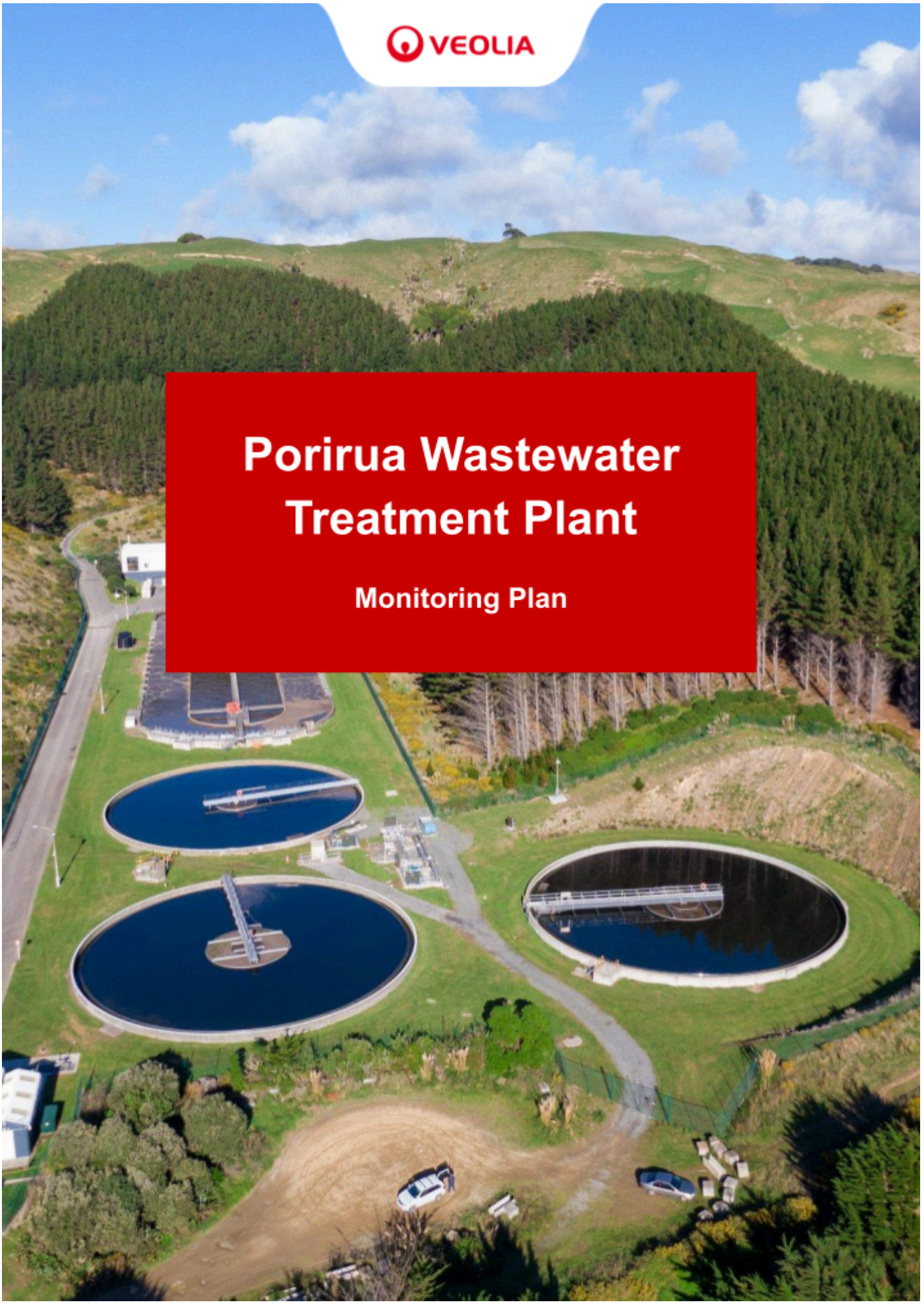

Porirua Wastewater Treatment Plant

Monitoring Plan

CONTROL SHEET

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DOCUMENT CONTROL REGISTER

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0	Draft	11/01/2024	Draft circulated internally to reviewers for comment.
1	Draft	09/01/2024	Draft circulated to WWL for review
2	Review	23/04/2024	Document updated based on the GWRC comments

EXECUTIVE SUMMARY

This monitoring plan is designed to work and be considered in conjunction with the Porirua wastewater treatment plant working group (WWTPWG). The objectives of this monitoring plan are:

- Provide timely feedback on plant performance
- Provide for the timely detection of spikes, trends or other changes in discharge and /or environment quality.
- Inform changes to treatment processes if adverse spikes, trends or changes occur.
- Demonstrate compliance with the conditions of consent.
- Measure the type, scale and magnitude of discharge effects on receiving water quality, ecology and kai moana species specified in condition 5J(c) of the Resource consent WGN200229 [36816].
- Inform plans for improving wastewater systems and processes.
- Seek to minimise the adverse effects of the discharge on values of significance to Ngāti Toa Rangatira.

The Monitoring Plan will be reviewed at least every 5 years in conjunction with the WWTPWG. All updated versions of the Monitoring Plan will be submitted to the Manager for certification that they comply with the requirements of Condition 5F of the Resource consent WGN200229 [36816].

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1. Quality Control

Monitoring the operation of the treatment plant is an important step to maintaining an optimally treated effluent quality and thus minimising the effects on the environment from the discharge of the treated effluent.

The operational monitoring principles include Operator checks as well as regular raw wastewater and treated effluent quality monitoring.

1.1. Data Records

Veolia uses a database called PI ODMS which records all the monitoring parameters of the Porirua WWTP. The data recorded by PI ODMS comes from four (4) sources:

- SCADA system which is connected to the PLC of the plant.
- Internal lab monitoring analysis
- External lab compliance monitoring parameters
- Emailed (Extract Transform Load) data (ie. Power consumption, sludge weights, screenings tonnage, etc).

1.2. Quality Monitoring Procedures

All sampling techniques and analyses employed and undertaken in respect of the conditions of the resource consent are performed by an International Accreditation New Zealand (IANZ) registered laboratory.

2. Wastewater Treatment Plant Monitoring

2.1. Wastewater Treatment Plant Operations

The operation of the Porirua WWTP is automatically controlled by the programmable logic controller (PLC). The supervisory control and data acquisition (SCADA) system takes information from analytical equipment at the WWTP controlled by the PLC and records it.

Data from SCADA is also extracted from the system and stored in an online data management system (ODMS) known as PI ODMS. It serves as a backup for the data in SCADA and allows users to manipulate the information without using the SCADA platform. The SCADA system allows the following:

- SCADA data integration: Ensure real-time collection and logging of critical process parameters by the SCADA system.
- Real-time visualisation: Utilise the SCADA interface for visually monitoring various processes and alarms in real-time.
- Historical trends: Analyse historical data trends stored in the SCADA system to identify patterns and conduct retrospective analyses.
- Alarms and notifications: Configure SCADA alarms to promptly alert deviations in critical parameters, enabling swift responses
- Remote access: Leverage the SCADA remote's access capability to supervise the plant beyond its physical location, facilitating remote management.
- Reporting: SCADA feeds the PI ODMS and ID databases to generate reports summarising key data, easing decision-making and also for regulatory reporting compliance.

2.2 SCADA system monitoring

2.2.1 Automatic alarming system

A number of instruments is in place to allow for real time monitoring of treatment process parameters. The instrumentation is integrated into the SCADA system and where applicable, alarm limits are defined. Everytime the pre-defined alarm value is reached (for example maximum level), alarm is raised and subsequent action is triggered. Details on instrumentation used for the process monitoring is given in table 1.

Monitoring instrument	Area	Alarms	Calibration frequency *
Flowmeter sensor	Screened Effluent into Aeration basin	No alarms (limits)-monitoring only	1 yearly
Level sensor	Aeration basin	High level alarm	1 yearly
Dissolved oxygen probe A	Aeration basin	Low DO alarm	1 yearly
Dissolved oxygen probe B	Aeration basin	Low DO alarm	1 yearly

Dissolved oxygen probe C	Aeration basin	Low DO alarm	1 yearly
Dissolved oxygen probe D	Aeration basin	Low DO alarm	1 yearly
Suspended Solids probe	Aeration basin	No alarms (limits)-monitoring only	1 yearly
Sludge Blanket Level sensor	CLARIFIER #1	High blanket alarm	1 yearly
Sludge Blanket Level sensor	CLARIFIER #2	High blanket alarm	1 yearly
Sludge Blanket Level sensor	CLARIFIER #3	High blanket alarm	1 yearly
Flowmeter sensor	Duron UV channel	No alarms (limits)-monitoring only	1 yearly
Flowmeter sensor	TAKUV channel	No alarms (limits)-monitoring only	1 yearly
UV transmittance probe	Duron UV channel	Value below 45%	1 yearly
Level sensor	UV Inlet Channel	UV by-pass active	1 yearly
Level sensor	UV Inlet Channel	UV by-pass active	1 yearly

Table 1 List of Instrumentation

*Alarms for instrument malfunction are integrated into SCADA and in case of failure, an alarm is raised.

2.2.2 Operator's supervision

SCADA system and alarms generated are visualised in the SCADA system accompanied by a sound alarm. Additionally, every alarm generated by SCADA is sent via a pager system to the on-call team, who are responsible for the plant's monitoring outside of normal operating hours and can monitor the site SCADA system remotely. In the case of a critical alarm an operator is available to attend site 24/7 For every work week the on-call team consist of the following:

- On-call operator
- On-call manager

Functionality of the pager system is routinely checked by an automatically generated health test alarm at 8pm, followed by remote SCADA checks by the on-call operator.

2.3. Influent Monitoring

2.3.1. Flow Rate

The plant's influent flow is taken from the sum of discharge flow from Tangere Pump Station and Rukatane Pump Station which feeds into the treatment plant. The data is recorded by SCADA and stored in PI ODMS.

2.3.2. Influent Quality Monitoring

An influent 24-hour composite sample is taken daily by an autosampler. The inlet autosampler is located to the southeast of the main plant building by the inlet pipeline about 15 m before the milliscreens building. The composite sample is analysed for 5-day Biochemical Oxygen Demand (BOD5) and total suspended solids (TSS). These analyses are performed by an International Accreditation New Zealand (IANZ) registered laboratory.

Figure 1. Inlet Autosampler

2.4. Aeration Basin

Constant Dissolved Oxygen concentration is measured and maintained in the aeration basin to make sure that a sufficient level of aeration is maintained. The DO level concentration is set up in the control system, if the DO concentration is out of this range, alarms are triggered. (low limit is 1 mg/L).

DO is being constantly monitored and recorded by SCADA. This data is also available in the PI ODMS database.

2.5. Effluent Monitoring

2.5.1. Flow Rate

Effluent flow rate is monitored by flowmeters in the Duron and TAK UV systems. These flows are automatically recorded by the SCADA system for trend analysis and real time monitoring.

The flow rates are reported in real-time through PI ODMS and reported on in the quarterly and annual reports against consented conditions.

2.5.2. Treated Effluent Quality Monitoring

An effluent 24-hour composite sample is taken daily by an autosampler. The outlet autosampler is located by the pre-UV system. The composite sample is analysed for 5-day Biochemical Oxygen Demand (BOD5) and total suspended solids (TSS). A pre-UV grab sample is taken and analysed for UV Transmissivity (daily) and Faecal coliforms (twice a week). Two daily grab samples are taken and analysed for Faecal coliforms and Enterococci. These analyses are performed by an International Accreditation New Zealand (IANZ) registered laboratory.

Figure 2. Outlet Autosampler

2.5.3. UV Transmissivity (UVT)

Daily grab sample is taken from the common pit after the UV systems, this sample is analysed for UV transmissivity. Also, a UVT probe was installed in the Duron UV system channel to constantly monitor the UV transmittance of the effluent before being discharged in Rukutane point. The data is recorded

by SCADA and stored in PI ODMS, allowing early detection of non-compliance with Resource consent.

The hourly average trend is also calculated by SCADA at 5-minute intervals and an alarm was set up to inform when this value is below the compliance limit of 45%. Therefore, the Manager will be notified as soon as practicable and an investigation will be initiated to meet the requirements under condition 12D of the consent.

2.6. Resource Consent Compliance Monitoring Schedule

The following is the monitoring schedule for influent and effluent resource consent compliance:

Sample location	Parameter	Type of sample	Frequency	Limit
Influent	Viral Testing (F-RNA bacteriophage)	Grab	Monthly	NA
Effluent	BOD5	Composite	Daily	Geometric mean <30mg/L Percentile <75mg/L
	Suspended solids	Composite	Daily	Geometric mean <30mg/L Percentile <75mg/L
	Faecal coliforms	Grab	Daily	2,000 cfu/mL
	Enterococci	Grab	Daily	NA
	UV Transmissivity	Grab	Daily	NA
	Total Ammonia Nitrogen	Composite	Weekly	NA
	Viral Testing (F-RNA bacteriophage)	Grab	Weekly	NA
	Nitrate Nitrogen	Composite	Monthly	NA
	Nitrite Nitrogen	Composite	Monthly	NA
	Dissolved Reactive Phosphorus	Composite	Monthly	NA
	Total Nitrogen	Composite	Monthly	NA
	Total Phosphorus	Composite	Monthly	NA
	Total Arsenic	Composite	Monthly	0.023 mg/L
	Total Cadmium	Composite	Monthly	0.055 mg/L
	Total Chromium	Composite	Monthly	0.044 mg/L
	Total Copper	Composite	Monthly	0.013 mg/L
	Total Lead	Composite	Monthly	0.07 mg/L
	Total Mercury	Composite	Monthly	0.044 mg/L
	Total Nickel	Composite	Monthly	0.08 mg/L
	Total Zinc	Composite	Monthly	0.001 mg/L

	Phenol	Composite	Monthly	2.7 mg/L

These analyses are performed by an International Accreditation New Zealand (IANZ) registered laboratory. The results are recorded in PI ODMS and ID databases, and reported on in the quarterly and annual reports against consented conditions.

2.7. Sampling procedures

Samples collection

Sample collection is undertaken by a dedicated site operator as per sampling schedule. Every week, there is one operator responsible for the samples collection. Operators alternate based on a duty roster.

Training for the correct sampling technique is part of the onboarding training process. Information on good sampling practices together with all on-site specific sampling information (equipment, sampling points etc.) are provided in the Porirua WWTP Sampling procedure document.

Samples transport

External company is contracted to transport the samples to the third-party accredited laboratory. For the transport, sample bottles are stored in ice pack cooled bins. For every sample, chain of custody document is completed. Chain of custody is signed by the sampling person and person accepting the samples in the laboratory. Chains of custody are stored in the Client’s portal of the external laboratory.

3. Receiving Water Monitoring

The effluent from the Porirua WWTP is discharged from the existing outfall in Rukutane Point (map reference NZTM: 1753097.5447922).

Representatives receiving water samples are collected monthly at the following locations:

1. At or about 140 metres generally east of the outfall	(41°06'21.85"S, 174°49'46.68"E)
2. At or about 200 metres generally southwest of the outfall	(41°06'25.03"S, 174°49'16.50"E)
3. Titahi Bay Beach at Toms Road	(41°06'22.25"S, 174°50'07.03"E)
4. Control site	(41°05'20.05"S, 174°50'58.56E)

These samples are analysed for:

Sample location	Parameter
1, 2, and 4	Enterococci
	pH
	Salinity
	Dissolved Oxygen
	Temperature
	Total Ammonia Nitrogen
	Nitrate Nitrogen
	Nitrite Nitrogen
	Dissolved Reactive Phosphorus
	Total Nitrogen
	Total Phosphorus
	Wind

	Tide
	Weather
3.	Enterococci
	pH
	Salinity
	Dissolved Oxygen
	Temperature
	Wind
	Tide
	Weather

These analysis are performed by an International Accreditation New Zealand (IANZ) registered laboratory. The results are recorded in PI ODMS and ID databases, and reported on in the quarterly and annual reports against consented conditions.

3.1. Receiving water visual monitoring

Daily visual inspections of the outfall at Rukutane point are performed by the on site operator to make sure the discharge of treated wastewater do not cause the following effects in the receiving waters:

a. The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material.
b. Any conspicuous change in colour or visual clarity.
c. Any emission of objectionable odour from the discharge to water.
d. Any significant adverse effect on aquatic life.

Photos of the outfall vicinity are taken on a daily basis as well.
If the Operator detects any of the effects listed above in the receiving waters, escalation process is initiated. The Operator will immediately notify the Duty Manager or the Operations Coordinator who will notify the Manager as soon as practicable. Shoreline Sampling campaign will be initiated as well to assess the environmental effects.

3.2. Discharge Monitoring and Sampling

Various discharge parameters and shoreline samples are collected as part of a monitoring campaign to determine the effect of the discharge on Titahi Bay when an unconsented discharge may occurred under plant malfunction conditions.

When any type of overflow discharge occurs, there are several parameters that must be recorded. They are as follows:

- duration of the overflow discharge;
- average and maximum overflow discharge flow rates;
- total volume of the overflow discharge; and
- total volume of treated wastewater discharged during the overflow discharge event.

Samples are collected within 24 hours of the discharge commencing, and approximately 48 hours after the discharge commenced if it is safe to do so. The locations of sampling are as follows:

A. At or about 140 metres generally east of the outfall.
B. At or about 200 metres generally southwest of the outfall.
C. Titahi Bay Beach at Toms Road.
D. Control site, Whitireia Park

If the discharge is due to an overflow event, a plant malfunction, or is unconsented then the shoreline monitoring campaign will need to be initiated. Contact the sampling contractor to collect the shoreline samples. The following information must be recorded when samples are collected:

- Date
- Time
- Weather
- Wind condition
- Tidal condition
- pH
- Salinity
- Dissolved oxygen
- Water temperature

The samples collected from sites (a) to (d) must be analysed for enterococci. In addition, the samples collected from sites (a), (b) and (d) must be analysed for total ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, dissolved reactive phosphorus, total nitrogen and total phosphorous as per condition 15 of the resource consent.

The discharge monitoring, sampling and notifications procedures is also stated in the Porirua Management plan as part of the Risk Communication Strategy.

3.3. Water Quality and Ecological Survey

A suitable qualified ecologist will be engaged to conduct a visual survey of the quantity and size range of Paua, Kina and Lobster along the six transects used in the Cawthron (2019) ecological survey. The survey will be undertaken before the third anniversary of the commencement of the resource consent and also will be included within the scope of any ecological survey undertaken in accordance with condition 28 and 29 of the consent.

An ecological survey of the receiving waters for the discharge will be undertaken as per the timeline set in condition 29. The survey shall involve the collection of information on the biota of the intertidal and shallow-subtidal habitats adjacent to the existing outfall at Rukutane Point, at Round Point to the west of the existing outfall, and at a reference location 300m east of the existing outfall. The survey methods should be comparable with those used for the ecological survey included as Appendix F in the application. The results of the survey shall be incorporated into a report prepared by a suitably qualified and experienced coastal ecologist.

3.4. Kaitiaki Monitoring Programme

The Kaitiaki Monitoring Programme is still yet to be developed. This plan will be updated once the programme has been prepared.

3.5. Alarm Monitoring Response

When the SCADA system at the Porirua WWTP detects a fault or a parameter out of normal operation level, an alarm is triggered. This alarm causes a text message to be sent out by the paging system.

When the duty operator has been alerted that a fault has occurred at the Porirua WWTP, they will identify the type of event either through routine maintenance inspections, trends on SCADA, or the SCADA alarm.

If the alarm requires escalation, the duty operator will contact the duty manager. They will inform the duty manager of the type of event.

4. Odour Monitoring and Recording

Odour monitoring and recording to comply with Resource Consent WGN200229 [36727] are outlined in the Porirua Wastewater Treatment Plant Management Plan.

- H2S monitors for monitoring of Inlet tunnel vent and Milliscreen building stack. The data is recorded by SCADA and also available in PI ODMS and ID databases.
- Weather Station for collection of meteorological data and inlet tunnel vent fan operation.
- Dissolved Oxygen in the Aeration basin

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