Townsville City Council

Townsville Water

DWQMP Annual Report

2016/2017 (FINANCIAL YEAR)

SPID	506
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Ross River Dam October 2016

Contents

1 Executive Summary

Townsville City Council's (TCCs) Drinking Water Quality Management Plan (DWQMP) was approved in August 2012. Included in the approval notice was the requirement to submit an annual water quality report to outline the performance of Townsville Water against their DWQMP as required under the *Water Supply (Safety and Reliability) Act 2008*.

Townsville Water has met all requirements under its DWQMP, the Australian Drinking Water Guidelines 2011 (updated February 2016) and the *Public Health Regulation 2005* for the 2016/2017 financial year.

The main water quality issue for the reportable period was the introduction of drought imposed water restrictions and our management of these. Water quality (and supply) required increased management by the Water Quality Team especially with regards to water age through increased monitoring, targeted flushing, managing reservoir levels and managing chlorine residuals. Ten of our twelve non-compliances were a direct consequence of water restrictions.

Overall annual compliance for *Escherichia coli* (*E.coli*) for each scheme was in compliance with the 98% required under the *Public Health Regulation 2005*: 99.8% for the Townsville Drinking Water Scheme, 100% for Giru/ Cungulla Drinking Water Scheme and 100% for Paluma Drinking Water Scheme.

Paluma Drinking Water scheme was placed on a boil water advisory in October 2016 due to the detection of protozoa in the raw water supply and will remain under boil water advisory until a new water treatment plant is commissioned in March 2018.

Twelve notifications of non-compliance were submitted to the Regulator:

- Five *E.coli* detections,
- Five disinfection-by-product exceedances,
- One chlorine exceedance, and
- Detection of *Cryptosporidium* and *Giardia* in the raw water supply to Paluma.

There were 138 customer complaints regarding drinking water quality of which 86 were for dirty water, 9 for milky water 8 for taste/ odour, 8 for Geosmin, 4 for suspected illness, 2 were owners side issues and 2 being for vexatious complaints.

An audit was conducted on the behalf of the Department of Energy and Water Supply (DEWS) under the Water Supply (Safety and Reliability) Act 2008 (Qld) (the Act) in July 2016 and was found to be compliant with its obligations under the Act, Regulations and audit guidelines.

2 Overview

Townsville City Council's DWQMP was submitted to the Office of the Water Supply Regulator on 21st June 2011. It was approved with conditions on 29 August 2012. The plan underwent a review from April – June 2014 and was submitted for approval to the Office of the Water Supply Regulator with Townsville City Council's Drinking Water Quality Management Plan Annual Report on December 2014. Townsville's first DWQMP Audit was undertaken in July of 2016.

Townsville Water services a population of 188,000 with 84,800 connected properties, in three drinking water schemes: Townsville Drinking Water Scheme, Paluma Drinking Water Scheme and Giru/ Cungulla Drinking Water Scheme.

Three Water Treatment Plants (WTPs) service the region with Douglas WTP and Northern WTP servicing Townsville and Giru WTP servicing Cungulla.

Ross River Dam water, supplemented with water from the Burdekin Dam when required, feeds Douglas WTP. Paluma Dam/ Crystal Creek feed Northern WTP. The Haughton River feeds Giru WTP. An unnamed rainforest creek feeds Paluma Township (Paluma Weir).

33,341ML of potable water was produced in the 16/17 financial year. Townsville Water maintains 2 dams (Ross River Dam and Paluma Dam), 2 Weirs (Paluma Weir and Blacks Weir), 23 water pumping stations, 41 reservoirs (water storage facilities) and 2,585 km of water distribution mains.

Crystal Creek Intake

3 Actions Taken To Implement The DWQMP

The Drinking Water Quality Management Plan is managed and updated by the Water Quality Officer. Both the Water Treatment Engineer and Water Quality Officer's role is to monitor, regulate and improve water quality for Townsville. They deal with all water quality non-compliances, water quality complaints/ queries from customers, monitor all Critical Control Points, the water sampling plan and the subsequent data it generates. They are part of a broader Water Quality Team which also includes the Water Operations Engineer, Water Treatment Graduate Engineer, Commercial Compliance Officer, Bulk Water Maintenance Officer and the Water Operators.

Trility are engaged to manage Douglas Water Treatment Plant and Northern Water Treatment Plant on Townsville City Council's (TCC) behalf. The contract is managed through informal weekly operations meetings, formal monthly Operational Management Team meetings and formal quarterly Contract Management Committee meetings. Any issues arising between these times are dealt with through phone calls, emails and ad hoc meetings.

There were no hazards or hazardous events that affected water quality during the financial year.

A formalised review of the plan was undertaken towards the end of the financial year and will be submitted for approval early 2018.

An audit was undertaken 26-28 July 2016. Within the scope of the audit, TCC complied with its obligations under the Act, Regulations, and audit guidelines. There was good compliance between the current version of the DWQMP in use by TCC and the observations made during the audit. No poor quality or inadequately maintained infrastructure was observed. Therefore, a compliant audit finding was made by the Auditor under the Act on behalf of DEWS.

Four opportunities for improvement (OFIs) were identified during the audit. These are being worked through currently.

Amendments made to the plan for this financial year will be included in the review submitted early 2018.

The tender for a water treatment plant at Paluma was awarded with a weather dependant completion date of March 2018.

4 Research Activities

No research activities were undertaken in the 16/17 financial year.

Paluma Dam December 2015

5 Information Supplied to the Regulator Regarding Non-Compliances and/ or Prescribed Incidents

There were twelve non-compliances with water quality criteria reported for the 16/17 financial year. Ten of these non-compliances were directly related to water restrictions. Water restrictions have meant greater management of the system with regards to maintaining chlorine residuals to the endpoints in the network to ensure disinfection is not compromised balanced against reducing disinfection by products. The long hot dry summer compounded the issue.

Management options provided by the water quality team to address the challenges namely:

- Increased monitoring (especially of chlorine residuals),
- Increased management of chlorine residuals throughout the distribution system,
- Increased secondary chlorination,
- A smart targeted approach to flushing,
- Managing reservoir levels,
- Removing reservoirs from service and
- Implementing a water quality monitoring program.

DWI-7-506-00041 Townsville Drinking Water Scheme

Incident Description: Detection of *E.coli* (1 org/100ml) in a treated water sample at Yongala Reservoir on 30th August 2016. Sample had a chlorine concentration of 0.05mg/L free chlorine and 0.16mg/L total chlorine. All resamples came back clear of *E.coli*. The *E.coli* rolling percentage average for the month was 99.9%

Corrective and Preventative Actions: Reservoir was hand-dosed. Reservoir level was dropped to as low as operationally possible. Chlorines were monitored daily at the reservoir with flushing occurring when chlorines were too low for disinfection. A temporary chlorinator at Yongala reservoir was later installed to remove the need for hand-dosing. The system continues to be monitored closely.

DWI-7-506-00042 Townsville Drinking Water Scheme

Incident Description: Detection of THMs (265 µg/L) in a treated water sample at Wulguru Reservoir from a sample taken on 23/9/2016.

Corrective and Preventative Actions: Due to water restrictions it has been hard to maintain chlorine residuals at optimal levels to the outlying parts of the network. Due to an *E.coli* detection (DWI-7-506-00041) chlorine levels were dosed at a higher level in Yongala reservoir which had a knock on effect at Wulguru reservoir. The increased chlorine with higher temperatures generated excessive THMs. Chlorine residuals were dropped slightly (so as not to compromise disinfection), reservoir levels were dropped slightly to increase turnover and a greater monitoring of THMs occurred.

DWI-7-506-00043 Townsville Drinking Water Scheme

Incident Description: Detection of chlorates in a treated water sample at Yarrawonga Reservoir, treated water sample in Yarrawonga and in Roseneath reservoir from a sample taken on 14/10/2016. Chlorates remained high across the city for the summer. Townsville has a self-imposed chlorate reporting limit of 700µg/L.

Corrective and Preventative Actions: Townsville has ongoing issues with chlorates in hot weather; compounded this year with higher chlorine set points due to water restrictions. All mitigation measures available have been put in place. Old stock replaced with new stock, reducing the size of storage tanks, stock emptied before refilling, keeping chlorine residuals as low as possible, lowering of reservoir levels to turn over reservoirs. Chlorates reduced as the temperatures cooled.

DWI-7-506-00044 Paluma Drinking Water Scheme

Incident Description: Detection of THMs (291µg/L and 274µg/L) in a treated water sample taken on 25/11/2015. This was not picked up on at the time and was reported at a later date. Later samples came back within limits.

DWI-7-506-00045 Paluma Drinking Water Scheme

Incident Description: Routine raw water samples on 26th October 2016 at Paluma weir detected 4 *Cryptosporidium* oocysts/10L in the raw water supply. Subsequent samples detected the presence of *Giardia*. As chlorination is the only treatment at Paluma and as chlorine does not deactivate *Cryptosporidium* or *Giardia* in concentrations safe for human consumption Paluma Township was placed on boil water advisory until a Treatment Plant is commissioned. The Treatment Plant is due to be commissioned March 2018.

DWI-7-506-00046 Townsville Drinking Water Scheme

Incident Description: During the laboratory's routine sampling on 21st November 2016 at Mt Margaret Reservoir a chlorine of 5.6mg/L was detected (free chlorine of 4.6mg/L).

Corrective and Preventative Actions: It was discovered that chlorine overdosing had occurred on the Mt Louisa feed from Douglas WTP and neither chlorine analyser had picked up on the overdose. The chlorine breach occurred only in the Mt Margaret Reservoir with no exceedances in reticulation or in the Mt Louisa Reservoir due to dilution with the water that was in Mt Louisa Reservoir. Chlorine was monitored in Mt Margaret Reservoir and reticulation throughout the day and decreased naturally over a few hours.

DWI-7-506-00047 Townsville Drinking Water Scheme

Incident Description: On 28th December 2016 18 org/100ml *E.coli* was detected at treated water sample point Blue Ridge Avenue which is the sample point for Yongala Reservoir. Further samples came back clear. This resulted in a rolling percentage of 99.9%.

Corrective and Preventative Actions: Hand-dosing at Yongala Reservoir was increased from twice weekly to every second day to maintain a chlorine residual. A temporary chlorinator at Yongala reservoir was later installed to remove the need for hand-dosing. The system continues to be monitored closely.

DWI-7-506-00048 Townsville Drinking Water Scheme

Incident Description: On 29th December 2016 8 org/100ml *E.coli* was detected at treated water sample at Mt Elliot. Further samples came back clear. This resulted in a rolling percentage of 99.9%.

Corrective and Preventative Actions: Extensive flushing occurred to pull water through the system and increase chlorine residuals. A reservoir was taken offline to aid water turnover and reduce water age therefore reducing chlorine decay. Flow paced chlorine dosing was installed on the inlet of the remaining reservoir.

DWI-7-506-00049 Townsville Drinking Water Scheme

Incident Description: THMs were detected in the Wulguru System on 4th January 2017. THMs caused issues for much of the year with a long hot dry summer and water restrictions.

Corrective and Preventative Actions: Ongoing management of system, reducing chlorines where possible without compromising disinfection. Reservoirs were taken offline, reservoir levels were lowered, and water was flushed at endpoints to pull chlorinated water through the system. Douglas WTP set-point was changed more frequently to reduce chlorine set-point when possible.

DWI-7-506-00050 Townsville Drinking Water Scheme

Incident Description: On 28th February 2017 1 org/100ml *E.coli* was detected at Mt Margaret Reservoir. A further detection occurred on 6th March 2017. This resulted in a rolling percentage of 99.8%.

Corrective and Preventative Actions: The set-point at Douglas WTP was increased. Flushing schedule was increased to aid turnover of water. Hand-dosing every second day while hot weather continued. As weather cooled hand- dosing was reduced to once per week.

DWI-7-506-00051 Townsville Drinking Water Scheme

Incident Description: On 8th March 2017 4 org/100ml *E.coli* was detected at Hillside Crescent. A further detection occurred on 9th March 2017. This resulted in a rolling percentage of 99.8%.

Corrective and Preventative Actions: Ongoing hand-dosing of Hamilton's tank to increase chlorine residual. Set-point at Top City Reservoir was also increased as it feeds into Hamilton's Tank. Monitoring of this part of the system was increased. Increased flushing occurred when chlorines dropped off.

DWI-7-506-00052 Paluma Drinking Water Scheme

Incident Description: Ongoing chlorate detections at Paluma Township from January through to April. Paluma Township is on a boil water advisory and TCC is supplying bottled water to the residents and visitors.

Corrective and Preventative Actions: The chlorate issue is caused by the high summer temperatures in Paluma. Sodium Hypochlorite (hypo) storage tank is as small as it can be operationally and it is restocked regularly with fresh hypo. Paluma hypo is stored in a fridge to try and mitigate the temperature issue. The high chlorate levels reduced with the cooler weather.

6 Compliance with Water Quality Criteria for Drinking Water

Townsville Water has a comprehensive sampling regime "*From catchment to tap"* which covers raw water supply, water treatment and water distribution. Over 100,000 tests are taken over the year for various parameters including but not limited to chlorine, pH, turbidity, alkalinity, metals, chemical, pesticides and microbial.

Where possible treated water samples are taken from dedicated sample points in Council owned parks. These sample points are housed in secure vandal proof casings.

All samples are taken and analysed by Townsville Laboratory services which are NATA accredited. Reports/ results are emailed to the water quality team and the team have access to Laboratory Information Management System (LIMS) to obtain results as required. All data is monitored and trends analysed throughout the year by the Water Quality Officer, Water Treatment Engineer and the Graduate Engineer.

Townsville Water has been largely compliant with the water quality criteria having twelve water quality incidents as outlined above occurring through the year. Water restrictions have meant greater management of the system with regards to maintaining chlorine residuals to the endpoints in the network to ensure disinfection is not compromised balanced against reducing disinfection by products. The long hot dry summer also compounded this with ten water quality incidents being directly attributable to water restrictions.

Overall annual compliance for *E.coli* for each scheme was in compliance with the 98% required under the *Public Health Regulation 2005*: 99.8% for the Townsville Drinking Water Scheme, 100% for Giru/ Cungulla Drinking Water Scheme and 100% for Paluma Drinking Water Scheme.

There have been no failures to meet sampling frequencies and all locations have been sampled.

Overall compliance for *E.coli* for each scheme was as per the table 1 below.

Table 1. *E.coli* compliance (percentage) for Townsville Water's three drinking water schemes.

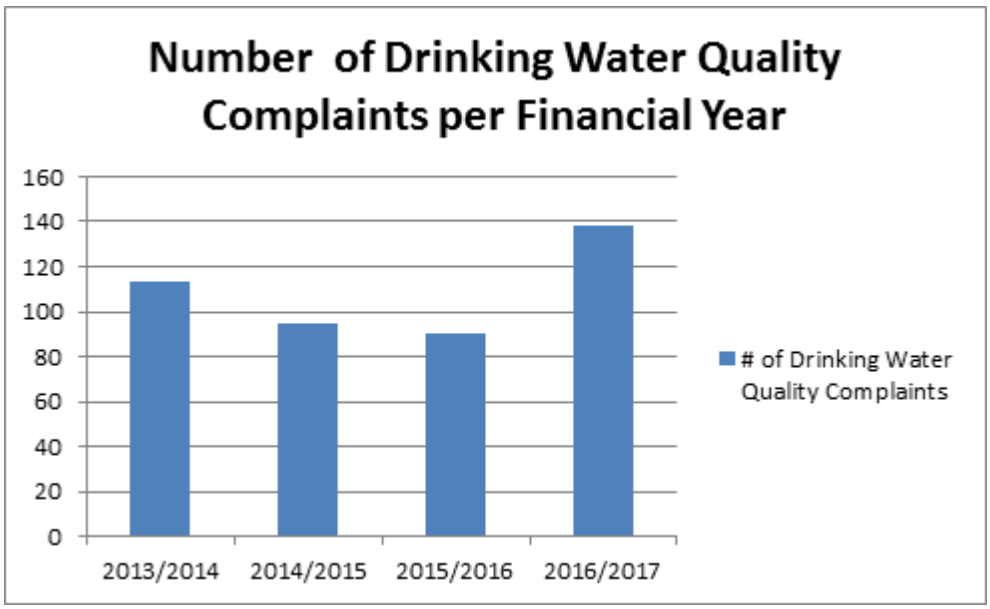
Drinking Water Scheme	No. of samples taken	% Annual Compliance
Townsville	3,393	99.88%
Paluma	85	100%
Giru/ Cungulla	153	100%

There were seven *E.coli* detections in Townsville's water supply scheme for the period as outlined in section 5 above.

Pipeline in Paluma Rainforest

7 Details of Complaints Made to the Provider About the Drinking Water Service Supplied to Customers.

There were 138 drinking water quality complaints with approximately 40 more than in previous years as per graph 1 below.



Graph 1: Number of drinking water quality complaints per financial year.

As evidenced from the breakdown of complaint type, as per table 2 below, this was due to an increase in dirty water complaints which numbered 40 more than the year previous. All other water quality complaints by type were relatively static with preceding years.

Table 2. Number of dirty water complaints by type.

Type of Water Quality Complaint	Dirty Water	Taste/ Odour	Geosmin	Suspected illness	Owners Side	Milky Water	Vexatious Customer Complaints
Number of Complaints	**86**	**8**	**8**	**4**	**8FM 13OS**	**9**	**2**

There are four main types of water quality complaints in Townsville as outlined below:

Dirty Water/ Milky Water

Dirty water results when sediments from the bottom of the pipes are stirred up due to works occurring in the area such as pipe repairs, water trucks filling from hydrants and construction works with heavy machinery. It can also be caused by changing velocities in pipes stirring up the sediment.

The increase in dirty water complaints this financial year is believed to have been caused by two factors, water restrictions causing sudden changes in water velocities during watering times and inadequate flushing after laying new pipes and pipe repairs. Inadequate flushing occurred as the Council

plumbers and pipelayers were trying to both flush adequately and manage customer expectation of no excessive water usage. Dirty water complaints are managed by flushing the main (and meter if required) until the water runs clear. The customer is called the following day to ensure that he issue is rectified.

Milky water is caused when air becomes trapped in the water under pressure, forming tiny bubbles. As these air bubbles escape they cause the water to look milky. Milky water occurs following large main repairs or when new mains are commissioned. The issue usually resolves itself once all the air has escaped but if it doesn't the mains are flushed. If this does not rectify the issue, extra air valves are cut in to the mains.

Taste and Odour (T&O)

T&O complaints in Townsville are generally are caused by

- Dirty water events.
- Geosmin.
- High chlorine (sudden change in chlorine concentration).
- Old/ new pipework on customer's side of the meter.

Townsville Water liaises with all customers for all T&O complaints, flush where required and take samples for further investigation if warranted.

Geosmin causes periodic issues in the northern beaches suburbs of Townsville which is part of the Paluma Dam/ Crystal Creek Water Supply Scheme. Geosmin has an earthy taste and results in T&O complaints even at low concentrations. In the past these areas are zoned off and water from Douglas WTP is pushed north. However, this was not possible during restrictions as Paluma Dam/ Crystal Creek supply was required. A media campaign was launched to educate people about the issue and this resulted in less complaints lodged than we expected. The issue resolved itself as suddenly as it appeared.

Owners Side

There were 21 owner's side issues this financial year with 8 of them caused by flick mix taps. Near the end of the life of flick mix taps (after 7 – 10 years) the inside braided hose degrades and leaves a black oily residue in the water. These are rectified through a phone call to customers. The remaining 13 were for a mix of old pipework on the owner's side, samples being taken from outside garden hoses or rusting hot water systems/ fixings.

Suspected Illness

There were 4 suspected illness complaints this year which is in line with previous years. However, this year was compounded by the low level of Ross River Dam which caused concern in the community that this was causing illness. Each customer was phoned to explain the treatment process and testing that is undertaken. If this does not allay their concerns a sample of their water is tested in the lab and results provided to the customer.

There were two vexatious complaints this year from the same customer.

8 Outcome of Review and Findings/ Recommendations of Audit.

8.1 Review

Townsville Water has undertaken a large scale review of their DWQMP which will be submitted to the Regulator for approval early 2018.

8.2 Audit

An audit of TCCs DWQMP was carried out in July 2016 by Water Futures Pty Ltd (with Zemek Environmental) under Dr Dan Deere as the Lead Auditor.

The purpose of the audit was to provide a “standard regular” audit of the way in which TCC complies with its approved DWQMP (dated to May 2014). The objective of the audit was to:

- Audit the monitoring and performance data provided to the regulator under the plan.
- Assess the service providers compliance with the plan.
- Assess the relevance of the plan in relation to the provider’s drinking water service.

The audit was conducted on the behalf of the Department of Energy and Water Supply (DEWS) under the Water Supply (Safety and Reliability) Act 2008 (Qld). The findings of the audit were reported to DEWS by the due date in August 2016.

Key Findings

Within the scope of the audit, TCC complied with its obligations under the Act, Regulations, and Audit Guidelines. There was good compliance between the current version of the DWQMP in use by TCC and the observations made during the audit. No poor quality or inadequately maintained infrastructure was observed. Therefore a compliant audit finding was made by the Auditor under the Act on behalf of DEWS.

Overview of Observations

The assets and systems inspected and audited were found to range from good to excellent in terms of their standard and the quality of their maintenance. TCC has made multiple significant improvements in the reliability of its water quality management system. The numerous step wise improvements made in recent years has greatly enhanced the ability of TCC to reliably ensure good water quality and to keep up with rising expectations of its stakeholders and tougher industry standards. The results are paying dividends in that TCC is getting excellent treated water quality results despite challenging source water conditions in both dry and wet periods.

» Water Treatment Plant Highlights

At the WTPs all records inspected at plants attended provided historical evidence of compliance with the DWQMP during the audit period. The records inspected included operational checks and online monitoring of critical limits. TCC maintains an effective telemetry system and was able to show evidence of consistent monitoring of critical limits with good to excellent performance. The filter upgrade at Giru WTP was particularly noteworthy and was undertaken to a high standard by TCC personnel.

» Network Highlights

TCC work hard to maintain good disinfectant residual barriers across its networks and is continuing to improve that performance. The stores and maintenance crews demonstrated a good understanding of water quality risks. Staff were able to demonstrate how TCC uses only appropriate materials in contact with water and protects water from cross contamination from wastewater. The stores set-up was excellent. The treated water storage tanks were of a good solid design and were well maintained in largely vermin proof conditions.

» Management System Highlights

The DWQMP has been regularly updated and kept sufficiently up to date. The process for managing and escalating incidents is clearly set out and logical and TCC has used that process during the audit period. TCC has continued to maintain its training program and use of Cert III vocational training of operators. All staff interviewed portrayed a good attitude and knowledge in relation to water quality management. It was noted that TCC is very well-served by its laboratory, as are surrounding councils.

Opportunities for Improvement

Although there are non-conformities with the Act and Regulation, a number of opportunities for improvement (OFIs) were identified during the audit as per table 3 below. None were considered urgent and none represented items that should be considered essential or 'must do' recommendations.

Table 3: Opportunities for Improvement

Opportunity for Improvement			Comments
1	Paluma	Although the catchment is of low density, the presence of septic systems and human habitation means that the absence of a treatment barrier to protozoan pathogens for Paluma Township is a potential concern. A more formalised and rigorous 'CCP-like' approach to protecting the catchment and/or an upgrade to the treatment plant to provide a protozoan barrier is warranted.	Paluma Township WTP - completion date end March 2018.
2	All	TCC staff had ensured that the majority of parts, and particularly the more sensitive parts, were retained indoor and undercover. However, some large pipes and fittings remained exposed outdoors. TCC should consider looking to store all potentially vulnerable parts that may form part of the drinking supply network undercover.	Project underway to move spare pipes/ fittings to land at Douglas WTP. Future capital will need to be secured to store large pipes and fittings under cover. Work being undertaken currently to cap all large pipes.
3	All	The standard of vermin proofing and run-off protection was high across the inspected treated water tanks. Minor weaknesses that could be improved included the absence of mesh on whirly birds on the Douglas WTP Reservoirs (such mesh was present at other sites) and possible run-off entry slits at Brookhill Reservoir.	Maintenance of reservoir roofs and structures is an ongoing process. Capital funding has been allocated for reservoir renewals. A program of works to renew the most important (risk rated) reservoirs first.
4	All	There were some single valve raw water bypasses on treatment plants and there is value in reviewing the robustness of the valves to seepage and protection against accidental valve operation.	A project is required to review if this would be advantageous and minimise risk

Ross River Dam

Townsville City Councils (SPID 506)
ANNUAL WATER QUALITY REPORT
for the reporting period
1st July 2016 - 30 June 2017

TOWNSVILLE DRINKING WATER SCHEME

Drinking Water Service Provider	Townsville City Council
SPID	506
Drinking Water Scheme	Townsville Drinking Water Scheme
Names of Towns, communities or regions serviced by this scheme	Townsville
Population Serviced by this scheme	192,038
Reporting Year	July 2016- June 2017
Laboratory Name	Townsville Laboratory Services

Scheme Name	Scheme Component	Parameter Category	Parameter	Unit of Measure	Limit of Reporting (LOR)	Count	# of Samples Detected	# DW Guidelines Value	Min Value	Max Value	Avg Value	95th %tile	Comments
Townsville DWS	**Source Water** Ross River Dam	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	197	187	0	0	14100	1109	4118	
		Thermotolerant Coliforms	Thermotolerant Coliforms	org/100ml	1	77	22	0	0	200	10	32	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	97	58	0	0	69	4.64	36	
		Turbidity	Turbidity	NTU	0.1	172	172	0	2.1	41.3	19.93	34.36	
		pH	pH	pH Units	1	203	203	0	5.60	8.41	7.68	8.31	
		Metals	Iron, Total	mg/L	0.005	172	172	0	0.27	1.90	0.98	1.7	
		Metals	Manganese, Total	mg/L	0.001	172	172	0	0.01	0.25	0.03	0.06	
		Anions	Nitrate	mg/L	0.01	172	85	0	0	0.18	0.05	0.14	
	Source Water Paluma Dam	Thermotolerant Coliforms	Thermotolerant Coliforms	org/100ml	1	18	1	0	0	220	12.22	33	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	100	63	0	0	13	1.69	6	
		Turbidity	Turbidity	NTU	0.1	122	122	0	0.9	5.4	1.73	2.30	
		pH	pH	pH Units	1	146	146	0	5.17	7.71	5.89	6.53	
		Metals	Iron, Soluble	mg/L	0.005	101	101	0	0.07	4.20	0.39	0.55	
		Metals	Manganese, Soluble	mg/L	0.001	101	101	0	0.008	0.1	0.02	0.05	
		Anions	Nitrate	mg/L	0.01	113	42	0	0	0.21	0	0.02	
	Water Treatment Plant Douglas WTP Raw Water	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	51	51	0	5	24200	1228	4640	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	52	15	0	0	41	1.81	5.35	
		Turbidity	Turbidity	NTU	0.1	392	392	0	2.69	58.0	17.75	29.4	
		pH	pH	pH Units	1	392	392	0	7.00	8.75	7.76	8.02	
		Anions	Sulphate	mg/L	0.5	13	13	0	2.00	6.10	3.25	4.66	
		Metals	Iron, Total	mg/L	0.005	55	55	0	0.11	1.70	0.49	1.6	
		Metals	Manganese, Total	mg/L	0.001	55	55	0	0.006	0.06	0.03	0.04	
		Geosmin/ MIB	Geosmin	ng/L	1	20	14	0	0	5.20	1.42	3.11	
		Geosmin/ MIB	MIB	ng/L	1	20	20	0	1.9	5.50	3.53	5.4	
		Fluoride	Fluoride (Naturally occuring)	mg/L	0.02	55	55	0	0.09	0.25	0.17	0.21	
		Metals	Arsenic	mg/L	0.001	4	3	0	0	0.002	0.001	0	
		Metals	Selenium	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Mercury	mg/L	0.0006	4	0	0	0	0	0	0	

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TOWNSVILLE DRINKING WATER SCHEME

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Townsville DWS	**Water Treatment Plant** Douglas WTP Raw Water	Metals	Cadmium	mg/L	0.0001	4	0	0	0	0	0	0	
		Metals	Nickel	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Chromium	mg/L	0.001	4	0	0	0	0	0	0	
		Giardia	Giardia	cysts/100ml	1	4	0	0	0	0	0	0	
		Cryptosporidium	Cryptosporidium	oocysts/10L	1	4	0	0	0	0	0	0	
	Water Treatment Plant Douglas WTP Treated Water	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	69	0	0	0	0	0	0	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	69	0	0	0	0	0	0	
		Disinfection Residual	Chlorine, free	mg/L	0.05	722	722	0	1	4.7	3.36	4.4	
		Turbidity	Turbidity	NTU	0.1	723	723	0	0.01	0.21	0.12	0.15	
		pH	pH	pH Units	1	7223	723	0	7.37	7.7	7.50	7.58	
		Anions	Sulphate	mg/L	0.5	23	23	0	1.9	6.2	3.21	5.68	
		Anions	Nitrate	mg/L	0.01	17	17	0	0.08	0.25	0.14	0.24	
		Metals	Iron, Total	mg/L	0.005	204	15	0	0	0.02	0	0	
		Metals	Manganese, Total	mg/L	0.001	104	5	0	0	0.007	0	0	
		Metals	Aluminium	mg/L	0.005	722	355	0	0	0.1	0.004	0.01	
		Fluoride	Fluoride	mg/L	0.02	1340	1340	0	0.53	0.81	0.7	0.74	
		Metals	Copper	mg/L	0.002	24	9	0	0	0.002	0	0.002	
		Metals	Zinc	mg/L	0.001	24	1	0	0	0.011	0	0	
		Metals	Arsenic	mg/L	0.001	8	3	0	0	0	0	0	
		Metals	Selenium	mg/L	0.001	8	0	0	0	0	0	0	
		Metals	Mercury	mg/L	0.0006	8	0	0	0	0	0	0	
		Metals	Cadmium	mg/L	0.0001	8	1	0	0	0.0003	0	0	
		Metals	Nickel	mg/L	0.001	8	1	0	0	0.002	0	0	
		Metals	Chromium	mg/L	0.001	8	0	0	0	0	0	0	
		Disinfection By-product	Trihalomethanes	ug/L	5	99	99	0	6	147	60	111	
	Water Treatment Plant Northern WTP Raw Water	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	46	45	0	0	2910	105	178	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	46	26	0	0	350	10	8	
		Turbidity	Turbidity	NTU	0.1	331	331	0	0	44.4	1.3	1.88	
		pH	pH	pH Units	1	331	331	0	9.91	11.01	10.60	10.77	

Townsville City Councils (SPID 506)
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TOWNSVILLE DRINKING WATER SCHEME

Drinking Water Service Provider	Townsville City Council
SPID	506
Drinking Water Scheme	Townsville Drinking Water Scheme
Names of Towns, communities or regions serviced by this scheme	Townsville
Population Serviced by this scheme	192,038
Reporting Year	July 2016- June 2017
Laboratory Name	Townsville Laboratory Services

Scheme Name	Scheme Component	Parameter Category	Parameter	Unit of Measure	Limit of Reporting (LOR)	Count	# of Samples Detected	# DW Guidelines Value	Min Value	Max Value	Avg Value	95th %tile	Comments
Townsville DWS	**Water Treatment Plant** Northern WTP Raw Water	Anions	Sulphate	mg/L	0.5	6	6	0	1	2.9	1.49	2.65	
		Metals	Iron, Total	mg/L	0.005	47	76	0	0	0.59	0.2	0.52	
		Metals	Manganese, Total	mg/L	0.001	47	44	0	0	0.02	0.004	0.008	
		Geosmin/ MIB	Geosmin	ng/L	1	11	10	0	0	26	5.76	19	
		Geosmin/ MIB	MIB	ng/L	1	11	0	0	0	0	0	0	
		Fluoride	Fluoride	mg/L	0.02	38	38	0	0	0.07	0.04	0.05	
		Metals	Arsenic	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Selenium	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Mercury	mg/L	0.0006	4	0	0	0	0	0	0	
		Metals	Cadmium	mg/L	0.0001	4	0	0	0	0	0	0	
		Metals	Nickel	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Chromium	mg/L	0.001	4	0	0	0	0	0	0	
		Giardia	Giardia	cysts/100ml	1	3	0	0	0	0	0	0	
		Cryptosporidium	Cryptosporidium	oocysts/10L	1	3	0	0	0	0	0	0	
	Water Treatment Plant Northern WTP Treated Water	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	46	0	0	0	0	0	0	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	46	0	0	0	0	0	0	
		Disinfection Residual	Chlorine, free	mg/L	0.05	330	330	0	1.66	2.92	2.27	2.8	
		Turbidity	Turbidity	NTU	0.1	330	330	0	0.02	0.09	0.04	0.05	
		pH	pH	pH Units	1	330	330	0	7.36	7.63	7.53	7.6	
		Anions	Sulphate	mg/L	0.5	11	11	0	1	4	1	3.35	
		Anions	Nitrate	mg/L	0.01	10	9	0	0.00	0.08	0.04	0.08	
		Metals	Manganese, Total	mg/L	0.001	47	22	0	0	0.008	0.0009	0.003	
		Metals	Iron, Total	mg/L	0.005	94	6	0	0	0.03	0	0.007	
		Metals	Aluminium	mg/L	0.005	328	179	0	0	0.05	0.006	0.02	
		Fluoride	Fluoride	mg/L	0.02	657	657	0	0.62	0.78	0.07	0.75	
		Metals	Copper	mg/L	0.002	11	4	0	0	0.004	0	0.004	
		Metals	Zinc	mg/L	0.001	11	0	0	0	0	0	0.000	
		Metals	Arsenic	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Selenium	mg/L	0.001	4	0	0	0	0	0	0	

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TOWNSVILLE DRINKING WATER SCHEME

Drinking Water Service Provider	Townsville City Council
SPID	506
Drinking Water Scheme	Townsville Drinking Water Scheme
Names of Towns, communities or regions serviced by this scheme	Townsville
Population Serviced by this scheme	192,038
Reporting Year	July 2016- June 2017
Laboratory Name	Townsville Laboratory Services

Scheme Name	Scheme Component	Parameter Category	Parameter	Unit of Measure	Limit of Reporting (LOR)	Count	# of Samples Detected	# DW Guidelines Value	Min Value	Max Value	Avg Value	95th %tile	Comments
Townsville DWS	**Water Treatment Plant** Northern WTP Treated Water	Metals	Mercury	mg/L	0.0006	4	0	0	0	0	0	0	
		Metals	Cadmium	mg/L	0.0001	4	0	0	0	0	0	0	
		Metals	Nickel	mg/L	0.001	4	0	0	0	0	0	0	
		Metals	Chromium	mg/L	0.001	4	0	0	0	0	0	0	
		Disinfection By-product	Trihalomethanes	ug/L	5	47	47	0	7	56	25	45	
	Transmission Reservoirs	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	985	14	0	0	200	0.5	0	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	985	2	2	0	2	0	0	DWI-7-506-00050
		Disinfection residual	Chlorine, free	mg/L	0.05	899	891	0	0	3.76	1.3	2.3	
		Disinfection residual	Chlorine, total	mg/L	0.05	899	899	0	0.13	4.21	1.7	2.8	
		Turbidity	Turbidity	NTU	0.1	876	876	0	0.1	0.7	0.22	0.4	
		pH	pH	pH Units	1	898	898	0	6.48	8.3	7.3	7.91	
		Metals	Iron, Total	mg/L	0.005	1004	373	0	0	0.61	0.007	0.02	
		Metals	Manganese, Total	mg/L	0.001	1004	334	0	0	0.02	0	0.003	
		Disinfection By-product	Trihalomethanes	µg/L	5	992	992	14	11	284	115	222	DWI-7-506-00042, DWI-7-506-00049
		Disinfection By-product	Chlorates	µg/L	50	163	140	20	0	1315	370	867	DWI-7-506-00043
	Reticulation Houses	Thermotolerant Coliforms	Total Coliforms	org/100ml	1	1717	10	0	0	78	0.17	0	
		Thermotolerant Coliforms	E.coli	MPN/100ml	1	1717	5	5	0	18	0.02	0	DWI-7-506-00041, DWI-7-506-00047, DWI-7-506-00048, DWI-7-506-00051
		Disinfection residual	Chlorine, free	mg/L	0.05	1748	1704	0	0	4.6	1	1.98	
		Disinfection residual	Chlorine, total	mg/L	0.05	1747	1744	1	0	5.6	1.34	2.46	DWI-7-506-00046
		Turbidity	Turbidity	NTU	0.1	657	657	0	0.1	2.6	0.26	0.5	
		pH	pH	pH Units	1	1746	1746	0	6.24	8.53	7.47	7.95	
		Metals	Iron, Total	mg/L	0.005	488	183	0	0	0.14	0.007	0.03	
		Metals	Manganese, Total	mg/L	0.001	488	191	0	0	0.06	0.002	0.008	
		Fluoride	Fluoride	mg/L	0.02	488	488	0	0.19	0.84	0.7	0.75	DWI-7-506-00042, DWI-7-506-00049
		Disinfection By-product	Trihalomethanes	µg/L	5	584	584	1	8	256	105	184	
		Disinfection By-product	Chlorates	µg/L	50	41	34	14	0	1082	493	966	

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Please note Paluma Township was on a boil water advisory from 28 October 2016 through to end of reporting period.

PALUMA DRINKING WATER SCHEME

Drinking Water Service Provider	Townsville City Council
SPID	506
Drinking Water Scheme	Paluma Drinking Water Scheme
Names of Towns, communities or regions serviced by this scheme	Paluma
Population Serviced by this scheme	25-140
Reporting Year	July 2016- June 2017
Laboratory Name	Townsville Laboratory Services

Scheme Name	Name place	Scheme Component	Parameter Category	Parameter	Unit of Measure	Limit of Reporting (LOR)	Count	# of Samples Detected	# DW Guidelines Value	Min Value	Max Value	Avg Value	95th %tile	Comments
Paluma DWS	Paluma Township	**Source Water** Paluma Weir	Thermotolerant Coliforms	E.coli	MPN/100ml	1	13	12	0	0	550	152.46	394	
			pH	pH	pH Units	1	14	14	0	5.15	7	5.96	6.88	
			Metals	Iron	mg/L	0.005	53	53	0	0.16	0.69	0.29	0.56	
			Metals	Manganese	mg/L	0.001	53	52	0	0	0.12	0.02	0.03	
			Turbidity	Turbidity	NTU	0.1	27	27	0	2.4	14.5	4.56	7.88	
			Cryptosporidium	Cryptosporidium	cells/10 Li	1	10	1	1	0	4	0.4	2.2	DWI-7-506-00045
			Giardia	Giardia	cells/10 Li	1	10	2	2	0	3	0.5	3	
		Transmission Paluma Reservoir	Thermotolerant Coliforms	Total Coliform	org/100ml	1	61	1	0	0	4	0.07	0	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	61	0	0	0	0	0	0	
			Disinfection Residual	Chlorine (free)	mg/L	0.05	358	358	0	0.31	3.11	1.67	2.43	
			Disinfection Residual	Chlorine (total)	mg/L	0.05	43	43	0	0.78	3.07	1.96	2.82	
			pH	pH	pH Units	1	12	12	0	5.65	6.92	6.32	6.88	
			Turbidity	Turbidity	NTU	0.1	12	12	0	2.2	5.7	3.25	5.59	
			Disinfection By-product	Chlorates	µg/L	15	26	26	4	209	1181	471	1067	DWI-7-506-00052
			Disinfection By-product	Trihalomethanes	µg/L	2	12	12	0	26	143	56	101.75	
		Reticulation Paluma Houses	Thermotolerant Coliforms	Total Coliform	org/100ml	1	27	0	0	0	0	0	0	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	27	0	0	0	0	0	0	
			Disinfection Residual	Chlorine (free)	mg/L	0.05	331	331	0	0.04	2.45	1.00	1.80	
			Disinfection Residual	Chlorine (total)	mg/L	0.05	24	24	0	0.44	2.63	1.35	2.07	
			pH	pH	pH Units	2	24	24	0	5.42	9.2	6.73	8.15	
			Turbidity	Turbidity	NTU	0.1	24	24	0	1.8	5.9	3.30	5.67	
			Metals	Iron	mg/L	0.005	24	24	0	0.47	1.5	0.82	1.47	
			Metals	Manganese	mg/L	0.001	24	24	0	0.002	0.04	0.01	0.04	
			Metals	Aluminium	mg/L	0.005	24	24	0	0.08	0.28	0.14	0.24	
			Fluoride	Fluoride (naturally occuring)	mg/L	0.02	24	24	0	0.07	0.27	0.1	0.14	
			Disinfection By-product	Chlorates	µg/L	15	26	26	4	269	1177	480.58	1054.75	
			Disinfection By-product	Trihalomethanes	µg/L	2	24	24	0	33	185	84.83	176	

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GIRU/ CUNGULLA DRINKING WATER SCHEME

Drinking Water Service Provider	Townsville City Council
SPID	506
Drinking Water Scheme	Giru/ Cungulla Drinking Water Scheme
Names of Towns, communities or regions serviced by this scheme	Cungulla
Population Serviced by this scheme	288
Reporting Year	July 2016- June 2017
Laboratory Name	Townsville Laboratory Services

Scheme Name	Name place	Scheme Component	Parameter Category	Parameter	Unit of Measure	Limit of Reporting (LOR)	Count	# of Samples Detected	# DW Guidelines Value	Min Value	Max Value	Avg Value	95th %tile	Comments
Giru/Cungulla DWS	Giru	**Source Water** Giru Raw Water (Haughton River)	Thermotolerant Coliforms	Total Coliform	org/100ml	1	40	39	0	0	19900	2228	10750	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	40	21	0	0	50	5	21.5	
			Turbidity	Turbidity	NTU	0.1	39	39	0	0.6	20.2	2.74	11.59	
			pH	pH	pH Units	1	38	38	0	6.75	8.89	7.96	8.66	
			Metals	Iron, Total	mg/L	0.005	39	37	0	0	1.2	0.16	0.89	
			Metals	Manganese, Total	mg/L	0.001	39	37	0	0	0.22	0.02	0.04	
			Cryptosporidium	Cryptosporidium	cells/10 Li	1	2	0	0	0	0	0	0	
			Giardia	Giardia	cells/10 Li	1	2	0	0	0	0	0	0	
		Water Treatment Plant Giru Clear Water Storage	Thermotolerant Coliforms	Total Coliform	org/100ml	1	40	4	0	0	200	13	84	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	40	3	0	2	0.13	1.05	3	This sample is taken pre-chlorination. Water is disinfected after this point.
			Turbidity	Turbidity	NTU	0.1	39	38	0	0	1.4	0.32	0.82	
			pH	pH	pH Units	1	39	39	0	6.49	7.87	7.21	7.74	
			Metals	Iron, Total	mg/L	0.005	39	6	0	0	0.08	0	0.05	
			Metals	Manganese, Total	mg/L	0.001	39	20	0	0	0.24	0	0.01	
	Cungulla	**Transmission** Cungulla Reservoir	Thermotolerant Coliforms	Total Coliform	org/100ml	1	51	0	0	0	0	0	0	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	51	0	0	0	0	0	0	
			Turbidity	Turbidity	NTU	0.1	52	52	0	0	0.7	0.27	0.50	
			pH	pH	pH Units	1	52	52	0	0	6.88	7.98	7.63	
			Metals	Iron, Total	mg/L	0.005	52	8	0	0	0.02	0	0.01	
			Metals	Manganese, Total	mg/L	0.001	52	26	0	0	0.06	0	0	
			Disinfection Residual	Chlorine (free)	mg/L	0.05	52	52	0	0.70	2.59	1.44	2.01	
			Disinfection Residual	Chlorine (Total)	mg/L	0.05	52	52	0	0.78	3.53	1.8	2.30	
			Disinfection By products	Chlorates	µg/L	15	12	12	0	188	608	321	524	
			Disinfection By products	Trihalomethanes	µg/L	2	51	51	0	38	93	64	86	
		Reticulation Cungulla Houses	Thermotolerant Coliforms	Total Coliform	org/100ml	1	102	1	0	0	2	0.06	0	
			Thermotolerant Coliforms	E.coli	MPN/100ml	1	102	0	0	0	0	0	0	
			Turbidity	Turbidity	NTU	0.1	52	50	0	0.00	0.70	0.27	0.55	
			pH	pH	pH Units	1	104	104	0	6.71	8.14	7.67	7.99	
			Metals	Iron, Total	mg/L	0.005	52	6	0	0	0.02	0	0.01	
			Metals	Manganese, Total	mg/L	0.001	52	52	0	4.4	10.1	6.98	9.85	
			Disinfection Residual	Chlorine (free)	mg/L	0.05	104	104	0	0.37	2.49	1.08	1.6	
			Disinfection Residual	Chlorine (Total)	mg/L	0.05	104	104	0	0.71	3.44	1.46	1.97	