# Drinking Water Quality Management Plan (DWQMP) report

For the financial year: 2015-2016

Scheme: COEN

**Cook Shire Council**

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Glossary of terms

| | |
|---|---|
| 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 |
| mg/L | Milligrams per litre |
| NTU | Nephelometric Turbidity Units |
| MPN/100mL | Most probable number per 100 millilitres |
| < | Less than |
| > | Greater than |
| NATA Lab | Accredited by the National Association of Testing Authorities of Australia |

# 1. Introduction

This report documents the performance of Cook 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 Act).

The report assists the Regulator to determine whether the approved DWQMP and any approval conditions have been complied with and provides a mechanism for providers to report publicly on their performance in managing drinking water quality.

# 2. Overview of Operations

One of Coen's Water sources is from the Lankelly Creek which originates high in the rainforest approximately 15km to the east of the township. The catchment area of approx. 5049 ha is in pristine rainforest and due to the terrain has very limited human impact. A second source is the from the Coen Dam, this is a ex mining dam, it does contain elevated levels of natural arsenic and iron, and in the past has had blue green algae blooms during the warmer months, this is not an annual event, but has happened in the years when seasonal conditions have been favourable. The algal blooms have been decreasing in intensity since Cook Shire Council fenced the perimeter of the dam, this has effectively kept wandering stock out of the dam and considerably reduced the nutrient levels
The third source is from the Coen borefields consisting of 3 bores located in the township

Dependent upon the water source, some or all of the following treatment processes are used

- Aeration
- Dissolved Air Flotation
- Filtration (Pressure filter and /or Microfiltration unit)
- Chlorination

The treated water is pumped to a 0.445ML Reservoir on site, and then gravity feeds directly into the Coen reticulation

Coen currently has 117 Service connections which can be broken down to approximately:

Residential 60%

Commercial / Industrial 10%

With the remaining 30% being Government, Council, Institutional or Other

# 3. Actions taken to implement the DWQMP

The water sampling schedule is now more rigorously adhered to than prior to the plan being approved, a database was set up with all the schedule details in it, this was given to all that collect samples. By typing in the "Week start date" a list of the required samples for that week is displayed, and can be printed. It tells the sample collectors the following information

- Week Commencing Date
- Type of sample to be collected e.g. E.coli & Total Coliforms, Fluoride, Reticulation Metals - (Suite of 15) etc
- Scheme e.g. Cooktown, Lakeland  Laura or Coen
- Who the sample is to be analysed by e.g. CSC Annan Lab., or NATA Lab., or both
- A description e.g. 3 Samples from Reticulation - Sample sites listed, 1 T/Plant Final Water Sample
- Sample Site - displays where the sample is to be taken from
- Whether the sample is a Verification Sample or otherwise.

Verification samples are collected in the same manner as any sample, however a larger sample is required, as the same sample is analysed by both Cook Shire as well as by a NATA lab. We then compare the CSC results against the results from the NATA Lab, to ensure that our testing methods are  getting valid results

A copy of the Sampling Matrix was sent to the NATA Lab, they now supply the appropriate sample bottles for each week as well as each scheme month by month. At approx the 3rd week of every month we receive the entire sample bottles for the following month. This seems to be working well

### Revisions made to the operational monitoring program to assist in maintaining the compliance with water quality criteria in verification monitoring.

To date there has been no revisions to the operational monitoring since the DWQMP was approved

### Amendments made to the DWQMP

A thorough review of the DWQMP was conducted with some extensive alterations being made to the existing plan.

The revised plan was submitted to the Regulator on 26th April 2016

The revised plan, as submitted, was approved by the Regulator on 27th July 2016

# 4. Compliance with water quality criteria for drinking water

**Table 1.0A Summary of Treated Water quality details – Sampled from: Coen Reticulation, Analysed by: SGS - Cairns (NATA Certified)**

**Sample Period 1/7/2015 - 30/6/2016**

**Physical and Chemical Characteristics**

| Parameter | Unit | No of Samples collected | Summary of Results | | | ADWG Guidelines Value (2011) | No of Samples exceeding ADWG | |
|---|---|---|---|---|---|---|---|---|
| | | | Max. Value | Min. Value | Avg. Value | | Health | Aesthetic |
| Alkalinity | *mg/L as CaCO3* | *4* | *28* | *10* | *17.8* | - | - | - |
| Calcium | *mg/L* | *4* | *6.3* | *0.6* | *3.0* | - | - | - |
| Chloride | *mg/L* | *4* | *20.0* | *14.0* | *18.0* | < 250 - mg/L | - | 0 |
| Colour | *HU* | *4* | *14.0* | *5.0* | *9.8* | < 15 - HU | - | 0 |
| Electrical Conductance | µs/cm | *4* | *140.0* | *52.0* | *106.8* | - | - | - |
| Fluoride | *mg/L* | *4* | *0.20* | *0.09* | *0.14* | < 1.5 - mg/L | 0 | - |
| Magnesium | *mg/L* | *4* | *1.5* | *0.7* | *1.0* | - | - | - |
| pH | *pH units* | *4* | *7.6* | *6.8* | *7.2* | 6.5-8.5 | - | 0 |
| Potassium | *mg/L* | *4* | *1.5* | *1.0* | *1.2* | - | - | - |
| Salinity | *mg/L* | *4* | *92.0* | *34.0* | *69.0* | - | - | - |
| SAR | | *4* | *2.3* | *1.7* | *2.1* | - | - | - |
| Silica Soluble | *mg/L* | *4* | *18.0* | *11.0* | *15.0* | < 80 - mg/L | - | 0 |
| Sodium | *mg/L* | *4* | *21.0* | *8.4* | *15.6* | < 180 - mg/L | - | 0 |
| Sulphate | *mg/L* | *4* | *14.0* | *0.8* | *7.4* | < 250 - mg/L | 0 | 0 |
| Total Dissolved Solids | *mg/L* | *4* | *84.0* | *31.0* | *63.5* | < 600 - mg/L | - | 0 |
| Total Hardness | *mg/L as CaCO3* | *4* | *19.0* | *4.0* | *11.5* | < 200 - mg/L | - | 0 |
| Turbidity | *NTU* | *4* | *1.2* | *0.5* | *0.8* | < 5 - NTU | - | 0 |

Samples collected from set sample points throughout the Reticulation including high and low flow areas.
Each quarter a sample is collected from 1 location in the Reticulation, systematically rotated to ensure all sample points are captured

**Table 1.0B Summary of All Treated Water quality details – Sampled from: Coen Reticulation, Analysed by: SGS - Cairns (NATA Certified)**

**Sample Period 1/7/2015 - 30/6/2016**

**Metals**

| Parameter | Unit | No of Samples collected | Summary of Results | | | ADWQ Guidelines Value (2011) | No of Samples exceeding ADWG | |
|---|---|---|---|---|---|---|---|---|
| | | | Max. Value | Min. Value | Avg. Value | | Health | Aesthetic |
| Arsenic | *mg/L* | *5* | *0.004* | *0.002* | *0.003* | 0.01-mg/L | 0 | - |
| Barium | *mg/L* | *5* | *0.01* | *0.005* | *0.0075* | < 2 - mg/L | 0 | - |
| Beryllium | *mg/L* | *5* | *0.0001* | *0.0001* | *0.0001* | < 0.006 - mg/L | 0 | - |
| Cadmium | *mg/L* | *5* | *0.0001* | *0.0001* | *0.0001* | < 0.002 - mg/L | 0 | - |
| Chromium | *mg/L* | *5* | *0.001* | *0.001* | *0.001* | < 0.05 - mg/L | 0 | - |
| Cobalt | *mg/L* | *5* | *0.001* | *0.001* | *0.001* | - | - | - |
| Copper | *mg/L* | *5* | *0.015* | *0.001* | *0.0072* | < 2 - mg/L | 0 | 0 |
| Iron | *mg/L* | *5* | *0.079* | *0.005* | *0.029* | < 0.3 - mg/L | - | 0 |
| Lead | *mg/L* | *5* | *0.001* | *0.001* | *0.001* | < 0.01 - mg/L | 0 | - |
| Manganese | *mg/L* | *5* | *0.011* | *0.005* | *0.0065* | < 0.1 - mg/L | 0 | 0 |
| Mercury | *mg/L* | *5* | *<0.00005* | *<0.00005* | *<0.00005* | < 0.001 -mg/L | 0 | - |
| Nickel | *mg/L* | *5* | *0.001* | *0.001* | *0.001* | < 0.02 - mg/L | 0 | - |
| Selenium | *mg/L* | *5* | *0.003* | *0.003* | *0.003* | < 0.01 - mg/L | 0 | - |
| Vanadium | *mg/L* | *5* | *0.005* | *0.001* | *0.0018* | - | - | - |
| Zinc | *mg/L* | *5* | *0.005* | *0.005* | *0.005* | < 3.0 - mg/L | - | 0 |

Samples collected from set sample points throughout the Reticulation including high and low flow areas.
Each quarter a sample is collected from 1 location in the Reticulation, systematically rotated to ensure all sample points are captured
This period there was 1 additional “Metals” sample collected and analysed, this was mistakenly sent off by the operator

**Table 1.1 Summary of E.coli & Coliforms monitoring – Sampled from: Coen Reticulation, Analysed by: SGS Cairns and Cook Shire Council's Annan Lab ***

**Sample Period 1/7/2015 - 30/6/2016**

| | Parameter | Sampling Location | Time Period | No of samples taken in time period | Summary of results | | Australian Drinking Water Guidelines guideline value (2011) | No of samples exceeding Australian Drinking Water Guidelines guideline value |
|---|---|---|---|---|---|---|---|---|
| | | | | | No of Samples where E.coli detected | No of Samples where Coliforms detected | | |
| **E.coli and Coliforms** | E.coli – MPN/100ml | Various set Locations within the Coen Reticulation | July 2015 – June 2016 | 153 | 0 | - | 0 | 0 |
| | Coliforms – MPN/100ml | | | 153 | - | 2 | - | 0 |

None of the samples collected had E.coli detected, 2 samples had 1 coliform each detected.

**Table 1.2 Location of sampling sites within Coen's water reticulation network.**

| Sample Location Name | Street Name | Site Chosen Because | GPS Coordinates * |
|---|---|---|---|
| Kindy Corner | Cnr Peninsular Dev. Rd and Reservoir Rd | Water Main "Tees" at this point and close to the Kindy | 13°56'38.31"S - 143°12'11.52"E |
| Heritage House | Regent Street | Ease of access and in the centre of the town | 13°56'39.41"S - 143°11'56.84"E |
| Coen School | Taylor Street | Central, and close to the School | 13°56'43.83"S - 143°11'59.12"E |
| Cultural Centre | Shephard Street | Towards the "End of Line" | 13°56'58.55"S - 143°11'53.53"E |
| Guest House | Regent Street | Central and "Ease of Access" | 13°56'39.19"S - 143°12'2.22"E |
| Old National Parks Office | Coleman Close | Towards the "End of Line" | 13°56'23.50"S - 143°11'57.44"E |
| Lutheran Church | Off Port Stewart Road | Towards the "End of Line" | 13°56'58.37"S - 143°12'1.14"E |
| CSC Depot | Lankelly Drive | Towards the "End of Line" | 13°56'27.13"S - 143°12'17.21"E |

All reticulation sampling for all parameters are collected from these fixed sites for the reasons listed

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

For the financial year 2015-2016 there were nil instances where the Regulator needed to be notified under sections 102 or 102A of the Act. There was no detection of E. coli – an organism that may not directly represent a hazard to human health, in any samples but indicates the presence of recent faecal contamination. There were nil incidents that required a "Boil Water Alert" to be issued, or "Do not drink Water" notices displayed in the community.

# 6. Customer complaints related to water quality

Cook Shire Council is required to report on the number of complaints, general details of complaints, and the responses undertaken.

Cook Shire maintains a "Register of Complaints" which includes Water & Wastewater. Customer Services officers generally receive the initial complaints, which if it's in the form of a letter, or email, then it is then filed in the "TRIM" Database, a Task is then generated from "Authority" and dispersed to the relevant officer/s for actioning. The relevant officer/s must record the actioned details in "Authority" to complete the Task. So a record of the complaint and the action taken to rectify the problem is all recorded. At the end, the complainant is notified of the outcome of the original complaint

A search of both the "Trim" database and the CRM (Customer Request Management) in "Authority" for the financial year 2015-2016 has located zero Customer Complaints regarding Water Quality

### Suspected Illness

Cook Shire Council (Water & Wastewater) are not aware of any customers who suspect their water from the Coen Reticulated Water Supply may in some way be associated with an illness or sickness they are experiencing.

### Discoloured water

Cook Shire Council had not had any Discoloured water incidents / complaints for the Coen Reticulated Water Supply in this reporting period

### Taste and odour

Cook Shire Council had not had any Taste & Odour water incidents / complaints for the Coen Reticulated Water Supply in this reporting period

# 7. Findings and recommendations of the DWQMP auditor

Cook Shire Council was not required to conduct a regular audit of the approved DWQMP during the current reporting period, 2015/2016

The first regular audit of Cook Shire's DWQMP's must be conducted by 30th June 2017

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

Cook Shire Councils first review of the DWQMP's was completed prior to 31st March 2016.
Michael Lawrence was engaged through Bligh Tanner to conduct the first review, in conjunction with Cook Shire Officers. Michael is highly qualified and experienced to perform these reviews, which in our case was quite extensive with some major changes to the original plan
The revised plans were submitted to the Regulator on 26/4/2016. A notification of approval of the "As submitted" plan was received on the 3/8/2016

# Appendix A – Summary of compliance with water quality criteria

Cook Shire Council has a Water sampling Schedule which shows which samples are to be collected and sent off for analysis on a weekly basis. This is broken up into the 4 water Schemes. The Coen operator is responsible for the collection and dispatch of all the Coen Sampling, whilst the Cooktown Reticulation team is responsible for the collection and dispatch of all the Cooktown, Lakeland and Laura Samples.

Verification monitoring has generally been carried out as per the stated program; some samples have had to be collected on the week before, or after, the dates in the Water Sampling Schedule, due to operational issues / commitments

Being in a remote location, the nearest NATA laboratories are located in Cairns which is well over 400km (Direct Line) from Coen, this has presented various challenges over the years in getting samples to the laboratory.

In the past samples collected have:

- Been taken to the airport only to be told that the flight was cancelled (This seriously affects bacteriological samples)
- Courier company in Cairns failed to pick up the samples at all
- Courier company in Cairns picks up samples but fails to deliver on time
- Airline or Courier Company completely losses esky containing water samples
- Airline ceases operations into Coen (without notice)

So despite our best intentions, not all samples that are collected get to be analysed due to reasons beyond our control. This becomes a huge inconvenience and cost to council to have to re-sample

Verification monitoring is a tool to verify that the water we are producing and suppling to consumers is Safe drinking water and that it complies with the ADWG's

# 9. Verification Monitoring Results

### Table 1.3A - Verification monitoring results (Raw Water) - Physical Chemical (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Lankelly Creek**

| Scheme component | Parameter<br>Physical / Chemical | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Alkalinity as CaCO3 | mg/L as CaCO3 | 2 | 6.0 | 7.0 | 6.5 | 5 |
| | Calcium, Ca | mg/L | 2 | 0.5 | 1.2 | 0.85 | 0.05 |
| | Chloride, Cl | mg/L | 2 | 12 | 14 | 13 | 1 |
| | Colour Apparent | PCU | 2 | 20 | 70 | 45 | 5 |
| | Conductivity @ 25°C | uS/cm | 2 | 50 | 67 | 58.5 | 5 |
| | Fluoride, by ISE | mg/L | 2 | <0.05 | <0.05 | <0.05 | 0.05 |
| | L.I. | | 2 | -3.8 | -3.4 | -3.6 | -10 |
| | Magnesium, Mg | mg/L | 2 | 0.7 | 1.1 | 0.90 | 0.05 |
| | pH | pH units | 2 | 6.9 | 6.9 | 6.9 | 0.1 |
| | Potassium, K | mg/L | 2 | 1.0 | 1.5 | 1.25 | 0.05 |
| | Salinity | mg/L | 2 | 33 | 44 | 38.50 | 10 |
| | SAR | | 2 | 1.5 | 1.7 | 1.6 | |
| | Silica | mg/L | 2 | 12 | 15 | 13.5 | 0.05 |
| | Sodium, Na | mg/L | 2 | 8.1 | 9.0 | 8.55 | 05 |
| | Sulphate, SO4 | mg/L | 2 | 0.7 | 1.5 | 1.10 | 0.5 |
| | TDS | mg/L | 2 | 30 | 40 | 35 | 10 |
| | Total Hardness | mg/L as CaCO3 | 2 | 5 | 7 | 6 | 1 |
| | Turbidity | NTU | 2 | 0.8 | 3 | 1.90 | 0.5 |

*Analysed by SGS Cairns*

*Lankelly Creek is a seasonal Creek, and generally only runs for 6-8 months, with the first couple of months being highly turbid and difficult to treat, after that when it settles down it produces a good quality water*

### Table 1.3B - Verification monitoring results (Raw Water) - Physical Chemical (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source: Coen Dam**

| Scheme component | Parameter<br>Physical / Chemical | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Alkalinity as CaCO3 | mg/L as CaCO3 | 4 | 6.0 | 26.0 | 15.5 | 5 |
| | Calcium, Ca | mg/L | 4 | 0.52 | 3.30 | 2.01 | 0.05 |
| | Chloride, Cl | mg/L | 4 | 11.0 | 14.0 | 12.75 | 1 |
| | Colour Apparent | PCU | 4 | 20 | 70 | 41.25 | 5 |
| | Conductivity @ 25°C | uS/cm | 4 | 50 | 94 | 72.75 | 5 |
| | Fluoride, by ISE | mg/L | 4 | 0.20 | 0.23 | 0.22 | 0.05 |
| | L.I. | | 4 | -3.80 | -2.10 | -3.10 | -10 |
| | Magnesium, Mg | mg/L | 4 | .73 | 1.40 | 1.11 | 0.05 |
| | pH | pH units | 4 | 6.9 | 7.3 | 7.1 | 0.1 |
| | Potassium, K | mg/L | 4 | 0.70 | 1.50 | 1.01 | 0.05 |
| | Salinity | mg/L | 4 | 33.0 | 61.0 | 47.50 | 10 |
| | SAR | | 4 | 1.40 | 1.70 | 1.53 | |
| | Silica | mg/L | 4 | 9.10 | 15 | 11.78 | 0.05 |
| | Sodium, Na | mg/L | 4 | 8.10 | 13.0 | 10.33 | 05 |
| | Sulphate, SO4 | mg/L | 4 | 0.50 | 1.50 | 0.90 | 0.5 |
| | TDS | mg/L | 4 | 30.0 | 56.0 | 43.50 | 10 |
| | Total Hardness | mg/L as CaCO3 | 4 | 7.00 | 14.0 | 11.0 | 1 |
| | Turbidity | NTU | 4 | 0.8 | 7.70 | 3.73 | 0.5 |

*Analysed by SGS Cairns*

*Coen Dam is used after the Lankelly creek dries up, requires more treatment than the Lankelly, but again produces good quality water.*

### Table 1.3C - Verification monitoring results (Raw Water) - Physical Chemical (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source: Coen Bores**

| Scheme component | Parameter<br>Physical / Chemical | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Alkalinity as CaCO3 | mg/L as CaCO3 | 4 | 6.0 | 26.0 | 15.5 | 5 |
| | Calcium, Ca | mg/L | 4 | 0.52 | 3.30 | 2.01 | 0.05 |
| | Chloride, Cl | mg/L | 4 | 11.0 | 14.0 | 12.75 | 1 |
| | Colour Apparent | PCU | 4 | 20 | 70 | 41.25 | 5 |
| | Conductivity @ 25°C | uS/cm | 4 | 50 | 94 | 72.75 | 5 |
| | Fluoride, by ISE | mg/L | 4 | 0.20 | 0.23 | 0.22 | 0.05 |
| | L.I. | | 4 | -3.80 | -2.10 | -3.10 | -10 |
| | Magnesium, Mg | mg/L | 4 | .73 | 1.40 | 1.11 | 0.05 |
| | pH | pH units | 4 | 6.9 | 7.3 | 7.1 | 0.1 |
| | Potassium, K | mg/L | 4 | 0.70 | 1.50 | 1.01 | 0.05 |
| | Salinity | mg/L | 4 | 33.0 | 61.0 | 47.50 | 10 |
| | SAR | | 4 | 1.40 | 1.70 | 1.53 | |
| | Silica | mg/L | 4 | 9.10 | 15 | 11.78 | 0.05 |
| | Sodium, Na | mg/L | 4 | 8.10 | 13.0 | 10.33 | 05 |
| | Sulphate, SO4 | mg/L | 4 | 0.50 | 1.50 | 0.90 | 0.5 |
| | TDS | mg/L | 4 | 30.0 | 56.0 | 43.50 | 10 |
| | Total Hardness | mg/L as CaCO3 | 4 | 7.00 | 14.0 | 11.0 | 1 |
| | Turbidity | NTU | 4 | 0.8 | 7.70 | 3.73 | 0.5 |

*Analysed by SGS Cairns*

*Coen Dam is used after the Lankelly creek dries up, requires more treatment than the Lankelly, but again produces good quality water.*

### Table 1.3D - Verification monitoring results (Raw Water) - Metals (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Lankelly Creek**

| Scheme component | Parameter<br>Metals | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Arsenic | mg/L | 2 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Barium | mg/L | 2 | 0.01 | 0.011 | 0.01 | 0.005 |
| | Beryllium | mg/L | 2 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| | Cadmium | mg/L | 2 | <0.0001 | <0.0001 | <0.0001 | 0.0001 |
| | Chromium | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Cobalt | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Copper | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Iron | mg/L | 2 | 0.20 | 0.23 | 0.215 | 0.005 |
| | Lead | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Manganese | mg/L | 2 | <0.005 | <0.005 | <0.005 | 0.005 |
| | Mercury | mg/L | 2 | <0.00005 | <0.00005 | <0.00005 | 0.00005 |
| | Nickel | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Selenium | mg/L | 2 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Vanadium | mg/L | 2 | <0.01 | <0.01 | <0.01 | 0.001 |
| | Zinc | mg/L | 2 | <0.01 | <0.01 | <0.01 | 0.005 |

*Analysed by SGS Cairns*

*Samples collected in the first half of the year when the creek is flowing*

### Table 1.3E - Verification monitoring results (Raw Water) - Metals (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Coen Dam**

| Scheme component | Parameter<br>Metals | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Arsenic | mg/L | 8 | 0.0070 | 0.020 | 0.0133 | 0.003 |
| | Barium | mg/L | 4 | 0.01 | 0.024 | 0.017 | 0.005 |
| | Beryllium | mg/L | 4 | <0.0001 | <0.0001 | <0.0001 | 0.0001 |
| | Cadmium | mg/L | 8 | 0.0001 | 0.0004 | 0.0002 | 0.0001 |
| | Chromium | mg/L | 8 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Cobalt | mg/L | 4 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Copper | mg/L | 8 | 0.001 | 0.0250 | 0.0091 | 0.001 |
| | Iron | mg/L | 8 | 0.097 | 0.27 | 0.167 | 0.005 |
| | Lead | mg/L | 8 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Manganese | mg/L | 8 | <0.005 | <0.005 | <0.005 | 0.005 |
| | Mercury | mg/L | 8 | <0.00005 | <0.00005 | <0.00005 | 0.00005 |
| | Nickel | mg/L | 8 | <0.001 | 0.003 | 0.0013 | 0.001 |
| | Selenium | mg/L | 8 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Vanadium | mg/L | 4 | 0.001 | 0.010 | 0.0055 | 0.001 |
| | Zinc | mg/L | 8 | 0.005 | 0.078 | 0.0236 | 0.005 |

*Analysed by SGS Cairns*

*Samples are collected throughout the year, but the water is usually only sourced from the Coen Dam after the Lankelly Creek dries up*

### Table 1.3F - Verification monitoring results (Raw Water) - Metals (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Coen Bores**

| Scheme component | Parameter<br>Metals | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Raw Water** | Arsenic | mg/L | 3 | 0.003 | 0.007 | 0.005 | 0.003 |
| | Barium | mg/L | 3 | 0.000 | 0.013 | 0.012 | 0.005 |
| | Beryllium | mg/L | 3 | <0.0001 | <0.0001 | <0.0001 | 0.0001 |
| | Cadmium | mg/L | 3 | <0.0001 | <0.0001 | <0.0001 | 0.0001 |
| | Chromium | mg/L | 3 | <0.001 | 0.001 | <0.001 | 0.001 |
| | Cobalt | mg/L | 3 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Copper | mg/L | 3 | 0.001 | 0.014 | 0.008 | 0.001 |
| | Iron | mg/L | 3 | 0.005 | 0.089 | 0.047 | 0.005 |
| | Lead | mg/L | 3 | 0.001 | 0.006 | 0.004 | 0.001 |
| | Manganese | mg/L | 3 | 0.005 | 0.150 | 0.078 | 0.005 |
| | Mercury | mg/L | 3 | <0.00005 | <0.00005 | <0.00005 | 0.00005 |
| | Nickel | mg/L | 3 | 0.001 | 0.003 | 0.002 | 0.001 |
| | Selenium | mg/L | 3 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Vanadium | mg/L | 3 | 0.001 | 0.003 | 0.002 | 0.001 |
| | Zinc | mg/L | 3 | 0.005 | 0.085 | 0.045 | 0.005 |

*Analysed by SGS Cairns*

*Samples are collected throughout the year. The Coen Bores are usually only used as a backup supply*

### Table 1.3G - Verification monitoring results (Treated Water) - Physical Chemical (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Treatment Plant Final**

| Scheme component | Parameter<br>Physical / Chemical | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Treatment Plant Final Water** | Alkalinity as CaCO3 | mg/L as CaCO3 | 5 | 10.0 | 30.0 | 19.80 | 5 |
| | Calcium, Ca | mg/L | 5 | 0.96 | 3.8 | 2.55 | 0.05 |
| | Chloride, Cl | mg/L | 5 | 17.0 | 21.0 | 18.6 | 1 |
| | Colour Apparent | PCU | 5 | <5 | 5 | <5 | 5 |
| | Conductivity @ 25°C | uS/cm | 5 | 92 | 160 | 120.8 | 5 |
| | Fluoride, by ISE | mg/L | 5 | 0.08 | 0.22 | 0.15 | 0.05 |
| | L.I. | | 5 | -3.40 | -1.80 | -2.52 | -10 |
| | Magnesium, Mg | mg/L | 5 | 0.72 | 1.70 | 1.19 | 0.05 |
| | pH | pH units | 5 | 6.90 | 7.50 | 7.16 | 0.1 |
| | Potassium, K | mg/L | 5 | 0.76 | 1.30 | 1.13 | 0.05 |
| | Salinity | mg/L | 5 | 60.0 | 100.0 | 78.0 | 10 |
| | SAR | | 5 | 2.20 | 3.10 | 2.50 | |
| | Silica | mg/L | 5 | 8.10 | 19.00 | 14.22 | 0.05 |
| | Sodium, Na | mg/L | 5 | 14.00 | 21.00 | 18.40 | 05 |
| | Sulphate, SO4 | mg/L | 5 | 6.30 | 20.00 | 11.48 | 0.5 |
| | TDS | mg/L | 5 | 55.00 | 94.00 | 72.20 | 10 |
| | Total Hardness | mg/L as CaCO3 | 5 | 5.0 | 16.0 | 11.0 | 1 |
| | Turbidity | NTU | 5 | <0.50 | 0.50 | <0.50 | 0.5 |

*Analysed by SGS Cairns*

### Table 1.3H - Verification monitoring results (Treated Water) - Metals (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Treatment Plant Final**

| Scheme component | Parameter<br>Metals | Units | Total No. samples collected | Min | Max | Average (Mean) | Limit of reporting |
|---|---|---|---|---|---|---|---|
| **Treatment Plant Final Water** | Arsenic | mg/L | 10 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Barium | mg/L | 2 | 0.014 | 0.0170 | 0.0155 | 0.005 |
| | Beryllium | mg/L | 2 | <0.0001 | 0.0050 | 0.0001 | 0.0001 |
| | Cadmium | mg/L | 10 | <0.0001 | 0.0002 | <0.0001 | 0.0001 |
| | Chromium | mg/L | 10 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Cobalt | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Copper | mg/L | 10 | <0.001 | 0.008 | 0.0036 | 0.001 |
| | Iron | mg/L | 8 | <0.005 | <0.005 | <0.005 | 0.005 |
| | Lead | mg/L | 10 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Manganese | mg/L | 8 | <0.005 | <0.005 | <0.005 | 0.005 |
| | Mercury | mg/L | 10 | <0.00005 | <0.00005 | <0.00005 | 0.00005 |
| | Nickel | mg/L | 10 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Selenium | mg/L | 10 | <0.003 | <0.003 | <0.003 | 0.003 |
| | Vanadium | mg/L | 2 | <0.001 | <0.001 | <0.001 | 0.001 |
| | Zinc | mg/L | 9 | <0.005 | 0.012 | 0.006 | 0.005 |

*Analysed by SGS Cairns*

### Table 1.3I - Verification monitoring results (Treated Water) - Metals (Analysed by NATA Lab)

**Sample Period 1/7/2015 - 30/6/2016**

**Source:** **Treatment Plant Final**

| Coen | Parameter<br><br>Coliforms / E.coli | Units | Total No. samples collected | No. of samples in which parameter was detected | No. of samples exceeding water quality criteria |
|---|---|---|---|---|---|
| **Reticulation** | Coliforms | MPM / 100 ml | 153 | 2 | 0 |
| | E.coli | MPM / 100 ml | 153 | 0 | 0 |

*Analysed by SGS Cairns*

## Table 2 - Reticulation *E. coli* verification monitoring

**Drinking water scheme:** Coen

| ***Year*** | ***2016 / 2017*** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Month*** | ***Jul*** | ***Aug*** | ***Sep*** | ***Oct*** | ***Nov*** | ***Dec*** | ***Jan*** | ***Feb*** | ***Mar*** | ***Apr*** | ***May*** | ***Jun*** |
| **No. of samples collected** | 12 | 15 | 12 | 16 | 13 | 12 | 10 | 15 | 12 | 12 | 15 | 12 |
| **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 samples collected in previous 12 month period** | 150 | 152 | 149 | 153 | 154 | 153 | 154 | 157 | 156 | 156 | 159 | 156 |
| **No. of failures for previous 12 month period** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **% of samples that comply** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| **Compliance with 98% annual value** | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |

**CALCULATE PERCENTAGE USING A TWELVE (12) MONTH 'ROLLING' ANNUAL VALUE**

The *Public Health Regulation 2005* (the regulation) requires that 98 per cent of samples taken in a 12 month period should contain no *E. Coli*. This requirement is refered to as the 'annual value' in Schedule 3A of the regulation.

This requirement comes into effect once you have 12 months data and should be assessed every month based on the previous 12 months data (so that it is a 'rolling' assessment).

**Coen's rolling average for E.coli compliance is 100%, in every month of the reporting period**

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

**Progress in implementing the risk management improvement program**

Existing Risk Management Improvement Program with "Progress to Completion" column added

| Scheme Component / Sub-component | Hazard/ Hazardous event | Priority | Action(s) | | | Target date/s | Progress to Completion |
|---|---|---|---|---|---|---|---|
| | | | interim | short-term | long-term | | |
| Sodium Hypochlorite dosing | Only one dosing pump<br>No duty / Standby arrangement | High | Maintain monitoring of Chlorine Residual at Treatment Plant | Maintain a new pump on site at all times and maintain stocks of spare parts | Install a second dosing pump with associated wiring, or switchboard alterations | Short term – Costings June 2014<br>(Inclusion in 2015-16 Budget)<br>Completion - May 2016 | Completed |
| Loss of Mains Power (No power utility network damage) | Periods of loss of mains power | High | Rely on the Ergon Energy Generators located in Coen | | Purchase of suitable sized generator / investigate alternative power sources | June 2018 | Maintaining the Interim actions as listed<br><br>No Further progress on the long term actions |
| Loss of Mains Power (Due to natural Disaster/s) | Extended periods of No mains Power due to power utilities distribution network severely damaged | High | N.A. | Hire of suitable sized generator if power not available at the Treatment Plant | Purchase of suitable sized generator / installation of alternative power sources | June 2018 | |
| Staff | Loss of Key & Trained Staff | High | Maintain existing recruitment practices | Offer further training within their field to try and encourage employees to develop and attain certification certificates so that positions can be filled from "In House" | | On Going | A recent Council "Restructure" saw 3 Water operations staff members with nearly 30 years combined experience, including 2 with Cert 3 in "Water & Wastewater Operations" lost to Redundancy |
| Operational & Maintenance Procedures | N.A | Medium | Identify outdated procedures, update and obtain approval and implement | Identify new procedures needed, develop and obtain approval and implement | | Dec 2018 | Some procedures have been developed, but more are required<br>CSC Recently rolled out the new SafePlan throughout the Shire |

# Appendix C – Implementation of the 2016/17 Budgeted Capital Works Improvement Program

**Progress in implementing the 2016/17 Budget Capital Works improvement program**

| Capital Works Item | Priority | Completion Target Date | Progress to Completion |
|---|---|---|---|
| Full Refurbishment of the Micro-Filtration Plant | High | Completion - June 2017 | Completed |
| Replacement of the Bore 10 Tank and associated Pipework | Med. | Completion - June 2017 | Not yet Started |
| Stage 1 SCADA System with associated Alarming | High | Completion - June 2017 | Started, not yet Completed |
| Valve and Fire Hydrant replacement of aging infrastructure | Med. | Completion - June 2017 | Started, not yet Completed |