above technologies	Progressively lower levels of pathogens (and indicator microorganisms) can be achieved by implementation of these technologies, (progressively lower levels as listed herewith) through to achieving potable water standards.	Not BPO – not considered necessary at this stage as current and planned upgrades will result in improvements. This assessment takes into account financial implications Refer section 2.5 & 2.6 of this Report.	No, in respect to additional treatment but periodically review monitoring of treated wastewater discharge and these effects of the River discharge	Yes, periodically review monitoring of treated wastewater discharge and effects on River discharge	

River recreation	Refer to Table 2.3	Further "at source" contaminant controls and treatment processes over those recently implemented and/or planned (refer sections 2.4 & 2.5 of this Report could/would improve River recreation values if that was required. In particular this could apply to microbiological River health.	• Yes for "at source" contaminant controls. • No for additional treatment over that implemented as planned.	No, in respect to additional treatment but periodically review monitoring of treated wastewater discharge and these effects of the River discharge	☐ Yes, periodically review monitoring of treated wastewater discharge and effects on River discharge	
Maori cultural values	Refer to Table 2.3	Further "at source" contaminant controls and treatment processes over those recently implemented and/or planned (refer sections 2.4 & 2.5 of this Report could further mitigate the adverse Maori cultural and spiritual effects. Alternative removal of the direct discharge to the River would (as previously advised by tangata whenua) remove the adverse cultural and spiritual effects if this was found to be practical, sustainable and affordable in the future. Refer to AEE Section 6 and AEE Support Document No 7 Category 3 – "Alternatives for Treated Wastewater Discharge and Reuse".	• Yes for "at source" contaminant controls. • No for additional treatment over that implemented as planned. • Refer to Section 2.8 and Table 2-5 for additional disposal techniques, some of which could be BPO's in respect to Maori cultural values.	☐ No, in respect to additional treatment but periodically review monitoring of treated wastewater discharge and these effects of the River discharge	☐ Yes, periodically review monitoring of treated wastewater discharge and effects on River discharge	

Actual or Potential Adverse Effect	Technology/Process Advance	What this Technology/Process would achieve?	Is this Technology/Process Advance considered a Best Practicable Option (BPO) presently or in the near future?	Are HCC proposing to use this Technology/Process advance?		Targeted Focus Area
				Presently/or near future	Leave open for later review	
		(refer sections 2.4 & 2.5 of this Report could/would reduce (any) broader community adverse perception about the treated Wastewater discharge into the river.		but periodically review monitoring of treated wastewater discharge and these effects of the River discharge	treated wastewater discharge and effects on River discharge	
Wastewater input controls and management – Category 2 alternatives, refer text above. These types of controls can have the effect of reducing inputs to the WWTP thereby allowing more effective operation of the WWTP and /or resulting in lower levels of contaminant and discharge volume. **Refer Section 4.3 (Wastewater Management Procedures) AEE May 2006 and Section 5.8.6 (HCC's Waste Management Plan)**	• At source trade waste controls on contaminant levels and flows and volumes. • Water conservation and demand management in the HCC's water supply system. E.g. water efficient household plumbing. • Infiltration and inflow (I&I) management in the wastewater collection system. • Other specific techniques. Note: A number of these management techniques are already in place and are others further being considered. Refer Section 2.4 of this Report.	Further controls on input wastewater contaminant levels, flows and volumes as maybe appropriate to both protect and enhance the WWTP processes and also mitigate actual and potential effects on the receiving environment, namely the Waikato River.	Yes, targeted at specific trade waste contaminants and reducing water and contaminant flows and loads into the Wastewater collection system. Refer HCC the liquid waste targets in HCC's Waste Plan and associated policies and bylaws e.g. Trade Waste By-law.	Yes	Yes	✔

Appendix E: Alternative Wastewater Disposal Techniques (Condition 22 viii)

Category 4 Item (Sup. Doc. 7)	Alternative Disposal Technologies	What this technique involves?	Recent application in New Zealand	Assessment of possible application to Hamilton's situation	Adopted for Wastewater Scheme	Monitor for Possible Future Adoption	Targeted Focus Area
DISCHARGE TO WATER							
4.1	**Discharge direct to natural water, namely Waikato River**	As present practiced with the discharge of treated wastewater to the Waikato River.	Many surface water discharges in NZ – some involve land contact before discharge.	This is the current practice for Hamilton to which other disposal means should be compared.	Yes	Yes	✔
DISCHARGE TO LAND	**Land based disposal**	• Disposal by slow rate irrigation onto land using evapotranspiration and soakage – usually for the full treated wastewater discharge 365 days per year.	• In addition to the existing Levin, Rotorua and the Taupo land based scheme's and the 35 (approx) small community schemes the two larger new schemes in NZ are: - Ashburton with land disposal to the porous stony soils adjacent to the Ashburton River. - A new (expanded) Taupo system to increase the capacity of this system and replace land lost from the former scheme for new State Highway. A cut and carry grass growing scheme based on free draining pumice soils. Note – the Rotorua and Levin schemes are in part land contact or land treatment schemes. • Russell, Bay of Islands – some limitations with this scheme and an alternative to pipe wastewater to Waitangi has been considered.	• There are significant limitations including land availability; implications/restrictions of dairy industry, high capital and operating costs • Rotorua wastewater will be stopped irrigating to land from 2019 onwards due to cultural concerns	No	Yes	
4.2 – 4.6		• Bore direct injection		• Bore injection was investigated in some detail in the Terra 21 and subsequent alternative investigations for HCC.	No	Yes	
	Evaporation of Wastewater	Evaporate to dryness the liquid proportion of wastewater leaving a solids/dry sludge that can otherwise be treated and disposed of or beneficially reused.	• Previously practiced by one industry in Dunedin until that industry closed down. • This technique was assessed in a preliminary way by Dunedin City Council for its total (Tahuna – City Catchment) wastewater volume and found extremely expensive and accordingly not financially viable	Most unlikely to be economic for HCC's total wastewater flow, but remains a possibility for selected at source low volume trade waste discharges of a special nature.	No	Yes	
	Aquifer/Groundwater recharge	Disposal into underground aquifers to supplement ground water flows and also in coastal areas salt water wedge intrusion.	None although, Russell has bore injection but it is understood not to be for either of these purposes.	Unlikely to be applicable. Would require detailed investigation to see if there were any applications for this technique.	No	Yes	

DISCHARGE T	**O BOTH "WATER" AND "TO L ND" and "THROUGH LAND"**						
4.7 – 4.12	**Land contact, Artificial Ponds / Lakes**	A range of techniques are available that are generally classified as "land contact". Many of these have been implemented to assist mitigating Maori spiritual and cultural concerns; others have been installed for reasons of perception and wild life enhancement. The technique includes: - overland flow with shoreline discharge - habitat /cultural wetlands with ocean and estuary discharges respectively - engineered treatment wetlands with ocean and estuary discharge respectively. - wetland pond with river discharge - river bank strip injection - papatuanuku rock passage - rapid infiltration basins	Examples of recent Local Authority Wastewater Schemes incorporating this range of land contact techniques. Note there are a range of other smaller schemes. Some of those listed here are larger recent schemes, a number reflect Hamilton's size and situation. As used in Oamaru (late 1990's scheme) As used in Tauranga City and Whangarei City As used in Waimakarri DC - Woodend 2006, Invercargill City 2006 As used in Palmerston North City 2002 As used at Wanaka 2008 and planned for Queenstown As used at Hastings 2009 (being commissioned) Dunedin City Tahuna 2009, Palmerston North City 2002 As used at Motueka, similar to river bank strip injection (Upgrade and remediation currently being investigated)	All the techniques listed here were considered in HCC's Terra 21 and/or HCC's subsequent alternatives assessment that were all part of the project seeking new consents for the WWTP discharges for which consents were lodged in 2006.	No	Yes	
TREATED WA 4.13	**TEWATER REUSE** **Irrigation at Council Reserves and Golf Courses/Race Courses etc.**	Irrigation on a water deficient basis of Council Reserves and other possible recreational etc areas such as golf courses, race courses etc.	Tauranga City Council has been granted consents - 2005 to irrigate (by low pressure spray) highly treated wastewater on to a number of Council Reserves, the Omanu Golf course and the airport	Irrigation of Reserves etc remains a possibility for HCC should Council decide to incorporate such techniques as part of an overall Wastewater Strategy. Additionally HCC could make treated wastewater available to other parties for	Yes	Yes	✔

Category 4 Item (Sup. Doc. 7)	Alternative Disposal Technologies	What this technique involves?	Recent application in New Zealand	Assessment of possible application to Hamilton's situation	Adopted for Wastewater Scheme	Monitor for Possible Future Adoption	Targeted Focus Area
			specified grassed areas. • Watercare Services Ltd has consent to irrigate by sub surface irrigation part of the Omaha Golf course.	irrigation on a controlled consented basis. It is noted that such procedures would only use a small proportion of the effluent at times of dry soil conditions.			
4.13	**Aquaculture**	Use for fish ponds etc.	• Not practiced in NZ. • Likely to be many public health and product market regulations and restrictions as well as perception issues.	• Unlikely in the short term unless there was a change in regulation and in appropriate aquaculture practice available. • If practiced would probably only take a relatively small amount of treated wastewater.	No	Yes	
4.16	**Industrial reuse**	• Conveyance of treated wastewater to specific industries and industrial areas. • Depending on the industrial use the HCC treated wastewater may require further treatment which could be	• Presently (to the authors knowledge) very limited. • Being considered by a number of local authorities including Watercare Services Limited in Auckland and Whangarei District	A number of possibilities may exist for the future depending on industrial demand for treated wastewater and Council's overall approach to water management. One possibility currently being considered is the industrial reuse of treated	Yes	Yes	✔

		undertaken by HCC at the WWTP or onsite by the industrial user.	Council for the Ruakaka /Marsden Point area for both new industry and the New Zealand Refining Company.	wastewater in the future Rotokauri industrial sub division.			
4.16	**Sewer Mining**	Sewer mining entails tapping into a local authority sewer, abstracting and treating the sewage (wastewater) for reuse (usually at or near the point of use) and returning unused liquid, sludges and screenings to the sewer.	None to the author's knowledge, but this technique is being included in some local authority wastewater strategies as a technique they would implement e.g. Whangarei DC's Ruakaka Strategy – Waipa DC's Cambridge Strategy.	A possibility for HCC for both new and existing industry if there was a demand by some individual industries.	No	Yes	
4.17	**Pasture/Farm land irrigation**	Irrigation by appropriate means in a controlled and managed way. Note – Fonterra's recommended standards require a very high quality effluent (Title 22 California Health Law Standard) for dairy farm irrigation. Application would (ideally) be consented and regulated on a "water deficient basis".	• Limited except for Taupo's land disposal "cut and carry" grass irrigation scheme. (refer land based disposal as above) • Community Dairy farm irrigation operating as part of Kaipara DC's Mangawhai WW Scheme.	Federated Farmers were not in favour of such proposals This remains a potential alternative disposal technique for part of the treated wastewater, particularly during dry soil conditions and for appropriate farming practices.	Yes	Yes	✔
4.17	**Food crop and Horticulture Production irrigation**	Irrigation of food/horticultural production where regulations allow and other factors are compatible with this practice.	Nil to limited- has been some consideration of irrigation of vine yards but to authors knowledge there are no examples to date.	Remains a possible application for appropriate crops that are within in economic distance of the WWTP. Unlikely to accommodate large volumes and would be on a seasonal basis.	No	Yes	
4.17	**Forest irrigation**	Irrigation into exotic or native forest areas.	Some small schemes but limited new application. Rotorua remains the largest forest irrigation system although this will be decommissioned from 2019.	Remains a potential alternative disposal technique for part of the treated wastewater if forests were established within economic distance of the WWTP and long term irrigation was agreed to be sustainable in all respects.	Yes	Yes	✔
4.17	**Fibre non food irrigation**	Some fibre crops can be effectively irrigated with treated wastewaters.	None to the Authors knowledge.	Remains a possible application for appropriate crops that are within economic distance of the WWTP. Unlikely to accommodate large volumes and would be on a seasonal basis.	No	Yes	
4.18	**Non potable residential water(re)use**	Reticulation of high standard treated wastewater through a separate piping system (called the third pipe or purple pipe in Australia) back to residential areas for non potable reuse in toilets, garden watering and some cases washing machines and even hot water systems.	• Has been considered for a number of community schemes but no significant size schemes have adopted this technique at this time nor are actively planning it. • The Golden Valley Subdivision at Kuaotunu, Coromandel Peninsula re uses septic tank effluent for non potable use. • The Kapiti Coast DC has recently approved their District Plan Change 75 to allow non potable reuse of grey water from an individual house back on that property. • Stonefields Subdivision in Auckland constructed a 'third pipe' system however this has not been made operational due to potential health concerns. • This practice (incorporating the third or purple pipe) is being used increasingly for communities in water short parts of Australia particularly in Queensland.	• Could be incorporated into new sub divisions that are within reasonable proximity of the WWTP. Additional treatment may be required. • Would need rules and regulations to be set by Health Authorities and HCC. • Refitting existing residential areas with a third /purple pipe system and re plumbing residential properties is theoretically possibly impracticable.	No	Yes	

4.19	**Direct Potable water (re)use**	Treating wastewater to potable water standards and in accordance with Health	None.	Long term this remains a possibility to at least supplement Hamilton's water supply if Health Authorities, HCC and the	No	Yes	

Category 4 Item (Sup. Doc. 7)	Alternative Disposal Technologies	What this technique involves?	Recent application in New Zealand	Assessment of possible application to Hamilton's situation	Adopted for Wastewater Scheme	Monitor for Possible Future Adoption	Targeted Focus Area
		Regulations and other requirements redistributing in potable water supplies.	A pilot trial has been considered by one water authority in New Zealand, but was not proceeded with.	community accepted it. This situation is the same throughout any community/city in NZ.			
MIX AND MATCH							
All	**Combination "Mix and Match" options**	• Various combinations of the above options. • For example a possible option is the continued discharge of treated wastewater to the Waikato River with varying amounts depending on demand and seasonal factors for industrial reuse and /or irrigation respectively. There are a range of irrigation possibilities as set out above. • It is noted that in the earlier Terra 21 investigations, HCC considered irrigation onto land in the alternatives assessment. One of the reasons this was not proceeded further with, was the farmers stand against this, particularly with the large dairying industry. Since that time, Fonterra's policy has tightened as to the severe restrictions including that if treated human wastewater is to be irrigated on dairy pasture, then an extremely stringent (California Title 22) Total Coliform level is to be achieved.	• Limited but increasing interest and planning towards by some local authorities using "Mix and Match Schemes" as a part of more sustainable wastewater management strategies. • Tauranga City Council's Wastewater Strategy includes consented Omanu golf course and Council reserve irrigation alternatives managed on a soil water deficient basis. This approach is part of the strategy to sustainably use a small portion of the treated wastewater that is otherwise discharged through an ocean outfall. • Watercare Services Limited has investigated industrial reuse options as part of their sustainable approach to water demand management. • Whangarei District Council have developed and had consented (2012) a wastewater strategy for the Ruakaka /Marsden Point area that includes reuse for future industry including the Marsden Point Refinery and also irrigation on a Council' reserve. Watercare's Omaha Wastewater System used subsoil irrigation of part of the effluent on the Omaha Golf Course • The new Rolleston Pines WWTP has centre pivot irrigation of all treated wastewater. • Masterton's new wastewater scheme (consented 2010-11) involves a "mix and match" scheme with discharge to land when the river is low flow and to the river when there is sufficient flow, all as set out in the consent. • Nearby Waipa District Council investigations into future treatment and disposal alternatives for the Cambridge wastewater have concluded land application of all treated wastewater is not a viable or BPO solution.	A number of possibilities exist for "Mix and Match" Schemes in the future.	No	Yes	