HAHEI WWTP
CONTINGENCY PLAN
December 2020

Hahei Wastewater Treatment Plant

Contingency Plan

Resource Consent 135636.01.01

for:

Thames-Coromandel District Council

Client:
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Contents

1 Introduction

Resource Consent AUTH135636.01.01 (refer to Appendix A) granted to Thames Coromandel District Council by Waikato Regional Council permits the operation of a wastewater treatment plant to service the Hahei township on the Coromandel Peninsula. The Hahei Wastewater Treatment Plant (WWTP), located on Pa Road Hahei is owned by Thames Coromandel District Council and is operated and maintained by Veolia Water. This document serves to show the risk assessment and contingency planning methodology undertaken by Veolia Water with regard to Condition 23 of the Resource Consent 135636, and will provide for compliance with this consent condition.

Condition 23 of this Resource Consent states:

"23. In The Event Of Any Bypasses, Other Extraordinary Events Or Failure Of Any Critical Part Of The Treatment Plant, The Consent Holder Shall Manage The Treatment Plant And Discharge To The Wigmore Stream In Accordance With The Contingency Plan Titled "Hahei Wastewater Treatment Plant Contingency Plan 2015" By Veolia (Waikato Regional Council Document Number 3584298 And 3584310), Or Any Subsequent Update. An Updated Plan Shall Be Provided To The Waikato Regional Council By 1 June 2018, And At Three Yearly Intervals Thereafter. The Consent Holder Shall Engage Appropriately Experienced Persons To Compile Any Update To The Contingency Plan, And It Shall Identify Measures And Notification Protocols To Be Undertaken By The Consent Holder That Will Take Into Account Any Potential Adverse Effects On The Wigmore Stream And Users, Including But Not Limited To Ecological Effects, Downstream Recreational Use, And The Medical Officer Of Health."

2 Background

The Hahei Wastewater Treatment Plant (WWTP) is responsible for the treatment of on average 112 m^3 per day of municipal wastewater from a nominal population of 250. During summer, this population can increase to up to 4,000 persons with an influx of visitors to the area.

Figure 1: Left: Location of Hahei on the Coromandel Peninsula.

Right: Hahei Wastewater Treatment Plant site

2.1 Summary of Operation

Raw effluent is pumped from the Hahei Wastewater Pump Station on Pa Road to the Aeration Lagoon. The effluent rests in the Aeration Pond and undergoes bacterial treatment for a theoretical 15 days (at average daily inflow). The effluent then enters the Retention Pond, where it undergoes further bacterial treatment for a theoretical 26 days. The effluent from the Retention Pond is then pumped through a Membrane Filtration Unit (MFU), which physically removes the last of the suspended solids and bacteria from the effluent. The treated effluent is then discharged from the MFU into the Wigmore Stream through a diffuser.

Further detail in with regard to the operation of the Hahei WWTP can be found in the Operation and Maintenance Manual compiled by Veolia Water and the Hahei WWTP Management Plan.

All the equipment and components of the WWTP that could result in a bypass or other extraordinary event or failure are presented within the Process and Instrumentation Diagram attached as Appendix B.

3 Risk Assessment Methodology

The classification of event risk in this document is based on the following risk assessment methodology where classification of risk is based on two aspects – Likelihood and Consequence.

This methodology was used to complete the site specific risk assessment for the entirety of the Hahei WWTP, which begins with the point of entry of wastewater to the plant and ends with the point of treated effluent discharge to Wigmore Stream.

The following subsections describe the qualitative analysis procedure which was used to determine the likelihood of an event occurring and the likely consequence of the event, with consideration given to the existing controls in place, at the Hahei WWTP.

3.1 Likelihood

The Likelihood is the potential for the event to occur. Likelihood is measured between 1 – 5 with 1 being rare and 5 being almost certain:

Likelihood	Descriptor
5	Event is almost certain to occur
4	Event is likely to occur
3	It is possible that the event will occur
2	Event is unlikely to occur
1	It is rare that the event will occur

3.2 Consequence

The Consequence is the severity of the likely results of the event. Consequence is also measured between 1 – 5 with 1 being insignificant and 5 being extreme.

Consequence	Descriptor	Description
5	Extreme	Issue may cause contamination of land and or Wigmore Stream with untreated wastewater or hypochlorite solution.
4	High	Issue may cause plant to shut down and/or may cause non-compliant discharge to Wigmore Stream.
3	Moderate	Issue may cause significant plant disruption but not requiring plant shut down (eg. Damage to one membrane).
2	Low	Issue may cause minimal plant disruption (eg. Loss of support functions for plant).
1	Insignificant	Issue may not cause plant disruption (eg. Due to redundancy of equipment).

3.3 Risk Rating

The overall risk rating for each event is calculated by multiplying the Likelihood and Consequence scores, and can be grouped in to four main categories:

- No Impact: Risk Rating of 1
- Low Risk: Risk Rating of 2 to 3
- Moderate Risk: Risk Rating 4 to 9
- High Risk: Risk Rating 10 to 15
- Extreme Risk: Risk Rating 16 and above

These categories are depicted in the following Risk Matrix:

Likelihood	Consequence				
	1. Insignificant	2. Minor	3. Moderate	4. Major	5. Extreme
5. Almost Certain	Medium (5)	High (10)	High (15)	Extreme (20)	Extreme (25)
4. Likely	Medium (4)	Medium (8)	High (12)	Extreme (16)	Extreme (20)
3. Possible	Low (3)	Medium (6)	Medium (9)	High (12	High (15)
2. Unlikely	Low (2)	Medium (4)	Medium (6)	Medium (8)	High (10)
1. Rare	No Impact (1)	Low (2)	Low (3)	Medium (4)	Medium (5)

4 Identified Adverse Effects

The risk analysis methodology outlined in the previous section was applied to the Hahei WWTP, and led to the identification of the following adverse events. Appendix C contains the full risk analysis.

Where these events have more than one likely cause, the event has been assigned the highest uncontrolled risk rating of all of the most likely causes.

Category	Risk	Most Likely Cause(s)
Untreated Effluent Contamination of Land and/or Wigmore Stream	15	• Failure of MFU or critical MFU components (membranes) • High Level in Retention Pond • No power to WWTP site • Rising main to WWTP blocked or leaking • High Level in Aeration Pond / High Inflow to Aeration Pond
Damage to Plant (MFU or Pump P2)	12	• Various MFU failure modes such as high flow to pump P2, resulting in extended breakdown duration
Hypochlorite Contamination of Land and/or Wigmore Stream	5	• Overflow of Hypochlorite Tank T1 (failure of LT2 Level Transmitter)
Non-compliant Discharge to Wigmore Stream	4	• Failure of FM2 Flow Meter • Various failure modes in MFU Plant • High flow through Plant (reduced treatment capacity) • Excessive discharge to Wigmore Stream outlet

Table 1: Identified Adverse Events

No extreme risk events were identified for Hahei WWTP.

5 Existing Controls of Identified Adverse Events

As each event may have more than one likely cause, it may also have more than one likely control. The existing controls in place at the Hahei WWTP corresponding to each adverse event identified in Section 4 are tabulated below.

Category	Existing Control (s)
Untreated Effluent Contamination of Land and/or Wigmore Stream	• MFU Shutdown Condition • Alarm • Checking (daily) • Site visit (daily)
Hypochlorite Contamination of Land and/or Wigmore Stream	• Checking (filling T1 as required)
Non-compliant Discharge to Wigmore Stream	• SCADA Alarm
Damage to Plant (MFU or Pump P2)	• Checking (daily) • Site visit (daily)

Table 2: Existing Controls of Identified Adverse Effects

5.1 Summary of Existing Controls

The Existing Controls tabulated in Table 2 are described in the following sections.

5.1.1 Alarm System

Alarms

Several events, such as a high level in the Retention Pond trigger alarms which can be seen on the MFU Human-Machine Interface (HMI) by an operator visiting the site on a daily basis. The operator can then investigate the situation.

SCADA Alarms

In the event of excessive discharge to Wigmore Stream, an alarm will be triggered in the SCADA remote monitoring system, which will notify an operator to visit the site and investigate the alarm.

5.1.2 MFU Shutdown

The following events will cause the MFU to automatically shut down as directed by the Programmable Logic Controller (PLC) in the MFU:

- Retention pond reaching a low level
- Scheduled stop time in Timer Control Mode
- Retention pond supply pump failure (P1)

- Permeate pump failure (P2)
- Blower failure
- Compressor failure
- Air Actuated Value failure (AAV1 – AAV6)
- Power failure
- PLC failure
- Shut down button pressed by an operator

The operator will then have to restart the MFU according to the Start-Up Standard Operating Procedure (Refer to the Operation and Maintenance Manual for the MFU as provided by Canadian Pacific). The automated shut down is useful in managing follow-on effects in the event of an incident above occurring, and is used to manage most of the adverse events in Table 2.

5.1.3 Daily Site Inspection and Checking of Plant Parameters

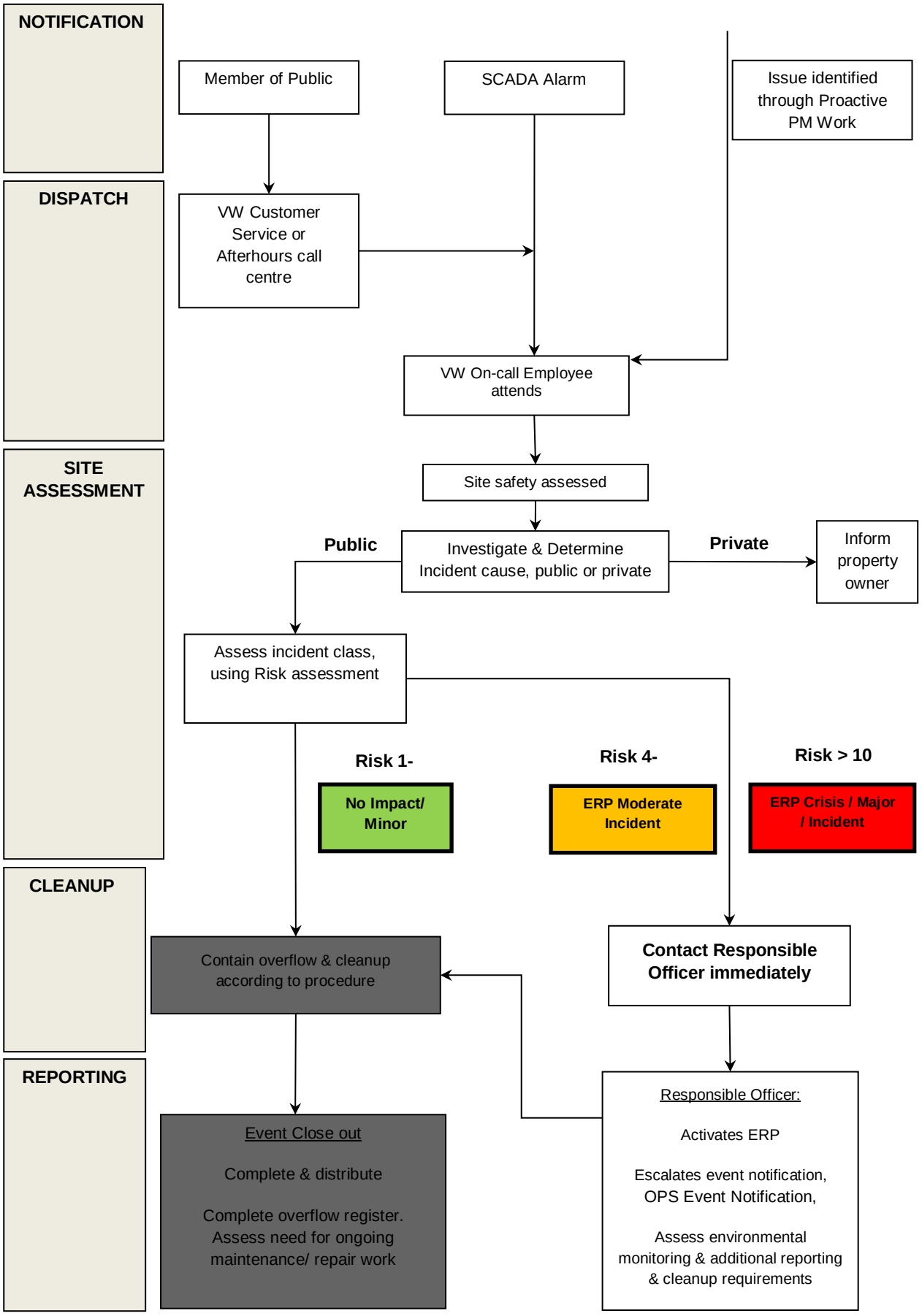
As part of Veolia Water's operation of the Hahei WWTP, the operation of the plant and its equipment are checked, calibrated and maintained as required by an operator visiting the site. The identified adverse events in Table 2 are managed with specific checks on parameters such as checking the MFU discharge flow rate. An operator also visits the site daily to perform daily operation and maintenance activities.

Refer to the Hahei WWTP Operations and Maintenance Manual, Sections 5.2 and 5.3 for schedules of daily, weekly, monthly, six-monthly and annual operation and maintenance activities performed by Veolia at the Hahei WWTP.

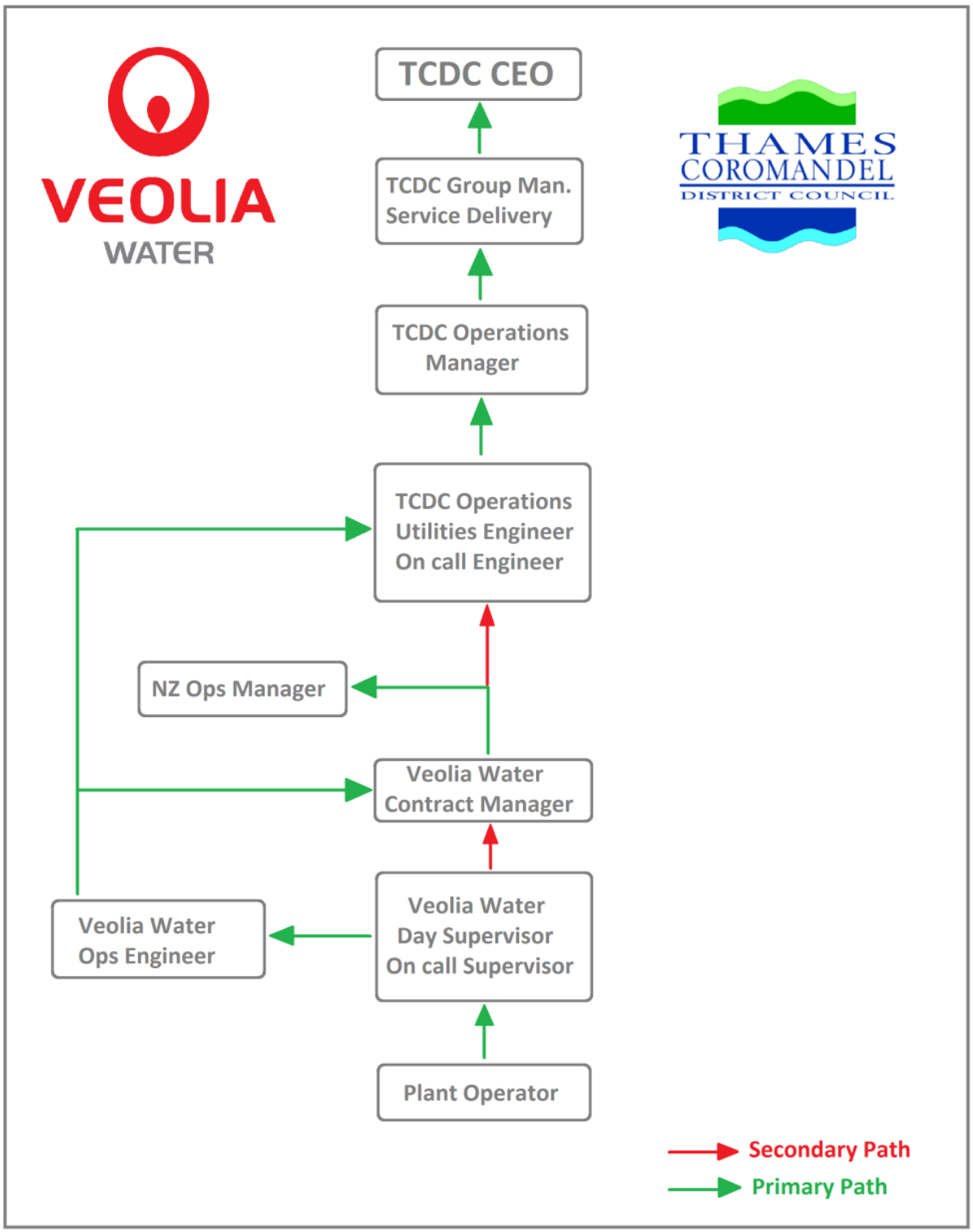
6 Incident Notification, Assessment and Management

Veolia Water follows a specific process for alarm triggers, public reports of incidents and adverse events discovered following scheduled operation and maintenance activities occurring at the Hahei WWTP. This process is illustrated on the following page.

'ERM' in the process refers to the Veolia Thames Coromandel Emergency Response Manual, which is to be referred to for all emergency matters. The ERM contains contact details, response protocol, escalation and contingency plants. Veolia Water has provided a copy of this document to Thames-Coromandel District Council (TCDC).


NOTIFICATION
DISPATCH
SITE ASSESSMENT
CLEANUP
REPORTING
Member of Public
SCADA Alarm
Issue identified through Proactive PM Work
VW Customer Service or Afterhours call centre
VW On-call Employee attends
Site safety assessed
Investigate & Determine Incident cause, public or private
Public
Private
Inform property owner
Assess incident class, using Risk assessment
Risk 1-
No Impact/ Minor
Risk 4-
ERP Moderate Incident
Risk > 10
ERP Crisis / Major / Incident
Contain overflow & cleanup according to procedure
Contact Responsible Officer immediately
Event Close out
Complete & distribute
Complete overflow register. Assess need for ongoing maintenance/ repair work
Responsible Officer:
Activates ERP
Escalates event notification, OPS Event Notification,
Assess environmental monitoring & additional reporting & cleanup requirements

Where the Responsible Officer must escalate notification of the event, this is to be conducted according to the hierarchy below:



Notification of Waikato Regional Council for any unauthorized discharge or significant event is to occur as soon as practicable, and as a minimum requirements within 24 hours as required by Condition 26 of Resource Consent 135636

7 Contingency Measures

Contingency measures are required in the event of any of the adverse events in Table 1 occurring, as while they are not likely to occur, they each have significant consequences.

The Veolia incident notification, assessment and management process is applied to all adverse events in this section and was described previously in Section 6.

This section addresses contingency measures in relation to the following identified adverse events:

1. Breakdown Events.
2. Storm Event/High Influent Volume Events.
3. Hypochlorite Contamination of Land and/or Wigmore Stream.
4. Non-compliant Discharge to Wigmore Stream.

7.1 Breakdown Events

Critical plant assets are discussed in the Hahei WWTP Management Plan. Regular checks and programmed maintenance is performed on these assets to ensure the performance of the plant and reduce the risk of breakdown events. That being said, the risk of a breakdown event occurring is not zero. The priority 1 assets at the plant are the aerators and MFU. The MFU feed pump is also a priority asset and considered here as the pump controls the pond levels.

7.1.1 Loss of Aeration

This could occur due to a power failure of aerator breakdown. There is redundancy in the ponds for loss of a single aerator as there are multiple aerators. Depending upon the pond loading; peak period populations are higher therefore loading is also higher, the impact of an aerator breakdown can be more severe. Dissolved oxygen levels across the ponds will be monitored daily in the event of an aerator breakdown. During off-peak loading periods, the aerator will be repaired and reinstated as soon as practicable provided DO levels in the ponds remain above 2.0 mg/L. During peak loading periods or if the DO drops below 2.0 mg/L during off-peak loading periods, a temporary replacement aeration will be instated as a priority.

7.1.2 MFU Feed Pump Breakdown

The severity of a breakdown to the MFU feed pump is dependent on the influent volumes and pond level. The pump should be replaced or repaired as soon as practicable. During the peak period, and/or if the pond levels are above 80%, and/or during high inflow events or if a storm event is predicted, a temporary replacement pump will be installed as a priority.

7.1.3 MFU Breakdown

Again, the severity of an MFU breakdown depends upon the hydraulic loading and pond levels at the time. If the pond levels are low and dry weather flow is predicted the MFU can be out of action for sometime before an alternative is needed. Repairing the MFU should still be completed as a priority as this treatment process produces a higher quality effluent than the alternatives.

If the pond level increases to above 90% and the MFU is still no longer available then the grass plots will be used as a last resort. In response to a discharge to the grass plots being necessary, additional sampling will be conducted to monitor the impact on the groundwater and Wigmore Stream. Samples will be collected from the following sample points weekly while the discharge occurs:

- Wigmore Stream 50m U/S
- Wigmore Stream D/S at the Pa Rd Bridge
- Small unnamed stream that joins the Wigmore Stream after the Pa Rd Bridge, adjacent to the HWSA bores.
- Pa Road TCDC Water Supply Bore.
- Wigmore Stream estuary mouth.

These samples will be tested for the parameters required by *Condition 16* of resource consent **135636.01.01**:

- Total ammoniacal nitrogen
- E.coli
- Enterococci
- Conductivity
- pH
- cBOD5
- Nitrate
- Suspended solids
- Total Kjeldahl nitrogen
- Dissolved reactive phosphorus
- Total phosphorus and
- Turbidity.

All efforts will be made to take the samples from a period one hour either side of a low tide.

7.2 Storm/High Inflow Events

Without a stormwater/emergency pond, all flows to treatment have to be treated at Hahei WWTP. All efforts are made to prepare the plant for a storm event. Discharge is maximised ahead of the event to provide additional capacity within the retention pond for storage. If high influent flows persist, the level in the retention pond may

increase to a point where the site is at risk of flooding. If the retention pond level reaches 95%, permission will be sought from TCDC to increase the discharge volume to prevent flooding. This will mean increased flows through the MFU. If this is not possible then discharge to the grass plots will be utilised as a last resort, following the sampling as laid out in section 7.1.

7.3 Hypochlorite Contamination to Land and/or the Wigmore Stream

The risk of such an event occurring is extremely low. Only small quantities (500L) of hypochlorite is stored on-site and the tank is on a concrete bund which drains to the aeration pond. The highest risk is during filling. If a spill to land were to occur then a clean-up would take place immediately. Any water course contamination would be reported to TCDC and WRC immediately and sign-age implemented on the Wigmore Stream and estuary mouth to notify the public of contamination in the stream.

7.4 Non-compliant discharge to the Wigmore Stream

A non-compliant discharge could be a volume above the consent limits or concentrations of pollutants above the consent quality limits. *Condition 26* of resource consent **135636.01.01** requires any discharge that has by-passed part of the treatment system and/or discharge to the redundant grass plots or storage pond to be reported to WRC as soon as practicable or as a minimum within 24 hours. A follow up report is required within 7 days. Discharge to the storage pond is not possible. Discharge to the grass plots, as discussed as a contingency measure in sections 7.1 and 7.2 will be notified to TCDC and WRC through the process outlined in section 6.

Sampling is conducted to monitor the quality of the effluent discharged to the Wigmore Stream. There is no requirement in resource consent 135636.01.01 to notify WRC if the consent quality limits are exceeded. However, TCDC will be notified if the consent limits are exceeded in the effluent laboratory samples. Depending upon the exceedance, additional signage may be required along the Wigmore stream to notify the public. For example, if high bacterial counts are recorded in the effluent sample and downstream in the Wigmore Stream.

APPENDIX A- RESOURCE CONSENT 11788

APPENDIX B - PROCESS AND INSTRUMENTATION DIAGRAM - HAHEI WWTP

APPENDIX C - RISK ANALYSIS

			Consequence Without Controls		Control Hierachy	Uncontrolled Ratings				Expected Final Risk (after actions)		
Category	**Process Component / Activity**	**Issue**	**Consequence**	**Existing Controls**	**(1-5)**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**	**Recommended Actions to Minimise Risk**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**
Untreated Effluent Contamination of Land and/or Wigmore Stream	Failure of LT1 Level Transmitter	No indication of level in the retention pond, may result in spillage of wastewater to land and or Wigmore Stream near P1	Damage to P1 (low level) or contamination of land and or Wigmore Stream (high level) and may result in complaints from the public	Checking (daily) of MFU, Site visit (daily)	5	5	3	15	Consider installing an alarm for sensor failure and adding to schedule of daily checks	5	1	5
Untreated Effluent Contamination of Land and/or Wigmore Stream	Failure of MFU or critical MFU components (Membranes)	No ability of plant to treat wastewater. Spillage of wastewater to land or Wigmore Stream. May also cause objectionable odour	Contamination of land and or Wigmore Stream and may result in complaints from the public	Checking (daily) of MFU, Site visit (daily)	3	5	3	15	SCADA Alarms for MFU failures and contingency plan	3	1	3
Untreated Effluent Contamination of Land and/or Wigmore Stream	High Level in Retention Pond	Spillage of wastewater to land or Wigmore Stream. May also cause objectionable odour	Contamination of land and or Wigmore Stream and may result in complaints from the public	Alarm, Site visit (daily)	3	5	3	15	SCADA Alarms on retention pond level and contingency plan	3	1	3
Untreated Effluent Contamination of Land and/or Wigmore Stream	No power to WWTP site	No ability of plant to treat wastewater. Spillage of wastewater to land or Wigmore Stream. May also cause objectionable odour	Contamination of land and or Wigmore Stream and may result in complaints from the public	MFU Shutdown Condition, Alarm, Site visit (daily)	3	5	2	10	Ensure a working generator is available. Contingency Plan.	3	1	3

			Consequence Without Controls		Control Hierachy	Uncontrolled Ratings				Expected Final Risk (after actions)		
Category	**Process Component / Activity**	**Issue**	**Consequence**	**Existing Controls**	**(1-5)**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**	**Recommended Actions to Minimise Risk**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**
Untreated Effluent Contamination of Land and/or Wigmore Stream	Rising main to WWTP blocked or leaking	Spillage of raw wastewater to land or Wigmore Stream. May also cause objectionable odour	Contamination of land and or Wigmore Stream and may result in complaints from the public	Checking (daily), Site visit (daily)	4	5	2	10	SCADA Alarms on pump station level.	5	1	5
Untreated Effluent Contamination of Land and/or Wigmore Stream	High Levels in ponds due to high inflow event	Spillage of wastewater to land or Wigmore Stream. May also cause objectionable odour	Contamination of land and or Wigmore Stream and may result in complaints from the public	Alarm, Site visit (daily)	3	5	2	10	Daily monitoring and communication with Waikato Regional Council. Consider short-term 'breach of maximum daily volume' condition. Contingency Plan.	3	2	6
Hypochlorite Contamination of Land and/or Wigmore Stream	Failure of LT2 Level Transmitter	No indication of level in TI, may result in spillage of hypochlorite solution to land and or Wigmore Stream	Damage to DP1 (low level) or contamination of land and or Wigmore Stream (high level) and may result in complaints from the public	Observation when filling T1	5	5	1	5	Concrete bunding installed, drain to aeration pond	3	1	3
Non-compliant Discharge to Wigmore Stream	Failure of FM2 Flow Meter	No indication of flow in abnormal operating conditions	Non-compliant discharge to Wigmore Stream	None	5	2	2	4	MFU not capable of exceeding limit. SCADA flow alarm.	2	1	2

			Consequence Without Controls		Control Hierachy	Uncontrolled Ratings				Expected Final Risk (after actions)		
Category	**Process Component / Activity**	**Issue**	**Consequence**	**Existing Controls**	**(1-5)**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**	**Recommended Actions to Minimise Risk**	**Consequence (1-5)**	**Likelihood (1-5)**	**Risk**
Non-compliant Discharge to Wigmore Stream	Excessive discharge to Wigmore Stream outlet	High flow to Wigmore Stream	Non-compliant discharge to Wigmore Stream	SCADA Alarm	3	2	2	4	Contingency plan	2	2	4
Damage to Plant (MFU or Pump P2)	High flow to pump P2	Damage to P2 and potentially subsequent plant, may also cause spillage of treated wastewater to land and or Wigmore Stream	Non-compliant discharge to land and or Wigmore Stream, maintenance and or replacement of MFU components or pump P2 may be required	Site visit (daily), checking (daily) of MFU discharge flow rate	4	4	3	12	Ensure spare pump is available. Contingency plan	3	2	6