



# Drinking Water Quality Management Plan

October 2018

Port of Townsville Limited

Service Provider Identification Number (SPID): 570

POTL Water Distribution Scheme



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# 1 INTRODUCTION

## 1.1 Background

The Port of Townsville (19°15'S, 146°50'E) is situated in the centre of the growing city of Townsville, the leading population centre in tropical North East Queensland, approximately 1,359 kilometres north of Brisbane, Queensland's capital city. The port is located in the southwest of Cleveland Bay, between the mouths of Ross River and Ross Creek. Port of Townsville Limited (POTL) administers the Port of Townsville.

POTL is responsible for its on-site potable water distribution network within the Port of Townsville and is committed to ensuring that the water scheme is managed so that the supply does not constitute a hazard to employees or the public. POTL draws its drinking water supply from Townsville City Council's (TCC) reticulated supply through two metered supply points. POTL does not store or have the capacity to treat potable water. The management of water quality until it is supplied to POTL is the responsibility of TCC, however, the Australian Drinking Water Guidelines (ADWG) require management of drinking water quality through to the consumer. POTL is considered a Water Service Provider under Queensland legislation and is required to have a Drinking Water Quality Management Plan (DWQMP) in place to manage water quality within its distribution scheme. POTL has been registered as a service provider under the *Water Supply (Safety and Reliability) Act 2008* (the Act) since 19 January 2015.

POTL's original DWQMP (June 2016) was approved in September 2016. As per condition 10.1 of the Information Notice dated 14 September 2016, a review of the plan was undertaken and submitted to the Department of Natural Resources, Mines and Energy (DNRME) on the 28<sup>th</sup> September 2018. As part of this review, several minor changes to the DWQMP were identified. These changes have been incorporated into this revised Plan for approval by DNRME.

## 1.2 Purpose of DWQMP

The purpose of this DWQMP is to provide an overview of POTL's current management system for achieving/maintaining drinking water quality and future plans to develop and continually improve the water quality management system. It will contribute to maintaining a safe and reliable drinking water supply for consumers. The plan is based on the principles described in the Framework for Management of Drinking Water Quality contained in the ADWG 2011. The ADWG Framework was developed to guide the design of a structured and systematic approach for the management of drinking water quality. It incorporates a preventive risk management approach in a drinking water supply context to support consistent and safe water supply.

This DWQMP focuses on the section of the drinking water scheme over which POTL has direct control (reticulation operation, maintenance, monitoring and corrective action). The supply components over which POTL has no control (catchment management, treatment and storage) are the responsibility of TCC and are considered by its DWQMP.

## 1.3 Objectives

This DWQMP and the ADWG Framework address four principal areas described below and illustrated in Figure 1.

- Commitment to drinking water quality management;
- System analysis and management;
- Supporting requirements; and
- Review and continual improvement.

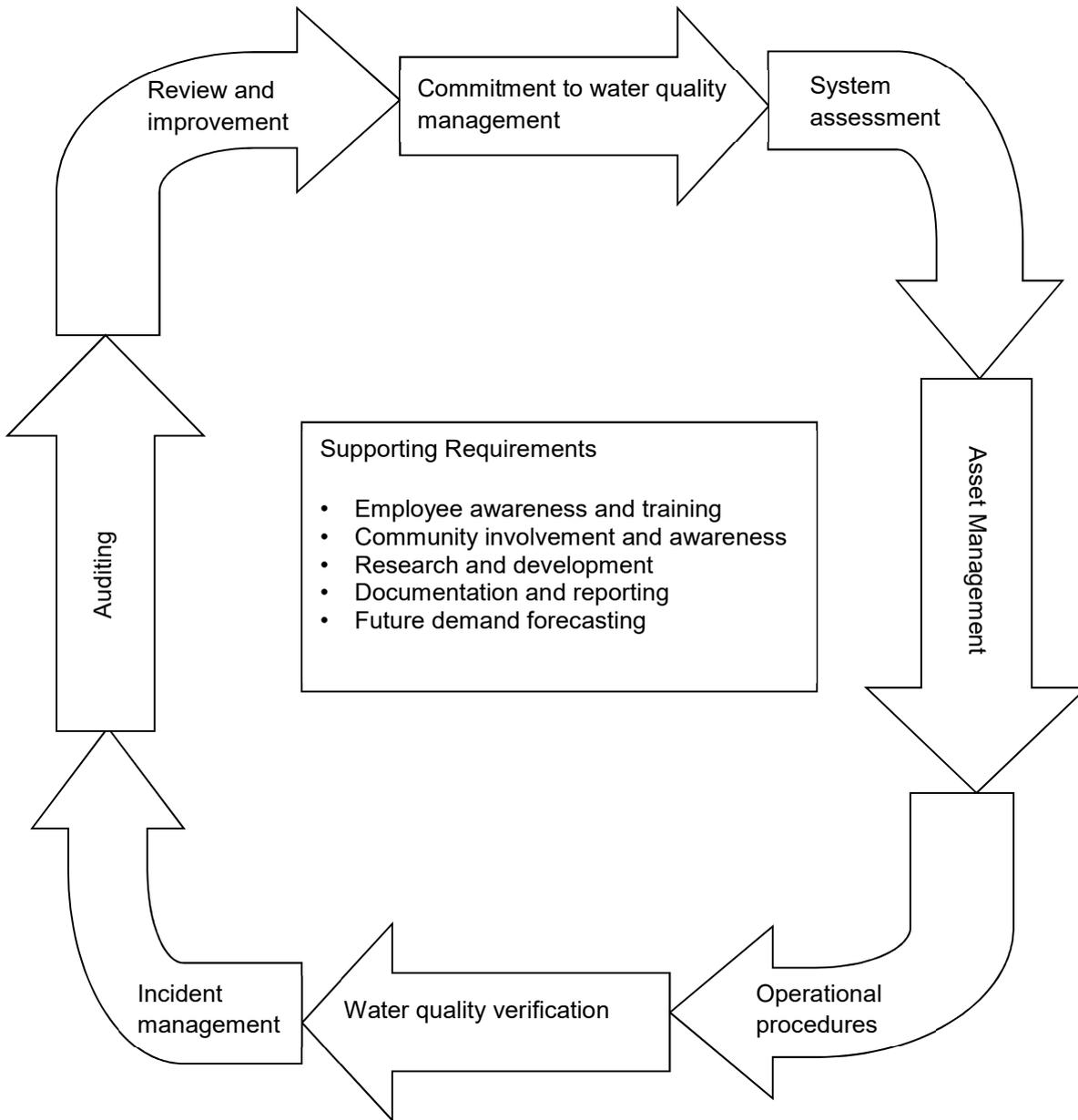
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This DWQMP addresses the 12 elements of the ADWG Framework in order to meet the required levels of service relating to drinking water quality and the legislative requirements of the Queensland *Water Supply (Safety and Reliability) Act 2008* and the Queensland *Public Health Regulation 2005*. The specific objectives of the DWQMP are:

- To demonstrate due diligence and protect public health by implementing a management strategy to ensure a high quality water is supplied to consumers;
- To improve consumer confidence in water quality and the supplier;
- To clearly define current and future management procedures and strategies for maintaining water quality;
- To clearly define strategies for monitoring the quality of water supplied to consumers; and
- To implement a process for continual review, development and improvement of the water quality management system.

**Figure 1: Framework for Management of Drinking Water Quality.**

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### 1.4 Management Plan Structure

This DWQMP has been based on the Drinking Water Quality Management Plan Guideline September 2010 developed by the Queensland Department of Energy and Water Supply (DEWS) (now the DNRME). The DWQMP guideline is built around the 12 elements of the ADWG Framework.

This DWQMP has been structured to comply with the DWQMP guideline. As a consequence, it includes the following sections:

- Registered Service Details;
- Infrastructure for Providing the Service;
- Hazard Analysis;
- Risk Assessment;

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- Risk Management;
- Monitoring Programs; and
- Best Practice Provisions.

## 1.5 Commitment to Drinking Water Quality

POTL's management commitment to risk management and quality is demonstrated by its Quality Policy which states:

“Port of Townsville Limited is committed to ensuring that all Port Facilities and Port Services meet customer, stakeholder and POTL's requirements by implementing appropriate processes and procedures which ensure any risks to delivering its commitment are appropriately mitigated and that these processes and procedures are pro-actively managed and monitored to ensure they are effective, relevant and correctly implemented.”

“POTL's vision and strategic objectives are directed towards ongoing process improvement as a basis for improving product quality and service standards and strengthening our competitive position. POTL maintains a Quality Management System which meets requirements of AS/NZS ISO 9001:2008.”

## 1.6 Employee Awareness and Training

### 1.6.1 Employee Awareness and Involvement

All employees and contractors with responsibilities for the drinking water scheme are aware of:

- characteristics of the water distribution scheme and preventive strategies in place throughout the scheme;
- regulatory and legislative requirements;
- roles and responsibilities of employees and departments; and
- how their actions can impact on water quality and public health.

### 1.6.2 Employee Training

Training needs and competencies necessary for maintaining and operating the water supply scheme are regularly reviewed and records updated. Training records for staff and contractors are the responsibility of the Manager Maintenance and the Human Resources Team.

## 1.7 Review and Continual Improvement

The Management Review Program described in Section 6.4 involves review by the senior leadership team of the effectiveness and relevance of the business. Management Reviews include evaluation of the Key Performance Indicators, incidents, customer complaints, investigations, internal audits, lessons learnt, improvements/ innovations, preventive and corrective actions, internal audit findings, external surveillance audit reports and reported progress against action plans to improve/correct activities and practices. Outcomes are expected to improve customer service, plant and equipment, maintenance regimes, quality practices, health and safety, efficiency and productivity.

This Plan will be reviewed every 2 years,.

The Service Level Agreement with the local authority will be reviewed every three years, or over shorter durations depending on the functioning of the system, to ensure that best practice measures are in place.

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## 2 REGISTERED SERVICE DETAILS

### 2.1 Service Provider Details

Service Provider: Port of Townsville Limited (POTL)

Service Provider Identification Number (SPID): 570

Name of Water Supply Scheme: POTL Water Distribution Scheme

Service Provider Contact Details: Tony Paroz, Manager Maintenance  
 tparoz@townsville-pot.com.au  
 Telephone: 07 4781 1614  
 Mobile: 0418 753 098  
 Fax: 07 4781 1525  
 PO Box 1031, TOWNSVILLE, QLD 4810

### 2.2 Application Form

As required under the Act, a completed application form has been submitted with the DWQMP which includes business details and basic information about the DWQMP.

### 2.3 Communities Supplied

This DWQMP applies to the Port of Townsville Water Distribution Scheme, namely the POTL owned and maintained potable water distribution mains across POTL owned lands. This distribution scheme services POTL owned buildings, lease held lands and facilities and the port berths for visiting ship connection.

Table 1 details ownership/operational responsibilities and the context of the supply in terms of current and future population and demand.

**Table 1: Listing of Drinking Water Supplies.**

Scheme Name	Operator	Communities Served	Current			Projected in 10 years		
			Population served	Connections	Demand	Population served	Connections	Demand
Port of Townsville Water Distribution Scheme	Port of Townsville Limited	Port of Townsville Workplaces	approx. 600	106	approx. 550 kL/d	800	200	approx. 1,100 kL/d

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### 3 DETAILS OF INFRASTRUCTURE FOR PROVIDING THE SERVICE

#### 3.1 Water Distribution Scheme Analysis

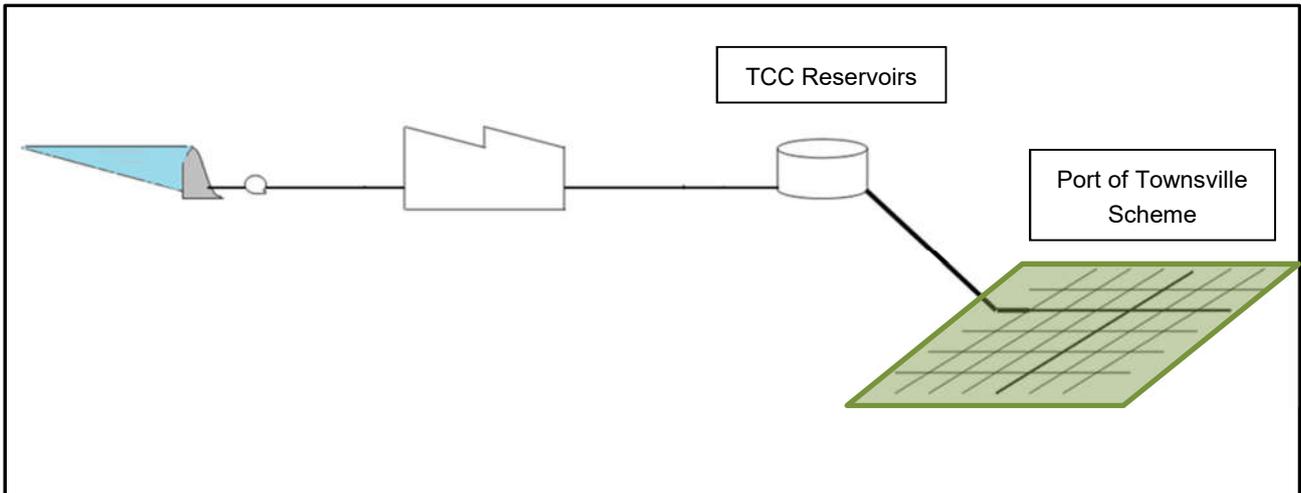
An understanding of the water distribution scheme provides essential information for the development of management strategies for prevention and control of hazards and risks that may impact the health or aesthetic quality of the drinking water supply.

#### 3.2 Schematics

Figure 2 summarises the major components in the supply of water from catchment to POTL's Water Distribution Scheme. It also shows the change of ownership and links between the Water Service Provider. Figure 3 illustrates the layout of the major supply components of the Port of Townsville scheme, including:

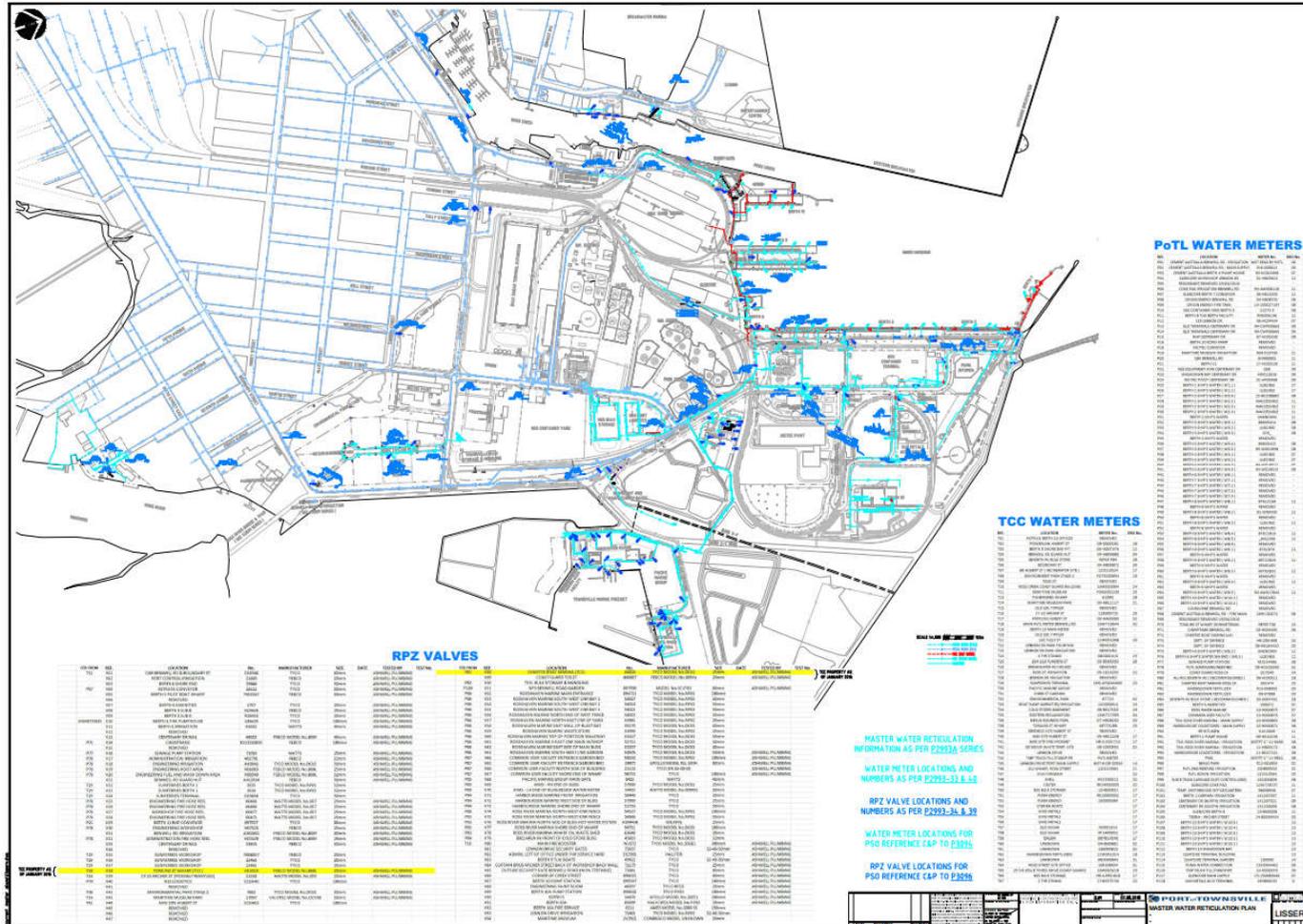
- The TCC water meters on Benwell Road, Lennon Drive, which are the point of change of ownership and operational responsibility between the local authority and POTL;
- Extent of reticulation provided by POTL;
- The size, materials and extent of the water mains used in the POTL distribution area;
- The connections and water metering / valve arrangements; and
- Dead end mains.

**Figure 2: Bulk Water Supply to Port of Townsville.**



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**Figure 3: Schematic Layout of the Port of Townsville Water Distribution Scheme (Dated 7/08/2018).**



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### 3.3 Source, Treatment and Distribution Details

Details of the water source, treatment processes, disinfection processes and distribution and reticulation scheme are provided in Table 2. It should be noted that the POTL scheme is a distribution scheme only. The POTL scheme does not include any storage or treatment infrastructure and there are no water pump stations within the POTL scheme. POTL has no influence over the quality of water distributed through its scheme and has no opportunity to treat water distributed through its scheme. POTL relies solely on the municipal potable water supplier in providing potable water that meets all necessary standards and no recycled water or alternate potable water sources are used within the Port of Townsville. POTL on charges for water supply in some circumstances, with charges including direct pass through water consumption costs from TCC and a nominal network distribution charge.

Water is supplied to POTL from TCC's Municipal Water Supply via two supply mains. POTL is responsible for water distribution after the water meters at Benwell Road, Lennon Drive and Windlass Crossing. Water is reticulated to various worksites within the Port of Townsville area of operations. All water infrastructure is designed and installed in accordance with the appropriate standards and regulations. Suitable isolation values are provided so that water quality can be controlled by providing one-directional flow and maximising water flow through the network. Isolation valves are also used to minimise impact to tenants while servicing and maintaining of water mains. Consideration is given to detention times in large diameter, low volume water mains to ensure that water quality will not be adversely affected. Installation of water main backflow devices and meters are installed on all main services (including fire) in accordance with appropriate standards.

The whole POTL Water Distribution Scheme operates under relatively high pressure between 400 and 800 kPa with most consumers supplied from a ring main arrangement. As a result, there have been no reported incidents of low pressure in the scheme and there is not anticipated to be any regions of low pressure in the current or planned supply zone.

**Table 2: Infrastructure Details.**

Component		POTL Water Distribution Scheme
Sources	Name	Townsville City Council Municipal Water Supply
	Type	Treated Water Supply
	% of supply	100%
	Reliability	No Reliability Issues
	Water quality issues	No Water Quality Issues
Sourcing Infrastructure	Type (pumped/gravity/equipped bore/etc.)	Supply Mains
	Description	The POTL Water Distribution Scheme is supplied by two water mains from the TCC Municipal Water Supply. One 200 pipeline services the Western area of the port and a second 300 mm pipeline services the Eastern area of the port.
Are there any sources that <b>do not</b> undergo treatment prior to supply?		No
Treatment Plant	Not applicable. The POTL Water Distribution Scheme has no treatment plants. All treatment is performed by the TCC Municipal Water Supply prior to water entering the POTL Water Distribution Scheme.	
Are there any sources that <b>do not</b> undergo disinfection prior to supply?		No
Disinfection	Not applicable. The POTL Water Distribution Scheme has no disinfection processes. All disinfection is performed by the TCC Municipal Water Supply prior to water entering the POTL Water Distribution Scheme.	

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Component		POTL Water Distribution Scheme
Distribution and Reticulation Scheme	Pipe material	Ductile Iron/Polyethylene
	Age range	15~ 50 years
	Approximate percentage % of total length	60% @ 50 year 40% @ 15 year
	Areas where potential long detention periods could be expected	N/A
	Areas where low water pressure (example < 12 m) could be expected during peak or other demand periods)	N/A
Reservoirs	Not applicable. The POTL Water Distribution Scheme has no reservoirs. All water storage is performed by the TCC Municipal Water Supply prior to water entering the POTL Water Distribution Scheme.	
Water Quality Responsibility Changes	Upstream location	Townsville City Council – bulk supplier
	Downstream location	None

### 3.4 Key Stakeholders

The key stakeholders involved in the management of drinking water quality are:

**Townsville City Council (TCC)** provides water and wastewater services to the city of Townsville and surrounding areas. TCC supplies treated water from Ross River Reservoir to two water meters at the boundary of POTL's scheme. TCC is responsible for charging POTL for its water use and is the primary contact for POTL for any water supply or quality issues. Information regarding supply and water quality which may affect the POTL scheme is conveyed to POTL via TCC.

**POTL Maintenance and Engineering** are responsible for the design, maintenance, repair and operation of the POTL water distribution and reticulation scheme. POTL Property is also responsible for checking that tenants are complying with lease agreements to maintain backflow prevention devices under their control. Advice to tenants regarding water supply or quality is supplied to tenants by **POTL Property**.

**Queensland Department of Natural Resources, Mines and Energy (DNRME)** is responsible for approving Drinking Water Quality Management Plans (DWQMP) in accordance with relevant legislative requirements and its own guidelines.

**Port of Townsville Tenants / Customers** are required by their lease agreements to provide and maintain necessary internal water reticulation infrastructure including backflow prevention devices. Any supply or water quality issues are communicated between POTL and its customers via email or direct consultation. POTL has a Customer Service Standard which outlines the details of the services being provided by POTL; the target levels of service for a number of performance indicators; and the obligations on POTL and customers in relation to the provision of water services. It also outlines the process for establishing new services, billing, metering, customer consultation, lodging complaints and dispute resolution. The Customer Service Standard only applies to customers with a direct connection to POTL infrastructure and does not apply during periods of Code Red (closed port) or declared natural disasters.

**Contractors** are used by POTL to perform some installation and repair work as required. POTL ensures that contractors have the necessary qualifications, experience and certification to perform the tasks assigned.

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## 4 IDENTIFY HAZARDS AND HAZARDOUS EVENTS

A comprehensive analysis of health hazards that are likely to enter the potable water supply ensures POTL is aware of the types of public health impacts associated with their drinking water supply and provides a basis to ensure the subsequent risk assessment is realistic and relevant.

### 4.1 Information Gathering – Water Quality and Catchment Characteristics

#### 4.1.1 Water Quality Information

Historically, POTL has not monitored the quality of water within the reticulation scheme. TCC tests the quality of water supplied to the POTL's distribution scheme and is responsible for advising POTL of any health related water quality issues in supplied water. In the event that supplied water does not meet the Australian Drinking Water Guidelines limits, TCC will contact the POTL Manager Maintenance so that appropriate action can be taken.

Following its registration as a Service Provider, POTL commenced operational monitoring of potable water at two locations within the scheme. The Environment & Planning Team is responsible for obtaining water samples with all analysis conducted by NATA accredited independent laboratories. An analytical report from the NATA Accredited laboratory is supplied to the Environmental Advisor who ensures the reports are entered into the monitoring database and that conformance with ADWG values for microbiological components of the supply is achieved. All laboratory results are analysed and trended by the Environment & Planning Team with reports provided to the Manager, Maintenance. POTL prepares an annual report assessing drinking water quality trends.

A summary of the available water quality data from POTL's Operational Monitoring Program is found in Table 3. This table represents data for all sample points from July 2017 to June 2018. All test results for this period are within ADWG health and aesthetic guidelines.

**Table 3: Water Quality Results.**

Sampling Location	POTL Water Distribution Scheme ( 5 locations)							
Parameter	Time Period	No of samples	Summary of Results			Australian Drinking Water Guidelines Guideline Value	No of Samples Exceeding Australian Drinking Water Guidelines Guideline Value	Comment
			Maximum Value	Average Value	Minimum Value			
<i>Escherichia coli (E. coli)</i>	Monthly	1 at each location	<1	<1	<1	0 coliform / 100mL	0	

There have been no customer complaints regarding water quality up to end of June 2018.

Verification monitoring of potable water has been conducted at five locations within the scheme in throughout 2017/2018. A summary of these results can be found in Appendix One.

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#### 4.1.2 Catchment Characteristics

The treated water supplied to the Port of Townsville is derived from surface runoff from the areas west and North of Townsville. Following treatment the water supplied is typically free from visible colour and turbidity, has moderate hardness, is free from human pathogens and does not contain detectable *E.coli* (microbiological health indicator organism). Other health related water quality parameters such as metals and organic compounds are consistently within the ADWG values.

## 4.2 Hazard Identification

### 4.2.1 Identifying and Documenting Hazards and Hazardous Events

The identification of hazards and assessment of the associated risks are valuable tools for understanding and planning effective risk management strategies to assure drinking water supply, quality and safety.

TCC delivers treated potable water to the POTL scheme. The delivered water is required to have a low risk from upstream hazards. The key catchment hazards which are managed by TCC are pathogenic microorganisms and turbidity. The key storage and transportation hazards which are also managed by TCC are loss of residual disinfectant and low system pressure. Low residual disinfectant can potentially leave the supplied water vulnerable to microbial contamination or regrowth. Low system pressure can allow ingress of contaminants into mains.

Routine monitoring by TCC is expected to detect any contaminants in treated water arising from the catchment, treatment processes, storage and bulk transport. As a consequence, the monitoring program to be conducted by POTL focuses on water quality parameters which can potentially change within reticulation systems as a result of corrosion, biological growth, and chemical reactions of dissolved substances or external contamination. In any case, POTL has no means of water treatment.

### 4.2.2 Hazard Identification and Risk Assessment Team

The 2016 development of this DWQMP included a hazard analysis and risk assessment process. Table 4 details the personnel responsible for this, their roles and responsibilities, and how knowledge of the actual day to day operations of the schemes has been included in the process.

**Table 4: Hazard Identification and Risk Assessment Team.**

Team Member	Position	System Knowledge
Kim Gebers	General Manager Infrastructure & Planning	Assessment Process Leader
Tony Paroz	Manager Maintenance	Water System Maintenance Input
Melinda Loudon	Manager Environment & Planning	Guidelines Input
Kate McLean	Manager Engineering	Water System Design Input
Steven Ingham	Manager Safety	Safety and Health Input
Tony Issac	Property Development Executive	Customer Standard Service Input
Ross Markham	Contracts Supervisor	Water System Maintenance Input
Patricia Elder	Environmental Coordinator	Water Quality Results Input

Team members provided knowledge of the management, treatment processes, risk mitigation and communication procedures employed by the upstream water service provider. They also provided specialist knowledge of water quality issues associated with water reticulation systems. The POTL representatives

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provided in depth knowledge of the assets incorporated in the POTL scheme, their operation, mechanical and electrical maintenance and the POTL management systems and procedures related to drinking water quality management.

The upstream provider of the water supply has completed hazard analysis and risk assessment processes for their system as part of the development of their own DWQMP. TCC actively manage the risks of their identified hazards and the residual risk in water supplied to POTL is considered low. As a result, TCC were not involved directly in the POTL hazard identification and risk assessment process other than by supplying background information and data.

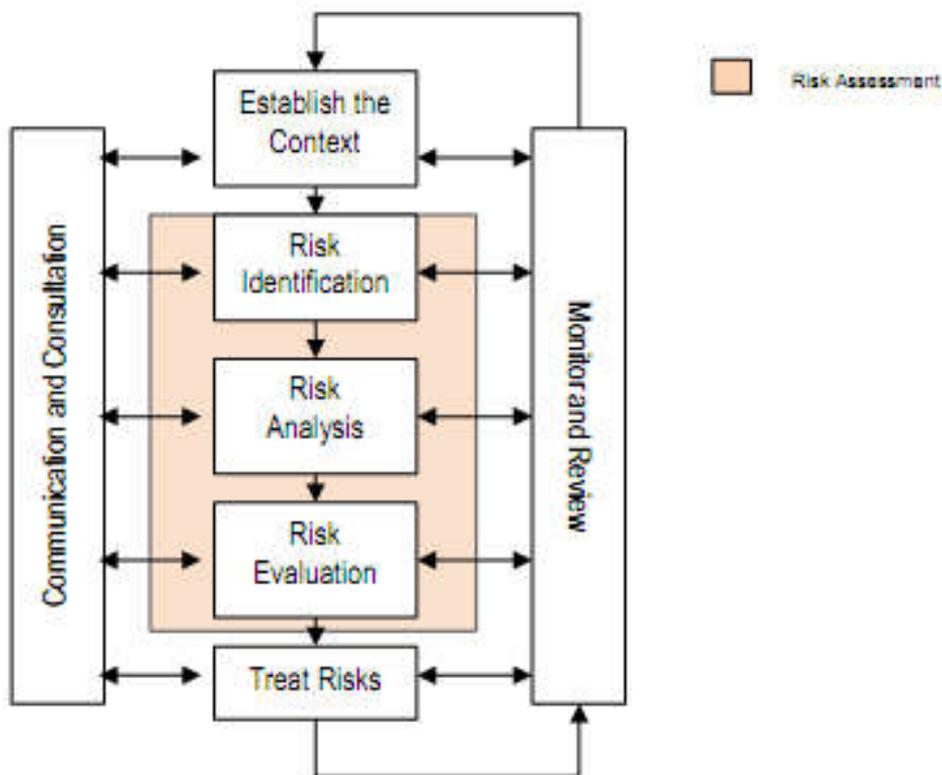
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## 5 ASSESSMENT OF RISKS

### 5.1 Methodology

POTL has developed Risk Management Guidelines to ensure a consistent approach to Risk Management throughout the organisation. The guidelines facilitate a Risk Management Process that is compliant with legislative requirements and *International Risk Management Standard AS/NZS ISO 31000:2009*. POTL's Risk Management Process contributes to the demonstrable achievement of objectives and improvement of performance in, for example, human health and safety, security, legal and regulatory compliance, public acceptance, environmental protection, product quality, project management, efficiency in operations, governance and reputation. Schematically, the Risk Management Process is depicted in Figure 4.

**Figure 4: Risk Management Process.**



A workshop risk assessment was conducted by Hazard Identification and Risk Assessment Team in order to identify known hazards, assess their associated risks and to identify and assess existing and required control measures. The risk assessment is based on existing information available to POTL and general knowledge of the overall water supply scheme and its water quality characteristics.

The level of risk for each hazard was estimated based on the likelihood of occurrence and the severity of consequences. POTL's Risk Assessment Process uses a semi-quantitative system closely matching the system used in the ADWG. Five (5) point likelihood and consequence scales are used by both the ADWG and POTL systems. The definitions in Tables 5 and 6 are derived from the ADWG and were used to tailor the POTL scales to water risks. The POTL calculation system was used to determine the raw risk posed by each hazard by multiplying the likelihood and consequence scores to provide a numerical risk rank which was then used to assign a risk level rating according to the bands shown in Table 7.

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**Table 5: Defined Measures of Likelihood.**

Rank	Descriptor	Probability / Frequency	
1	Rare	May only occur in exception circumstances	Unlikely in the life of the facility
2	Unlikely	Could occur at some time	Once in 20 years
3	Possible	Might occur at some time	Once in 5 years
4	Likely	Will probably occur in most circumstances	Once per year
5	Almost Certain	Expected to occur in most circumstances	Many times per year, continuous

**Table 6: Defined Measures of Consequence.**

Rank	Descriptor	Severity of Impact
1	Insignificant	Reversible health effects of concern Little or no impact on assets < ½ day interruption to Services Up to 5% variation to KPI Unsubstantiated, low impact, low profile or no news items. No political implications.
2	Minor	Severe reversible health effects of concern Minor loss or damage to assets ½ - 1 day interruption to Services 5-10% variation to KPI Substantiated, low impact, low news profile. Minor political implications resulting in minor local media attention.
3	Serious	Short term health problems or irreversible health effects of concern Major damage to assets 1 day – 1 week interruption to Services 10-25% variation to KPI Substantiated, public embarrassment, moderate impact, moderate (local) media attention. Political implications resulting in directions given by the shareholding Ministers.
4	Major	Health impacts, long term/chronic health problems or life threatening or disabling illness Significant loss of assets 1 week – 1 month interruption to Services 25-50% variation to KPI Substantiated, public embarrassment, high impact, high (local and national) news profile, third party actions. Political implications resulting in state/ national inquiry.
5	Catastrophic	Long term, permanent or irreversible health problems. Chronic health affects too many people Complete loss of assets >1 month interruption to Services 50% variation to KPI Substantiated, public embarrassment, very high multiple impacts, high widespread (national and international) news profile, third party actions. Political implications resulting in state/ national inquiry. Significant national and worldwide attention from governments and media condemning activity.

**Table 7: Risk Level Rating.**

	Rank	Consequence				
		1	2	3	4	5
Likelihood	1	L1	L2	L3	L4	M5
	2	L2	L4	M6	M8	S10
	3	L3	M6	M9	S12	H15
	4	L4	M8	S12	H16	E20

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	Rank	Consequence				
	5	M5	S10	H15	E20	E25

## 5.2 Risk Assessment Outcomes

The initial assessment of risk was based on available knowledge at the time of the risk assessment workshop. The aim of the Risk Management Process was to determine risks within the water supply to help set management priorities for improving water quality. Investigative studies and monitoring conducted over time will be used to provide further input into the assessment of risk and setting of management priorities. Risk assessment will remain an on-going process and the risk register will be updated and reviewed as required.

This risk assessment has been reviewed in 2018. Overall, there has been no significant changes to the distribution scheme or attendant risks at the Port of Townsville since the DWQMP was submitted in 2016. As such the risk assessment is still considered to be appropriate. Since the approval of the original DWQMP the ADWG has been updated to include guidance on emergent chemicals per-fluoroalkyl and poly-fluoroalkyl substances. During 2018 POTL undertook testing of the drinking water and confirmed that PFAS was not detected. Given that the test results, the risk assessment has not been updated specific to PFAS.

Table 8 contains a summary risk register for the initial risk assessment of the POTL Water Distribution Scheme and indicates which level of risk POTL considers acceptable and hence at which it would take no additional actions to further reduce the risk. The residual risk after existing or proposed control measures was calculated using a POTL risk mitigation algorithm based on the hazard consequence, likelihood, estimated control effectiveness and the assurance adequacy which is a measure of uncertainty based on experience with the specific control measure being assessed. The residual risk rank is determined by the equation: Residual risk rank = consequence x likelihood x (control effectiveness + assurance adequacy).

The POTL actions for residual risks nominated in Table 8 provide a framework for establishing acceptable risk within the POTL management system.

- Hazards assessed with a low residual risk are acceptable and require monitoring only.
- Hazards assessed with a medium residual risk require monitoring and the development of a risk control plan. Commencement or continuation of activities with a medium residual risk requires the approval of the responsible Executive Delegate. These activities can proceed, however the object of the risk control plan is to reduce the residual risk to low
- Hazards assessed with a high residual risk require monitoring and the development of a risk control plan. Commencement or continuation of activities with a high residual risk require the approval of the Chief Executive Officer or nominated Executive Delegate. These activities can proceed in exceptional circumstances, however this level of approval indicates that the residual risk is considered unacceptable and the object of the risk control plan is to reduce the residual risk to an acceptable level.
- Hazards assessed with an extreme residual risk require monitoring by the Chief Executive Officer and Board and the development of a risk control plan. Commencement or continuation of activities with an extreme residual risk can proceed with the approval of the Chief Executive Officer and Board, however this level of approval clearly indicates that the activity is outside normal operations and the object of the risk control plan is to reduce the residual risk to an acceptable level as soon as possible.

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**Table 8: Hazard Identification, Risk Assessment.**

Hazard	Hazardous Event	Maximum Risk			Existing Preventive Controls	Residual Risk			Comments/ Proposed Risk Reduction Actions (Risk Management Improvement Plan (RIMP))
		Consequence	Likelihood	Risk Level		Consequence	Likelihood	Risk Level	
<b>Municipal Water Supply</b>									
Loss of potable water supply from TCC	Failure from source provider (less than 1 day)	2	3	M6	Requirement to maintain supply – POTL/TCC Service Level Agreement.	2	3	M6	
Reduced water supply	Insufficient water supply due to long term reduced water availability (drought restrictions etc.)	3	3	M9	Requirement to maintain supply – POTL/TCC Service Level Agreement. TCC has access to alternate water source. Restricted water use applies.	2	3	M6	
Poor water quality Drop in disinfection, Pathogens, turbidity, suspended solids etc.	Failure of dosing equipment, chemical dosing or inadequate mixing/disinfection or treatment by source provider	3	3	M9	Requirement to notify POTL in the event of water quality issues – POTL/TCC Service Level Agreement. TCC advise POTL of water quality issues and whether the water is fit for consumption. Notification procedures including Port Alert SMS (Red Oxygen) automated email system is used for notifying all Port Customers of water quality issues.	2	3	M6	More likely to occur during severe weather events
<b>POTL Water Distribution Scheme</b>									
Loss of potable water supply	Fire	1	3	L3	Wharf side areas service by saltwater fire network. Key assets are buried and not susceptible to fire. High pressure is maintained in the system which controls ingress of contaminants from fires/firefighting through joints or leaks.	1	3	L3	
	Communication failure	1	3	L3	Notification and communication requirements are maintained. Use of Port Alert SMS (Red Oxygen) and email communications systems to maintain communication between POTL and Port Customers.	1	2	L2	
	Sabotage/ Vandalism	3	1	L3	Appropriate security to prevent unauthorised access to or interference with water distribution scheme.	2	1	L2	

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Hazard	Hazardous Event	Maximum Risk			Existing Preventive Controls	Residual Risk			Comments/ Proposed Risk Reduction Actions (Risk Management Improvement Plan (RIMP))
		Consequence	Likelihood	Risk Level		Consequence	Likelihood	Risk Level	
					All assets are buried and not susceptible to vandalism.				
Loss of potable water supply	Sabotage/ Vandalism	3	1	L3	High pressure is maintained in the system which controls ingress of contaminants through vandalism damaged assets. Dual feed into POTL system.	2	1	L2	
Loss or reduction of potable water supply	Workforce retention and succession planning	2	2	L4	Sufficient pool of qualified contractors and material suppliers within the region to undertake repairs.	1	2	L2	
	Loss of documentation and records	1	1	L1	POTL Records Standard applies to all procedures.	1	1	L1	Use Queensland wide standards so no loss possible
Reduced water supply	Insufficient water due to short term reduced water availability Aged pipes, infrastructure Pipe breaks / bursts Pipe leaks Inadequate repair and maintenance, inadequate system flushing	2	3	M6	Water tanker for temporary supply to areas not able to be supplied. Procedures to ensure prompt repairs, critical spares on site. Asset management plan developed for each asset class.	2	2	L4	
Water supply does not meet KPIs	Loss of service	3	3	M9	Maintenance / inspection program in place.	2	2	L4	
Water usage exceeds available supply from TCC	Insufficient water due to increased demand and TCC supply limitations	2	3	M6	POTL scheme users to comply with TCC water use guidelines and restrictions as varied from time to time.	2	2	L4	See RIMP Action 6
Foreign substance such as lead zinc,	Stormwater from roads or stormwater ingress	3	1	L3	Ensure water distribution scheme is fully enclosed to prevent contamination.	3	1	L3	See RIMP Action 10 Reduced risk due to

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Hazard	Hazardous Event	Maximum Risk			Existing Preventive Controls	Residual Risk			Comments/ Proposed Risk Reduction Actions (Risk Management Improvement Plan (RIMP))
		Consequence	Likelihood	Risk Level		Consequence	Likelihood	Risk Level	
sediments, petrol/oil products	into pipes				Asset owners consent and permit required for connection to POTL scheme.				network characteristics
Pathogens, nutrients, turbidity, colour	Sewer overflows or infiltration and ingress of contamination from cross-connections, backflow	4	3	S12	Cross connection protection installed, commissioned, tested and maintained as per AS/NZS 3500.1, Standard Plumbing and Drainage Regulations 2003 and Queensland Plumbing and Wastewater Code. Asset management plan developed for each asset class.	2	2	L4	See RIMP Action 10
	Connecting pipes to vessels during cattle or fertiliser loading	4	3	S12	Water delivery via to vessel via lay flat hose.	3	2	M6	See RIMP Actions 7 and 8
Turbidity, colour	Extreme weather event with high rainfall	3	3	M9	TCC to advise POTL of water quality issues and whether the water is fit for consumption.	2	3	M6	
	Build-up of sediments and slimes	2	2	L4	Effective maintenance and monitoring procedures (e.g. for repair of faults and burst mains in a manner that prevents contamination, to control corrosion, to minimize growth or persistence of biofilms etc.).	2	1	L2	See RIMP Action 10 Reduced holding time due to average daily consumption
Poor water quality	Commissioning new mains	2	3	M6	Adequate training of maintenance workers, including contractors, responsible for the distribution scheme to minimise the potential for contamination during recommissioning. Use of standard plumbing codes of practice.	2	2	L4	See RIMP Action 10
	Temporary supply during repairs (scouring or cross connection)	2	3	M6	Temporary lines to be appropriate materials and sizing for supply. Use approved repair methods by adequately trained maintenance and repair personnel.	2	2	L4	
	Inadequate disinfection after construction or repairs	2	3	M6	Adequate training of maintenance workers, including contractors, responsible for the distribution scheme to minimise the potential for contamination during repairs. Minimal purging of pipes after construction or repair.	2	2	L4	

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Hazard	Hazardous Event	Maximum Risk			Existing Preventive Controls	Residual Risk			Comments/ Proposed Risk Reduction Actions (Risk Management Improvement Plan (RIMP))
		Consequence	Likelihood	Risk Level		Consequence	Likelihood	Risk Level	
Poor water quality	Inappropriate materials and coatings or material failure	2	3	M6	Ensure all water infrastructure are designed and installed in accordance with the appropriate standards and regulations. Use of standard plumbing codes of practice.	2	2	L4	See RIMP Action 10
	Biofilms, sloughing and re-suspension, regrowth	2	3	M6	Minimise growth or persistence of biofilms by maintenance of residual disinfectant through minimisation of detention time as confirmed by verification testing.	2	2	L4	See RIMP Action 10 Minimal holding time
	Chemical spillage	4	2	M8	Some assets are buried. Water system is fully enclosed and not susceptible to surface spillage. High pressure is maintained in the system which controls ingress of contaminants through joints or leaks.	4	1	L4	
	Salinity ingress from groundwater	4	2	M8	Effective maintenance and monitoring procedures.	4	1	L4	See RIMP Action 10
<b>Port Customers</b>									
Loss of potable water supply	Inappropriate plumbing and construction materials	3	3	M9	Connection design and installation as per AS/NZS 3500.1, Standard Plumbing and Drainage Regulations 2003 and Queensland Plumbing and Wastewater Code. Mandated use of registered plumber.	2	2	L4	
Poor water quality	Potential customer misuse	3	3	M9	Application of backflow prevention policies and related monitoring. TCC maintain register of currency and type of devices.	2	2	L4	See RIMP Action 10
	Leaching of metals	3	3	M9	Connection design and installation as per AS/NZS 3500.1, Standard Plumbing and Drainage Regulations 2003 and Queensland Plumbing and Wastewater Code. Land owners consent required from approving authority for maintenance and development work with standard conditions applied to approval.	2	2	L4	

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## 6 MANAGEMENT OF RISKS

### 6.1 Risk Management Measures

#### 6.1.1 Existing Preventative Measures

POTL takes the following key preventative measures to protect water quality:

- The water distribution scheme is fully enclosed to prevent contamination with no storages.
- All water infrastructure is designed and installed in accordance with the appropriate local authority standards and regulations.
- Positive pressure is maintained throughout the distribution scheme.
- Growth or persistence of biofilms is minimised by maintenance of residual disinfectant through minimisation of detention time as confirmed by verification testing.
- A maintenance schedule is in place to identify corrosion or deterioration of pipes and other infrastructure which may results in implications for public health.
- Effective maintenance and monitoring procedures (e.g. for repair of faults and burst mains in a manner that prevents contamination, to control corrosion, to minimize growth or persistence of biofilms etc.) are employed to prevent contamination during repair of scheme faults.
- Maintenance workers, including contractors, responsible for the distribution scheme are required to be licensed tradesmen with current registration for the work to be carried out and are adequately trained to minimise the potential for contamination during repairs and recommissioning.
- An on-call system for maintenance workers to ensure prompt repairs.
- Critical spares kept on site.
- Backflow prevention policies are a requirement of connection in the development application of all Port Customers. These devices are installed, maintenance and monitored in accordance with local authority procedures.
- Notification of potable water outages/issues via Port Alert SMS Red Oxygen automated email system to all Port customers.

Other preventative controls are undertaken as detailed in Table 8.

#### Critical control points

Critical control points (CCP) are defined as activities, procedures or processes at which control can be applied to prevent a hazard or reduce it to an acceptable level. A critical control point has several operational requirements, including:

- operational parameters that can be measured and for which critical limits can be set to define the operational effectiveness of the activity;
- operational parameters that can be monitored frequently enough to reveal any failures in a timely manner; and
- procedures for corrective action that can be implemented in response to deviation from critical limits.

Each CCP has critical limits which separate acceptability from unacceptability in terms of hazard control and water quality. These critical limits may incorporate both a numerical value as well as a consideration of time. Deviation from critical limits indicates loss of control of the process or activity and should be regarded as representing a potentially unacceptable health risk. Such events should result in immediate notification of management. There were no CCPs identified for the POTL system as there is no direct control of water quality exercised by POTL.

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Where a step is important in managing risk, but cannot technically be considered a CCP, it is considered to be a quality control point (QCP). QCPs have been determined for the POTL system and are found in Table 9 with the rationale for their selection, their limits and a summary of responses to exceedances.

**Table 9: Quality Control Points and Associated Control Limits.**

QCP	Rationale	Control parameter(s)	Control Limit(s)	Monitoring	Response
Benwell Road and Lennon Drive water meters	TCC/POTL network interface	<i>E. coli</i> Residual chlorine	1 coliform / 100mL <0.2 mg/L	Monthly	Contact TCC to determine supplied water quality
Port Control Lunch Room	Representative of low flow amenities with long residence time at western section of scheme	<i>E. coli</i> Residual chlorine	1 coliform / 100mL <0.2 mg/L	Monthly	Repeat <i>E. coli</i> testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Disinfect and flush affected system if contamination is confirmed as locally sourced
		Monitoring Plan Chemical Parameters	Relevant ADWG health limits	6-monthly	Repeat testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Flush affected system if contamination is confirmed as locally sourced
Berth 1 Guard Hut	Representative of low flow amenities with long residence time at furthest section of scheme	<i>E. coli</i> Residual chlorine	1 coliform / 100mL <0.2 mg/L	Monthly	Repeat <i>E. coli</i> testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Disinfect and flush affected system if contamination is confirmed as locally sourced
		Monitoring Plan Chemical Parameters	Relevant ADWG health limits	6-monthly	Repeat testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Flush affected system if contamination is confirmed as locally sourced
POTL Eng Building Lunch Room	Representative of amenities with intermittent usage	<i>E. coli</i> Residual chlorine	1 coliform / 100mL <0.2 mg/L	Monthly	Repeat <i>E. coli</i> testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Disinfect and flush affected system if contamination is confirmed as locally sourced

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QCP	Rationale	Control parameter(s)	Control Limit(s)	Monitoring	Response
		Monitoring Plan Chemical Parameters	Relevant ADWG health limits	6-monthly	Repeat testing Contact TCC to determine supplied water quality Advise Port employees / Port Customers of potential risk Flush affected system if contamination is confirmed as locally sourced

### 6.1.2 Measures Used by Service Provider and Arrangements for Effective Control

As the only service provider, TCC takes the following preventative measures to protect water quality:

- Coagulation and media filtration to remove protozoan pathogens;
- Free chlorination to inactivate bacterial and virus pathogens;
- Chloramination to prevent regrowth of bacterial and virus pathogens and to inactivate pathogens from contamination sources;
- Maintenance of minimum pressure to prevent ingress of contaminants; and
- Online monitoring of turbidity and chlorine residual.

## 6.2 Operation and Maintenance Procedures

The effectiveness of preventive measures is dependent on the implementation of associated process control procedures and supporting elements to ensure that all operations are optimised, are continuously controlled and that barriers are functional at all times. A list of the documents which contain procedures and responsibilities relating to the POTL scheme is found in Table 10.

**Table 10: Operation and Maintenance Procedure Documentation.**

Preventive Measure Managed (where applicable)	Documented Procedure	Version Date	Position Responsible	Process for Implementing the Procedure (Activity and Frequency)	Comments (including where procedures are inadequate or need updating)
Guarantee of supply	POTL/TCC Service Level Agreement Schedule		Property Development Executive	Constantly	
	POT 934 Crisis Management Plan	12/10/2018	Manager Marine Services	During Crisis	
	POT 1488 Emergency Response Plan	8/10/2018	Manager Marine Services	During Emergency	
	POT 1493 Business Continuity Plan	30/04/2015	Manager Marine Services	During events	
	POT 609 Emergency Response Plan – Cyclone Emergency Procedure	16/10/2018	Manager Marine Services	During Cyclone	
Design and installation of water infrastructure in accordance with the appropriate local standards and regulations	POT 1303 Engineering Standard No 6 – Standard Specification for Construction of Water Mains	08/05/2015	Manager Engineering	As required for design and installation of equipment	
	POTL Planning Codes &	March	Manager	Water use	

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Preventive Measure Managed (where applicable)	Documented Procedure	Version Date	Position Responsible	Process for Implementing the Procedure (Activity and Frequency)	Comments (including where procedures are inadequate or need updating)
	Guidelines (s 7.1.1 and s7.1.2)	2015	Environment & Planning	considered during new developments	
	Port of Townsville Lease Agreements with Port Customers	Various	Property Development Executive	On Signing and Renewal	Individual Agreements
Business Water Efficiency Management Plans in place where required requiring all fittings and fixtures to be 4 star WELS rated	POT 1551 Port of Townsville Development Guidelines	15/06/2015	Property Development Executive	On Signing and Renewal	
Maintenance of positive pressure	Asset specific manual		Manager Maintenance	Constantly	Early draft complete
Necessary and approved flow changes only	Asset specific manual		Manager Maintenance	As required	Early draft complete
Undertake flushing if low chlorine residual	Asset specific manual		Manager Maintenance	As required	Early draft complete
Maintenance Schedule	Asset specific manual		Manager Maintenance	Annual	Early draft complete
Maintenance Procedures	POT 933 Asset Maintenance Manual	20/02/2015	Manager Maintenance	As required	
Materials meet AS4020	Asset specific manual		Manager Maintenance	As required for repair and installation of equipment	Early draft complete
Corrosion product controls	Asset specific manual		Manager Maintenance	As required	Early draft complete
Prevention of contamination during repairs	Asset specific manual		Manager Maintenance	As required	Early draft complete
Prevention of contamination during installation of temporary supply	Asset specific manual		Manager Maintenance	As required	Early draft complete
Flushing following repairs	Asset specific manual		Manager Maintenance	As required	Early draft complete
Flushing of temporary supplies prior to use	Asset specific manual		Manager Maintenance	As required	Early draft complete
Water quality testing after repairs	Asset specific manual		Manager Maintenance	As required	Early draft complete
Water quality testing of temporary supplies	Asset specific manual		Manager Maintenance	As required	Early draft complete
Procedures to ensure prompt repairs including personnel on call	Asset specific manual		Manager Maintenance	As required	Early draft complete
Critical spares on site	Asset specific manual		Manager	Constantly	Early draft

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Preventive Measure Managed (where applicable)	Documented Procedure	Version Date	Position Responsible	Process for Implementing the Procedure (Activity and Frequency)	Comments (including where procedures are inadequate or need updating)
			Maintenance		complete
Ability to backfeed customers in the event of mains repair or failure procedures	POT 1551 Port of Townsville Development Guidelines	15/06/2015	Manager Maintenance	Constantly	
All sites required to have backflow prevention devices			Property Development Executive	During installation	
Backflow prevention devices are properly maintained			Property Development Executive	Constantly	
Monitoring procedure for potable water	POT 1882 Potable Water Monitoring work Instruction	6/08/2018	Manager Environment & Planning	Monthly	Updated

### 6.2.1 Document Review

POTL has an established Integrated Management System (IMS) which provides direction and guidance to POTL employees to effectively develop procedures in conjunction with the appropriate operational staff using appropriate document control, review and distribution policies and procedures. The structure and integration of information contained in the IMS enables the Quality System to closely follow the ISO 9001:2008 Quality Management System Standard.

The Work Activities Element ensures that specific operations and work activities are undertaken in a planned, systematic and controlled way to mitigate identified risk to people, property and environment; to ensure that the value of assets is maintained; to reduce or eliminate risk and minimise the potential for incidents; and ensure compliance with relevant legislation. POTL operations and work activities are defined by functional procedures, guides, checklists, plans, manuals etc. and are maintained and version controlled by the relevant functional areas of the business. The Asset Maintenance Manual outlines the approach to the development of functional documentation in relation to work activities.

### 6.2.2 Equipment Capability and Maintenance

Careful selection, regular inspection and maintenance of all equipment in the water distribution scheme are required to ensure continuing process capability. POTL's IMS provides direction and guidance to employees to effectively incorporate quality practices in their day to day activities at POTL, including procurement and work practices. The Procurement Element covers the acquisition, management and evaluation of equipment, materials and contractor/consultant services that support the provision of business activities. Procurement activities are carried out in accordance with the organisation's procurement guidelines.

### 6.2.3 Materials and Chemicals

The selection of materials and chemicals used in water systems is an important consideration as they have the potential to adversely affect drinking water quality. All chemicals and materials used in contact with drinking water should comply with *Australian Standard AS/NZ 4020, Products for use in contact with drinking water*.

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*6.2.4 Laboratory Monitoring Results*

Water quality test results from the NATA accredited laboratory responsible for sampling and analysis are reviewed by the Manager Maintenance or nominated deputy for compliance with ADWG. The laboratory is responsible for supplying test results within the nominated turn-around time. The Environment & Planning Team performs trending of the test result data. The laboratory has no direct involvement with compliance evaluation and notifications.

**6.3 Management of Incidents and Emergencies**

*6.3.1 Incident and Emergency Response Protocols and Communications*

POTL has clearly defined protocols for management of incidents and emergencies in its Crisis Management Plan. The Crisis Management Plan is designed to guide all actions in the event of an incident or emergency and describes the sequence of events to be followed for incident management. This plan identifies key POTL personnel, notifications, responsibilities and authorities to be employed in incidents and emergencies.

POTL's incident procedures will be used to implement the action(s) required to re-establish acceptable water quality following failure to meet target control limits. The procedures will be used for assignment of corrective actions, responsibilities, communication, and notification requirements. Guidelines for incident response planning are found in POTL's Emergency Response Plan Introduction & Response Strategy. Following implementation of a corrective action, effectiveness of the action will be verified in accordance with the Emergency Response Plan's requirements.

Emergency management systems provide a systematic, organised and managed response to a crisis, so that the business may continue to operate and return to normal conditions as soon as possible. The POTL Business Continuity Plan identifies the teams established to react to emergencies and describes their membership, responsibilities and activities. The relationship and line of reporting between incident team members is described in the Business Continuity Plan along with communication responsibilities for POTL personnel in incidents and emergencies.

*6.3.2 Incident Levels and Responses*

There are five (5) incident levels in the POTL incident response protocols. These are defined by the consequences to people (particularly human health), the environment, the community, financial and commercial considerations, as summarised in Figure 5. Level 3 incidents require the activation of the Emergency Response Plan or the Business Continuity Plan.

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**Figure 5: Incident Levels and Responses.**

<b>Levels of Incident/Emergency – Classification Chart</b>			
	<b>Description</b>	<b>Impact</b>	<b>Action</b>
<b>Level 1</b>	An incident that may potentially result in low level safety, health, environmental, social, operational or financial impacts, or involve insignificant legal issues or which causes insignificant impacts on operations that can be managed under normal operational processes.	TOTAL ESTIMATED COST (inclusive of all safety, health, operational, environmental and community related costs and any financial loss <\$50,000)	<ul style="list-style-type: none"> <li>Standard Operating Procedures</li> <li>Normal Reporting</li> </ul>
<b>Level 2</b>	An incident which may potentially result in minor injury or health problems to one or more people, or cause minor environmental effects or social issues, or attract low impact local media attention, or involve a minor breach of regulations and potential for pecuniary penalty and/or minor damage to mission critical equipment/facilities leading to a minor impact on operations that can be managed under normal operational processes.	TOTAL ESTIMATED COST (inclusive of all safety, health, operational, environmental and community related costs and any financial loss \$100,000 - \$500,000)	<ul style="list-style-type: none"> <li>Standard Operating Procedures</li> <li>Normal Reporting</li> </ul>
<b>Level 3</b>	An incident which may potentially result in serious injury or health problems to one or more people, or cause serious environmental effects or social issues, or attract moderate local media attention, or involve a serious breach of regulation and potential for imprisonment and/or serious damage to mission critical equipment/facilities leading to a temporary loss of operations that requires a coordinated response beyond normal operating processes.	TOTAL ESTIMATED COST (inclusive of all safety, health, operational, environmental and community related costs and any financial loss \$500,000 - \$5,000,000)	<ul style="list-style-type: none"> <li>IRP &amp;/or BCP Activated</li> <li>BCP Leader Advised</li> <li>CMT Marketing &amp; Corporate Affairs Activated</li> </ul>
<b>Level 4</b>	An incident which may potentially result in major health effects/fatalities, or material environmental harm, or major widespread social/cultural impacts, or attract high impact local and national media attention, damaging NGO campaigns, and/or major reputation damage/threat to licence to operate, or attract significant fines and prosecutions, or result in major damage to and loss of mission critical equipment/facilities resulting in a temporary closure of a navigation channel for several days and loss of trade and requiring a joint site (operational) and corporate (strategic) response.	TOTAL ESTIMATED COST (inclusive of all costs \$5,000,000 to \$10,000,000)	<ul style="list-style-type: none"> <li>Relevant IRP activated</li> <li>BCP activated</li> <li>CMP activated</li> </ul>
<b>Level 5</b>	An event which attracts high widespread local/national/international media and stakeholder interest and/or public outrage and threatens the Corporation's reputation, image, financial standing and ability to operate. Complete loss of assets. Examples include:	<ul style="list-style-type: none"> <li>Major lawsuit</li> <li>Major legislative breach</li> <li>Major financial loss</li> <li>Whistle blowing</li> <li>Loss of key executive</li> <li>Fraud</li> <li>Terrorist Event</li> <li>Business scandal</li> <li>Consumer action</li> <li>Mismanagement</li> <li>IR Dispute</li> <li>Safety or health incident involving multiple fatalities or long-term permanent or irreversible health problems</li> <li>Serious environmental harm resulting in severe impact to the community, plants and wildlife</li> <li>Channel blockage</li> <li>Severe weather event</li> <li>Breach of corporate governance</li> <li>Discrimination</li> <li>Extortion/sabotage</li> </ul>	<ul style="list-style-type: none"> <li>Relevant IRP activated</li> <li>BCP activated</li> <li>CMP activated</li> </ul>

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The actions to be undertaken at each level in response to water quality incidents are included in Table 11. All incidents and subsequent records of investigation and responses are recorded in the POTL Incident Management System.

**Port of Townsville Tenants / Customers** are advised of any issues concerning water supply or quality through the posting of Port Alert notices.

**TCC** is required to advise POTL of supply or water quality issues in accordance with the POTL/TCC Service Level Agreement. TCC is also required to advise the DNRME of health-related incidents within its system. Incidents within the POTL scheme related to water quality are communicated to TCC for action and/or escalation if required. Liaison contacts for POTL (Manager Maintenance) and TCC (Control Room) are listed in the POTL/TCC Service Level Agreement.

**Table 11: Potable Water Incidents and Emergencies.**

Levels of Potable Water Incident – Management				
Level	Action	Emergency Contacts	Internal/External Communication Process	Responsible Positions
1	Undertake additional sampling Notify Port Customers in affected area	Duty Officer Manager Maintenance	Internal – email/phone External – Port Alert SMS Red Oxygen automated email system	Incident managed by Manager Maintenance
2	Undertake additional sampling Notify all Port Customers	Duty Officer Manager Maintenance	Internal – email/phone External – Port Alert SMS Red Oxygen automated email system	Incident managed by Manager Maintenance
3	Undertake additional sampling Notify all Port Customers Prevent human contact with water through isolation	Duty Officer Manager Maintenance Senior Management including CEO	Internal – email/phone External – Port Alert SMS Red Oxygen automated email system Notify CA team who will handle any media enquires	Incident managed by General Manager Infrastructure
4	Undertake additional sampling Notify all Port Customers Prevent human contact with water through isolation Activate Emergency Response Plan / Business Continuity Plan	Duty Officer Manager Maintenance Senior Management including CEO POTL Board Members	Internal – email/phone External – Port Alert SMS Red Oxygen automated email system Notify CA team who will handle any media enquires Contact Board Members	Incident managed by General Manager Infrastructure Advised to the Critical Incident Team Leader
5	Undertake additional sampling Notify all Port Customers Prevent human contact with water through isolation Activate Emergency Response Plan / Business Continuity Plan Disaster or emergency situation, may require coordination with other organisations	Duty Officer Manager Maintenance Senior Management including CEO POTL Board Members Shareholding Ministers	Internal – email/phone External – Port Alert SMS Red Oxygen automated email system Notify CA team who will handle any media enquires Contact Board Members Contact Shareholding Ministers	Incident managed by the Critical Incident Team Leader

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### 6.3.3 Incident Reporting

Events where a health-related limit for a water quality parameter is exceeded must be reported to the regulator (DNRME) by the Manager Maintenance. The requirements for reporting include:

- detection of *Escherichia coli* (*E. coli*)
- detection of a pathogen
- detection of a chemical parameter that does not meet a health guideline value in the ADWG
- detection of radioactivity exceeding gross alpha or gross beta screening values in the ADWG
- detection of a parameter for which there is no guideline value in the ADWG
- an event or series of events likely to affect drinking water quality or that will cause difficulty in the ability to adequately treat or provide drinking water.

## 6.4 Risk Management Improvement Program

The POTL Manager Maintenance is responsible for reviewing water quality data from TCC and POTL's monitoring plan. The Manager Maintenance reviews this data annually by trending the data for parameters tested to assess any changes in water quality. Deterioration in water quality or any other areas of concern indicated by the trends may be regarded as an incident and addressed through the incident management system. In addition, POTL will review water quality and trends as well as asset condition of the POTL Water Distribution Scheme as part of its Management Review Program described in the Management Responsibility/Management Review Procedure. Management review involves the senior leadership team of the IMS at planned intervals, to ensure its effectiveness and relevance to the business.

Management reviews include but are not limited to:

- standards relevant to the organisation's business;
- all documentation that responds to audit requirements and describes POTL's way of doing things in accordance with external standards;
- Strategic, Corporate and Operational Risk Registers;
- planned and unplanned workplace inspections;
- variations, including the key performance indicators, incidents, customer complaints;
- investigations, internal audits, lessons learnt, improvements/ innovations, and preventive and corrective actions;
- internal audit findings, external surveillance audit reports and reported progress against action plans to improve/correct activities and practices;
- actions from management review findings;
- changes to legislation and external standards;
- attendance at external surveillance audit opening and close-out meetings, required involvement in external surveillance audits; and
- approval on annual business plan and priority objectives and targets.

Outcomes from management reviews may include but are not limited to the following system improvements:

- improvements to the IMS;
- customer service;
- communication;
- business planning;

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- plant and equipment, maintenance regimes, environmental management, quality;
- practices, health and safety;
- greater levels of efficiency and productivity, increased revenues; and
- desired cultural transition.

#### 6.4.1 Risk Management Improvement Program Actions

Following the 2018 review, POTL has updated the RIMP actions in Table 12. Please note that the original action numbers have been maintained for continuity.

**Table 12: Risk Management Improvement Program.**

Action	Hazard	Measures	Responsible Parties	Timeframe
6	Water usage exceeds available supply from TCC	Investigate possible options/locations for water recycling / rainfall tanks.	Manager Maintenance / Manager Environment & Planning	Ongoing
7	Pathogens, nutrients, turbidity, colour in POTL scheme	Install double check valve assemblies at key connection points.	Manager Maintenance	Ongoing
8		Conduct investigation into water quality being supplied via pipes to berthed vessels.	Manager Environment & Planning / Manager Maintenance	Ongoing
10	Poor water quality	Continue the Verification Monitoring Program and use the results to generate trends to identify corrosion or deterioration of pipes/infrastructure and other issues which may result in implications for public health. Conduct Verification Monitoring Program after major infrastructure works.	Manager Environment & Planning / Manager Maintenance	Ongoing
12	Inadequate operation and maintenance procedures	Develop asset specific control manuals.	Manager Maintenance	Early draft complete (see table 10)

## 6.5 Service Wide Support – Information Management

### 6.5.1 Communication

The flow of information and established lines of communication and feedback within the organisation include reporting structures and mechanisms, formal meetings, fortnightly team briefs, regular management presentations, education and awareness sessions, internal workshops, publications, notice boards, the Intranet and the Internet. The POTL Internal and External Communications Process outlines the commitment to meeting the information needs of a diverse range of internal and external stakeholders and responding in a timely manner to their questions, complaints and feedback.

### 6.5.2 Document Control

IMS controlled documents apply across the entire organisation. Documents such as operational procedures, risk registers, risk assessments, process maps, and manuals that are relevant to specific areas of the business are version controlled by the operational area.

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IMS documents are centrally controlled to protect content and intent. IMS controlled and functional documents respond to the needs of the business and the requirements of the standards to which the company prescribes. IMS controlled documents are reviewed at least once every three years, although reviews can also be triggered by factors such as changes to legislation, introduction of new equipment or changes to business processes. Each IMS document has a Document Owner who cannot delegate ownership or responsibility. The IMS Control of Documents Procedure contains further information relating to the management of IMS documents.

### 6.5.3 Records

The organisation is required to keep records of its business activities:

- to preserve records in accordance with legislative, regulatory and audit requirements;
- to explain the activities of the organisation and its people;
- to document decision-making;
- to provide the history or context of an activity;
- to achieve synergies of effort and avoid duplication;
- to protect people's rights and interests;
- to retain and preserve corporate information and memory; and
- to provide an information and evidence trail for audit purposes.

Recorded information, in any media format, that is produced during the course of business activities and considered to be of organisational value is retained and stored in recordkeeping systems, both electronic and physical. The IMS Control of Records Procedure contains further information relating to the management of all organisational records.

### 6.5.4 Routine Internal and External (including Regulatory) Reporting

POTL's routine internal reporting is conducted via regular management meetings. POTL will provide routine external regulatory reporting in accordance with the legislative reporting requirements pertaining to its Service Provider Registration Notice, i.e. within 30 business days after 30 June each year. POTL will notify the regulator of any changes in registration details and report all drinking water quality monitoring results on a yearly basis.

### 6.5.5 Incident and Non-Routine Reporting (Internally and Externally)

POTL has in place an internal Incident Reporting System which is part of the POTL IMS. POTL is required to report any incident that will or is likely to adversely affect drinking water quality to the regulator.

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## 7 OPERATIONAL AND VERIFICATION MONITORING PROGRAMS

### 7.1 Operational Monitoring

POTL uses operational monitoring to confirm that preventive measures implemented to control hazards are functioning properly and effectively. Data from operational monitoring can be used as triggers for immediate short-term corrective actions to improve drinking water quality. Key elements of the operational monitoring program are included in Table 13, including site selection justifications. The operational testing sites were chosen to monitor key zones for the nominated parameters. The key operational parameters for the POTL scheme are supply pressure and residual disinfection. Chlorine testing locations are designed to assess the residual disinfectant concentration at entry to the system and at high and low flow regions. Although there are no supply guarantees to consumers regarding operational parameters, POTL regards a lower limit of 400 kPa for pressure and 0.2-0.8 mg/L chlorine residual as appropriate operational limits for its service to Port Customers. According to the Australian Drinking Water Guidelines, a free chlorine residual in the distribution system of between 0.2 and 0.5 mg/L is adequate for disinfection purposes and the odour threshold for aesthetic purposes is generally 0.6 mg/L for most people.

**Table 13: Operational Monitoring.**

Operational Control Points	Reason for Selection	Operational Parameters	Monitoring Requirements	Limits	Actions
Benwell Road and Lennon Drive water meters	TCC/POTL network interface	Pressure and Flow	Real Time with periodic reporting and data logging capability	400kPa minimum	Pressure outside the nominated range requires action to maintain customer service and prevent damage to infrastructure. Actions to be taken for non-compliance will generally be limited to valve changes and review of usage patterns and controls.
Benwell Road and Lennon Drive water meters	TCC/POTL network interface	<i>E. coli</i> Residual Chlorine	Monthly testing	0 coliform / 100mL 0.2 to 0.5 mg/L	Notify TCC of issue with water supply.
Port Control Lunch Room and Berth 1 Guard Hut	Representative of low flow amenities with long residence time	<i>E. coli</i> Residual chlorine	Monthly testing	0 coliform / 100mL 0.2 to 0.5 mg/L	Notify TCC of issue with water supply.
POTL Engineering Building Lunch Room	Representative of amenities with intermittent usage	<i>E. coli</i> Residual chlorine	Monthly testing	0 coliform / 100mL 0.2 to 0.5 mg/L	Notify TCC of issue with water supply.

#### 7.1.1 Appropriateness of Operational Monitoring Program

POTL does not store or treat water in its Water Distribution Scheme. The only operational parameter under POTL's control is residence time of water in its distribution scheme. Long residence times in the POTL scheme may result in low disinfectant residuals, microbial growth or regrowth and high concentrations of contaminants due to leaching or corrosion of system materials. Residual chlorine is a useful measure of the

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potential for microbial growth and residence time of water in a system and is used as the operational parameter for control of the POTL system.

Operational control of residence time can be achieved by valving arrangements and by flushing if necessary.

## 7.2 Verification Monitoring

POTL performs 6-monthly sampling and laboratory analysis of water from the three representative verification sites in the water distribution scheme. The verification sites were chosen to represent a range a scenarios for water use, namely an intermittent use area (POTL Engineering Building) and low flow amenities with long residence time zone (Port Control Lunch Room and Berth 1 Guard Hut). The verification monitoring program tests a number of classes of compounds to characterise water in the system and to identify processes which may be occurring within the water supply scheme. Details of the verification monitoring program, including the classes of compounds tested and the rationale for testing them is contained in Table 14.

**Table 14: Verification Monitoring.**

Class of Parameter	Water Quality Significance	Rationale for testing
Major anions (sulphate, nitrate, nitrite, chloride)	Aesthetic quality and phytotoxic effects	The major anions are associated with taste of water and have a key influence on consumer perception of water quality. Chloride can also have phytotoxic effects on sensitive plants.
Major cations (calcium, sodium, magnesium, potassium)	Aesthetic quality	These parameters are associated with taste and hardness of water and have a key influence on consumer perception of water quality. High calcium may indicate leaching of concrete products.
Bacterial ( <i>E.coli</i> )	Indicators of effective initial and residual disinfection	<i>E. coli</i> is the primary indicator of water disinfection and hygiene and is a regulated value. Detection of this organism requires immediate action and reporting.
Metals (As, Al, Sb, Ba, B, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn)	Most have health related limits	The metals tested have health related limits and may be present in water from the catchment, treatment processes, corrosion of water assets or leaching from pipe materials. Their presence may indicate a public health risk or may indicate corrosion or industrial contamination.
Physico chemical parameters (pH, turbidity)	Aesthetic quality	These parameters are associated with taste and corrosive properties of water and have a key influence on consumer perception of water quality.
Polycyclic Aromatic Hydrocarbons (benzo-(a)-pyrene)	May have health related limits and most will affect taste of water	These compounds are tested for public health protection. Presence of these compounds may indicate industrial or fuel contamination by backflow from customer sites. After initial screening testing will be event based.
Nitrogen oxides	Indicative of microbial growth and nitrate has a health based limit	Nitrate and nitrite in water may be present from catchments or may be formed by nitrifying bacteria in water distribution systems. Nitrification in the distribution system interferes with residual disinfection by chloramines. Nitrate has a health based limit for drinking water
Fluoride	Health related limits	Fluoride is added to water for health reasons and there are upper and lower limits for health protection.

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*7.2.1 Appropriateness of Verification Monitoring Program*

POTL will continue to review the scope of testing (included in the Risk Management Improvement Program) and/or the frequency of testing for particular parameters in future as confidence is gained regarding the risks which are significant to the POTL water distribution scheme.

**7.3 Incident Monitoring**

POTL will undertake sampling and laboratory analysis of the affected water supply in the event of any incident for the full suite of parameters as per the verification monitoring program.

**7.4 Short-term Evaluation of Results and Corrective Action**

Short-term performance evaluation is conducted on receipt of drinking water quality monitoring data to verify that the quality of water supplied to consumers conforms with guideline values. If the quality does not conform with health based limits then immediate corrective action through the incident reporting system is implemented.

**7.5 Consumer Satisfaction**

Monitoring of consumer comments and complaints can provide valuable information on potential problems that may not have been identified by performance monitoring of the water supply system. Consumer satisfaction with drinking water quality is largely based on aesthetic quality, however changes from the norm are particularly noticeable to consumers. Consumer complaints and responses will be regularly reviewed as part of the Management Review Program described in Section 6.4.

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## APPENDIX ONE

A summary of the results for 2017/18 for residual chlorine and the verification monitoring program are outlined below.

### Operational Residual Chlorine Monitoring Results and Verification Program Monitoring Results 2017/2018

Scheme Name		<b>POTL Water Distribution Scheme</b>								
Scheme Component		<b>Distribution</b>								
Parameter	Units	Limit of reporting	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Laboratory name
Residual Chlorine	mg/L	0.02	monthly	60	60	N/A	0.06	1.6	0.6	ALS
pH	pH unit	0.01	six-monthly	15	15	0	7	8	7.5	ALS
Turbidity	NTU	0.1	six-monthly	15	13	0	0.1	0.5	0.2	ALS
Fluoride	mg/L	0.1	six-monthly	15	15	0	0.4	0.7	0.5	ALS
Sulphate	mg/L	1	six-monthly	15	15	0	1	2	1.5	ALS
Chloride	mg/L	1	six-monthly	15	15	0	13	29	22	ALS
Calcium	mg/L	1	six-monthly	15	15	N/A	10	13	11.7	ALS
Magnesium	mg/L	1	six-monthly	15	15	N/A	2	3	2.4	ALS
Potassium	mg/L	1	six-monthly	15	15	N/A	2	3	2.2	ALS
Sodium	mg/L	1	six-monthly	15	15	0	13	29	20.5	ALS
Nitrite	mg/L	0.01	six-monthly	15	0	0	<0.01	<0.01	<0.01	ALS
Nitrate	mg/L	0.01	six-monthly	15	15	0	0.05	0.11	0.07	ALS
Aluminium (Total)	mg/L	0.01	six-monthly	15	14	0	0.01	0.02	0.01	ALS

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Scheme Name		POTL Water Distribution Scheme								
Scheme Component		Distribution								
Parameter	Units	Limit of reporting	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Laboratory name
Antimony (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Arsenic (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Barium (Total)	mg/L	0.001	six-monthly	15	15	0	0.03	0.044	0.03	ALS
Boron (Total)	mg/L	0.05	six-monthly	15	0	0	<0.05	<0.05	<0.05	ALS
Cadmium (Total)	mg/L	0.0001	six-monthly	15	0	0	<0.0001	<0.0001	<0.0001	ALS
Chromium (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Copper (Total)	mg/L	0.001	six-monthly	15	15	0	0.004	0.199	0.04	ALS
Iron (Total)	mg/L	0.05	six-monthly	15	1	0	<0.05	0.07	<0.05	ALS
Lead (Total)	mg/L	0.001	six-monthly	15	4	0	<0.001	0.003	0.001	ALS
Manganese (Total)	mg/L	0.001	six-monthly	15	2	0	<0.001	0.001	<0.001	ALS
Molybdenum(Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Nickel (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Selenium (Total)	mg/L	0.01	six-monthly	15	0	0	<0.01	<0.01	<0.01	ALS
Silver (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Uranium (Total)	mg/L	0.001	six-monthly	15	0	0	<0.001	<0.001	<0.001	ALS
Zinc (Total)	mg/L	0.005	six-monthly	15	15	0	0.006	0.029	0.012	ALS
Mercury (Total)	mg/L	0.0001	six-monthly	15	0	0	<0.0001	<0.0001	<0.0001	ALS
Acenaphthene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Acenaphthylene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS

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Scheme Name		POTL Water Distribution Scheme								
Scheme Component		Distribution								
Parameter	Units	Limit of reporting	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Laboratory name
Anthracene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Benz(a)anthracene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Benzo(a)pyrene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Benzo(a)pyrene TEQ (zero)	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Benzo(b+j) & Benzo(k)fluoranthene	µg/L	4	six-monthly	15	0	N/A	<4	<4	<4	ALS
Benzo(g,h,i)perylene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Chrysene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Dibenz(a,h)anthracene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Fluoranthene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Fluorene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Indeno(1.2.3.cd)pyrene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Naphthalene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Phenanthrene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Pyrene	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
Sum of polycyclic aromatic hydrocarbons	µg/L	2	six-monthly	15	0	N/A	<2	<2	<2	ALS
2-Fluorobiphenyl	µg/L	surrogate	six-monthly	15	10	N/A	3	7	5.9	ALS

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Scheme Name		POTL Water Distribution Scheme								
Scheme Component		Distribution								
Parameter	Units	Limit of reporting	Frequency of sampling	Total No. samples collected	No. of samples in which parameter was detected	No. of samples exceeding water quality criteria	Min	Max	Average (Mean)	Laboratory name
4-Terphenyl-d14	µg/L	surrogate	six-monthly	15	14	N/A	2	9	6	ALS
Anthracene-d10	µg/L	surrogate	six-monthly	15	12	N/A	2	8	5.66	ALS

Note: N/A indicates that no guideline value is specified.

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