Your Ref: 1003805

RESPONSE TO NOTICE TO SUPPLY FURTHER INFORMATION

TO: [redacted]

OF: **ENVIRONMENT PROTECTION AUTHORITY**

181 WILLIAM STREET
MELBOURNE VIC 3000

In accord with your Notice issued on 12 August 2020, please find attached information to address the remaining items 1 to 3 in Attachment A. Information addressing items 4 to 8 was previously sent to the Authority on 11 September 2020.

DATED: 13 November 2020

[redacted]
DELEGATE OF
SOUTH EAST WATER

ATTACHMENT A

1. Provide evidence that the proposed treatment process can meet Class A water quality standards by:

a. Demonstrating the log reduction value for each step of the water treatment plant.

For item 1a, the *Guidelines for Validating Treatment Processes for Pathogen Reduction* (DoH, 2013) provide the methods for determining log reduction values (LRVs) for each process and the EPA guidelines for *Dual Pipe Water Recycling Schemes* (EPA Victoria, 2015) notionally provides the overall targets. However, the targets have been updated in the new draft *Victorian Recycled Water Guidelines* (EPA Victoria, 2020b) based on work done for the future update of the *Australian Recycled Water Guidelines* (in preparation, see Table 1-2). These new targets have been used to update the draft log removals table (Table 1-1 below).

Note that the required virus log reduction has changed from a 7-log reduction from raw sewage to recycled water to a 6 log reduction (as per the conditions in the footnote to Table 1-2). Similarly, the protozoa requirement has changed from 6 log to 5.5 log. Management of bacterial pathogens from residential sewage should be adequately addressed by the nominated pathogen control measures listed in the table as per advice in the DHHS validation guidelines (DoH, 2013).

Table 1-1. Claimed and required log reduction values (LRVs) for viruses and protozoa. The claimed LRVs are considered as drafts until they can be validated through the processes described in the DHHS recycled water validation guidelines (DoH, 2013).

Item	Draft Claimed LRV			Total	Required* LRV	Safety Margin (≥ 1 LRV)
	UF	UV	Chlorination			
Viruses	4	1	2	7	**6**	**1**
Protozoa	3.5	4	0	7.5	**5.5**	**2**

It is important to note here the information contained in the footnote to Table 1-2 which states that *"*This is the overall minimum log reduction, after considering return streams, and based on validated treatment processes with real-time operational monitoring of critical limits. Below these log reduction values, the water is not fit for supply and therefore for practical purposes the minimum log reduction requirements should not be used as the design target and nor the operational target. The design and operational target should provide for 1 log margin of safety to minimise the occurrence of ceasing supply*" (EPA Victoria, 2020b).

Identification of influencing factors

According to the DHHS recycled water validation guidelines (DoH, 2013), identifying the factors that influence treatment efficacy relies on a detailed understanding of the mechanisms that are responsible for pathogen reduction. Any factor that is deemed to have a significant effect on treatment efficacy needs to be monitored because the ultimate control of the system will

rely on ensuring these factors are within their validated range. Essentially, a validation study will only be applicable to treatment process units that operate within the validated operational envelope.

A risk management framework, such as the hazard analysis and critical control point (HACCP) system, must be used to identify factors that affect treatment efficacy and the associated operational monitoring that must be undertaken to indicate when these factors are within an acceptable range. The DHHS validation guidelines refer to the *Australian Guidelines for Water Recycling* (AGWR; see element 2 of the *Preventive risk management framework*) for conducting an assessment of the recycled water system. This topic is also addressed in Chapter 6 of the technical document (EPA Publication 1911) (EPA Victoria, 2020a) accompanying the new draft *Victorian Recycled Water Guidelines*.

Footnote: ***Table 1-2. Minimum default pathogen log reduction requirements for class A recycled water (EPA Victoria, 2020b).***

Group	**Total log reduction values to be achieved***
Bacteria	6-log reduction from raw sewage to recycled water
Viruses	6-log reduction from raw sewage to recycled water
Protozoa	5.5-log reduction from raw sewage to recycled water

**This is the overall minimum log reduction, after considering return streams, and based on validated treatment processes with real-time operational monitoring of critical limits. Below these log reduction values the water is not fit for supply and therefore for practical purposes the minimum log reduction requirements should not be used as the design target and nor the operational target. The design and operational target should provide for 1 log margin of safety to minimise the occurrence of ceasing supply*

2. Regarding Water treatment plant validation and monitoring:

a. Demonstrate the methods to be used to validate the performance of the proposed water treatment plant.

The material in this section is largely summarised from the DHHS recycled water validation guidelines (DoH, 2013).

Membrane Filtration: UF (Ultrafiltration)

The most authoritative guidance on membrane filtration is the US EPA's *Membrane filtration guidance manual* (MFGM) (US EPA, 2005). The validation of membrane filtration systems must be consistent with the approach described in the MFGM.

Membrane validation involves three complementary approaches. These approaches are used in combination as they each have inherent limitations and therefore, in isolation, they do not provide effective performance monitoring

- Challenge testing;
- Direct integrity testing; and
- Continuous indirect integrity testing.

The maximum reduction value that a membrane filtration system may receive is the lower of the:

- LRV demonstrated during challenge testing, or
- maximum LRV that can be verified by an integrity test under normal plant operation.

The validation report must include:

- specifications on the membrane module;
- challenge test protocol consistent with the MFGM approach;
- challenge test results for intact membrane modules (i.e. membrane modules that are free from any integrity breaches); and
- challenge test results for compromised membrane modules, if virus reduction is sought.

Section 3.13.3 of the MFGM provides an outline for a challenge test report.

Critical limits for the direct integrity test and continuous indirect integrity monitoring must be validated. These critical limits represent a threshold response which, if exceeded, indicates a potential integrity problem. Corrective actions must be initiated if the critical limits are breached.

Validating UF

For membrane filtration processes like UF challenge testing must be conducted according to the US EPA *Membrane filtration guidance manual* (MFGM) (US EPA, 2005) on a full-scale membrane module identical in material and construction to the membrane modules proposed for use *in situ*. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure. The term 'module' refers to all types of membrane configurations including terms such as 'element' or 'cartridge' that are commonly used in the membrane treatment industry.

Pre-validated membrane modules
Pre-validated membrane modules can be used provided the validation testing conditions, including design configuration, operating conditions (validated range or limits) and control philosophy, are representative of *in situ* conditions.

UV disinfection
The UV disinfection guidance provided by the US EPA *Ultraviolet disinfection guidance manual for the final long term 2 enhanced surface water treatment rule* (UVDGM) (US EPA, 2006) is considered the most authoritative guidance document and is therefore adopted for validation of UV reactors.
For UV disinfection systems: validation testing must involve full-scale testing of a reactor (including open and closed channels), according to the US EPA *UV disinfection guidance manual* (UVDGM) for the long-term 2 enhanced surface water treatment rule (LT2ESWTR) (US EPA, 2006).

UV Validation monitoring
The LRV assigned to the UV disinfection step must be validated under the worst-case conditions that will be experienced by the system when it will supply recycled water. The minimum requirements for validation testing must be consistent with section 5 of the UVDGM. Section 5 of the UVDGM includes a useful checklist of the key elements of the validation test plan.

The validation testing must demonstrate the operating conditions under which the reactor can deliver the necessary UV dose, including flow rate, UV intensity, and UV lamp status. The following must be accounted for in validation testing:

- the UV absorbance of the water;
- lamp fouling and aging;
- measurement uncertainty of on-line sensors;
- UV dose distributions from the velocity profiles through the reactor;
- failure of UV lamps or other system components; and
- inlet and outlet piping or channel configurations of the UV reactor.

Validation testing must include full scale testing of a reactor that is identical to the UV reactor that will be used *in situ*.

Pre validation for UV
Pre-validated UV disinfection reactors can be used provided the validation testing conditions, including design configuration, UV-dose response curve, operating conditions, and dose-monitoring strategy, are representative of *in situ* conditions

The validation report submitted to the department must demonstrate compliance with the UVDGM validation methodology, including all QA/QC requirements. The UV dose requirements specified in Table 1.4 of the UVDGM apply.

Pre-validated reactor designs, or units built to simulate designs validated elsewhere, are accepted without a requirement to repeat the validation for the specific reactor, provided the validation methodology is consistent with the UVDGM and the validation test conditions are representative of *in situ* conditions.

Some additional details are provided in the DHHS Recycled water validation guidelines (DoH, 2013) on the application of the UVDGM to recycled water since the UVDGM is in fact designed to be applied only to drinking water. These differences are namely the influence of particles in wastewater and high UV absorbance. The UV dose requirements were established on particle-free water and therefore the influence of particles in wastewater will restrict the application of UV disinfection in some recycled water schemes. Therefore, planning is essential in designing a recycled water scheme to ensure that upstream treatment processes allow for the application of UV disinfection and optimise its efficacy. In relation to UV absorbance, the UVDGM does not provide RED bias figures for UVT levels below 65 per cent, and therefore some modifications have been made.

Chlorination

For practical purposes, chlorine is ineffective at inactivating *Cryptosporidium* oocysts in wastewater, but is effective against both bacteria and viruses.

Validating Chlorination

For chlorination CT values established from bench- scale experimental studies can be adopted where appropriate (further guidance on CT values is provided in the DHHS validation guidelines). Tracer studies used to establish the minimum contact time, must be conducted at full-scale, unless plug flow can be assumed.

Pre-validated treatment process units or bench-top experimental studies

Where pre-validated treatment process units or bench-top experimental studies are adopted, it is important to ensure that the validation data:

- is not extrapolated (for example, dose–response relationships cannot be extrapolated beyond the validated range)
- is critically reviewed to ensure it is directly applicable to the treatment process unit to be installed and the operational conditions at the site

Pre-validation preparation

The major interfering factors that need to be considered in validating oxidant disinfectants like chlorine are:

(i). Particles,
(ii). Disinfectant demand and
(iii). Short-circuiting.

Each has very different implications for validation. Other physico-chemical parameters that affect the efficacy of the oxidants include pH, temperature and alkalinity.

Particles
Particles are the more problematic of the major interfering factors since it is very difficult to objectively measure their interfering effect.

In order to examine the impact of particle shielding on the inactivation kinetics of an organism, validation experiments require careful design to achieve particle interaction.

Chlorine demand
Chlorine demand is a relatively manageable interfering factor, although a number of assumptions need to be applied when taking the effects into consideration. The first implication of the effect of chlorine demand is that operational monitoring of chlorine requires the direct measurement of chlorine (or a suitable indicator parameter) to demonstrate the concentration of freely available chlorine at the end of the disinfection period.

Generally, the simplest and most conservative monitoring strategy is adopted, which consists of monitoring the chlorine concentration at the end of the nominated contact time, such as at the exit of the contact tank.

Short-circuiting
The US EPA has adopted 'T_{10}' in calculations for the required contact time. In tracer studies T_{10} is a time where 10 per cent of the injected tracer has passed through the contact tank. Using this time in oxidant contact time calculations ensures that 90 per cent of the water passing through the contact tank is exposed to the oxidant.

An acceptable method for deriving contact times in reactors using tracer studies is provided by the US EPA (U.S. EPA 2010, 1999b cited in DoH 2013).

As T_{10} is inversely proportional to the flow rate, tracer studies conducted at only one flow rate must use the highest flow rate to give a conservative T_{10} value. To give more operational flexibility, tracer studies can be carried out at various flow rates (minimum of three) to derive a relationship between T_{10} and flow, from which interpolation can be used to derive the appropriate T_{10}.

Validation monitoring conditions
The LRV assigned to the chlorine disinfection step must be validated under the worst-case conditions that will be experienced by the system under which it will supply recycled water. Separate LRVs are assigned for the three pathogen groups (viruses, protozoa and bacteria).

In most cases, where chlorine disinfection is used on adequately filtered water, the validation study will consist of the desktop application of standard CT values from CT tables to the specific validated case site. A minimum contact time will need to be demonstrated through a tracer study.

Test operating conditions, monitoring and sampling
The validation testing program needs to demonstrate the $\log_{10}$ reduction of the target pathogen or surrogate provided by the treatment process unit. Therefore, samples need to be

taken from both the influent and treated water. That is, at a point after mixing has occurred, prior to and post the treatment process unit.

The validation testing program must be conducted under the expected field operating conditions for the scheme and must be approved by the department.

Typical and worst-case operating conditions associated with the treatment process unit (i.e. the critical control point for the specific pathogen under examination) must be informed by historical baseline monitoring and underpinned by a risk management framework.

The DHHS guidelines require testing to cover seasonal variation. The testing regime that forms part of the Recycled Water Management Plan includes 3 x 30d validation periods to confirm that the water recycling plant has met its performance requirements.

b. Demonstrate the methods to be used to monitor the performance of the proposed water treatment plant.

Plant Performance Testing

General

Performance testing will consist of three separate 30 day periods of testing before and within the first 24 months of operation, and during the following times:

- The first 30 consecutive day performance test period shall be undertaken after completion of design build and successful trial operation. This first Performance Test will demonstrate that South East Water's requirements and schedule of performance guarantees are met. This performance test period needs to be completed successfully to enable the issue of the Commissioning Certificate and subsequent Operations Service period to commence.

Prior to contract completion, test:

- The second 30 consecutive day testing period shall be undertaken during the summer period (December to February); and
- The third 30 consecutive day testing period shall be undertaken during the winter period (June to August).

Note that winter or summer testing can be undertaken to suit the schedule of the works (i.e. whatever season can be accommodated first).

During the Performance Tests, all equipment items shall be run as designed. Ancillary equipment shall be run as designed, and as required, during the Performance Trials.

Performance proving prerequisites

Prior to performance testing commencing, the following activities must have been completed:

- Commissioning completed and commissioning report submitted
- Draft Operations and Maintenance (O&M) manuals submitted
- No defects or outstanding punchlist items (condition free)
- Plant process has been stable for one sludge age, as a minimum, as demonstrated during successful trial operation
- Independent OH&S audit has been undertaken on the plant and any actions addressed
- EPA and DHHS approval for the plant has been obtained
- HACCP plan has been prepared by the Contractor and approved by South East Water.

Performance Testing Plans

A detailed performance testing plan shall be prepared and submitted for review and acceptance by the Employer four weeks prior to the start of each test.

The performance testing plans shall describe the activities during each performance test, personnel, operating requirements, and the testing and measurement regime and schedule that will be used.

Treatment plant testing requirements

The following tests and measurements shall be carried out during each consecutive 30 day Performance Test to prove compliance or otherwise of the water recycling plant with the performance requirements of this Specification:

- Measurement of plant input and output on a continuous basis with daily totalising for the following key streams:
  - Raw sewage influent flow rate
  - Class A feed water (Sewage Treatment Plant (STP) effluent)
  - Class A treated water
  - Residual streams including biological sludge, grit, screenings, scum, filter wash water, and chemical waste.
- Measurement of raw water quality parameters at the frequency specified in Table 2-1.
- Measurement of raw sewage influent, Class A Treatment Plant feed water and Class A treated water quality parameters at the frequency specified in Table 2-1.
- Measurement of chemical consumption on a continuous basis with daily totalising.
- Measurement of power consumption on a continuous basis with daily totalising, including the following specific consumption records:
  - STP key equipment, including as a minimum:
    - Inlet works
    - Bioreactors
    - Aeration
    - Clarifiers
    - Sludge system
  - Class A Treatment Plant key equipment, including as a minimum:
    - Strainers
    - Filtration
    - UV system
    - Chlorination
- Measurement of the noise level at the site boundary on the downwind side of the water recycling plant, in accordance with the EPA guidelines and the following:
  - A minimum of four noise tests will be undertaken on different days
  - Half the noise tests will be undertaken at mid-day
  - Half the noise tests will be undertaken at midnight
  - At least one day and one night noise test will be undertaken with all process units operating.
- Measurement of the odour level at the site boundary during a still day, when there is not any natural dilution. At least two odour tests will be undertaken at locations nominated by South East Water.
- Observation of process equipment washing and cleaning performance
- Confirmation of the correct operation and full functionality of all process equipment including operating sequences, process monitoring, and alarms
- Operational attendance out of hours

Analytical testing on raw sewage and treated water for the Performance Testing shall be conducted by a NATA registered laboratory.

All 24 hour daily composites should be flow weighted.

Monitoring of the performance of the water recycling plant shall be via instrumentation as follows:

- Bioreactor – pH, Dissolved Oxygen, Sludge Flow
- Ultrafiltration Plant – Transmembrane Pressure, Discharge Turbidity, Backwash Flow
- UV Plant – UVT
- Discharge – pH, Free Chlorine, Turbidity

These control points will be used in determining an issue during normal operation. The O&M component also includes a monthly testing regime covering the same parameters listed in Table 2-1.

Table 2-1. Testing Regimes for Different Water Quality Parameters

Water Quality Parameter	Raw Sewage Sampling Frequency	Class A Feed Water Sampling Frequency	Class A Treated Water Sampling Frequency
COD	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	N/A
BOD_5	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	N/A
Total Suspended Solids (TSS)	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	24 hour daily composite	N/A
Turbidity	Continuous on-line	Continuous on-line	Continuous on-line
pH	Continuous on-line	Continuous on-line	Continuous on-line
Total Kjeldahl Nitrogen (TKN)	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	N/A
Ammonia (as nitrogen) and nitrate	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	Continuous on-line 24 hour daily composite and three daily spot samples (morning, afternoon, and night)	Continuous on-line 24 hour daily composite and three daily spot samples (morning, afternoon, and night)
Total Phosphorus	24 hour daily composite and three daily spot samples (morning, afternoon, and night)	24 hour daily composite	N/A
Total organic carbon	N/A	24 hour composite 3 times per week	N/A
True colour	N/A	N/A	24 hour composite
Apparent colour	N/A	N/A	24 hour composite
Metals	Weekly grab on RAS or WAS	Weekly on a composite	N/A
Crypto	24 hour composite per week	One sample per week	Two samples per week
E.coli	N/A	Two samples/day	Two samples/day
Heterotrophic plate count	N/A	N/A	One sample/day
Viruses (MS2-Phage)	N/A	One sample/day	One sample/day
Chlorine residual after Class A tank	N/A	N/A	Continuous on-line (0.2 – 1.5 mg/L)

3. Provide a risk assessment of the risks associated specifically with the proposed water treatment plant. The assessment should include but not be limited to:

a. Demonstrate controls in place to prevent cross connection of pipes

A risk assessment of the proposed treatment plant is shown in Table 3-1. The following controls are already in place to prevent cross connection of potable and recycled water pipes:

- Existing plumbing regulations require that potable and recycled water pipes are marked differently so they can be readily identified;
- Recycled water distribution pipes and household connections are fed from the potable water supply until approved for release by South East Water's development/plumbing inspectors. So any inadvertent cross-connection at this stage will not result in contamination with recycled water;
- While still supplied with potable water, South East Water's development/plumbing inspectors check that the recycled water distribution pipes and household connections only supply recycled water connections and fittings. The attached *Recycled Water Plumbing Commissioning* procedure (AM2725) shows the process for ensuring recycled water only connects to recycled water fittings in the household;
- South East Water's development/plumbing inspectors check the recycled water connections of all recycled water distribution systems and every household supplied with recycled water;
- Once the development/plumbing inspectors have satisfied their checking requirements, the recycled water pipes can be commissioned (that is, switched onto recycled water supply).

b. Controls to prevent accidental consumption

The controls to prevent accidental consumption of recycled water are:

- Existing regulations and inspections to prevent cross-connection of potable and recycled water pipes (see Section 3a);
- Recycled water taps are identified by a distinctive colour (lilac) and marked with a “do not drink” sign;
- As part of the land purchase process, prospective buyers are advised of the special features of the Aquarevo development, including the provision of recycled water for non-drinking purposes (see Aquarevo Disclosure Statement);
- Householders are provided with a removable spindle to operate the recycled water taps. These can be removed when the tap isn’t required or is not being supervised by the householder;
- All householders at Aquarevo have a personal induction to explain the operation/requirements of the water features, including being advised that the recycled water is not for drinking. This message is reiterated in the Aquarevo owner’s manual, which is left with the householder (see attached Aquarevo brochure); and
- South East Water undertakes an initial maintenance inspection three months after householders move in, and then an ongoing annual maintenance inspection. During those inspections, South East Water will identify and address any issues with the controls for preventing accidental consumption of recycled water – including distinctive colour (lilac) taps, provision of removable spindles and marking recycled water taps with “do not drink” signs.

c. Potential generation of Bioaerosols

EPA requested further information on the management of risks associated with bioaerosols for the Aquarevo WRP and with respect to the use of Class A recycled water in the Aquarevo housing estate. In Victoria, Class A recycled water, by virtue of the high level of treatment that the product undergoes and its supporting quality management systems, is approved for the following uses:

- residential use;
- unrestricted public access; and
- Open industrial systems.

Unless there are uses of Class A recycled water at the Aquarevo Estate, other than those proposed in the SEW Works Approval, or listed in Table 3.7 of the AGWR or Table 25 of the draft Technical Information for the Victorian Guideline for water recycling, then bioaerosol risk can be considered to be managed along with other uses of recycled water in residential settings. Note that a use of Class A recycled water that generated bioaerosols at a greater rate and level of exposure than use in firefighting would be a trigger for a QMRA to quantify the risk. In the AGWR and Victorian guidance documents, a firefighting event with recycled water was conservatively estimated to involve exposure (i.e. ingestion) of up to 20 mL of water and was considered safe with up to 50 such exposure events a year.

d. Pathogen controls include in the proposal

Addressed in material covered in Section 2 of this document. Describes pathogen reduction treatment measures, validation, and performance monitoring.

e. Undertaken by a competent microbial risk assessor

This report was prepared by Steve Muir (South East Water's Integrated Water Delivery Manager) with input from John Koumoukelis (Director Hydroflux Utilities) and Dr Nick O'Connor (Director Ecos Environmental Consultants). In particular, Dr O'Connor, is a competent professional risk assessor with extensive experience in environmental and public health risk assessment. A copy of Dr O'Connor's CV has been supplied to SEW.

f. Demonstrate any assumptions made in the assessment

All assumptions in relation to the quantification and management of risks to recycled water quality at the Aquarevo WRP will be documented in the relevant quality system documents (e.g. RHEMP, Recycled Water HACCP Plan, Aquarevo RWQMP plus supporting SOPs and prerequisite programs).

g. Provide supporting evidence for the above

Supporting evidence in response to the above information requests is included in the relevant sections. Currently SEW is reviewing and updating its recycled water regional HEMP and HACCP plan and will prepare an RWQMP for Aquarevo.

Table 3-1. Risk Assessment Associated with the Aquarevo Water Recycling Plant

No	Failure Mode	Potential Impact	Existing Mitigating Measures	Risk Assessment			Additional Mitigating measures	Risk Assessment		
				Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
1	Cross-connection of potable and recycled water	Potential health risk	Existing plumbing regulations. Potable and recycled water pipes are marked differently.	Possible	Moderate	Medium	• Recycled water distribution pipes and household connections are fed from the potable water supply until approved for release. • South East Water's development/plumbing inspectors check that the recycled water distribution pipes and household connections only supply recycled water connections and fittings. • Recycled water pipes only commissioned after approval.	Unlikely	Moderate	Medium
2	Accidental consumption of recycled water	Potential health risk	Recycled water taps are coloured lilac, and marked with a "do not drink" sign.	Possible	Minor	Low	• Existing regulations and inspections to prevent cross-connection of potable and recycled water pipes; • All prospective buyers are advised of the provision of recycled water for non-drinking purposes; • Householders are provided with a removable spindle to operate the recycled water taps;	Unlikely	Minor	Low

							• All householders at Aquarevo have a personal induction to explain that the recycled water is not for drinking. • South East Water undertakes ongoing maintenance inspections.			
3	Potential generation of bio aerosols	Potential health risk	Treatment to Class A standard Supporting quality management systems	Unlikely	Minor	Low	Class A recycled water is approved for: • Residential use; • Unrestricted public access; and • Open industrial systems	Unlikely	Minor	Low
4	Failure of one or more treatment stages, due to power outage	Potential health risk	Online monitoring, backup generator	Possible	Minor	Medium	Divert all sewer flows to Cranbourne Main Sewer	Unlikely	Minor	Low
5	Failure of one or more treatment stages	Potential health risk	Online monitoring	Unlikely	Minor	Medium	Divert all sewer flows to Cranbourne Main Sewer	Unlikely	Minor	Low

References

DoH (2013) *Guidelines for validating treatment processes for pathogen reduction. Supporting Class A recycled water schemes in Victoria. Victorian Department of Health*, Victorian Government Department of Health.

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