Drinking Water Quality Management Plan

Report

1 July 2017 to June 2018

Port of Townsville Limited

Service Provider Identification Number (SPID): 570

POTL Water Distribution Scheme

2015/16 AUSTRALIAN PORT OR TERMINAL OF THE YEAR

1. INTRODUCTION

This report documents the performance of Port of Townsville Limited's (POTL) drinking water service with respect to water quality and performance in implementing the actions detailed in its drinking water quality management plan (DWQMP- June 2016) as required under the *Water Supply (Safety and Reliability) Act 2008* (the Act). POTL has been registered as a service provider under the Water Supply (Safety and Reliability) Act 2008 (the Act) since 19 January 2015.

The report has been prepared in accordance with the template provided in the *Water Industry Regulatory Reform – drinking water quality management plan report factsheet* published by the Department of Energy and Water Supply, Queensland, which provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

2. OVERVIEW OF OPERATIONS

POTL is responsible for its on-site potable water distribution network within the Port of Townsville, namely the POTL Water Distribution Scheme, which includes the POTL owned and maintained potable water distribution mains across POTL owned lands. This distribution scheme only services POTL owned buildings, lease held lands and facilities and the port berths for visiting ship connection.

The POTL Water Distribution Scheme 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. 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 distributed by POTL within the Port of Townsville. The management of water quality until it is supplied to Port of Townsville is the responsibility of TCC. On a monthly basis, POTL requests and is supplied with a summary Certificate of Analysis on the potable water quality at the nearest reservoir to the Port to confirm compliance with the ADWG. POTL is committed to ensuring that the water scheme is managed so that the supply does not constitute a hazard to employees or the public.

Table 1 details the water source, treatment processes, disinfection processes and other infrastructure of the scheme along with the context of the supply in terms of current population and demand.

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Table 1: Infrastructure Details

Component		Details
Name of Scheme		POTL Water Distribution Scheme
Operator		Port of Townsville Limited
Sources	Name	Townsville City Council Municipal Water Supply
	Type	Treated Water Supply
	% of supply	100%
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 200mm 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 **do not** 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 **do not** 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.	
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
	Communities served	Port of Townsville Workplaces
	Population served	approx. 600
	Connections	106
	Demand	approx. 550 kL/d
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. COMPLIANCE WITH WATER QUALITY CRITERIA FOR DRINKING WATER

Tables 2 and 3 provide a summary of the results of the operational and verification monitoring programs for the POTL Water Distribution Scheme. Both monitoring programs were carried out as per the specifications stated in the DWQMP, with the exception that the January 2018 drinking water samples were delayed and taken on the 5th February, due to unplanned resourcing limitations in January.

The results from the operational and verification monitoring programs have been compared against the levels of the water quality criteria specified by the Regulator in the *Water Quality and Reporting Guideline for a Drinking Water Service*. The water quality criteria means the health guideline values in the most current Australian Drinking Water Guidelines, as well as the standards in the Public Health Regulation 2005.

The water quality results met the recommended values in the *E. coli* and fluoride standards and Australian Drinking Water Guidelines (ADWG).

It should be noted that the laboratory limit of reporting for Selenium is the same as the guideline limit and the limit of reporting for Benzo(a)pyrene is higher than the guideline limit. An additional round of verification sampling was undertaken in June 2018 in conjunction with port wide PFAS testing.

3.1 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 remains a useful measure of the potential for microbial growth and residence time of water in a system.

In the DWQMP Operational Limits for Residual Chlorine are assigned as between 0.2 to 0.5 mg/L. During 2017/18 there were 12 results below 0.2 mg/L with 8 of these results occurring at sampling site PW01 (Berth 1). This site is at the end of the reticulation system and there is limited demand for potable water at this location. A non-potable water sign has been placed at this location and will continue to monitor.

3.2 Appropriateness of Verification Monitoring Program

All parameters tested as part of the verification monitoring program met the ADWG. POTL will continue to review the scope of testing and/or the frequency of testing for particular parameters as continual improvement and knowledge of risks improve through monitoring and understanding of POTL water distribution scheme.

POTL has monitored Polynuclear Aromatic Hydrocarbons since 2016 and the results during this period remain below the limit of reporting. However, it is noted that only one parameter (Benzo(a)pyrene) has applicable drinking water guidelines. Currently the standard level analysis limit of reporting for Benzo(a)pyrene (2 ug/l) is higher than the guideline limit (0.01 ug/l). POTL has identified a low level laboratory test able to undertake a l analysis with LOR (0.005 ug/l) which should enable comparison to the guideline limit of 0.01 ug/l. POTL will undertake this low-level analysis during 2018-19 period and further consider whether to retain PAH analysis or not.

No incidents that affected water supply occurred in 2017/18.

No complaints were received about potable water during 2017/18.

3.3 PFAS (Per- and poly-fluoroalkyl substances)

The ADWG (amended August 2018) now includes health guidance values for PFOS (0.07 ug/l) and PFOA (0.56 ug/l). POTL undertook PFAS sampling in June 2018 at the Operational monitoring sites under the DWQMP and at a number of Port Berths. Results showed that PFOS and PFOA was not detectable in any of the sites. The results indicate that PFOS/PFOA is not present in the incoming water from TCC nor is it detectable from within the distribution scheme (Berth testing). No further testing of PFAS is proposed at this time.

		No. of samples Collected	No. of samples collected in which PFOS/PFOA is detected	% of samples that comply
Operational Monitoring	PF0S	5	0	100
	PFOA	5	0	100
Berths	PFOS	5	0	100
	PFOA	5	0	100

3.4 Berth monitoring

As per action 8 of the Risk Management Improvement Plan in the DWQMP, POTL carried out additional Berth monitoring during 2017/18. In August 2017, Berth monitoring was carried out at 3 outlets on Berth 10 and Berth 8, with and without the hose that would provide water to the vessels. The results showed that E-coli was not detectable at the Berths, but residual chlorine results were generally below the range 0.2 to 0.5mg/L. This result relates to limited usage of potable water on Berths. On Berth 8 there was one turbidity result which was above the guideline (13.6 NTU compared to 5 NTU) and on Berth 8 and 10, there were a couple of detections of iron (2), lead (4) and nickel (1) above the guideline. There were no clear trends (with or without the hose).

In June 2018 additional Berth monitoring was undertaken at a single outlet on Berths 3, 4, 5, 8, 9 and 10. This sampling occurred directly from the outlet following a short period of flushing. The results met the ADWG guidelines for all parameters tested, including pH, turbidity, sulphate, chloride, sodium, total metals (Al, Sb, As, Ba, B, Cd, Cr, Cu, Fe, Pb, Mn, Mo, Ni, Se, Ag, U, Zn, Hg), fluoride, nitrite, nitrate and E-coli. Residual chlorine results were all within the range 0.2 to 0.5mg/L, with the exception of Berth 8 (0.12 mg/l).

Further potable water testing on the Berths is proposed in 2018/19, including further review and testing of the hoses used to fill vessels. Noting that currently a flushing procedure is in place prior to use/ provision to a vessel.

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Table 2: Operational E. coli Monitoring Results

Scheme Name	POTL Water Distribution Scheme											
Scheme Component	Distribution											
Year	2017/2018											
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	5	5	5	5	5	5	5	5	5	5	5	5
No. of samples collected in which E. coli is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100	100	100	100	100	100	100	100	100	100	100	100
Compliance with 98% annual value	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Laboratory	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
Unit	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml	CFU/100 ml
Limit of reporting	1	1	1	1	1	1	1	1	1	1	1	1

Table 3: Operational Residual Chlorine Monitoring Results and Verification Program Monitoring Results

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
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
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

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
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
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

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
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
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.

4. REVIEW OF DWQMP

By 30th September 2018, POTL is required to undertake a review of the DWQMP (Condition 10.1 of the Information Notice). A review of the DWQMP has been undertaken based on the 'Drinking water quality review and audit guidelines' (Department of Energy and Water Supply, 2013) as outlined below. 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. Minor changes to the DWQMP are needed to update certain sections of the plan (e.g. Risk Management Improvement Program) and this is proposed to occur by the end of 2018.

	Suggested Prompts with POTL responses
Service Description	Have any of the provider contact details changed? Nil Do the scheme details still apply? No Have there been changes in the communities serviced, population size, or the connections that apply to each scheme? No Has the projected water demand (volume) changed? No Has there been any change in operators upstream or downstream? No Is the design capacity sufficient for population projections? No
Infrastructure	Do the schematics of each scheme accurately reflect all the current components of each scheme, from catchment to consumer? Yes Have any of the linkages between the major infrastructure elements changed and/or are they reflecting the current service? No Has infrastructure ownership or operational responsibility changed for any component of the scheme? No Have new water sources been used? (If so, does the hazard identification (3.7.2) and risk assessment (3.8) adequately address risks associated with the new source?) No new sources Do any of the source details—including names, characteristics, performance and infrastructure—require updating? No Has analysis of the operational and verification monitoring data identified changes in the source characteristics and performance? No Have new treatment processes commenced, or original treatment processes been excluded? N/A

	Have checks been undertaken on capacity to vary operations, such as variable depth of water intake and/or trigger of different treatment steps based on intake water quality? N/A Have chemical records been reviewed to check planned treatment processes? N/A Has operational monitoring data identified any poorly functioning treatment processes? No Has the current loading or proportion of flow from each source changed? No Have monitoring and telemetry systems been checked and/or changed? No Has source water quality changed sufficiently to require alterations in treatment processes? N/A Has the disinfection process changed, such as a change in disinfectant, additional disinfection points or target residuals? N/A Have the records of chemical usage for disinfection processes indicated operational adjustments? N/A Has the distribution system been extended or altered? No Have low pressure areas in the distribution and reticulation system changed? No Has a reservoir undergone refurbishment? N/A Have there been changes in the key stakeholders involved in the management of drinking water quality? No Have there been any problems with the treatment or disinfection processes that require changes to processes, operational procedures, and/or responsibility? No
Water quality and catchment	Have there been changes to the source water quality and catchment characteristics? No Has operational and verification monitoring and trend analysis identified changes in water quality – both source and output quality? No Are there new industries or development that present additional water quality hazards? No Have the arrangements for monitoring, transport arrangement for off-site analysis, or testing laboratory changed? No Has the nature or frequency of any water quality complaints changed? No Has there been any occurrence of suspected illness following a customer complaint about water quality? No

Hazard ID	Have incident and excursion records identified changes in risks and hazards? No Is there a need to develop new risk assessment and preventive measures, and add to the plan? No Are disinfection residuals maintained throughout the distribution network? Yes, with the exception of one location at the end of the distribution network. This location has low demand and a non-potable water sign has been put in place. Have the personnel (position) responsible for hazard identification and risk assessment changed? No Are staff with knowledge of day to day operations included in the process of identifying emerging risks and hazards? Yes Is there a need to amend the information about the key stakeholders? No If multiple providers, have changes in upstream and downstream water quality been identified and/or notified? N/A
Assessment of risks	Has the system been upgraded or have there been changes in source water quality that require a review of the risk assessment? No Is the risk assessment methodology still considered appropriate? Yes Does water quality data indicate that the level of risk has changed for certain hazards? No Have all identified hazards been added to the risk assessment tables? Yes Have new risk management strategies been implemented, and require new assessment of residual risk? New identified risk of PFAS emerged, sampled however did not need a new assessment of residual risk as not detected Have new risks from other providers' systems or changes in the catchment activities been identified? No Are the risks related to incidents, excursions, and events included in the previously identified risks? Yes
Risk management measures	Have the existing risk management strategies achieved desired water quality outcomes? Yes What improvement actions outlined in the plan have been implemented?– See updated Table 12 Have new procedures such as alarm settings or event-based chemical dosing been implemented? N/A Has the effectiveness of any new risk management strategies or infrastructure upgrades been evaluated? N/A

	Have procedural documents been reviewed and updated? Yes – see update Table 10 Have there been any changes in regulations or legislation? ADWG have been updated in August 2018 to include health guidance values for PFOS and PFOA. POTL has already tested for PFOS and PFOA in the distribution scheme with nil detections and seeking TCC's results as well. Have there been organisational structure changes that may impact on risk management? No
Operation and Maintenance procedures	Is there a need to create new operation and maintenance procedures? No Do the procedural documents outline management of the current risks? Yes Are staff using current versions of procedures? Yes Have maintenance records been kept to confirm frequency specified in the plan? Yes Are monitoring systems managed appropriately, such as alarm settings, improved telemetry, and calibration? N/A Have chemical dosing and disinfection processes, including storage supply and application rates, been reviewed? N/A Have all procedures and practices been reviewed to reflect current operations? Reviewed as per review timeframes in Integrated Management System Have training records been maintained? Yes Is training appropriate to the system as it currently exists? Yes
Incidents and emergencies	Is the process for managing drinking water incidents and emergencies still appropriate? Yes Do internal and external communication process and protocols work effectively? Yes Does the list of people to be contacted during emergencies require amending? No Have the emergency response procedures been implemented, and were there any issues with the response? N/A Is staff training for incidents and emergencies up to date? Yes Is the process for managing drinking water incidents and emergencies understood by staff? Yes
RMIP	Did the Risk Management Improvement Program outlined in the plan achieve the intended outcomes? Yes

	Does the program require updating to manage risks effectively, including measures for newly identified risks? No newly identified risk other than PFAS which was not detected. Were measures in the program completed in the timeframe outlined? Yes, one element has been extended (see table 12 item 7)
Information management	Are the information management, record keeping and reporting processes being used appropriately? Yes Are current versions of documents being used? Yes Are communication protocols working effectively? Yes
Operational Monitoring	Are the range and frequency of parameters being tested appropriate? Yes – see section 3 above. Are alarm settings still as defined in the plan? N/A Are the established alert/critical limits, alarm settings and feedback controls actively applied and still appropriate? N/A Have changes to the infrastructure resulted in a need to revise the monitoring program? No Do critical personnel have sufficient knowledge of the responses required for excursions? Yes Have records been maintained according to referenced procedures? Yes
Verification Monitoring	Has the monitoring program been reviewed for compliance and appropriateness (sample parameters, analytical procedure, frequency)? Yes, see section 3 above Have ADWG health guideline values changed for any parameters? ADWG have been updated in August 2018 to include health guidance values for PFOS and PFOA. POTL has already tested for PFOS and PFOA in the distribution scheme with nil detections. Have changes to the infrastructure resulted in a need to revise the monitoring program? No Has an analysis of the incident records indicated a review of the monitoring program? N/A Have sampling methods, or the process for sampling, routine analysis and transportation changed? No Have sampling locations been reviewed? Sampling locations are appropriate – no changes to distribution scheme to warrant changes to locations. Has progressive analysis of monitoring trends been undertaken? Yes Do the record keeping and data analysis procedures require updating? No

	Have all incidents been reported as required and indicated actions implemented? Nil incidents 2017/18

Table 12: Risk Management Improvement Program (From the DWQMP - Updated September 2018)

Action	Hazard	Measures	Responsible Parties	Timeframe
1	Loss of potable water supply or reduced water supply from TCC	Adopt notification procedures (Port Alert SMS Red Oxygen automated email system) to notify all Port Customers of water supply issues including anticipated extent and duration.	Manager Maintenance	Complete
2		Revise potable water network configuration to reduce impact e.g. isolation, direct to urgent/critical services or customers.	Manager Maintenance	Complete
3	Poor water quality from TCC	Add residual chlorine to Operational Monitoring Program.	Manager Environment & Strategic Planning	Complete
4		Conduct additional investigation into residual chlorine concentrations throughout scheme to identify any locations of concern. Depending on the results of investigation: • Discuss results with water supplier i.e. TCC. • Attach non-potable water stickers at certain locations.	Manager Environment & Strategic Planning Manager Maintenance / Property Development Executive	Complete Complete – Location PW01 has low residual chorine levels. Non-potable water sticker has been attached.
5	Low pressure in POTL scheme	Install a data logging system to monitor pressure and flow at key connection points.	Manager Maintenance	Complete
6	Water usage exceeds available supply from TCC	Investigate possible options/locations for water recycling / rainfall tanks.	Manager Maintenance / Manager Environment & Strategic Planning	Ongoing
7	Pathogens, nutrients, turbidity, colour in POTL scheme	Develop and maintain risk profile of connections and installation schedule based on risk	Manager Maintenance	Ongoing
8		Conduct investigation into water quality being supplied via pipes to berthed vessels.	Manager Environment & Strategic Planning / Manager Maintenance	Ongoing – see section 3.4 above
9	Turbidity, colour after extreme	Adopt notification procedures (Port Alert SMS Red Oxygen automated	Manager Maintenance	Complete

Action	Hazard	Measures	Responsible Parties	Timeframe
	weather event in POTL scheme	email system) to issue no drinking notice to all Port Customers.		
10	Poor water quality	Commence 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 & Strategic Planning / Manager Maintenance	Ongoing
11	Communications Failure	Monitor effectiveness of potable water notices.	Manager Maintenance	Complete (exception reporting)
12	Inadequate operation and maintenance procedures	Develop asset specific control manuals.	Manager Maintenance	Early draft complete (see table 10)
13	Monitoring procedure is out of date	Update POT 1758 Potable Water Monitoring Procedure to reflect new monitoring requirements.	Manager Environment & Strategic Planning	Complete

Table 10: Operation and Maintenance Procedure Documentation (From the DWQMP Updated September 2018)

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	28/04/2015	Manager Marine Services	During Crisis	
	POT 1488 Emergency Response Plan	29/04/2015	Manager Marine Services	During Emergency	
	POT 1493 Business Continuity Plan	30/04/2015	Manager Marine Services	During events	

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)
	POT 609 Emergency Response Plan – Cyclone Emergency Procedure	10/01/2018	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 Water Efficiency Management Plan				TBD
	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

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)
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 Maintenance	Constantly	Early draft 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 1758 Potable Water Monitoring Procedure	21/09/2015	Manager Environment & Strategic Planning	Monthly	Updated

5. ACRONYMS AND GLOSSARY

ALS	Australian Laboratory Services
CFU/100ml	Colony forming units per 100 millilitres
E. coli	*Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
POTL	Port of Townsville Limited
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
org/100ml	Organisms per 100 millilitres
TCC	Townsville City Council
<	Less than