

# DSC DWQMP Report

Period: 01 July 2015 – 30 June 2016

Drinking Water Service Provider 558



# 2016



mLawson

**DOUGLAS** SHIRE  
COUNCIL

Issue Date: 8 December 2016



**Document Information:**

Version	Created By	Issued To	Qty	Reviewed By & Date	Approved By & Date
1	DSC – Henry Maro, Samadhi Senior	Peter White	1	 Peter White 7/12/16	 Nicholas Wellwood 8/12/16

**Document and DWQMP related Information Controller:**

**Acting Manager Water and Wastewater:** Peter White

T: (07) 4099 9434

E: [peter.white@douglas.qld.gov.au](mailto:peter.white@douglas.qld.gov.au)

## Glossary of terms

**AWG 2004** Australian Drinking Water Guidelines (2004). Published by the National Health and Medical Research Council of Australia

**ADWG 2011** Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia

***E.coli*** *Escherichia coli*, a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk

**HACCP** Hazard Analysis and Critical Control Points certification for protecting drinking water quality

**mg/L** Milligrams per litre

**NTU** Nephelometric Turbidity Units

**MPN/100mL** Most probable number per 100 millilitres

**CFU/100mL** Colony forming units per 100 millilitres

**<** Less than

**>** Greater than

**UF** Ultra Filtration

**UV** Ultra Violet Light

**Contents**

- 1. Introduction..... 1
- 2. Overview of operations ..... 1
- 3. Actions taken to implement the DWQMP ..... 1
  - 3.1 Progress in implementing the risk management improvement program ..... 2
  - 3.2 Amendments made to the DWQMP ..... 2
- 4. Compliance with water quality criteria for drinking water ..... 2
- 5. Notifications to the Regulator under sections 102 and 102A of the Act ..... 2
  - 5.1 Non-compliances with the water quality criteria and corrective and preventive actions undertaken ..... 3
  - 5.2 Prescribed incidents or events reported to the Regulator and corrective and preventive actions undertaken..... 3
- 6. Customer complaints related to water quality..... 3
  - 6.1 Alleged illness..... 3
  - 6.2 Discoloured water ..... 4
  - 6.3 Taste and odour ..... 4
- 7. Findings and recommendations of the DWQMP auditor..... 4
- 8. Outcome of the review of the DWQMP and how issues raised have been addressed 4
- Appendix A – Summary of compliance with water quality criteria ..... 4
- Appendix B – Implementation of the DWQMP Risk Management Improvement Program.....21



# DQWMP Report

---

December 2016

## 1. Introduction

This report documents the performance of **Douglas Shire Council's** drinking water service with respect to water quality and performance in implementing the actions detailed in the Drinking Water Quality Management Plan (DWQMP) as required under the *Water Supply (Safety and Reliability) Act 2008*.

The report provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

## 2. Overview of operations

The Douglas Shire Council as Drinking Water Service Provider (SPID 558) operates three principle water supply schemes namely:

- Mossman / Port Douglas
- Whyanbeel
- Daintree

The water supply schemes draw raw water from rainforest streams and treat water to ADWG standards by utilising UF (Ultra Filtration) membrane processes and disinfection with chlorine.

In addition there is a non-potable water supply scheme:

- Dagmar Heights

This scheme consists of a bore field pump system with no treatment and is a declared non-potable water supply.

## 3. Actions taken to implement the DWQMP

Douglas Shire Council (DSC) undertook a comprehensive review of the drinking water quality management plan in 2015. Following the review, it was decided to complete a new risk assessment of the drinking water schemes, and rewrite the entire DWQMP in a simpler, more easily implementable format.

Following the risk assessment, risk management improvement items were identified for any mitigated risks that were considered unacceptable. Other improvements made to the DWQMP included development and documentation of more appropriate critical control point (CCP) limits, and ensuring that these changes were reflected in the SCADA systems at the water treatment plants. The changes to the CCPs have ensured that operators become

aware of potential issues faster, and respond to ensure that our customers receive safe drinking water.

The amended DWQMP was submitted to the Regulator for approval in December 2015, and was approved on 1 March 2016.

Operationally, DSC has developed processes and procedures that ensure that the DWQMP is being implemented. Compliance with the operational limits is continually monitored via SCADA Citec control systems and operational checks performed by plant operators. Our operational monitoring is undertaken to provide us with confidence that the drinking water that we provide to our customers meets the Australian Drinking Water Guideline recommendations. Verification monitoring is undertaken regularly with external analyses undertaken at a NATA certified laboratory.

All data is recorded and reviewed to ensure a system is in place to identify any potential risks that may arise in relation to water quality and allow for early intervention with corrective measures to ensure compliance.

### 3.1 Progress in implementing the risk management improvement program

As stated above, the RMIP was updated in the review of the DWQMP. This identified a number of important actions to improve our drinking water quality over time. Refer to Appendix B Table 5 for a summary of progress in implementing each of the Improvement program actions.

### 3.2 Amendments made to the DWQMP

As stated above, a comprehensive amendment to the DWQMP was submitted to the Regulator in December 2015 and was approved on 1 March 2016.

## 4. Compliance with water quality criteria for drinking water

Douglas Shire Council undertook verification monitoring in accordance with the requirements of both the approved DWQMP from July 2015, and with the amended DWQMP from March 2016.

Water quality data is presented in **Appendix A: Tables 1 to 4** – Summary of water quality criteria compliance. All chemical and microbiological parameters met with the recommended values in the Australian Drinking Water Guidelines including the standards in the Public Health Regulation 2005, with the exception of the one sample detailed below

## 5. Notifications to the Regulator under sections 102 and 102A of the Act

This financial year there was one instance where the Regulator was notified under sections 102 or 102A of the Act. This notification involved the detection of *E. coli* – an organism that



may not directly represent a hazard to human health, but indicates the presence of recent faecal contamination.

## 5.1 Non-compliances with the water quality criteria and corrective and preventive actions undertaken

Incident Description: The non-compliance was a detection of *E. coli* from a routine sample taken on 24 May 2016 at Bougainvillea Street, Cooya Beach during heavy rainfall. One *E. coli* organism per 100 mL was detected, with a free chlorine disinfection residual of 0.18 mg/L.

Corrective and Preventative Actions: Immediate re-sampling was performed and samples despatched for analysis. Chlorine residual levels were also checked within the surrounding reticulation system and found to be within acceptable limits. There were no other *E. coli* detections and/or high bacterial counts from within the surrounding reticulation system in any of the samples.

The most probable cause of the detection was external contamination of the sample due to inclement weather at the time of sampling. As such, a review of sampling procedures was carried out to ensure all sampling was being performed in accordance with sampling procedures, and a Standard Operating Procedure is being documented to detail the specific actions to be undertaken to reduce the possibility of further instances of sample contamination.

## 5.2 Prescribed incidents or events reported to the Regulator and corrective and preventive actions undertaken

There were no instances of prescribed incidents and/or events during the reporting period.

## 6. Customer complaints related to water quality

**Table (a) – Complaints about water quality**

Scheme	Alleged Illness	Discoloured Water	Taste and Odour	Total
Daintree	0	0	0	0
Mossman / Port Douglas	0	3	6	9
Whyanbeel	0	0	1	1

### 6.1 Alleged illness

During the reporting period there were no complaints of illness arising from the water supply system.

## 6.2 Discoloured water

### Mossman/ Port Douglas Scheme.

A total of 3 complaints were received from residents in relation to discoloured water. Milky to yellow coloured water was reported from domestic taps. Precautionary flushing of service water mains was conducted in each instance and consumers were advised to flush their taps. Chlorine residual was checked and found to be adequate. Customer samples were analysed, and in each instance demonstrated compliance with ADWG health guideline values

## 6.3 Taste and odour

### Mossman/ Port Douglas Scheme and Whyanbeel Scheme.

A total of 7 complaints across all schemes were received from residents in relation to taste and odour. Typically, the complaints were in relation to chlorine odour and or metallic tastes. In all instances the chlorine residual levels were checked and found to be well within our target set points of less than 1 mg/L. Customer samples were taken to check for possible compounds that may be causing metallic tastes and in all demonstrated compliance with ADWG health guideline values. Precautionary flushing of the service mains was also performed and consumers advised to flush their taps.

## 7. Findings and recommendations of the DWQMP auditor

The first regular audit is required to be undertaken by 30 June 2017.

## 8. Outcome of the review of the DWQMP and how issues raised have been addressed

Please refer to Item 3 - Actions taken to implement the DWQMP

## Appendix A – Summary of compliance with water quality criteria

Verification monitoring was carried out as per the program stated in the approved DWQMP at the time.

The verification monitoring program is considered appropriate to ensure compliance with the recommended values in the Australian Drinking Water Guidelines (ADWG 2011) as well as the standards in the Public Health Regulation 2005.

**Table 1 – Verification monitoring results for the reporting period – July 2015 to June 2016**

**Mossman Water Quality Data - Reticulation**

<b>E.coli</b>	<b>2009/10</b>	<b>2010/11</b>	<b>2011/12</b>	<b>2012/13</b>	<b>2013/14</b>	<b>2014/15</b>	<b>2015/16</b>
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	1	<1	1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	537	526	522	524	618
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

<b>Chlorine</b>	<b>2009/10</b>	<b>2010/11</b>	<b>2011/12</b>	<b>2012/13</b>	<b>2013/14</b>	<b>2014/15</b>	<b>2015/16</b>
Avg	0.31	0.41	0.45	0.62	0.54	0.61	0.46
Max	3.9	1.1	1.9	2.4	1.2	1.2	1.07
Min	0.01	0.01	0.01	<0.10	<0.10	<0.10	<0.1
Count	653	514	536	526	472	422	617
5 <sup>th</sup> %ile						<0.10	<0.1
95 <sup>th</sup> %ile	0.7	0.8	0.9	1	0.92	0.92	0.89

<b>pH</b>	<b>2009/10</b>	<b>2010/11</b>	<b>2011/12</b>	<b>2012/13</b>	<b>2013/14</b>	<b>2014/15</b>	<b>2015/16</b>
Avg	8.6	8.5	8.2	7.9	7.7	7.64	7.76
Max	9.6	9.7	9.6	9.4	9.2	9.6	9.42
Min	6.3	7.2	7.2	7.1	6.8	6.6	6.7
Count	533	522	537	526	490	525	603
95 <sup>th</sup> %ile	9.4	9.3	9	8.6	8.6	8.48	8.78

<b>Colour</b>	<b>2009/10</b>	<b>2010/11</b>	<b>2011/12</b>	<b>2012/13</b>	<b>2013/14</b>	<b>2014/15</b>	<b>2015/16</b>
Avg	2.7	1.9	1.6	1.8	1.3	<1	<5
Max	46	13	4.5	8.4	5.3	5	5
Min	1	1	<1	<1	<1	<1	<5
Count	311	219	537	526	486	71	154
95 <sup>th</sup> %ile	4.9	3.1	2.8	3.4	4	5	<5

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.6	0.25	0.1	0.1	0.1	<0.10	<0.5
Max	31	3.1	1	5.7	0.3	2	14
Min	0.1	0.1	<0.10	<0.10	<0.10	<0.10	<0.5
Count	232	135	537	526	494	208	154
95 <sup>th</sup> %ile	1.25	0.63	0.2	0.2	0.2	0.1	0.5

Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<0.05	0.05	0.03	<0.02	0.006
Max	-	-	<0.17	0.51	0.09	0.11	0.11
Min	-	-	<0.05	<0.02	<0.02	<0.02	<0.005
Count	-	-	253	505	349	71	154
95 <sup>th</sup> %ile	-	-	<0.05	0.09	0.07	<0.02	0.016

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.001	<0.01	0.02	<0.01	<0.005
Max	-	-	0.025	0.02	0.03	<0.01	<0.005
Min	-	-	<0.001	<0.01	<0.01	<0.01	<0.005
Count	-	-	253	505	349	71	154
95 <sup>th</sup> %ile	-	-	0.004	0.02	0.03	<0.01	<0.005

#### ***Mossman Water Quality Data - Reservoir***

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	106	105	104	106	105
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.65	0.48	0.64	0.77	0.73	0.72	0.79
Max	1.9	0.93	1.9	2.8	1.4	1.21	2.1
Min	0.01	0.01	0.03	<0.10	<0.10	<0.10	0.14
Count	103	97	106	105	96	103	105
5 <sup>th</sup> %ile	-	-	-	-	-	0.17	0.37
95 <sup>th</sup> %ile	1	0.8	1.51	1.2	1.2	1.18	1.11

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	8.2	8.3	8.2	7.7	7.5	7.5	7.25
Max	9.5	9.5	9.3	8.7	8.5	8.5	8.52
Min	7	7.4	7.1	7.1	7	6.4	6.44
Count	90	98	106	105	90	105	101
95 <sup>th</sup> %ile	9.4	9.4	9.1	8.5	8	8.21	7.75

**Mossman Water Quality Data - Treatment**

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	157	168	153	156	158
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.91	1	0.91	0.9	0.89
Max	-	-	2.2	2.6	1.3	1.13	1.31
Min	-	-	0.2	0.38	0.34	0.085	0.54
Count	-	-	137	113	89	102	106
95 <sup>th</sup> %ile	-	-	1.38	1.3	1.2	1.04	1.13

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	7.2	7.2	7.1	7.3	7.3
Max	-	-	7.7	8.5	7.3	7.92	8.55
Min	-	-	6.6	6.9	6.9	6.5	6.7
Count	-	-	137	113	92	113	102
95 <sup>th</sup> %ile	-	-	7.5	7.4	7.2	7.8	7.63

#### **Mossman Water Quality Data - Raw**

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	45	46	9	14	10.75
Max	-	-	>100	>100	12	37	34
Min	-	-	5	3	6	4	1
Count	-	-	4	5	4	5	4
95 <sup>th</sup> %ile	-	-	94	>100	12	34	34

Colour	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	14.4	7.3	5.8	10.2	9
Max	-	-	27	8.8	7.2	15	15
Min	-	-	4.4	5.7	3.3	5.5	5
Count	-	-	4	5	4	3	4
95 <sup>th</sup> %ile	-	-	25.4	8.7	7.1	14.5	15

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	7.1	7.1	7.1	6.84	6.78
Max	-	-	7.2	7.2	7.3	7.1	6.8
Min	-	-	6.9	6.9	6.9	6.5	6.7
Count	-	-	4	5	4	16	4
95 <sup>th</sup> %ile	-	-	7.2	7.2	7.3	7.1	6.8

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	1.5	0.6	0.4	0.5	6.75
Max	-	-	2.5	1.1	0.6	5.3	25
Min	-	-	0.4	0.3	0.3	0.1	<5
Count	-	-	4	5	4	17	4
95 <sup>th</sup> %ile	-	-	2.5	1	0.6	2.02	25

Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.082	0.03	0.02	0.013	0.024
Max	-	-	0.094	0.05	0.024	0.036	0.037
Min	-	-	<0.05	<0.02	<0.02	<0.02	0.015
Count	-	-	4	5	4	3	4
95 <sup>th</sup> %ile	-	-	0.093	0.05	0.023	0.033	0.037

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.002	<0.01	<0.01	<0.01	<0.005
Max	-	-	0.004	<0.01	<0.01	<0.01	<0.005
Min	-	-	0.001	0.001	<0.01	<0.01	<0.005
Count	-	-	4	5	4	3	4
95 <sup>th</sup> %ile	-	-	0.004	<0.01	<0.01	<0.01	<0.005

#### **Whyanbeel Water Quality Data - Reticulation**

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	1	7	<1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	162	209	154	160	154
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.31	0.41	0.47	0.29	0.39	0.36	0.37
Max	2.6	4.4	8.2	1	1.9	1.25	1.5
Min	0.01	0.01	<0.10	<0.10	<0.10	<0.10	<0.1
Count	233	208	162	209	146	157	154
5 <sup>th</sup> %ile						<0.10	<0.1
95 <sup>th</sup> %ile	0.94	1.3	1.4	0.6	0.8	0.92	0.81

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	8.2	8.6	8	8.1	7.7	7.69	7.95
Max	10	10.1	9.4	9.7	8.9	9.31	9.08
Min	6.9	6.9	7	7.2	7.1	6.5	6.8
Count	212	211	162	209	144	159	153
95 <sup>th</sup> %ile	9.6	9.6	9.2	9.3	8.7	9.01	8.83

Colour	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	2.3	1.4	1.8	2.5	1.3	<1	<5
Max	16	.5	13	21	3.9	1.4	<5
Min	1.1	1	<1	<1	<1	<1	<5
Count	92	42	162	156		38	39
95 <sup>th</sup> %ile	3.6	2.1	3.2	4.6	3	1.1	<5

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.28	0.15	0.2	<0.10	0.1	<0.10	<0.5
Max	4.6	0.4	3.2	4.9	0.8	0.2	<0.5
Min	0.1	0.1	<0.10	<0.10	<0.10	<0.10	<0.5
Count	59	51	162	156	145	62	39
95 <sup>th</sup> %ile	0.61	0.25	0.4	0.3	0.3	<0.10	<0.5



Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.11	0.07	0.11	0.09	0.05	<0.02	0.02
Max	0.21	0.09	0.47	0.7	0.17	0.053	0.046
Min	0.06	0.06	<0.05	<0.02	<0.02	<0.02	<0.005
Count	8	4	75	150	108	24	39
95 <sup>th</sup> %ile	0.19	0.09	0.3	0.22	0.1	0.047	0.042

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0	0	0.001	<0.01	0.02	<0.01	<0.005
Max	0	0	0.02	0.03	0.03	<0.01	<0.005
Min	0	0	<0.001	<0.01	<0.01	<0.01	<0.005
Count	8	21	75	150	108	24	39
95 <sup>th</sup> %ile	0	0	0.01	0.01	0.03	<0.01	<0.005

#### **Whyanbeel Water Quality Data - Reservoir**

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	3	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	110	49	85	52	53
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.31	0.34	0.29	0.33	0.23	0.71	0.72
Max	2.8	0.8	3	1.4	1.8	1.49	2.2
Min	0.01	0.02	<0.10	<0.10	<0.10	<0.10	0.19
Count	49	51	110	49	84	51	53
5 <sup>th</sup> %ile						<0.10	0.24
95 <sup>th</sup> %ile	0.7	0.61	0.6	0.74	.056	1.08	1.03

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	7.2	0	8.4	7.4	7.9	7.13	7.34
Max	7.8	0	10	8	9.6	7.58	8.49
Min	6.9	0	7	7.2	7.1	6.6	6.6
Count	51	0	110	49	77	52	51
95 <sup>th</sup> %ile	7.6	0	9.9	7.8	9.1	7.43	8.03

#### **Whyanbeel Water Quality Data - Treatment**

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	<1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	87	53	100	106	105
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.88	0.92	0.83	0.96	0.90
Max	-	-	1.5	2	1.3	1.34	1.46
Min	-	-	0.48	0.27	0.36	0.67	0.44
Count	-	-	54	53	49	51	53
5 <sup>th</sup> %ile						0.69	0.68
95 <sup>th</sup> %ile	-	-	1.24	1.2	1.1	1.12	1.11

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	7	7.1	7	7	7	7.1	7.05
Max	7.5	7.5	7.4	7.4	7.2	8.56	7.81
Min	6.5	6.7	6.7	6.8	6.8	6.3	6.6
Count	56	53	53	53	47	64	51
95 <sup>th</sup> %ile	7.3	7.3	7.2	7.2	7	7.58	7.63

### Whyanbeel Water Quality Data - Raw

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	44	54	44	52	102
Max	-	-	>100	>100	130	>100	260
Min	-	-	16	6	14	12	27
Count	-	-	3	4	4	4	4
95 <sup>th</sup> %ile	-	-	92	>100	113	97	260

Colour	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	15.3	12.4	8.6	11.2	10
Max	-	-	20	17	9.2	15	15
Min	-	-	7	8.6	9.2	15	5
Count	-	-	3	4	4	3	4
95 <sup>th</sup> %ile	-	-	19.9	16.4	9.2	14.5	15

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	6.7	6.6	6.7	6.6	6.54	6.48
Max	-	6.9	6.7	6.8	6.7	7	6.5
Min	-	6.4	6.5	6.5	6.4	6.1	6.4
Count	-	9	3	4	4	18	4
95 <sup>th</sup> %ile	-	6.9	6.7	6.8	6.7	6.99	6.5

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	1.4	0.9	0.6	0.36	4.23
Max	-	-	2.8	2.2	0.7	2.8	15
Min	-	-	0.4	0.5	0.3	<0.1	<0.5
Count	-	-	3	4	4	18	4
95 <sup>th</sup> %ile	-	-	2.6	1.9	0.7	1.19	15

Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.085	0.06	0.03	0.03	0.031
Max	-	-	0.117	0.12	0.032	0.04	0.037
Min	-	-	<0.05	0.03	0.027	0.02	0.026
Count	-	-	3	4	4	3	4
95 <sup>th</sup> %ile	-	-	0.114	0.11	0.03	0.04	0.037

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	0.002	<0.01	<0.01	<0.01	<0.005
Max	-	-	0.003	<0.01	<0.01	<0.01	<0.005
Min	-	-	0.001	0.001	<0.01	<0.01	<0.005
Count	-	-	3	4	4	3	4
95 <sup>th</sup> %ile	-	-	0.003	<0.01	<0.01	<0.01	<0.005

#### ***Daintree Water Quality Data - Reticulation***

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	<1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	55	51	50	54	52
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.3	0.13	0.12	0.17	0.2	0.2	0.64
Max	1.6	0.3	0.3	0.4	0.37	0.71	1.16
Min	0.01	0.01	<0.10	<0.10	<0.10	<0.10	0.2
Count	45	53	55	51	50	53	52
5 <sup>th</sup> %ile						<0.10	0.4
95 <sup>th</sup> %ile	0.9	0.28	0.25	0.31	0.36	0.62	0.85

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	7.7	7.7	7.8	7.7	7.7	7.46	7.53
Max	8.2	7.9	9	7.9	8	7.9	7.96
Min	7.4	7.3	7.5	7.5	7.3	6.75	7.03
Count	53	55	55	51	48	54	51
95 <sup>th</sup> %ile	7.9	7.9	8.3	7.8	7.8	7.74	7.81

Colour	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	3.3	1.5	<1	<1	1.3	<1	<5
Max	15	3.8	2.1	1.8	2.1	4.1	5
Min	1.1	1	<1	<1	<1	<1	<5
Count	47	29	55	51	48	13	13
95 <sup>th</sup> %ile	7.5	3.3	1.3	1	1.8	1.64	5

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.54	0.18	0.1	0.1	0.1	0.11	<0.5
Max	2.5	0.6	0.2	0.6	0.3	0.6	0.7
Min	0.1	0.1	<0.10	<0.10	<0.10	<0.10	<0.5
Count	37	32	55	51	50	21	13
95 <sup>th</sup> %ile	1.34	0.49	0.2	0.2	0.2	0.4	0.7

Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.11	0.07	<0.05	<0.02	<0.02	0.03	0.008
Max	0.21	0.09	<0.05	0.03	<0.02	<0.02	0.031
Min	0.06	0.06	<0.05	<0.02	<0.02	<0.02	<0.005
Count	8	4	55	49	37	8	13
95 <sup>th</sup> %ile	0.19	0.09	<0.05	0.02	<0.02	0.08	0.031

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0	0	<0.001	<0.01	<0.01	<0.01	<0.005
Max	0	0	<0.001	0.01	<0.01	<0.01	<0.005
Min	0	0	0.001	<0.01	<0.01	<0.01	<0.005
Count	8	21	55	49	37	8	13
95 <sup>th</sup> %ile	0	0	<0.001	<0.01	<0.01	<0.01	<0.005

#### ***Daintree Water Quality Data - Treatment***

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	<1	<1	<1	<1	<1
Max	-	-	<1	<1	<1	<1	<1
Min	-	-	<1	<1	<1	<1	<1
Count	-	-	107	106	103	104	105
95 <sup>th</sup> %ile	-	-	<1	<1	<1	<1	<1

Chlorine	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	0.67	0.31	0.28	0.28	0.33	0.5	0.96
Max	4.6	0.5	0.5	0.62	0.51	0.98	1.39
Min	0.14	0.19	<0.10	<0.10	<0.10	0.1	0.67
Count	53	54	87	54	49	51	53
5 <sup>th</sup> %ile						0.29	0.69
95 <sup>th</sup> %ile	1.88	0.41	0.4	0.47	0.43	0.85	1.29

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	7.5	7.5	7.5	7.5	7.6	7.4	7.41
Max	7.8	8.6	7.7	8.2	7.7	8.3	7.74
Min	7.2	7.2	7.2	7.4	7.4	6.93	7.02
Count	54	53	87	54	48	66	51
95 <sup>th</sup> %ile	7.7	7.6	7.6	7.6	7.7	7.69	7.64

### Daintree Water Quality Data - Raw

<i>E.coli</i>	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	-	52	89	66	39	141.3
Max	-	-	>100	>100	160	88	340
Min	-	-	27	72	23	10	30
Count	-	-	4	5	4	3	3
95 <sup>th</sup> %ile	-	-	92	>100	144	81	340

Colour	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	3.2	1.5	38.6	13.6	14.3	12	18.3
Max	15	3.8	>70	19	24	15	45
Min	1.1	1	5.9	9.2	5.3	10	10
Count	47	29	4	5	4	3	3
95 <sup>th</sup> %ile	7.4	3.3	>70	18.4	22.5	14.6	45

pH	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	7.3	7.4	7.5	7.5	7.37	7.27
Max	-	7.3	7.5	7.7	7.6	7.6	7.3
Min	-	7.1	7.2	7.3	7.3	7.2	7.2
Count	-	9	4	5	4	3	3
95 <sup>th</sup> %ile	-	7.3	7.5	7.7	7.6	7.57	7.3

Turbidity	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	1.56	13.6	1.4	1.4	0.8	18.4
Max	-	2.7	45	2.9	2.6	1.2	52
Min	-	0.9	0.6	0.9	0.7	0.6	1.3
Count	-	9	4	5	4	3	3
95 <sup>th</sup> %ile	-	2.58	39.4	2.6	2.4	1.14	52

Iron	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	0.16	0.37	0.19	0.162	0.176	0.24
Max	-	0.25	0.67	0.28	0.28	0.28	0.4
Min	-	0.11	0.13	0.14	0.098	0.1	0.14
Count	-	6	4	5	4	3	3
95 <sup>th</sup> %ile	-	0.24	0.65	0.27	0.264	0.267	0.4

Manganese	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Avg	-	0	0.007	0.008	<0.1	<0.1	0.002
Max	-	0.01	0.017	0.01	<0.1	<0.1	0.007
Min	-	0	0.001	0.003	<0.1	<0.1	<0.005
Count	-	6	4	5	4	3	3
95 <sup>th</sup> %ile	-	0.01	0.015	0.01	<0.1	<0.1	0.007

**Table 2 –E.coli verification monitoring Mossman/Port Douglas Scheme**

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	78	69	84	69	69	75	69	53	102	69	77	79
No. of samples collected in which <i>E.coli</i> was detected	0	0	0	0	0	0	0	0	0	0	1	0
No. of samples collected in previous 12 month period	657	681	730	830	846	859	868	827	851	846	862	881
No. of failures for previous 12 months	2	2	2	2	2	1	1	1	0	0	1	1
% of samples that comply	99.7	99.7	99.7	99.8	99.8	99.9	99.9	99.9	100	100	99.9	99.9
Compliance with 98% annual value	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y



**Table 3 –E.coli verification monitoring Whyanbeel Scheme**

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	31	25	31	25	25	27	25	25	31	25	31	25
No. of samples collected in which <i>E.coli</i> was detected	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	318	318	330	330	331	335	334	317	311	309	315	315
No. of failures for previous 12 months	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	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

**Table 4 –E.coli verification monitoring Daintree Scheme**

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	16	13	16	13	13	14	13	13	16	13	16	13
No. of samples collected in which <i>E.coli</i> was detected	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	158	158	161	164	164	166	167	157	154	154	157	157
No. of failures for previous 12 months	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	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y



## Appendix B – Implementation of the DWQMP Risk Management Improvement Program

Table 5 – Progress against risk management improvement program in the approved DWQMP

RMIP Reference	Scheme	Hazardous Event	Hazards Managed by Same Barriers	Primary Preventive Measures	Risk Management Improvements		
					Status	2015/16 FY	2016/17 FY or later
DWQMP Doc	Mossman/Port Douglas	Raw water main break	Failure of supply	Multiple intakes – Mossman	Commenced	Strategy to be finalised in 2016/17 FY	Mains break procedure to be updated
DWQMP Doc	All Schemes	Blocked Johnston screen	Failure of supply	Intake checked daily	Commenced	Strategy to be finalised in 2016/17 FY	Procedure, including preparing for storm events required
PCWST116	Daintree	Loss of raw water reservoir at Daintree due to subsidence	Failure of supply	Stabilisation works are scheduled	Commenced	Reassessed and moved to 2016/17 FY	Budget item PCWST116 Daintree WTP Bank Stabilisation Adjacent to Raw Water Reservoir
PCWST111	Mossman/Port Douglas	Loss of integrity	Protozoa, turbidity	Continuous turbidity monitoring, 24 hr PDT	Completed	Budget item PCWST111 MWTP UF racks integrity test associated valve replacement. Replace all the old butterfly valves (on each UF rack) associated with the integrity test pressurisation system	
PCWST110	Mossman/Port Douglas	Loss of integrity	Protozoa, turbidity	Continuous turbidity monitoring, 24 hr PDT	Completed	Budget item PCWST110 Install turbidity meters to each rack	
Dain 1*	Daintree	Loss of integrity	Protozoa, turbidity	Continuous turbidity monitoring, 24 hr PDT	Completed	Move turbidity meter to permeate rather than treated water	
Whyanbeel 1*	Whyanbeel	Loss of integrity	Protozoa, turbidity	Continuous turbidity monitoring, 24 hr PDT	Completed	Move turbidity meter to permeate rather than treated water	
PCWST117	Whyanbeel	Membrane scaling reducing plant capacity	Reduced supply	Regular backwashes, including CEB/CIP as required	Completed	Budget item PCWST117 Renewal of chemical dosing system for CIP and CEB	
PCWST112	Mossman/Port Douglas	Chemical breakdown	Chlorate	Nil currently	Commenced	Expected completion by 30 June 2017	Budget item PCWST112 Change MWTP to gas chlorine (2*920kg cylinders)
PCWST113	Whyanbeel	Chemical breakdown	Chlorate	Nil currently	Commenced	Expected completion by 30 June 2017	Budget item PCWST113 Whyanbeel gas chlorination project
PCWST114	Daintree	Chemical breakdown	Chlorate	Nil currently	Commenced	Project under review	Budget item PCWST114 Daintree gas chlorination project under review
PCWR125 DWQMP Doc	Mossman/Port Douglas	Ingress into reservoirs	Bacteria/virus	Primary disinfection, redosing at Craiglie	Commenced	Project under review	Budget item PCWR125 replace Craiglie Reservoir roof placed on future capital program
WR2 DWQMP Doc	Mossman/Port Douglas	Ingress into reservoirs	Protozoa	Integrity at Craiglie	Commenced	Project under review	Budget item WR2 replace Craiglie Reservoir roof placed on future capital program
PCWR124 DWQMP Doc	All Schemes	Ingress into reservoirs	Protozoa	Integrity and sealing	Commenced	Expected completion by 30 June 2017	Budget item PCWR124 eliminate any potential ingress into reservoir, seal vertical sheeting to abutment, repair/replace sheeting, water proof hatches
PCWST118 DWQMP Doc	Mossman/Port Douglas	Ingress into reservoirs	Bacteria/virus	Primary disinfection, hypo dosing at Rocky Point	Completed	Budget item PCWST118 Investigate Gas v Hypo at Rocky Point, and include telemetry and alarms	
PCWST115 DWQMP Doc	Mossman/Port Douglas	Ingress into reservoirs	Bacteria/virus	Primary disinfection, manual redosing at Flagstaff Res	Completed	Budget item PCWST115 Gas chlorination project Flagstaff Reservoir	

RMIP Reference	Scheme	Hazardous Event	Hazards Managed by Same Barriers	Primary Preventive Measures	Risk Management Improvements		
					Status	2015/16 FY	2016/17 FY or later
PCWST119 DWQMP Doc	Mossman/Port Douglas and Whyanbeel	Ingress into reservoirs	Bacteria/virus	Primary disinfection, no redosing (Cooya, Wonga)	Cooya Reservoir and Wonga Reservoir not currently in use		Reassessed and moved to the 2017/18 FY budget
PCWR127 DWQMP Doc	Mossman/Port Douglas	Ingress of contaminated water	Bacteria/virus	Network pressure, residual disinfection, mains break procedure	Commenced	Capital program to be established in 2016/17 FY	Budget item PCWR127 Upgrade of mains Newell Beach
DWQMP Doc	All Schemes	Ingress of contaminated water	Protozoa	Network pressure, mains break procedure	Commenced	Capital program to be established in 2016/17 FY	Mains break procedure to be updated
Port 1		Power failure	Failure of supply	Power supply generally robust. Many areas gravity fed	Completed – Generator to be provided by Ergon Energy as required in an emergency situation		
PCWST114	All Schemes	Increasing pH impacting residual disinfection	Bacteria/virus	Network pressure, reservoir integrity, mains break procedure	Commenced/Ongoing	Budget item PCWR128 Replacement of ageing AC mains	Ongoing on a priority status
DWQMP Doc Retic 1	All Schemes	Backflow	Protozoa	System integrity, backflow prevention on new installations	Commenced		Long term meter replacement strategy
PCWST115 and PCWST118	Mossman/Port Douglas	Insufficient dose	Bacteria/virus	Disinfection, daily inspections	Completed	PCWST115 and PCWST118	
PCWST120 PCWST121 PCWST122 PCWST123	All Schemes	SCADA/telemetry failure	Protozoa	Treated water in system	Completed Additional minor improvements ongoing	Budget item PCWST120 Upgrade SCADA to new version of CITEC. PCWST121, PCWST122, PCWST123 telemetry and switching improvements also associated with these communication upgrades	PCWST123 improving telemetry over 2 years
PCWR126	Mossman/Port Douglas	Demand exceeds supply	Limited supply	Asset planning	Commenced planning phase		Subject to planning review – 2017/18
PCWR131	Mossman/Port Douglas	Demand exceeds supply	Limited supply	Asset planning	Commenced	Budget item PCWR131 Develop Crees Rd Reservoir site	Continue PCWR131
PCWR132	Mossman/Port Douglas	Drought (Mossman)	Failure of supply	Restrictions leading to wet season	Commenced	Budget item PCWR132 Water supply security – investigate, design and possibly implement alternate supply source	Continue PCWR132
PCWR130	Daintree	Flood	Failure of supply	Daintree intake	Completed	Budget item PCWR130 install 2 hydrants and 2 sluice valves to improve raw water supply source	
PCWR130	Daintree	Landslip Daintree intake	Failure of supply	Daintree intake	Completed	Budget item PCWR130 install 2 hydrants and 2 sluice valves to improve raw water supply source	
PCWR127	Mossman/Port Douglas & Whyanbeel	Cyclone	Failure of supply	DMP	Commenced	Budget item PCWR127 Improve interconnection to improve supply security	To be budgeted in future capital program
Training 1 DWQMP Doc	All Schemes	Operator error	Any	Training, experience, mentoring	All operators are Cert III trained and relevant training occurring as courses are available	Develop procedures listed as required	
DWQMP Doc	All Schemes	Accidental use of bypass	Protozoa and bacteria	Valves identified as permanently closed, tagged out	Commenced	Develop bypass procedures	To be completed 16/17 FY
Training 1	All Schemes	Loss of knowledge	All	Formalise Water Operations professional development. Ground truth is GIS	Ongoing	Local government structure plan	