

Drinking Water Management system  
Bogan Shire Council

# Annual Report 2015



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## Executive Summary

*This report provides the performance of drinking water system and the review of DWMS implementation and is based on the current reporting requirements and guidelines in place with the Australian Drinking Water Guidelines (ADWG; 2011), and the reporting requirements of NSW Health.*

### Critical Control Points

	CCP1 Plant Inlet Raw water (Turbidity)	CCP2 Pre- Dose Soda Ash Dosing (pH)	CCP3 Clarifier (Turbidity)	CCP4 Duel Media Filters (Turbidity)	CCP5 Sodium Hypochlorite Dosing Pump (Chlorine- Free)	CCP6 Fluoride Dosing Pump (Fluoride)	CCP7 Free Chlorine in reticulation (Chlorine- Free)
Number Of Exceedances	0	0	1 (less than 02 hours)	0	0	22	50

### Water quality

*NSW Health had recorded 02 high fluoride values of 2.04 and 2.29 in reticulation system on 30<sup>th</sup> of June and 20<sup>th</sup> of October in 2015 respectively. Hence NSW Health advised to shut down the fluoridation plant from 23/10/2016. Existing system gives 93 % compliance to critical control operational limits.*

*The existing fluoridation plant (system), has been already identified to replace in 2016, under NSW Health funds since it did not meet the requirement of the New South Wales Code of Practice for Fluoridation of Public Water Supplies 2011, in a number of areas.*

*Similarly, the current hypo chlorination system is also insufficient and inconsistent to maintain the ADWG value of 0.2 mg/L free chlorine in reticulation system. Presently, water towers are manually chlorinated with chlorine tablets to maintain the free chlorine levels in reticulation system. This system can achieve the minimum level 0.1 mg/L of free chlorine in reticulation system and 86% of critical control operational limits. Therefore installation of in line chlorine booster or complete gas chlorination system has been proposed as a corrective action.*

*Finally, there were no E-Coli incidents recorded in reporting period.*

## Action and improvement plan

	Completed	In progress	Short term not started	Long term	Total
Number of actions	30	20	0	12	62

## DWMS Reviews

NSW Public Works reviewed the Bogan DWMS in February 2015.

Review	Scope	Summary of outcomes	Actions taken
Glenn Fernandes	Reviewing Chlorination system	Calculation of C.t value	Confirm the effective disinfection
	Reviewing Chemical dosing system	Proposed an alternative dosing arrangement	If current process fails only

## Reservoir inspections

The entry hatch covers are not sealed and they need to be replaced with sealed hatch design. The existing hatches may cause to contaminate the drinking water. Upper cages on the internal ladder has to be removed to make the tank safe for diving.

Date	Reservoirs inspected	Recommendations	Category	Corrective actions
15/07/2014	Cobar St	Seal the entry hatch	Priority-1	Hatch has been sealed.
		Remove the upper cage of internal ladder	Priority-4	In progress
15/07/2014	Terangion St	Seal the entry hatch	Priority-1	Hatch has been sealed.
		Remove the upper cage of internal ladder	Priority-4	In progress

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## 1 Report purpose

This reports documents DWMS implementation and drinking water performance for 2015 and satisfies the reporting (Element 10), evaluation (Element 11) and review and continual improvement (Element 12) requirements of Councils Drinking Water Management System (DWMS).

## 2 Scheme summary

The Bogan WTP consists of multiple reservoirs gravity feeding into the town's distribution system. Potable water is sourced from the Bogan River weir pool. The treatment plant consists of PAC dosing, coagulation, flocculation, sedimentation and filtration prior to disinfection and fluoridation. Treated water is tested and delivered via pump into the distribution system. There are 1079 connections available in this town water supply system.

### Checklist

Have there been any system upgrades within the reporting period?	<input checked="" type="checkbox"/>
Upgrade or system improvements details have been provided	<input checked="" type="checkbox"/>

## 3 DWMS document control

Any updates to DWMS documentation should be summarised here. Major changes should be submitted to NSW Health.

Document	Version	Updates	Submitted to NSW Health and date submitted?
1 <sup>st</sup> Draft	Version-1	29/01/2016	29/01/2016

## 4 Critical control points

The initial CCPs were reviewed in year 2015 to achieve the ADWG targets. Following changes were adopted

CCP number	Monitoring Parameter	Initial Critical Limit	New Critical limit	Reasons
1. Plant Inlet Raw water	Turbidity	<300 NTU	< 500 NTU	Turbidity increases up to 500 NTU in Bogan River
2. Pre-Dose Soda Ash Dosing System	pH	> 7.5	> 8	pH varies in Raw water
5. Sodium Hypochlorite Dosing Pump	Chlorine (Free)	> 1.0 mg/L	> 3.5 mg/L	Existing system could not manage the 0.2 mg/L free chlorine level in reticulation
6. Fluoride Dosing Pumps	Fluoride	New	<0.9mg/L and >1.5mg/L	Existing system gives higher Fluoride levels to reticulation since it's a manual system
7. Free Chlorine in Reticulation System	Chlorine (Free)	New	<0.19 mg/L and <3.5 mg/L	Chlorine tablets are used to boost chlorine levels in water towers

The reviewed CCPs for year 2015 for Nyngan Town Water system are shown in Table 4-1.

**Table 4-1. Summary of critical control points**

CCP number	Monitoring Parameter	Target criterion	Adjustment limit	Critical limit
1. Plant Inlet Raw water	Turbidity	No target	Above the normal quality	< 500 NTU
2. Pre-Dose Soda Ash Dosing System	pH	6-7	< 6 and > 7.6	< 5 and > 8
3. Clarifier	Turbidity	3 NTU	< 5 NTU >3 NTU	< 5 NTU 2 hours
4. Dual Media Filters	Turbidity	0.5 NTU	0.8 NTU	< 1.5 NTU
5. Sodium Hypochlorite Dosing Pump	Chlorine (Free)	2.0 mg/L	<1.5 mg/L and >2.5 mg/L	< 1.0 mg/L and > 3.5 mg/L
6. Fluoride Dosing Pumps	Fluoride	1.2 mg/L	< 1.1 mg/L and >1.3 mg/L	<0.9mg/L and >1.5mg/L
7. Free Chlorine in Reticulation System	Chlorine (Free)	<0.2 mg/L	<0.19 mg/L and <3.5 mg/L	<0.19 mg/L and <3.5 mg/L

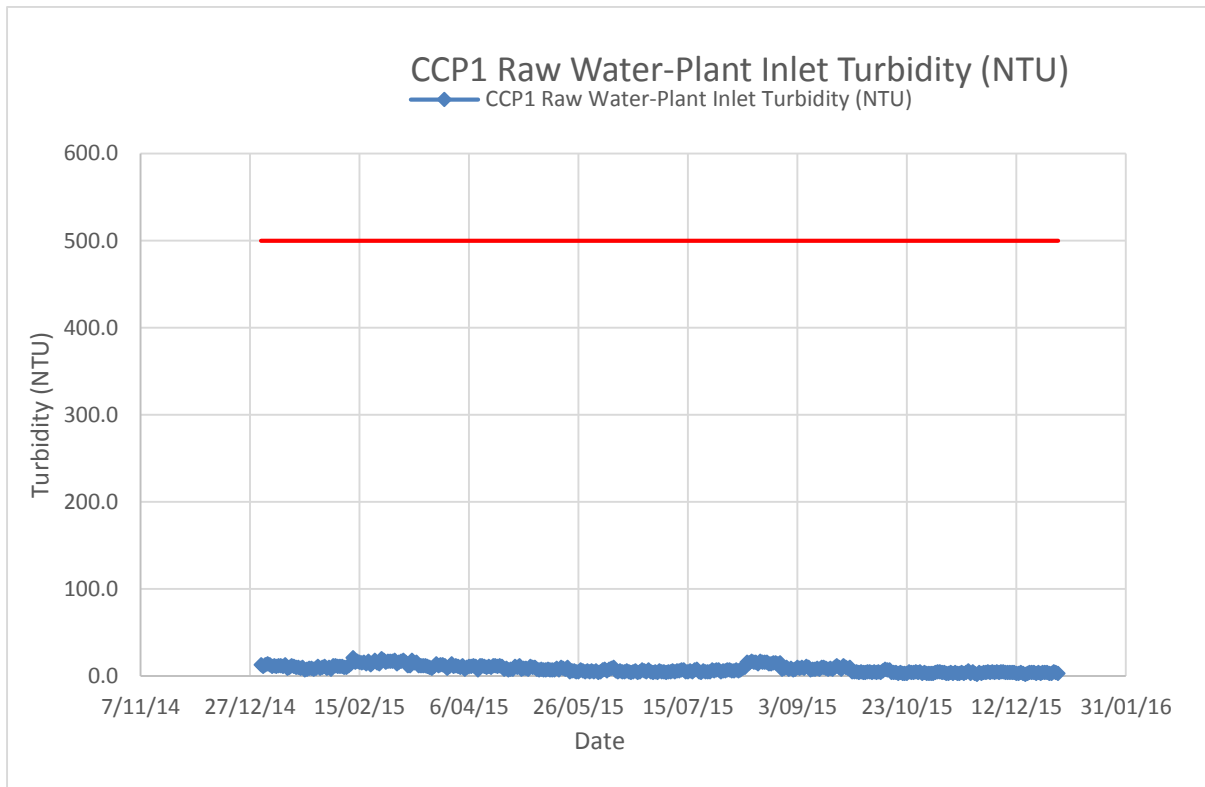


## 4.1 Critical limit exceedance

The performance of the critical control points should be reported in this section. A monitoring template is available that can be used to record and plot monitoring data.

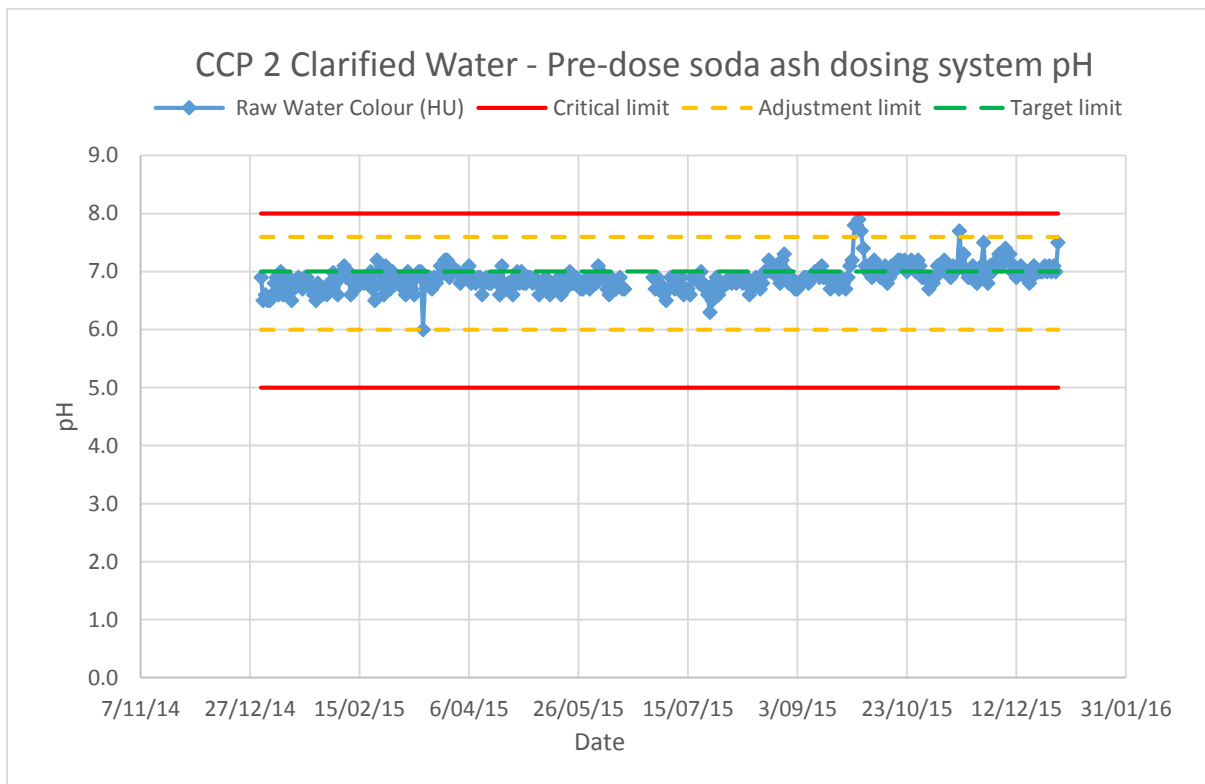
Process	Parameter	Min	Ave	Max	Lower Critical Limit	Upper Critical Limit	Number of Exceedances	No. of Samples	% Compliance
Raw Water-Plant Inlet	Turbidity (NTU)	2	8.29	21		500	0	365	100%
Raw Water	Colour (HU)		51.4	100			0	365	100%
Raw Water	pH	6.8	7.39	8.9			0	365	100%
Clarified Water - Pre-dose soda ash dosing system	Turbidity (NTU)	0.8	2.24	5.8		5.0	1	353	100%
Clarified Water - Pre-dose soda ash dosing system	pH (1)	6	6.89	7.9	5	8	0	353	100%
Treated Water - Filters	Turbidity (NTU)	0.1	0.54	1.1		1.5	0	365	100%
Treated Water - Sodium hypochlorite dosing system	Free Cl (mg/L)	1.24	2.22	3.38	1.0	3.5	0	365	100%
Reticulated Water - Fluoridation system	Fluoride (mg/L)	0.86	1.04	2.29	0.9	1.5	22	295	93%
Reticulated water	Free Cl (mg/L)	0.1	0.48	2.77	0.2	3.5	50	365	86%

CCP-1- Turbidity in Raw water



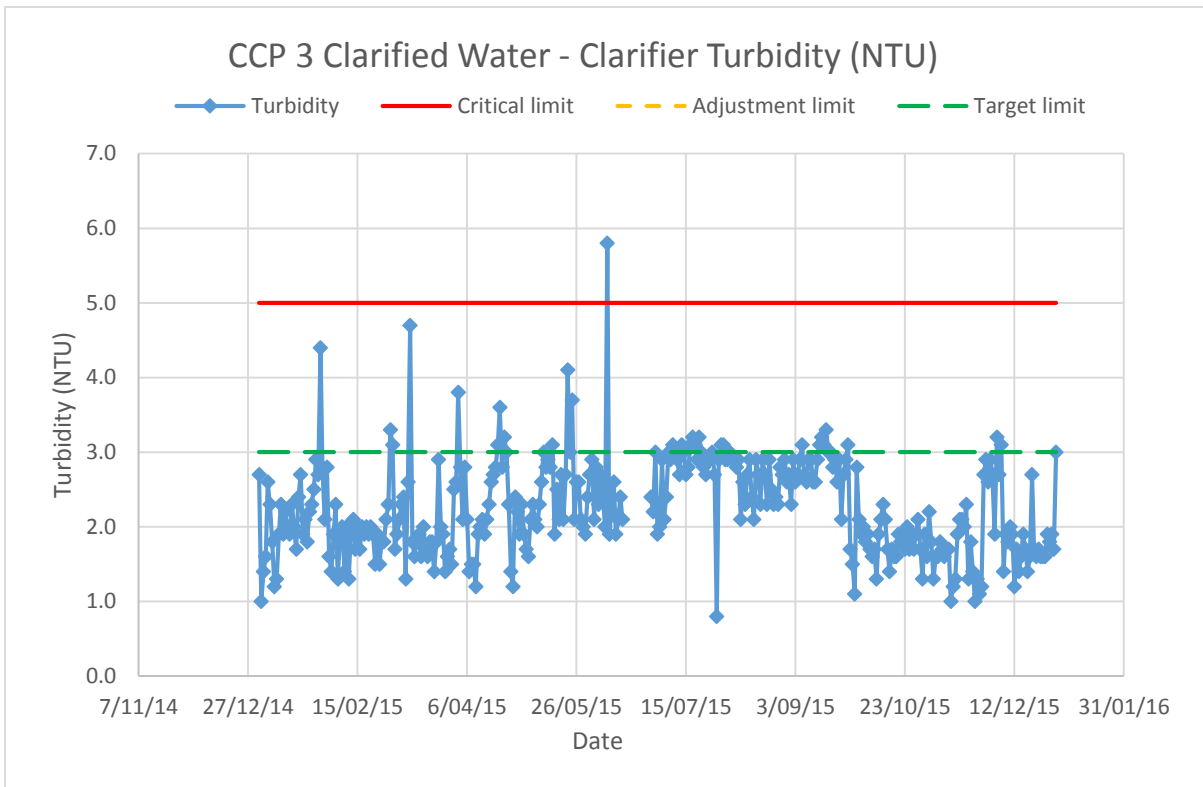
Turbidity in raw water is 100% compliance with critical control limits.

CCP-2 – pH in Clarified water



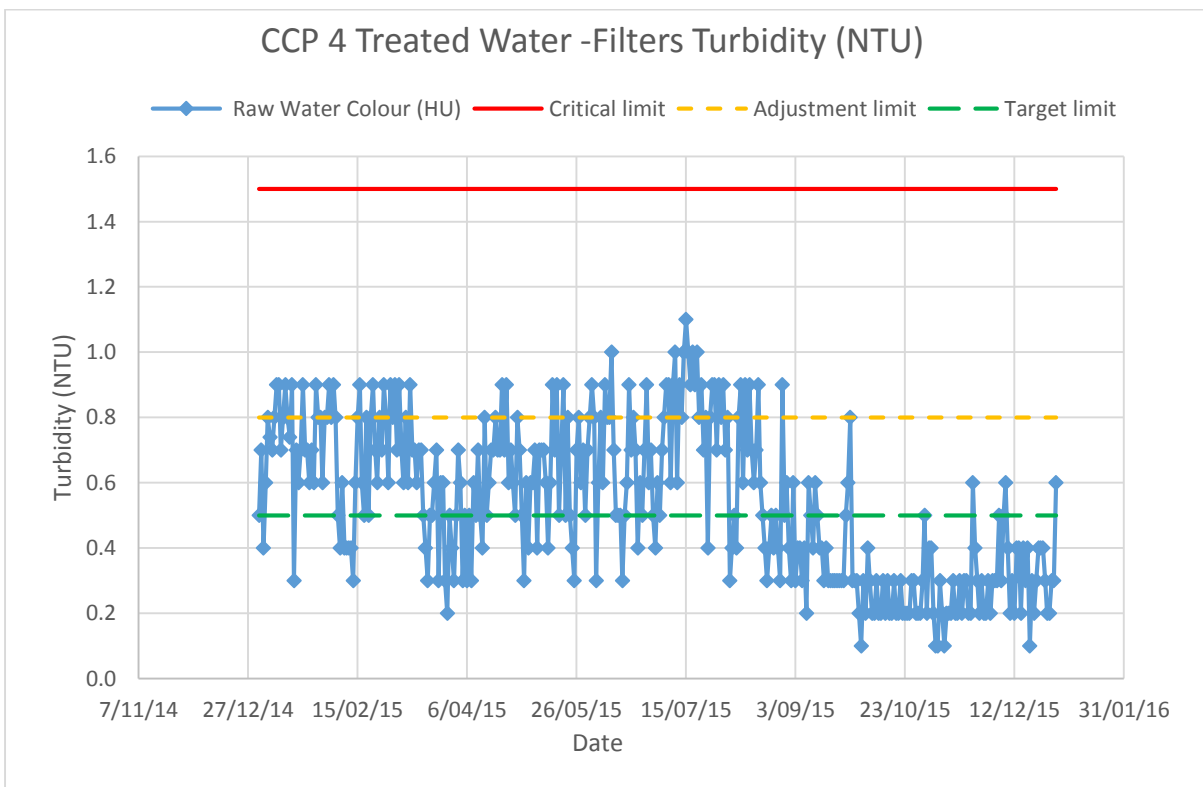
pH in clarified water is 100% compliance with critical control limits.

CCP- 3 – Turbidity in Clarified water

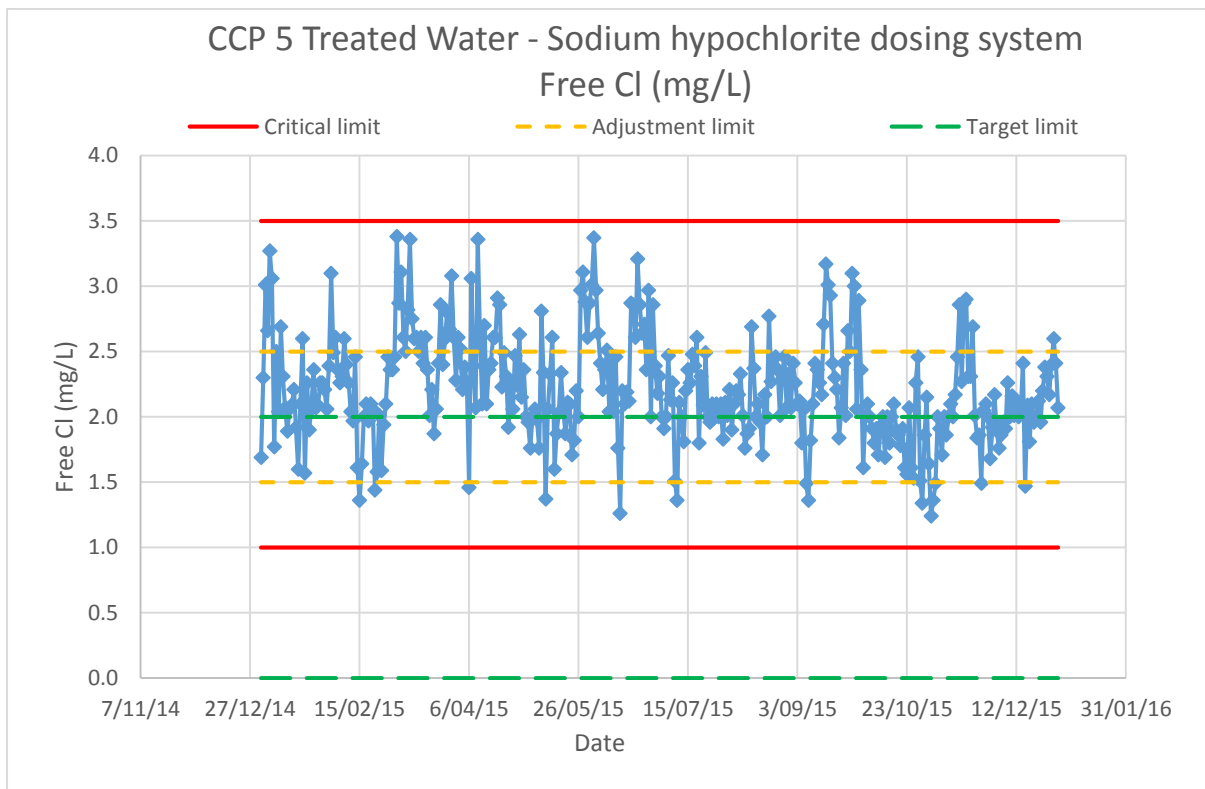


There was an isolated incident of high turbidity of 5.8 NTU which exceeded the operational limits of 5NTU at clarifier. This was recorded on 09<sup>th</sup> of June 2015 only for less than 2 hour period. However, there was no effect for final product of water quality and 100% compliance with critical control limits

CCP -4 – Turbidity in Treated water

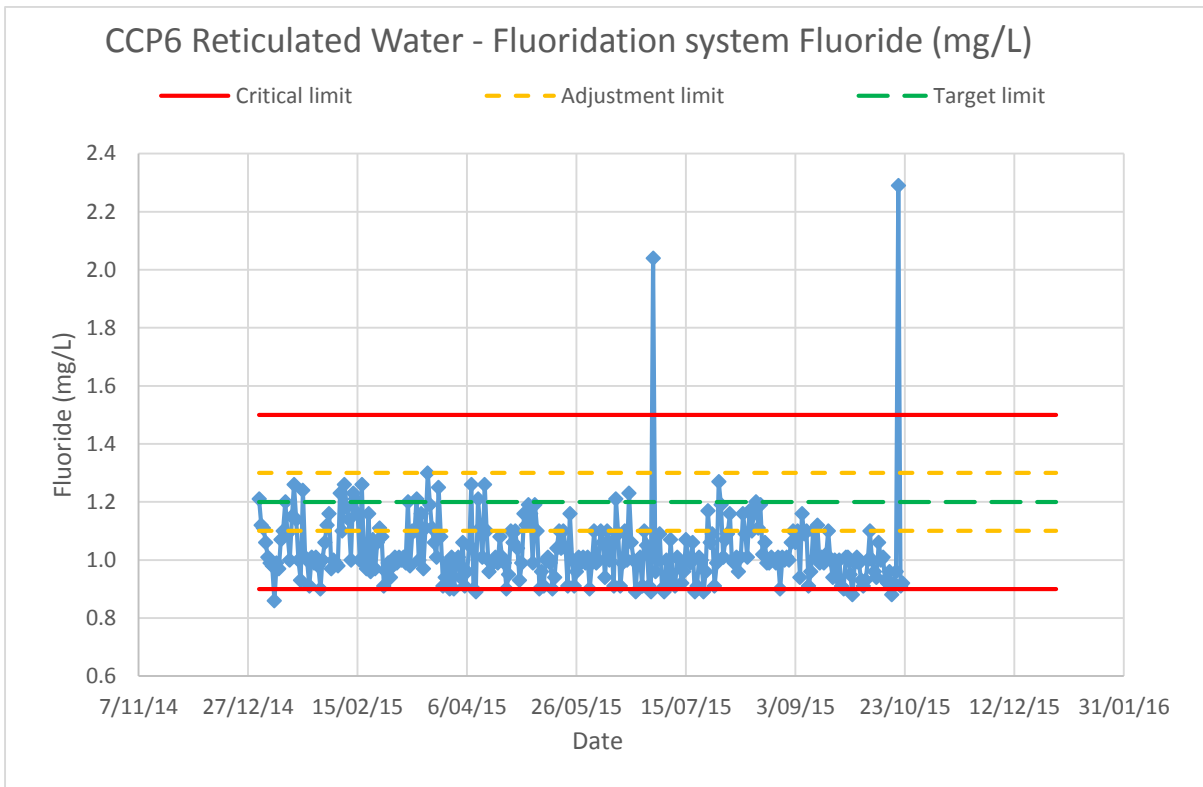


CCP-5– Free Chlorine in Treated water



*The hypo chlorination system gives lot of variations of its concentration. However, treated water must have a higher value of free chlorine at water treatment plant to maintain the free chlorine level of 0.2 mg/L in water reticulation system. Therefore operational free chlorine limits were set between 1.5 and 3.5 mg/L at treatment works. Therefore CCP 5 is 100% compliant with critical control operational limits*

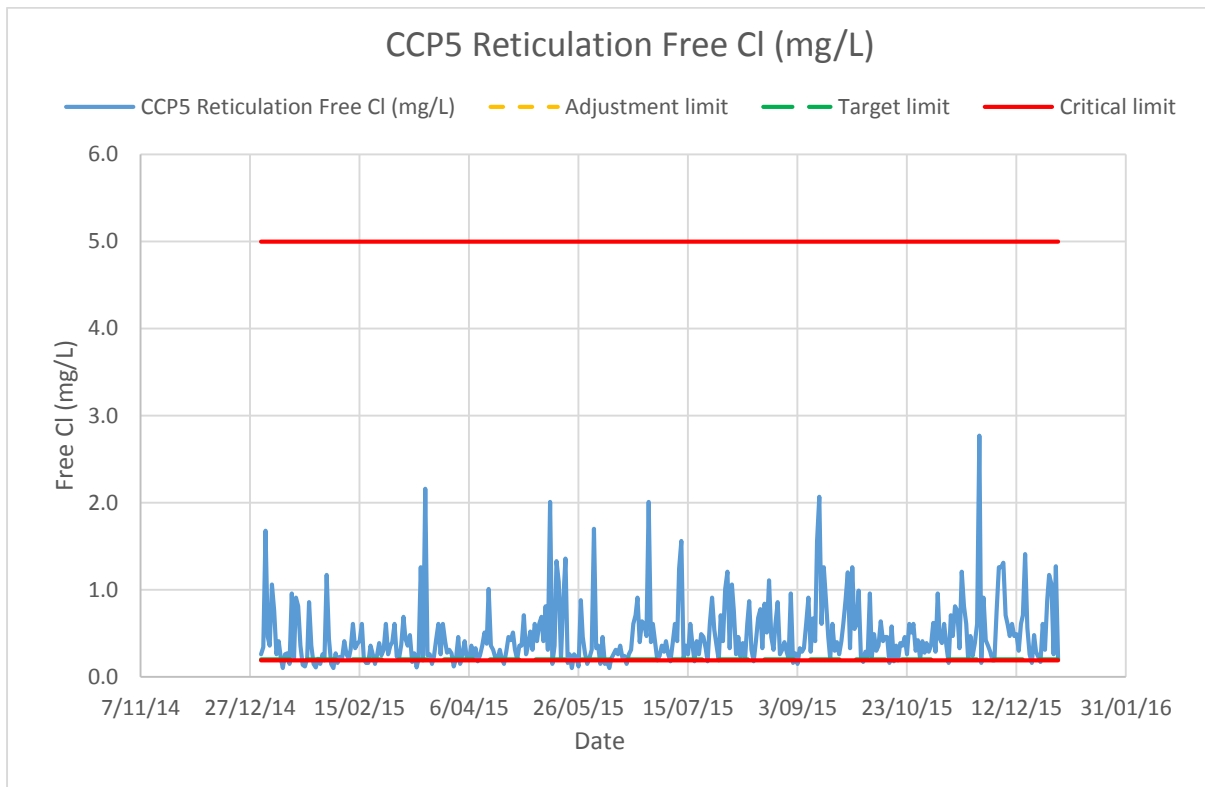
CCP-6– Fluoride in Treated water



*This plant was operated approximately 93% within CCP values till 21st of October 2016. However, NSW Health had recorded 02 high fluoride values of 2.04 and 2.29 in reticulation system on 30<sup>th</sup> of June and 20<sup>th</sup> of October in 2015 respectively. Hence NSW Health advised to shut down the fluoridation plant from 23/10/2016. Existing system gives 93 % compliance to critical control operational limits.*

*The existing fluoridation plant (system), has been already identified to replace in 2016, under NSW Health funds since it did not meet the requirement of the New South Wales Code of Practice for Fluoridation of Public Water Supplies 2011, in a number of areas.*

CCP -7 – Free chlorine in Reticulation system.



Existing hypo chlorination system is insufficient and inconsistent to maintain the ADWG value of 0.2 mg/L free chlorine in reticulation system. Presently, water towers are manually chlorinated with chlorine tablets to maintain the free chlorine levels in reticulation system. This system can achieve the minimum level 0.1 mg/L of free chlorine in reticulation system and 86% of critical control operational limits. Therefore installation of in line chlorine booster or complete gas chlorination system has been proposed as a corrective action.

However, there were no E-Coli incidents recorded in reporting period.

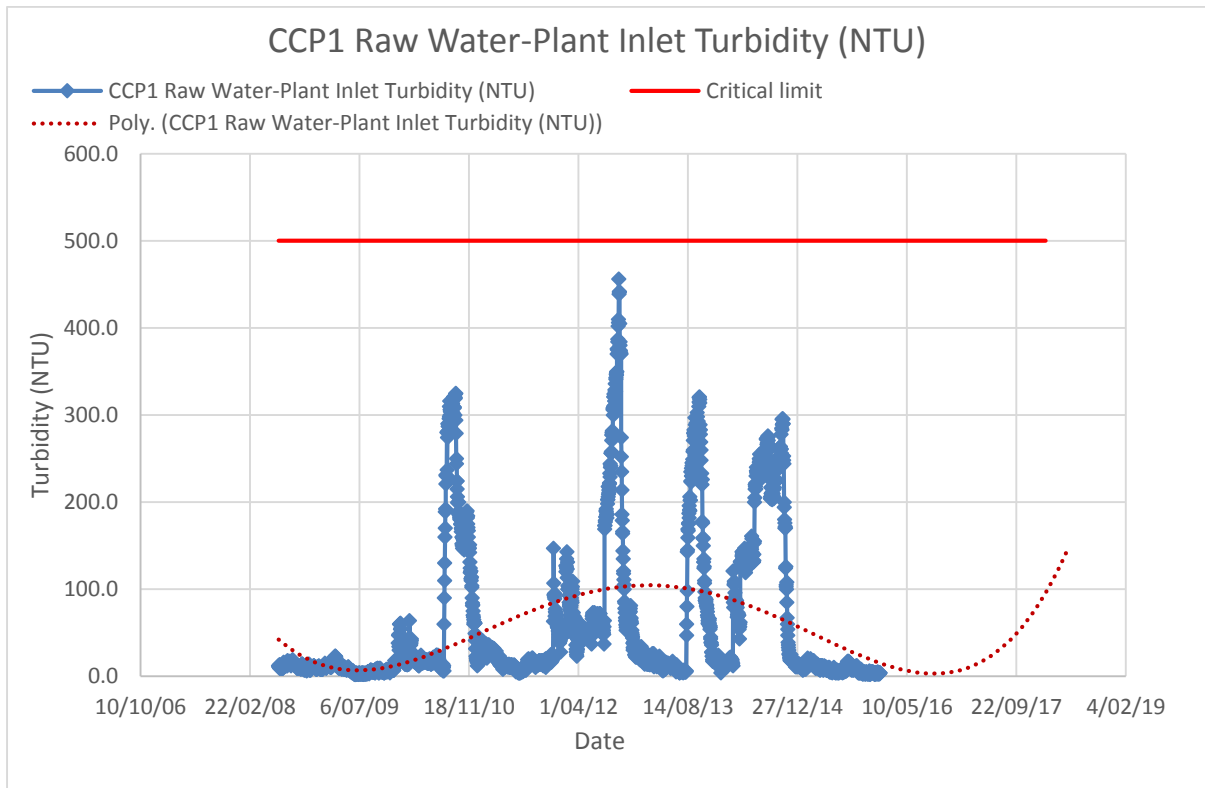
Table 4-2. Critical limit exceedances

Date	Critical control point	Critical limit	Details of exceedance	Correction	Reason	Corrective Action
09/06/2015	CCP-3	5 NTU	Turbidity at sedimentation tank. One reading was recorded at greater than 5 NTU.	Repeat the jar test and adjust the chemical	Sudden change of raw water quality	Corrected within less than 02 hours. Keep monitoring the water quality
01/01/2015 to 31/12/2015  30/06/2015 And 20/10/2015	CCP-6	0.9-1.5 mg/L	Fluoride in treated water at treatment plant 22 incidents (7%) were recorded as less than 0.9 mg/L. However, NSW Health has recorded two incidents of high Fluoride concentration of 2.0 and 2.3mg/L in reticulation system	Fluoride plant was shut down as per the instructions from NSW Health		Fluoridation plant was shut down and new plant to be install in near future with the assistance of NSW Health
01/01/2015 to 31/12/2015	CCP-7	>0.2 mg/L	50 incidents(14%) were recorded as less than 0.2 mg/L free chlorine levels in reticulation system	Water towers are chlorinated with chlorine tablets		Chlorine booster system is proposed to implement

## 5 Water Quality

Reviewing of water quality data and longer term trends from 2008 to 2015.

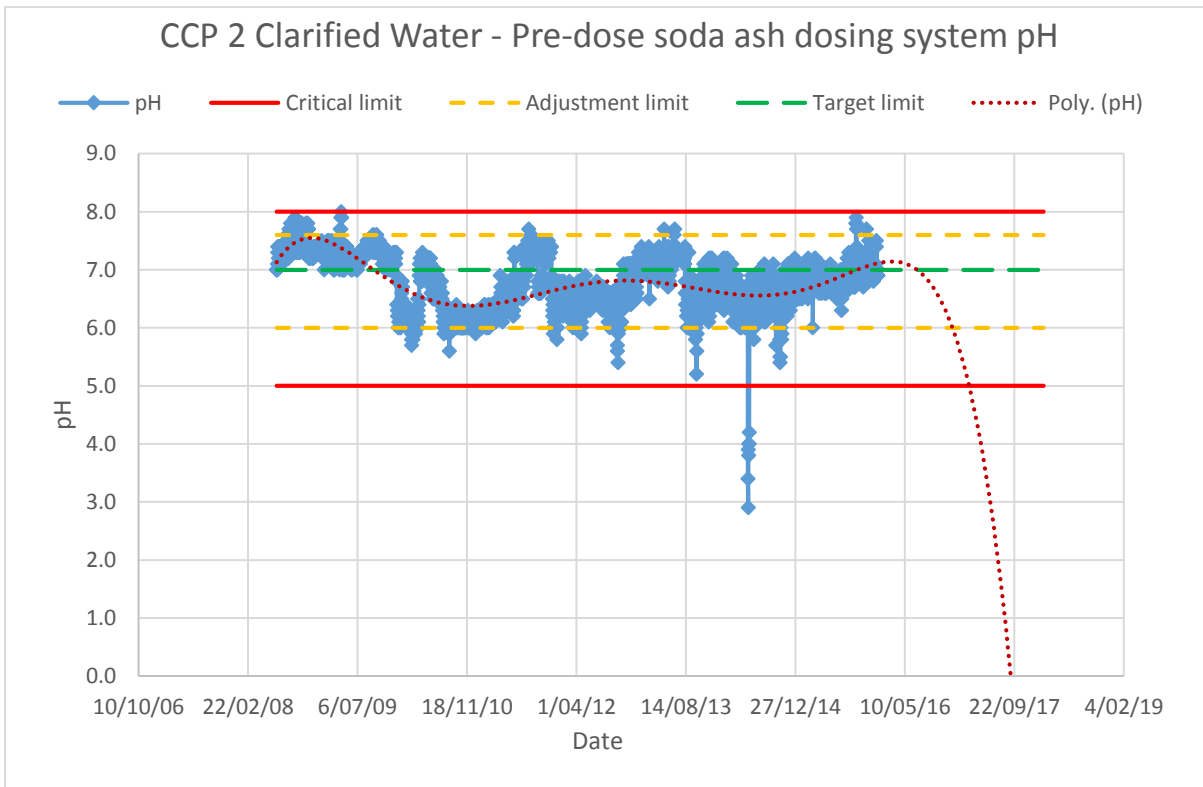
### CCP1 - Raw Water Turbidity



Generally, Nyngan gets heavy rains in spring time from September to November. During this season Bogan river flows with high turbid water. This is the only time Nyngan water supply can use the river water. Otherwise Nyngan gets low turbid water from Albert Priest Chanel. As per the trend we could expect some high turbid Bogan flows in spring seasons.

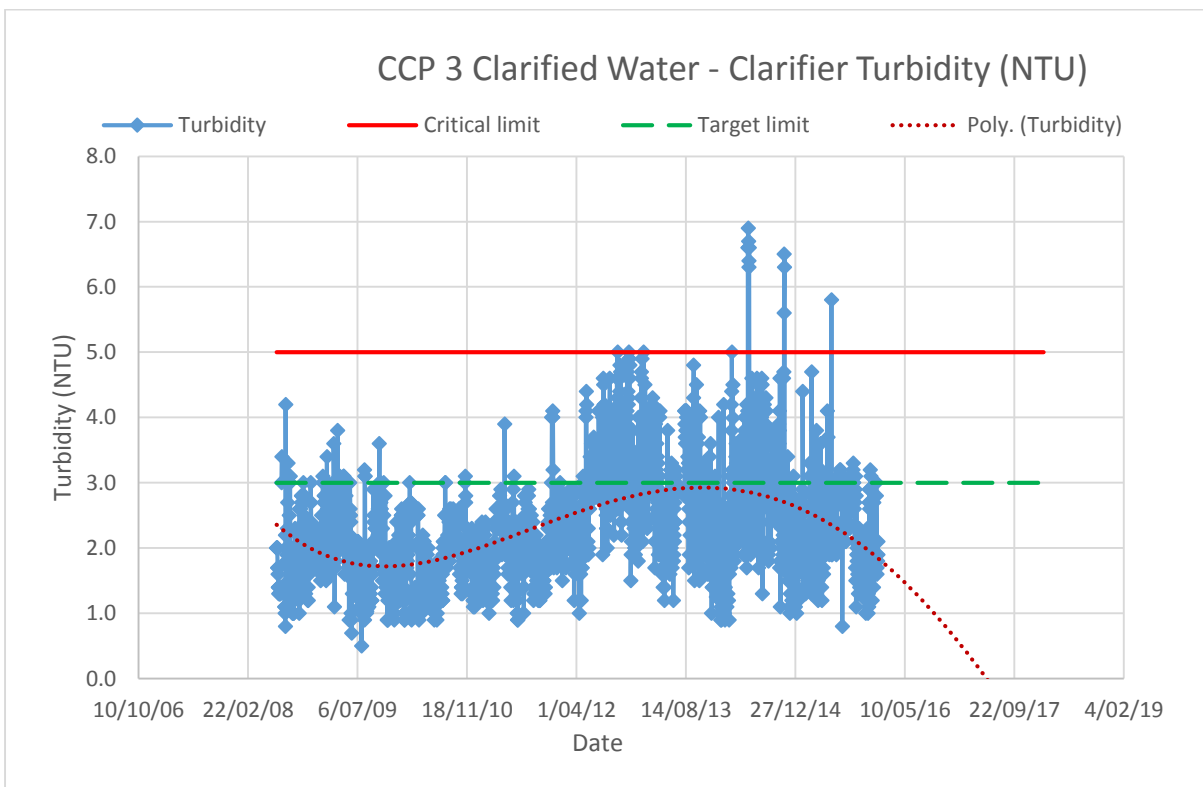


CCP-2 – pH in Clarified water



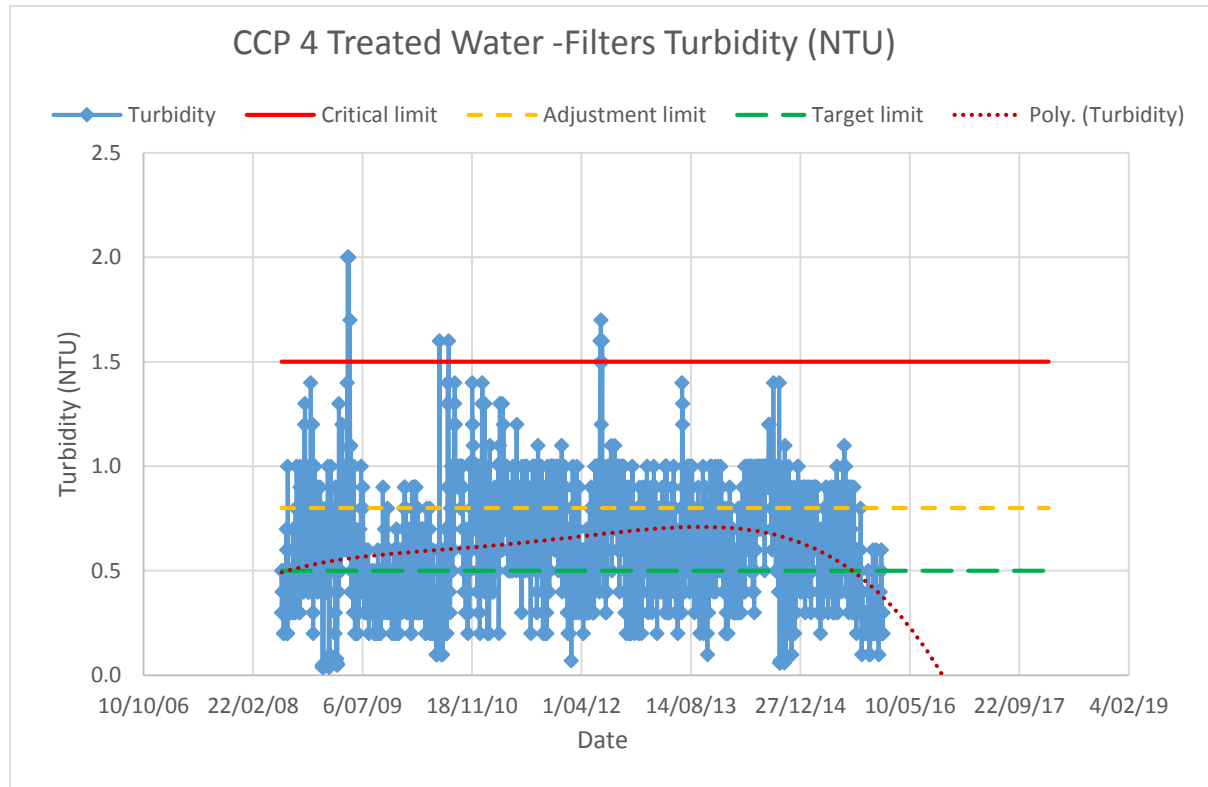
Pre dose soda ash dosing system does operate reliably within the adjustment limits since 2008. There were only 8 incidents recorded and all of them were less than 02 hour incidents. pH correction is consistence and uniform over the period and approaching to the operational target of 7.

CCP- 3 – Turbidity in Clarified water



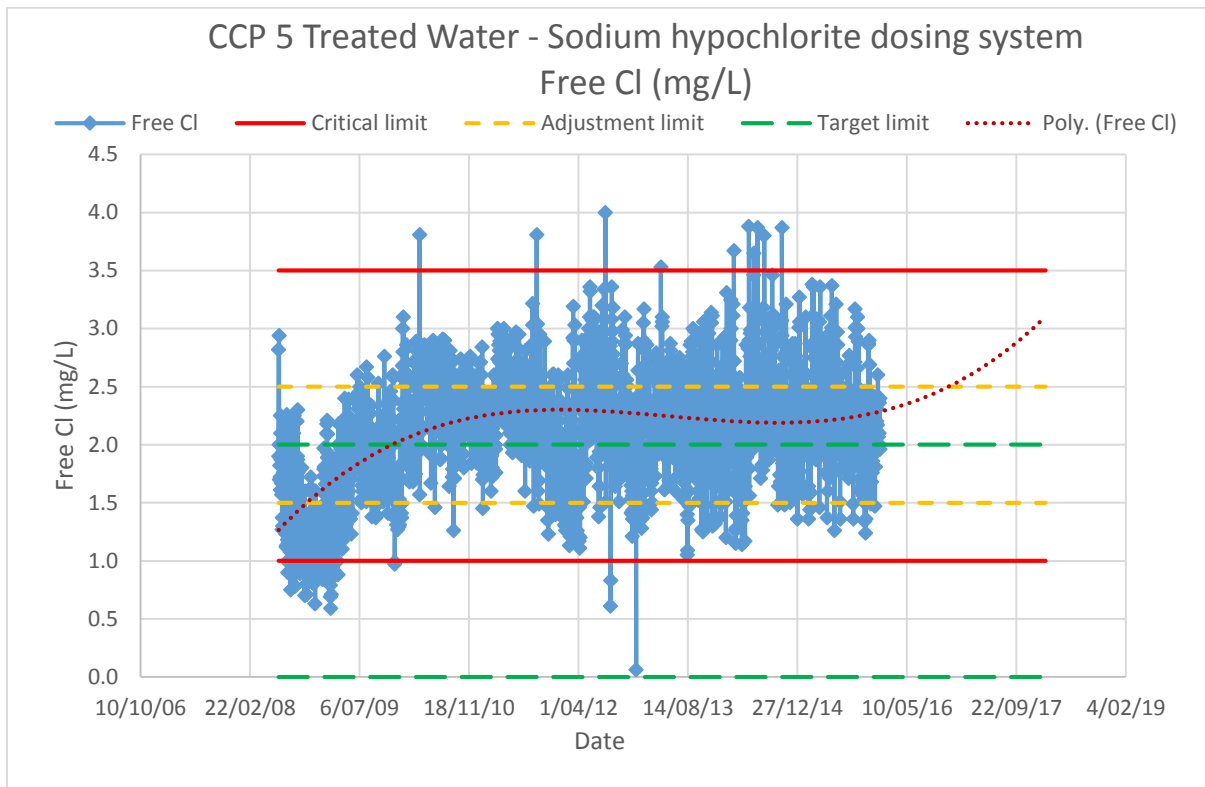
Water flocculation and sedimentation process is within the operational target except 15 isolated incidents of less than 02 hours, over a period of 8 years. Trend line shows that this system produces average of 2.0 NTU water during Albert Priest Channel Flow and 3.0 NTU (Operational target) water during Bogan River Flow (High turbid water).

CCP -4 – Turbidity in Treated water



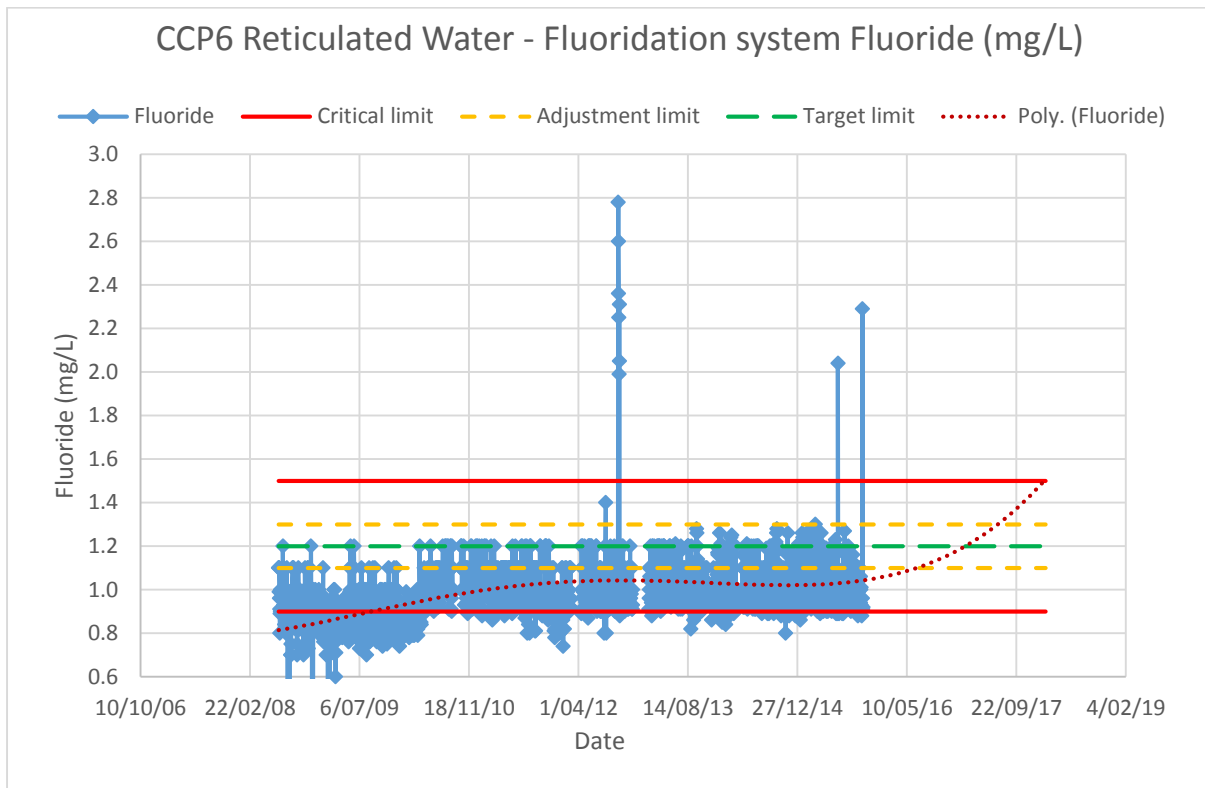
Water filtration process is also within the operational target except 15 isolated incidents of less than 02 hours, over a period of 8 years. Having done some filter improvements in 2012, trend of filter operation has been improved to average of 0.5 NTU and no incidents were recorded.

CCP-5– Free Chlorine in Treated water



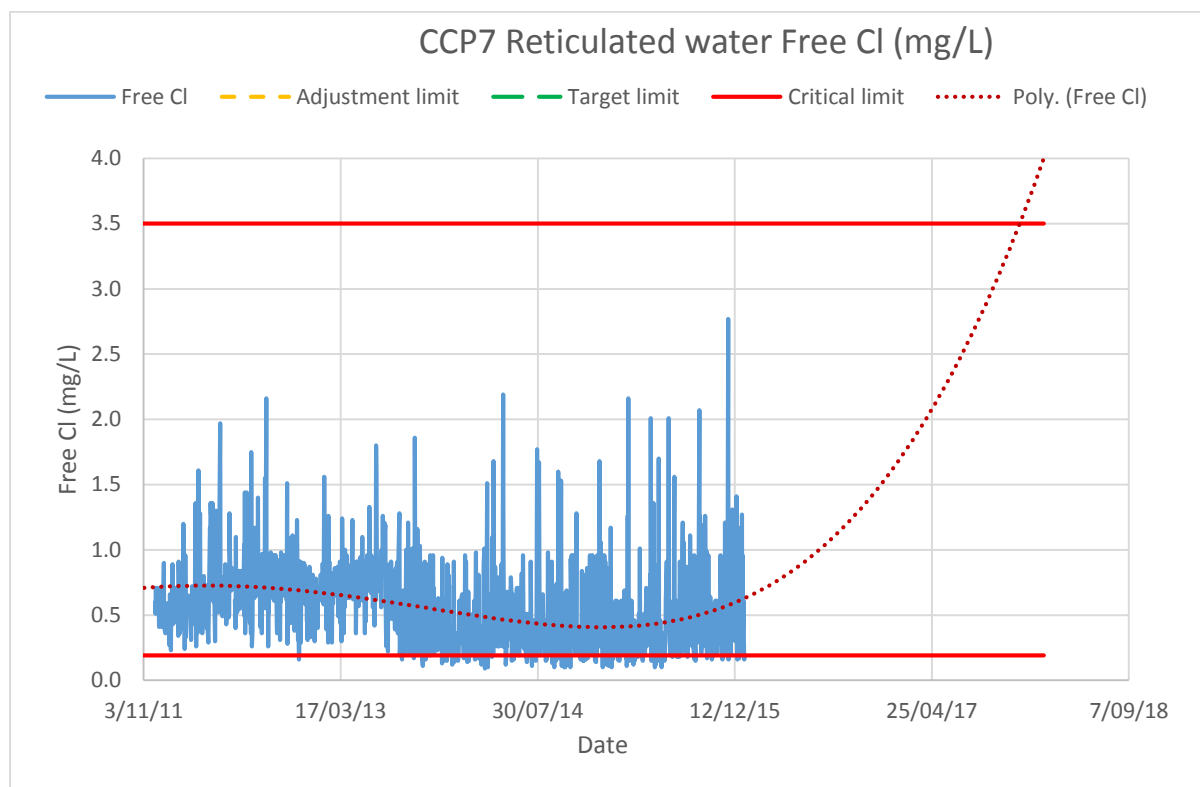
The existing hypochlorite dosing system operates within the critical operational limits with 71 volatile readings over last 8 years. The percentage of exceedence was recorded as 3%. Trend shows that the free chlorine level of treated water has been gradually increased and approximately fluctuating around 2.5 mg/L to maintain the free chlorine level in reticulation. Hence critical operational limits were increased to 3.5 mg/L

CCP-6– Fluoride in Treated water



The existing Fluoridation system is not compliant with the NSW guidelines. There were 513 noncompliance incidents were recorded over a period of 8 years and the percentage of exceedences is 21%. There is a trend of increasing fluoride concentration with current operation. However, the fluoridation system was shut down from 23<sup>rd</sup> of October 2015, due to reporting of high concentration of fluoride in reticulation system.

### CCP -7 – Free chlorine in Reticulation system.



Data available only for four year period since 2012. There were 465 incidents recorded as noncompliance events. That is 25% of non exceedences occurred in last four years. The major issue is to maintain the minimum free chlorine concentration above the 0.2 mg/L level in reticulation system. Trend line shows that average level of free chlorine level is increasing approximately from 0.5 to 1. Therefore, inline chlorine bolstering system has been proposed as a corrective action.

## 5.1 Data collection

Nyngan water supply system has established daily data collection and weekly data entering system. Four data sheets provide the all relevant data for critical control point monitoring. Each data sheet provides following information.

### Water Data Sheet 1

- Weather condition (temperature) , River water levels and Channel operations

### Water Data Sheet 2

- Raw water quality (Turbidity, Colour, pH, Fluoride)
- Treated water quality (Turbidity, Colour, pH, Free Chlorine, Total Chlorine, Fluoride)
- Clarifier water quality (Turbidity, pH)
- Chemical usage ( Alum, Soda Ash ( pre), Soda Ash (post), Polyelectrolyte, Pre- Chloride, Post- Chloride, Fluoride)

### Water Data Sheet 3

- Raw water flow rate, rated water flow rate, backwash flow rate, Sludge pumping rate

### Water Data Sheet 4

- Water quality of reticulation system (pH, Free Chlorine, Total chlorine, Fluoride, Turbidity)

Water data collection procedure is given below.



## WATER PROCEDURES DATA ENTRY

### Weekly Water Data Inputs

**Water 1 - Water & Filtration Plant Report – Blue Sheet**

In the first section:

Find this data off the internet by going into the site:

<http://www.bom.gov.au/climate/dwo/201309/html/IDCJDW2103.201309.shtml>

Select the month and enter off the data

All the rest follow the sheets as the setup is the same as the document you are entering off just look for the tabs and columns that correspondence.



**Water 1 – Water & Filtration Plant**

**Water 2 – Filtration Plant Water Quality – Green Sheet**

**Water 3 – Water Consumption Report – Pink Sheet**

**Water 4 – Reticulation System Quality Samples – White Sheet**



All in one excel documents under different tabs down the bottom.

Where to find it to enter:

<S:\Engineering\Water and Sewerage\REGISTER - WATER.xlsx>

## 5.2 Non-compliant data

Except the recorded eight incidents with high total coliform in reticulation system no any non-compliant data findings or water quality issues in addition to critical limit exceedances during the reporting year.

**Table 5-1. Summary of non-compliant water quality data (Source of data: NSW Health)**

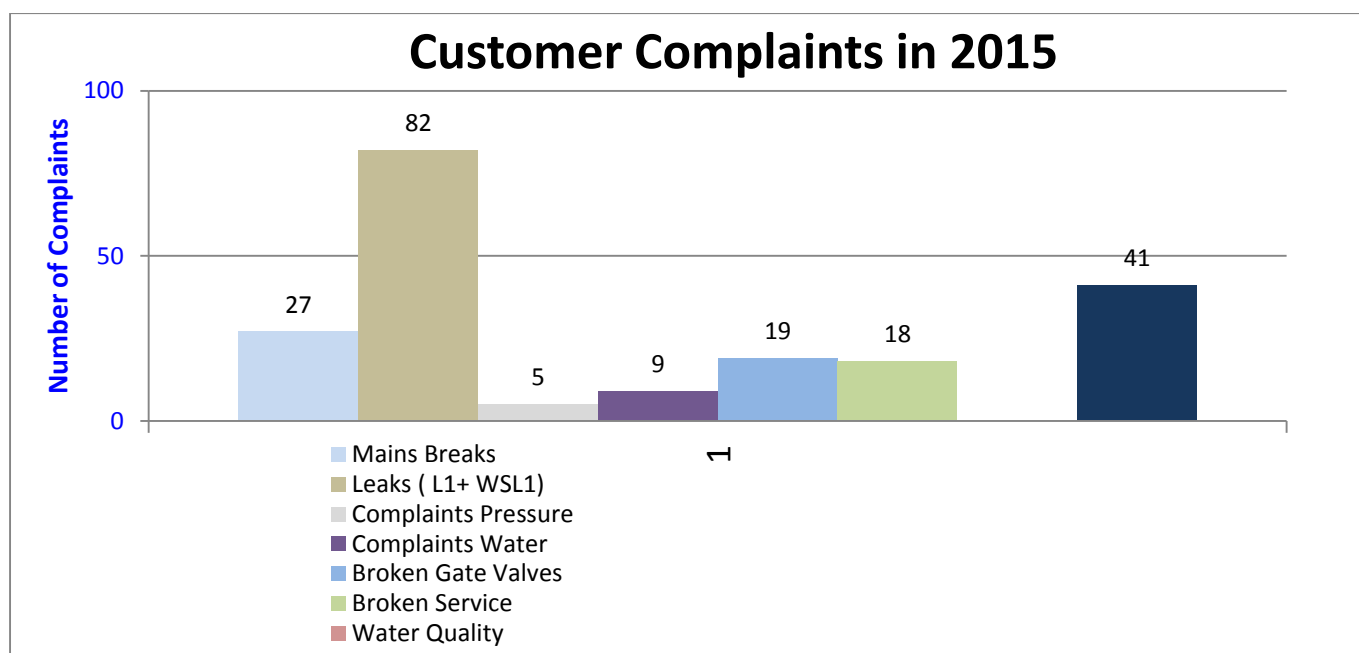
Date	Location	Parameter	Exceedance	Correction	Corrective action	Notes
06/01/2015	Reticulation	Total Coliforms	8 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
20/01/2015	Reticulation	Total Coliforms	2 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
03/02/2015	Reticulation	Total Coliforms	2 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
17/02/2015	Reticulation	Total Coliforms	2 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
21/04/2015	Reticulation	Total Coliforms	1 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
03/11/2015	Reticulation	Total Coliforms	83 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break
08/12/2015	Reticulation	Total Coliforms	32 cfu/100	Flushing, retest	Review of maintenance schedule	Pipe break

## 5.3 Water quality discussion

There were no any positive microbiological results recorded in this reporting year.

A summary of water quality data available as an Appendix.

## 6 Consumer complaints (optional)



## 7 Water quality incidents

One incident reported on high fluoride concentration in reticular system on 20th of October 2015.

**Table 7-1. Summary of incident and emergencies, recommendations and corrective actions**

Details of incident/emergency	Investigation recommendations	Corrective action undertaken
High Fluoride in Reticulation	Repeat sampling	Plant shut down and done a detailed investigation



## 8 Action plan/Improvement plan

A summary of the action/improvement plan activities that have been implemented during the period 2012/2015 is included in Table 8-1. The full action and improvement plan is included in Appendix B.

**Table 8-1. Action/improvement plan activities that have been completed during the period 2012/2015**

Action no.	Item	Status
4.1	<i>Develop and implement a reticulation monitoring program to ensure the free chlorine residual in the distribution system is in-line with the NSW office of Water guidance (greater than 0.2 mg/L throughout the system).</i>	<i>Implemented as CCP 7</i>
4.2	<i>Develop procedures and log sheets for the calibration of chemical dosing systems</i>	<i>Instrument calibration LMWUA s project- In progress</i>
5.4	<i>Document daily testing procedures including the review of the water quality results at the water treatment plant.</i>	<i>Implemented</i>
5.5	<i>The DWMS document must be updated to state who is responsible for reviewing the results in the NSW Drinking Water Database. Reviews must be conducted after the results of each microbial sample and monthly for trends and water quality implications.</i>	<i>Implemented- In progress</i>
5.6	<i>Document daily testing procedures including who undertakes the daily review of the water quality results at the water treatment plant.</i>	<i>Implemented</i>
6.8	<i>Develop a contact list of key people, agencies and businesses for a water quality emergency in line with the NSW Guidance.</i>	<i>Part of IRP</i>
6.9	<i>Document in the DWMS where controlled copies of the emergency contact list is kept.</i>	<i>controlled</i>
6.10	<i>Document which agencies should be notified and under what circumstances and who is authorised to notify.</i>	<i>Part of IRP</i>
11.9	<i>C.t should be calculated.</i>	<i>Done by Public Work</i>
1.13	<i>Ensure Staff and Councillors are aware of the National Health Guidelines which include the development of a Drinking Water Quality Management Plan.</i>	<i>Implemented</i>
2.14	<i>Prepare relevant SOPs and make sure they are practised by the operators.</i>	<i>Implemented</i>
3.15	<i>Ensure Critical Control Points are documented.</i>	<i>Implemented</i>
3.16	<i>Ensure Critical Control Points are monitored.</i>	<i>Implemented</i>
4.17	<i>Implement the operational procedures that were developed</i>	<i>Implemented</i>
4.18	<i>Include these procedures in the O&amp;M manual and ensure they are also located where the activity is undertaken</i>	<i>Displayed in the plant room</i>
4.19	<i>Document corrective actions for critical control points</i>	<i>Implemented</i>
5.20	<i>Document all operational procedures</i>	<i>Implemented</i>
6.21	<i>Formalise how incidents and emergencies and reviewed and protocols updated.</i>	<i>Implemented</i>
1.22	<i>Ensure regular (weekly or fortnightly) toolbox style meetings are held with technical and operational staff to ensure staff understands the practical implications and application of formal and regulatory requirements and to allow two way communication of issues. Minutes should be kept of these meetings.</i>	<i>Implemented</i>

Action no.	Item	Status
2.23	<i>Develop a formal maintenance schedule for sludge rake and other equipment in the water supply system.</i>	<i>Implemented</i>
2.25	<i>Consider daily recording of weather conditions and river flows with raw water turbidity.</i>	<i>Implemented</i>
2.26	<i>Consider installing an on-line turbidity meter to measured filtered water</i>	<i>Implemented</i>
2.27	<i>Consider automating filter backwash</i>	<i>SCADA system-In progress</i>
2.28	<i>Monitor filtered water turbidity data over a filter run to determine filter characteristics</i>	<i>SCADA system-In progress</i>
2.29	<i>Formalise reticulation testing program and log all results. Test for chlorine prior to flushing.</i>	<i>Implemented</i>
4.30	<i>Ensure these procedures are held in an operations and maintenance manual</i>	<i>In progress</i>
4.31	<i>Extend the documentation to include the daily monitoring;</i>	<i>Implemented</i>
4.32	<i>Document all corrective actions and formalise associated communication protocol</i>	<i>In Progress</i>
5.33	<i>Ensure turbidity, Cl, pH and F are added to the daily log sheet.</i>	<i>Implemented</i>
5.34	<i>Formalise water quality monitoring schedule for the distribution.</i>	<i>Implemented</i>
5.35	<i>Improve complaint recording through TRIM</i>	<i>In progress</i>
6.36	<i>Document what information is assessed for the NOW performance reporting forms</i>	<i>Implemented</i>
7.37	<i>Regular (weekly or fortnightly) toolbox style meetings should be held with technical and operational staff to ensure two way communication of issues. Minutes should be kept.</i>	<i>Implemented</i>
7.38	<i>Develop and maintain a formalised training program for the employees.</i>	<i>Implemented- In progress</i>
7.39	<i>Share knowledge among the members of LMWUA and other neighbour Councils.</i>	<i>Implemented- In progress</i>
8.40	<i>Ensure water quality is considered during the community consultation as planned under objectives 6 and 7 of SBP 2007/08.</i>	<i>Implemented- In progress</i>
9.42	<i>Participate in research programs and technical/operational workshops organised by LMWUA.</i>	<i>Implemented - In progress</i>
9.43	<i>Undertaking investigative work to determine suitable upgrading method for the existing Nyngan WTP</i>	<i>SCADA system-In progress</i>
11.44	<i>Long term water quality and performance data logs including trends and results should be kept in a designated electronic file location</i>	<i>Implemented SCADA system-In progress</i>
4.50	<i>Ensure sufficient funds are available to fund asset maintenance and replacement, through the development of the management plan or strategic business plan</i>	<i>Implemented \$60,000 budget allocated for main replacement in 2015</i>
5.52	<i>Document how customer complaints are used to inform system maintenance programs (e.g. flushing programs or pipeline replacement).</i>	<i>Implemented- Mainly on breaks and asset life – In progress</i>
5.53	<i>Document internal and external reporting measures for water quality monitoring.</i>	<i>Implemented</i>
5.54	<i>Document corrective procedures and communication systems for other non-conformances.</i>	<i>Implemented- In progress</i>

Action no.	Item	Status
6.55	Develop formal incident log sheets for recording of incident and management actions undertaken and for use in debriefing sessions	Implemented- In progress
6.56	Develop and incident and emergency response plan which contains information to guide staff in an incident and emergency. Ensure hard copies are controlled and available.	Part of IRP
8.57	Review Council's involvement in the Save Water alliance to improve communication with consumers.	Implemented with LMWUA
11.61	Establish procedures for long term performance evaluation of the water business within LMWUA.	Involved in the Water Security Program – In progress
12.62	Formalise management review of the water business	Involved in the Water Security Program – In progress
4.67	Replace the existing fluoridation system with a new system that complies with the NSW Code of Practice for Fluoridation of Public Water Supplies.	In progress with NSW Health and Public Work Dept

## 9 Review of DWMS implementation

NSW Public Works has done a review on 19h February 2015

Table 9-1. Summary of internal reviews

Element	Component	Finding	Action
N/A	N/A	N/A	N/A

Table 9-2. Summary of external reviews

Date	Reviewer	Scope	Summary of outcomes	Actions taken
19/02/2015	Glenn Fernandes	Reviewing Chlorination system	Calculation of C.t value	Confirm the effective disinfection
		Reviewing Chemical dosing system	Proposed an alternative dosing arrangement	If current process fails only

## 10 Reservoir inspections

Reservoir inspection progress

Date	Reservoirs inspected	Issue	Corrective actions
15/07/2014	Cobar St	Entry hatch is not sealed	Hatch has been sealed.
		Upper cage of internal ladder needs to be removed	In progress
15/07/2014	Terangion St	Entry hatch is not sealed	Hatch has been sealed.
		Upper cage of internal ladder needs to be removed	In progress



## Appendix A Water quality data

### A.1 Water quality graphs

- *Provided in Section-5*

### A.2 Water quality data summary

*This section includes the summary of available water quality data over the reporting period:*

- *Raw water – Council reported data*
- *Treated water - Council reported data*
- *Reticulation - Council reported data*
- *Verification – NSW Health reported data*

#### A.2.1 Raw Water

Parameter	Min	5 <sup>th</sup> per-centile	Median	95 <sup>th</sup> per-centile	Critical Limits	No. samples
Turbidity (NTU)	2	3	8	16	500	365
Colour (HU)	30	30	50	100	N/A	365
pH	6.8	7	7.2	8.2	8	365
Fluoride (mg/L)	0.08	0.14	0.17	0.21	0.9-1.5	294

#### A.2.2 Treated Water

Parameter	Min	5 <sup>th</sup> per-centile	Median	95 <sup>th</sup> per-centile	Critical Limits	No. samples
Turbidity (NTU)	0.1	0.2	0.5	0.9	1.5	365
Colour (HU)	0	0	0	0	0	365
pH	7	7.2	7.5	7.8	8	365
Fluoride	0.9	0.9	1.0	1.21	0.9-1.5	295
Free Chlorine (mg/L)	1.24	1.57	2.15	2.97	3.5	365

#### A.2.3 Reticulation

Parameter	Min	5 <sup>th</sup> per-centile	Median	95 <sup>th</sup> per-centile	Critical Limits	No. samples
Turbidity (NTU)	0.2	0.3	0.8	1.3	1.5	365
pH	6.8	7.1	7.35	7.7	8	364
Fluoride	0.86	0.9	1.01	1.21	1.5	295
Free Chlorine (mg/L)	0.1	0.15	0.36	1.26	3.5	365

### A.2.4 Verification monitoring (optional)

A summary of NSW Health's Drinking Water Quality Monitoring Program data is included here.

Parameter	Location	Min	5 <sup>th</sup> per- centile	Median	95 <sup>th</sup> per- centile	ADWG Limit	Unit	No. excee d- ances	No. samples
E. coli	Reticulation	0	0	0	0	0	Cfu /100ml	0	48
Free Chlorine	Reticulation	0.21	0.24	0.49	1.56	0.2-5	mg/L	2	48
pH	Reticulation	6.9	7	7.3	7.7	6.5-8.5		0	50
Turbidity	Reticulation	0.06	0.3	0.7	1	5	NTU	0	51
Fluoride	Reticulation	0.94	0.94	1.21	2.04	1.5	Mg/L	2	9

## Appendix B Improvement / Action Plan

- Element 1 Commitment to Drinking Water Quality Management
- Element 2 Assessment of the Drinking Water Supply System
- Element 3 Preventive Measures for Drinking Water Quality Management
- Element 4 Operational Procedures and Process Control
- Element 5 Verification of drinking water quality
- Element 6 Management of incidents and emergencies
- Element 7 Employee awareness and training
- Element 8 Community involvement and awareness
- Element 9 Research and development
- Element 10 Documentation and record keeping
- Element 11 Evaluation and audit
- Element 12 Review and continual improvement

Task No	Element	To Do Actions	Time	By whom	By when	Completed
1	4	Develop and implement a reticulation monitoring program to ensure the free chlorine residual in the distribution system is in line with NSW Office of Water (NOW)	DWMS			A typical format has been provided
2	4	Develop procedures and log sheets for the calibration of chemical dosing systems	DWMS			
3	4	Council must develop procedures for the delivery of chemicals	DWMS			Council to develop procedures based on the templates provided in the DWMS
4	5	Document daily testing procedures including the review of the water quality results at the water treatment plant.	DWMS		30/09/12	Has been prepared. Operators implement
5	5	The DWMS document must be updated to state who is responsible for reviewing the results in the NSW Drinking Water Database. Reviews must be conducted after the results of each microbial sample and monthly for trends and water quality implications.	DWMS			
6	5	Document daily testing procedures including who undertakes the daily review of the water quality results at the water treatment plant.	DWMS			Procedure to be developed

7	5	Document communication system to deal with unexpected water quality results at the water treatment plant.	DWMS			Not completed
8	6	Develop a contact list of key people, agencies and businesses for a water quality emergency in line with the NSW Guidance.	DWMS			Part of the IRP
9	6	Document in the DWMS where controlled copies of the emergency contact list is kept.	DWMS			Control
10	6	Document which agencies should be notified and under what circumstances and who is authorised to notify.	DWMS			As shown in the IRP
11	9	C.t should be calculated.	DWMS			NSW PW
12	11	An internal and external audit schedule should be developed in consultation with NSW Health and NOW.	DWMS			NSW Health
13	1	Ensure Staff and Councillors are aware of the National Health Guidelines which include the development of a Drinking Water Quality Management Plan.	Immediate			Complete
14	2	Prepare relevant SOPs and make sure they are practised by the operators.	Immediate		30/09/12	Have been prepared. Operators implement
15	3	Ensure Critical Control Points are documented.	Immediate		30/09/12	Have been prepared. Operators implement
16	3	Ensure Critical Control Points are monitored.	Immediate		30/09/12	Have been prepared. Operators implement
17	4	Implement the operational procedures that were developed	Immediate			
18	4	Include these procedures in the O&M manual and ensure they are also located where the activity is undertaken.	Immediate		30/09/12	These are displayed in the plant room.
19	4	Document corrective actions for critical control points	Immediate		30/09/12	Have been prepared. Operators implement
20	5	Document all operational procedures	Immediate		30/09/12	Have been prepared.



						Operators implement
21	6	Formalise how incidents and emergencies and reviewed and protocols updated.	Immediate		30/09/12	Have been prepared. Operators implement
22	1	Ensure regular (weekly or fortnightly) toolbox style meetings are held with technical and operational staff to ensure staff understands the practical implications and application of formal and regulatory requirements and to allow two way communication of issues. Minutes should be kept of these meetings.	Short term			Minutes to be kept.
23	2	Develop a formal maintenance schedule for sludge rake and other equipment in the water supply system.	Short term			The sludge rake is identified as critical. This needs to be addressed

24	2	Consider participating in CMA catchment management programs.	Short term			
25	2	Consider daily recording of weather conditions and river flows with raw water turbidity.	Short term			Done
26	2	Consider installing an on-line turbidimeter to measure filtered water turbidity.	Short term			Test chlorine sample on site rather than bring back to lab. There is a common turbidimeter on-line, however it would be more beneficial to add individual turbidimeters with the SCADA upgrade.
27	2	Consider automating filter backwash	Short term			Included in SCADA upgrade
28	2	Monitor filtered water turbidity data over a filter run to determine filter characteristics.	Short term			Included in SCADA upgrade
29	2	Formalise reticulation testing program and log all results. Test for chlorine prior to flushing.	Short term			In progress
30	4	Ensure these procedures are held in an operations and maintenance manual;	Short term			

31	4	Extend the documentation to include the daily monitoring;	Short term			Done
32	4	Document all corrective actions and formalise associated communication protocol.	Short term			
33	5	Ensure turbidity, Cl, pH and F are added to the daily log sheet.	Short term			This may be element 4 rather than 5.
34	5	Formalise water quality monitoring schedule for the distribution.	Short term			Done
35	5	Improve complaint recording through TRIMS.	Short term			Currently only a spreadsheet.
36	6	Document what information is accessed for the NOW performance Reporting Forms	Short term			
37	7	Regular (weekly or fortnightly) toolbox style meetings should be held with technical and operational staff to ensure two way communication of issues. Minutes should be kept.	Short term			Done
38	7	Develop and maintain a formalised training program for the employees.	Short term			Done
39	7	Share knowledge among the members of LMWUA and other neighbour Councils.	Short term			Done
40	8	Ensure water quality is considered during the community consultation as planned under objectives 6 and 7 of SBP 2007/08.	Short term			on-going
41	8	Council must develop an education program to ensure consumers understand the quality difference between the raw water and potable system.	Short term			Village water is non-potable. Advising rental agencies in currently in progress
42	9	Participate in research programs and technical/operational workshops organised by LMWUA.	Short term			Done
43	9	Undertake investigative work to determine suitable upgrading method for the existing Nyngan WTP	Short term			Included in the SCADA upgrade
44	11	Long-term water quality and performance data logs, including trends and results should be kept in a designated electronic file location.	Short term			Included in the SCADA upgrade
45	12	Implement the actions identified in the drinking water quality management improvement plan (Reference 3)	Short term			

46	1	When the Water Strategic Business Plan is updated ensure that levels of service include public health/water quality objectives	Medium term		Not Yet	The next WSBP will be in 2016
47	1	When the Water Strategic Business Plan is updated document public health/water quality implications of the operating environment review	Medium term		Not Yet	The next WSBP will be in 2016
48	1	When the Water Strategic Business Plan is updated ensure the operating review captures responsibilities in other documents such as Codes of Practice and Standards.	Medium term		Not Yet	The next WSBP will be in 2016
49	2	Ensure the risk assessment is reviewed every five years or if conditions or system knowledge changes.	Medium term		Not Yet	The next WSBP will be in 2016
50	4	Ensure sufficient funds are available to fund asset maintenance and replacement, through the development of the management plan or strategic business plan	Medium term			Mains replacement program in is progress. \$60k/year for pipe replacement work. 2014/15 there has been 500m of AC pipe replaced.
51	4	Formally document the maintenance program.	Medium term			
52	5	Document how customer complaints are used to inform system maintenance programs (e.g. flushing programs or pipeline replacement).	Medium term			Mainly on breaks and asset life
53	5	Document internal and external reporting measures for water quality monitoring.	Medium term			Done - Every Monday put onto Council database
54	5	Document corrective procedures and communication systems for other non-conformances.	Medium term			CCP report quarterly
55	6	Develop formal incident log sheets for recording of incident and management actions undertaken and for use in debriefing sessions	Medium term			Done
56	6	Develop and incident and emergency response plan which contains information to guide staff in an incident and emergency. Ensure hard copies are controlled and available.	Medium term			IRPs

57	8	Review Council's involvement in the Save Water alliance to improve communication with consumers.	Medium term			15 December - TV ads, school programs, info inserts with customer bills. \$5k/year allocated
58	9	Replace or upgrade the WTP with affordable appropriate technology.	Medium term		Not Yet	
59	10	Formalise document control system.	Medium term		Not Yet	On-going - formalised with the SCADA upgrade
60	10	Formalise documentation review system.	Medium term		Not Yet	On-going - formalised with the SCADA upgrade
61	11	Establish procedures for long term performance evaluation of the water business within LMWUA.	Medium term			Involved in the Water Security Program - \$10M grant for 2000ML off-river storage

62	12	Formalise management review of the water business	Medium term		Not Yet	
63	4	Provide a calibration cylinder for the sodium hypochlorite dosing pumps	Immediate			
64	4	Rearrange the chemical dosing points as shown in this report and assess the performance.	Immediate			
65	4	After completion of switchboard replacement and SCADA upgrade, flowpace all chemical dosing systems with the starting and stopping of the plant.	Immediate			
66	5	Measure chlorine residual at the outlet of the town reservoir from the sample point recommended by NSW Public Works.	Immediate			
67	4	Replace the existing fluoridation system with a new system that complies with the NSW Code of Practice for Fluoridation of Public Water Supplies.	Immediate			
68	4	Investigate replacing Alum with PACI for coagulation.	Medium term		Not Yet	
69	4	Consider diluting sodium hypochlorite to 6% for storage. Calculate the sodium hypochlorite	Medium term		Not Yet	

		dosage (for 6% solution strength) and check if the dosing pump capacity is suitable				
70	4	Install on-line turbidimeter and backwash filters on turbidity breakthrough once SCADA upgrade is completed.	Medium term		Not Yet	
71	4	Interlock starting and stopping of the fluoride dosing system with the operation and flowrate of the plant.	Medium term		Not Yet	

Figure: 4.1 Critical Control Points –Nyngan Water Treatment Plant

