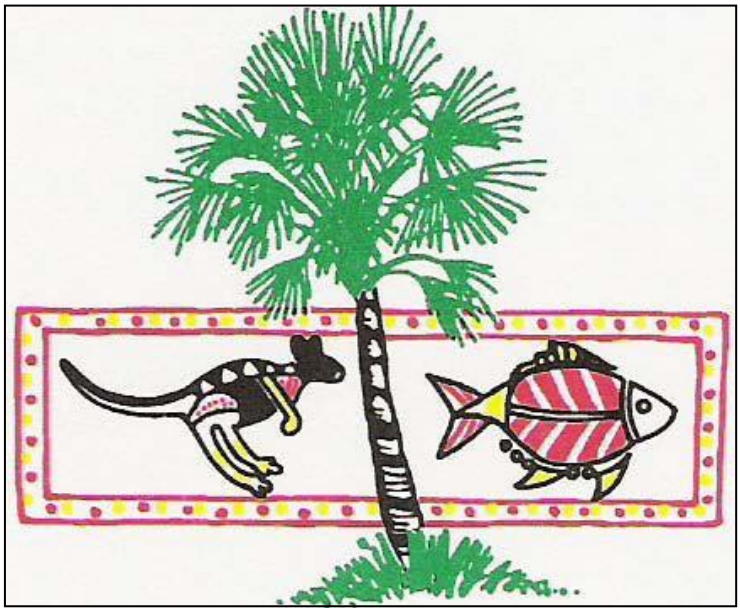
Kowanyama
Aboriginal Shire Council



Drinking Water Quality Management Plan

Version 2, July 2012
Update in response to OWSR additional information request

Registered Drinking Water Service Provider
Number 142

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1 Introduction

This Drinking Water Quality Management Plan (DWQMP) documents Kowanyama risk assessment and risk management process and provides a basis on which to maintain (and improve) the safety of the supply of Kowanyama drinking water. It describes what is actually undertaken and must be updated when practices change.

The DWQMP has been developed to meet the requirements of the *Water Supply (Safety and Reliability) Act 2008*. The Act is administered by the Office of the Water Supply Regulator who oversees compliance with drinking water monitoring and reporting requirements against drinking water quality standards.

2 Registered Service Details

The Kowanyama Aboriginal Shire Council community lies 25 km (as the crow flies) from the West coast of the Gulf of Carpentaria in the South-Western region of the Cape York Peninsular, and 600 kilometers North-West of Cairns.

Scheme name	Owner & Operator	Communities served	Current			Projected in 10 years		
			Pop.	Connections	Demand ML/d	Pop.	Connections	Demand ML/d
Kowanyama	Kowanyama Aboriginal Shire Council	Kowanyama	1200	260	0.9	2000	300	1.5

The average annual growth rate in Kowanyama Shire LGA between 2006 and 2011 was 1.9 per cent. (*Queensland Regional Profiles*, Office of Economic and Statistical Research, Queensland Treasury and Trade.)

Kowanyama Aboriginal Shire Council
30 Chapman Road
Kowanyama 4871

ABN: 86 255 216 480

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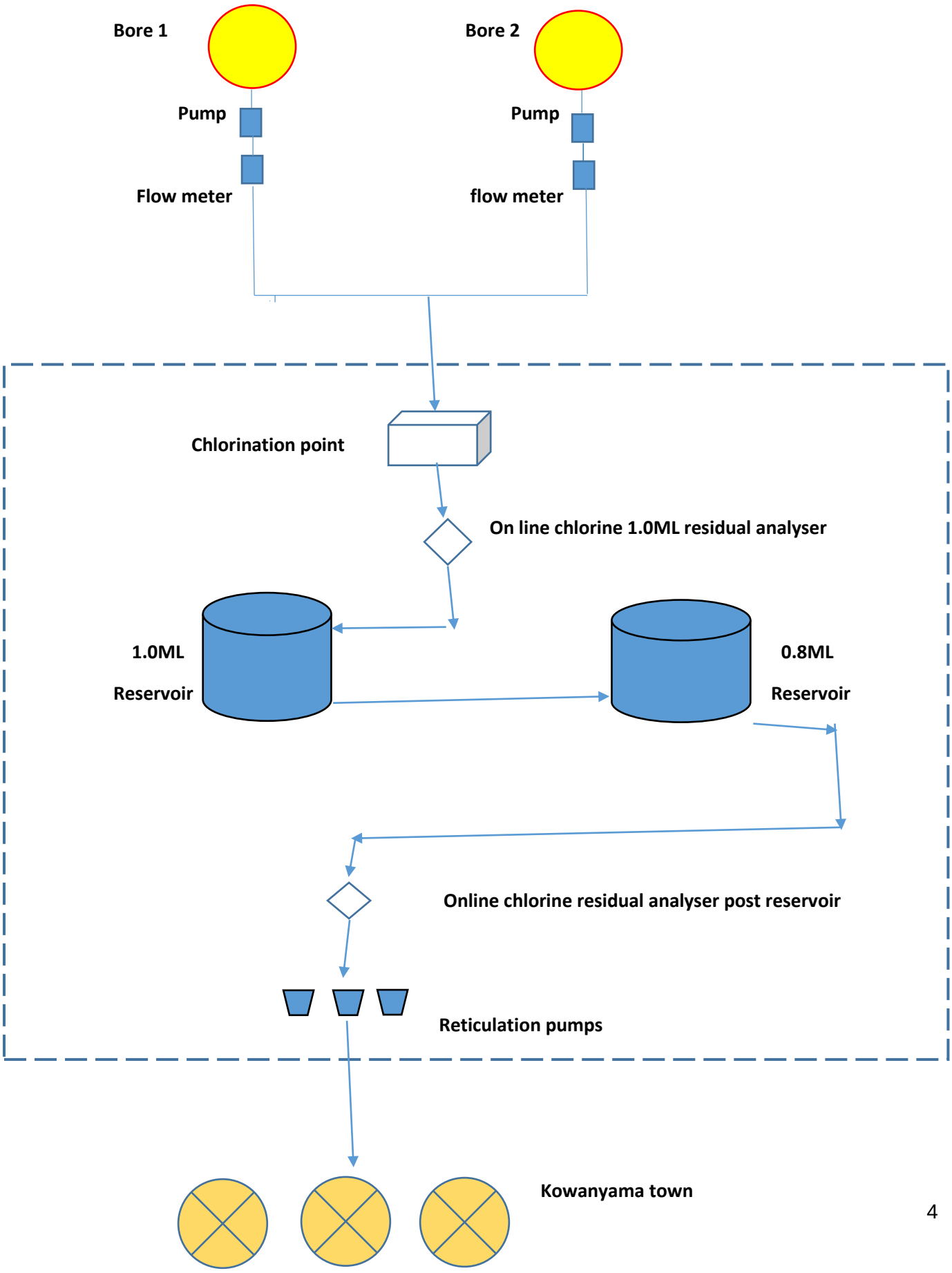
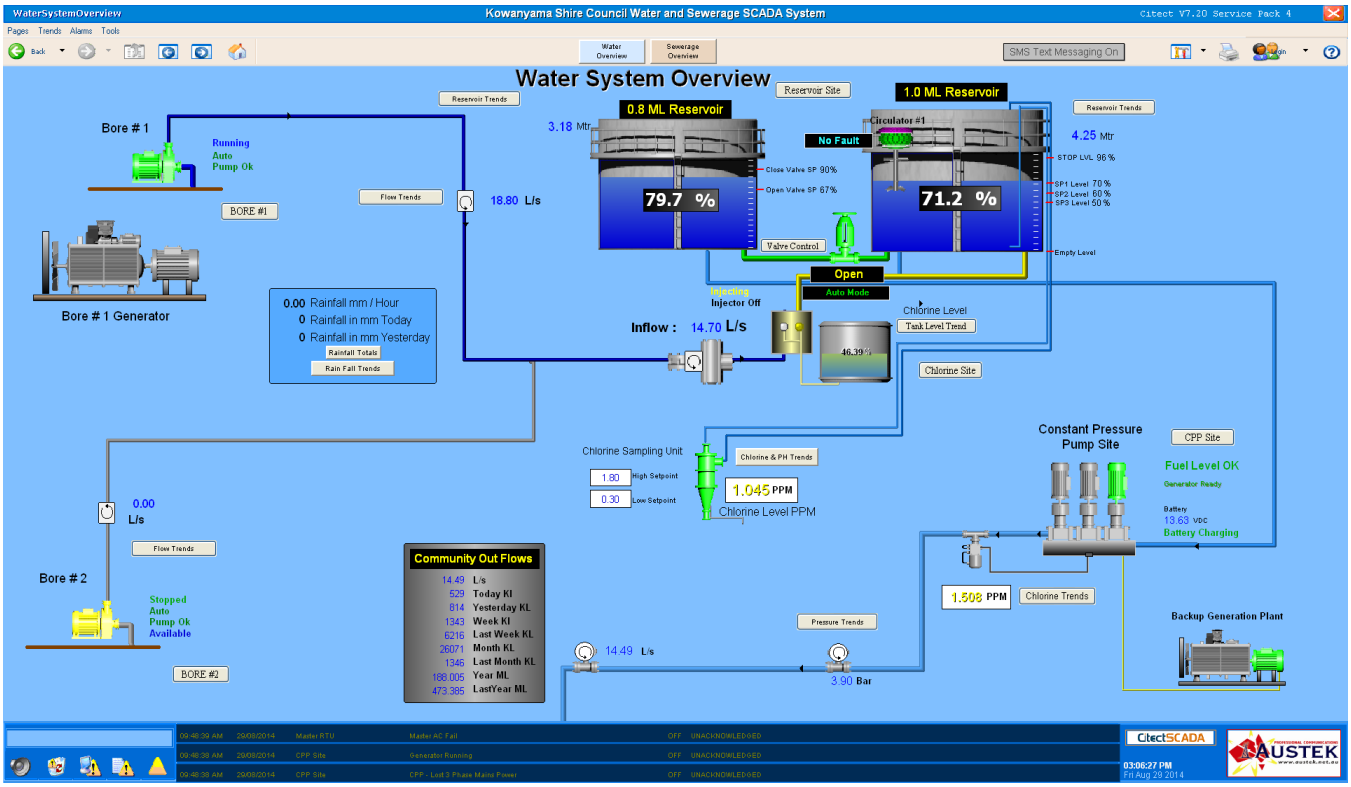
CEO E-Mail: Emil.Moul@kowanyama.qld.gov.au

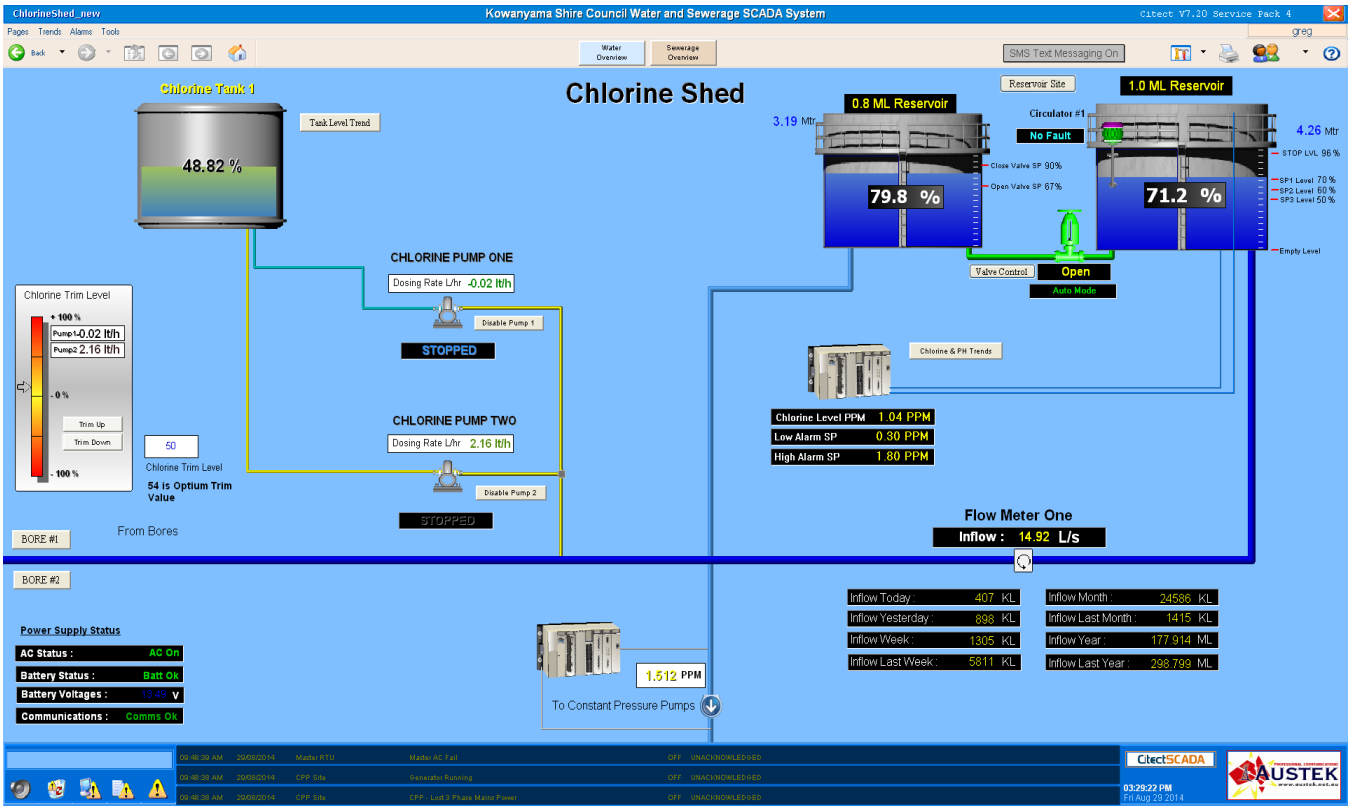
Website: http://www.kowanyama.qld.gov.au/kac/

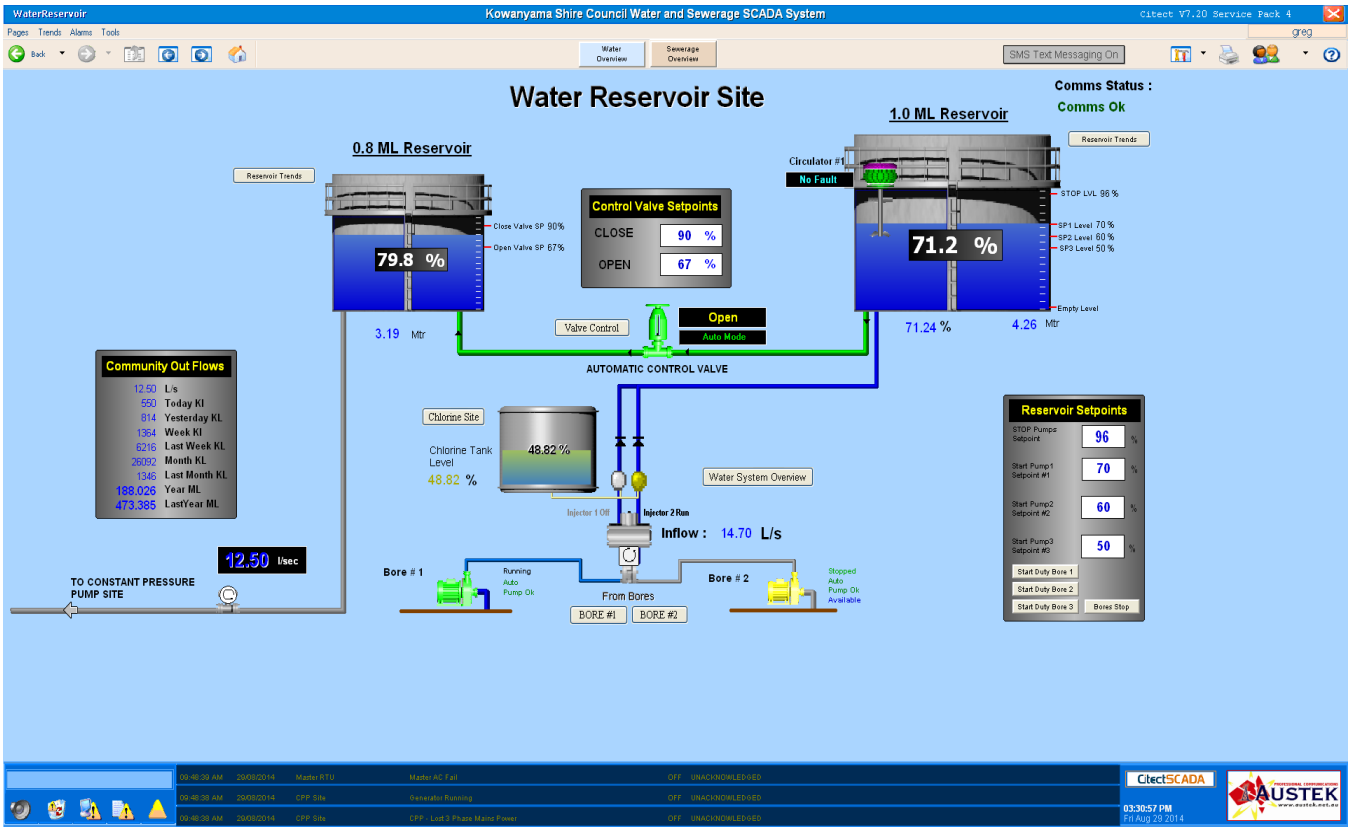
Details of water infrastructure-Kowanyama water supply schematic



SCADA schematic





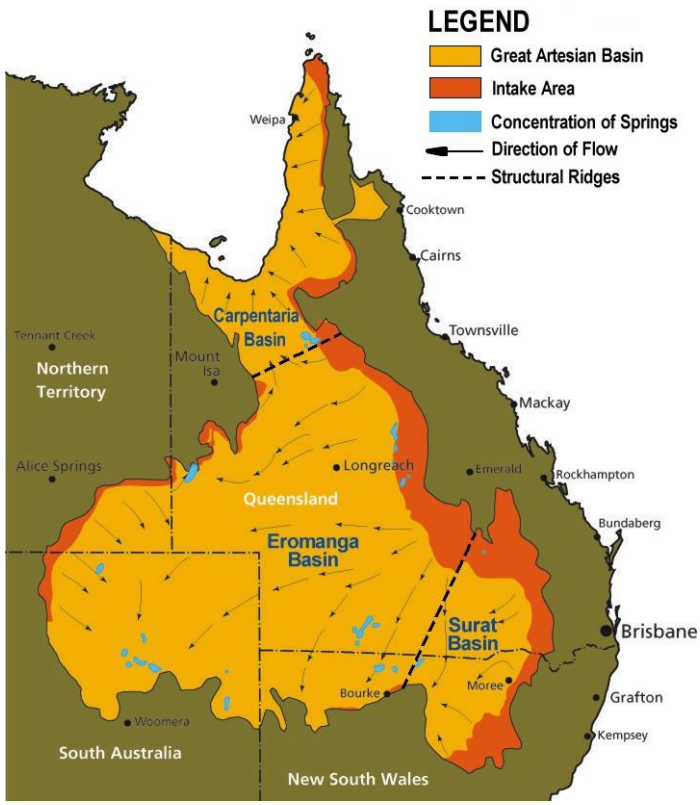

WaterReservoir
Kowanyama Shire Council Water and Sewerage SCADA System
Citect V7.20 Service Pack 4
Pages Trends Alarms Tools
greg
Back
Water Overview
Sewerage Overview
SMS Text Messaging On
Water Reservoir Site
Comms Status :
Comms Ok
0.8 ML Reservoir
1.0 ML Reservoir
Reservoir Trends
Circulator #1
No Fault
79.8 %
Close Valve SP 90%
Open Valve SP 67%
Control Valve Setpoints
CLOSE 90 %
OPEN 67 %
71.2 %
STOP LVL 96 %
SP1 Level 70 %
SP2 Level 60 %
SP3 Level 50 %
Empty Level
3.19 Mtr
Valve Control
Open
Auto Mode
71.24 %
4.26 Mtr
AUTOMATIC CONTROL VALVE
Community Out Flows
12.50 L/s
550 Today Kl
814 Yesterday KL
1364 Week Kl
6216 Last Week KL
26092 Month KL
1346 Last Month KL
188.026 Year ML
473.385 LastYear ML
Chlorine Site
Chlorine Tank Level
48.82 %
48.82 %
Water System Overview
Injector 1 Off
Injector 2 Run
Inflow : 14.70 L/s
Reservoir Setpoints
STOP Pumps Setpoint 96 %
Start Pump1 Setpoint #1 70 %
Start Pump2 Setpoint #2 60 %
Start Pump3 Setpoint #3 50 %
Start Duty Bore 1
Start Duty Bore 2
Start Duty Bore 3
Bores Stop
12.50 l/sec
TO CONSTANT PRESSURE PUMP SITE
Bore # 1
Running
Auto
Pump Ok
From Bores
BORE #1
BORE #2
Bore # 2
Stopped
Auto
Pump Ok
Available
09:48:39 AM 29/08/2014 Master RTU Master AC Fail OFF UNACKNOWLEDGED
09:48:39 AM 29/08/2014 CPP Site Generator Running OFF UNACKNOWLEDGED
09:48:39 AM 29/08/2014 CPP Site CPP - Lost 3 Phase Mains Power OFF UNACKNOWLEDGED
CitectSCADA
03:30:57 PM
Fri Aug 29 2014
AUSTEK

3.1 Catchment Characteristics

Description[1]

Kowanyama's artesian bore water is sourced from the Bulimba Formation overlying the Carpentaria Basin.

The Bulimba Formation is predominantly recharged via infiltration of rainfall in outcrop areas and via some upward leakage from underlying GAB aquifers, as shown in the diagram alongside. In the Mitchell River region of the basin, recharge occurs primarily along the elevated margins of the basin on the western side of the Great Dividing Range, remote from the area of utilization.



The Bulimba formation contains artesian aquifers typically not in hydraulic connection with each other.

A study published by the Department of Natural Resources and Mines (Qld) in 2005, found that near continuous pumping for the Kowanyama community water supply had resulted in a localized depression of approximately 25 m in potentiometric head. This drop in pressure had not been measured in bores outside the Kowanyama town area, suggesting that there was very limited connectivity between the discontinuous aquifers of the Bulimba Formation.

Pastoral production from native pastures is the most extensive land use within the region. It was reported that historically there have been scattered, relatively small-scale mining activities.

There is a strong seasonality in rainfall patterns, with most rain falling in the wet season from November to March and very high dry season evaporation.

3.2 Source

Local Area Characteristics of Bores

Characteristics	Details
Topography	Flat. Not normally able to flood the bores, however water draining off the town may cause temporary flooding within town areas.
Soil type	Aquifer is not thought to recharge rapidly due to its depth. Clay soil.
Monthly rainfall (min, max, average)	1263mm annually. Most rain occurs in the wet season Nov - Mar
Incidence of flooding and bushfires	The bores are situated in and reasonably close to town and so are unlikely to be affected by bushfires. No incidences in recent years

[1] CSIRO (2009) Water in the Mitchell region, pp. 347-416 in CSIRO (2009) Water in the Gulf of Carpentaria Drainage Division. A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project. CSIRO Water for a Healthy Country Flagship, Australia. xl + 479pp

DNRM (2005) Hydrogeological framework report for the Great Artesian Basin resource plan area. Queensland Department of Natural Resources and Mines.

DERM, The Great Artesian Basin factsheet, February 2011, http://www.derm.qld.gov.au/factsheets/pdf/water/w68.pdf

Land use	Residential, pastoral
Agriculture, industry, mining	None
Potential sources of microbial and chemical contamination in the catchment	None

The bore heads are all raised with a concrete slab around the bores to seal them from surface water ingress. All bores are fenced and locked. Supply will be augmented with a third bore planned to be drilled in 2012. This will provide increased security of supply and help meet future demand. Summer demand has been readily met with 2 bores in the past; however their yield is steadily declining as expected due to clogging of the bore screens with age.

	Bore 1	**Bore 2**
Location	Adjacent to Council Offices eastern side of town Long 141.747404, Lat -15.472237 NRW bore no. 45019	North-West of township. Adjacent to old slaughter house which is no longer operational Long 141.738764, Lat - 15.471058
Operation	Generally flows under artesian pressure to the ground level reservoirs. Pumps through a 670 m long 150 mm diameter pvc main to both ground level storage reservoirs. Refurbishment and/or replacement of the water mains was completed in 2011. Pumps commissioned in 2007 are necessary to deliver water at the end of the dry season to satisfy the community water demand.	Generally flows under artesian pressure to the ground level reservoirs. Pumps commissioned in 2004 are necessary to deliver water at the end of the dry season to satisfy the community water demand. The two bores automatically alternate when the storages require filling. If Bore two is on and cannot meet demand, then
Aquifer type	Artesian Bulimba formation	Artesian Bulimba formation
% of supply	Bore one pumps water in sequence with bore two , they pump water constantly to reservoirs to meet demand until reservoir level is met then turns off, bore one delivers water at higher liters per second than bore two, demand much higher in the dry	Bore two pumps water in sequence with bore one , they pump water constantly to reservoirs to meet demand until reservoir level is met then turn off , bore one delivers water at higher liters per second than bore two, demand much higher in the dry
Reliability	Historically impacted during droughts. Artesian head drops during dry season, initiating pump via telemetry. Currently reliable supply with depletion date estimated beyond 2013. No rapid recharge from rain. Constructed around 1982	Historically impacted during droughts. Artesian head drops during dry season, initiating pump via telemetry. Currently reliable supply with depletion date estimated beyond 2013. No rapid recharge from rain. Constructed around 1982
Pump type	Grundfos centrifugal 3-phase Backup generator at bore one in the process of linking into SCADA for automatic start up in the event of power failure	Grundfos centrifugal 3-phase No backup power for bore two
Capacity	18 L/s pumped, 5-6L/s natural flow	9 L/s pumped, 2-4 L/s natural flow

Bore depth (m)	220 including final 10m of screen.	220 including final 10m of screen.
Bore head details	Raised head. Qld Gov. approved design.	Raised head. Qld Gov. approved design.
Diameter, casing and material	200 mm, cased, cast iron with pvc	150 mm, cased, cast iron with pvc
Water quality issues	Naturally elevated fluoride and iron levels.	Naturally elevated fluoride and iron levels.

3.3 Treatment

The source is a bore protected from potential surface water microbiological contamination. In addition, the historical water quality also shows that having disinfection only is suitable, as a protective measure against potential reticulation contamination.

The only treatment is disinfection with liquid sodium hypochlorite before entering the reservoir storages. Chlorine dosage is controlled according to flow rate into the reservoirs. Adequate dosage is easily maintained during peak water usage and dose rate is also well controlled during low flow trickle into the reservoirs. By-passing chlorination is not possible. Any power failures would trigger an alarm on SCADA. There are no sources that do not undergo chlorination.

Disinfection

Location	Immediately after the supply flow meter prior to entering the storage reservoirs at the Water Compound/Depot Shed. Feed from bores 1 and 2 combine before disinfection. Bore 3 will be a separately disinfected pipe with duty and standby equipment. Bore 3 construction work has been suspended until further notice
Type	Sodium hypochlorite injection with 10% solution
Dose rate	Varies according to inflow rate.
Target residual level	Aim is for a routine residual of 0.2mg/L free chlorine in the reticulation network at 5 monitoring sites around town.
Duty / standby	Two dosing pumps alternate automatically. Back-up generator available with auto start.
Dosing arrangement	Flow paced based on flow into storage reservoirs
Alarms	Failure, high/low. Approx. 1.99mg/L high alarm and approx. 0.08 mg/L low alarm at the pumps from storages into town.
Chemicals added, storage and turnover	Sodium hypochlorite from 200L drums stored in a purpose built storage shed meeting Aus. Stds for safety, decanted into 1000L tank.
Inspection schedule	Daily operational monitoring and inspection of equipment, recorded on daily work schedule.

Reservoirs

Both bores combine to supply water to both reservoirs simultaneously. Supply from both reservoirs combines into a common main which feeds town.

Capacity	0.8ML	1ML
Location	At the Water Compound/Depot Shed, Long 141.746935, Lat -15.475666 Constructed around 1997/1998	Same location. Constructed around 2007
Type	19.1 m diameter A-Betong concrete ground level. Epoxy coated inside.	Concrete, ground level. Epoxy coated inside.
Roofed	Yes	Yes
Vermin-proof	Yes	Yes
Runoff from roof	Sloping roof directs run-off onto the ground	Sloping roof directs run-off onto the ground
Cleaning schedule	Approximately 12 monthly, lots of sediment accumulates	

Filling	Major redirection of water configuration to avoid stagnate water and inconsistent chlorine readings of the past, have gone back to original engineer design before it was tampered with. Water flows to reservoir one and fills up until required level has been reached then shuts off bore flow. Water then runs into the .8 meg reservoir [once a certain depletion water level has been reached] via an actuating valve and fills up again to required height has been reached. Water from the .8 reservoir is then pumped out into the community

An old elevated storage reservoir was removed due to structural integrity issues with the stand which remains on site.

3.4 Distribution and Reticulation

Pumps into reticulation

Capacity	Up to 600kPa, 22 L/s at 17 m head. Grundfos CR64
Duty/standby	Yes (3 pumps, generally not all required) - They auto adjust turbine speed according to demand. They all run independently and share the work according to flow demand. They don't serve different regions of the reticulation. Back-up generator available with auto start.
Inspection schedule	Daily as per work schedule Alarms – low pressure, power failure

Reticulation network

Pipe material(s)	PVC.
Age range	Majority of reticulation was replaced in 2011. Existing pvc was installed in 1989.
Length of mains	16.5 km
Issues with dead ends	No
High pressure issues	No
Low pressure issues	No
Reticulation type	Pumped
Flushing schedule	Yes, yearly works schedule to remove sediments.
Still old AC line connected to water mains but not Feeding any houses	

3.5 Key Stakeholders

Organization	Contact name and details	Relevance to management of drinking water quality	How the stakeholders is engaged in the DWQMP
Kowanyama community	Particular vulnerable customers listed in Incident and Emergency Response section.	Consumers	Informed of water quality issues as they arise.
Chemical suppliers		Appropriate quality chemicals, availability and supply of stock	Drums have specifications printed on them e.g. strength, impurities. Ordered as needed - No issues with obtaining supply when required. Larger stock of chlorine kept on site over wet season of 4-7 months.
Office of the Water Supply Regulator (OWSR)	Office of Water Supply Regulator Incident Hotline: 1300 596 709 (24/7) PO Box 15456, City East QLD 4002	Drinking water supply regulator	Report incidents on 1300 596 709 when detection *of Escherichia coli* (*E. coli*) and chemical parameter above health guideline value in ADWG in potable water supply; Report an event likely to affect drinking water quality in potable water supply.
Cairn Public Health Unit, Queensland Health	Director Environmental Health Ph.: 4226 5604 PO Box 1103, Cairns, Qld 4870	Point of contact for assistance with public health issues related to water supply.	Provides advice during any public health incidents
CEO and Elected Council		Provides overall management, budget and finance resources to deliver services	Kept up to date and informed of water operations. Submits DWQMP to OWSR for approval.
Cairns Regional Council laboratory	Laboratory Manager Ph.: 4044 8344 PO Box 359 Cairns, QLD 4870	NATA certified laboratory where water samples are sent for analysis	Scheduled water samples from the drinking water supply are collected and sent to this laboratory for analysis.

4 Identify Hazards and Hazardous Events

4.1 Water Quality Information

A detailed annual water analysis of both bores revealed the following, all metals and physical parameters were well under the ADWG health guideline values, except fluoride being at the higher end of the recommended ADWG health guidelines

Cairns Regional Council Water & Waste
Laboratory Services
38 MacNamara Street
MANUNDA, QLD 4870
Australia

Tel: (07) 4044 8344
Fax: (07) 4044 8333
email: laboratory@cairns.qld.gov.au

Certificate of Analysis

Final Report

Project No: 070719
Report ID: 10354

Attention: **Greg Sandrey**
Client: **Kowanyama Aboriginal Shire Council**
Address: PO Box 994
NORTH CAIRNS QLD 4871

Date Received: **2/07/2014 9:30am**
Date Issued: **08-Jul-2014**

The sample(s) referred to in this report were analysed by the following method(s):

Analysis	*Method*	*Laboratory*	*NATA Accredited*
Anions	TPA280	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
Anions - Fluoride	TPA370	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
ICPMS Metals - Total	TPC015	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
ICPOES Metals - Total	TPC360	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
EC, pH, Alkalinity	TPP030, 050, 010	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
Solids - Total Dissolved	TPP060	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓
Turbidity	TPP090	Cairns Regional Council Water & Waste (Accreditation # 14206)	✓

The result(s) in this report were authorised by:

Name	*Title*	*Qualifications*
Darren Saint	Scientist (Chemistry)	B. App. Sc. (Env. Science)
Melissa Aalbers	Scientist (Chemistry)	B. Sc. (Chemistry/Zoology) MRACI CChem
Mark Butler	Scientist (Chemistry)	undertaking B. Sc.
Robyn Lale	Technical & Quality Coord. (LIMS Administrator)	B. App. Sci., MBA, MRACI C Chem

Principal Contact for this Report:

Mark Wuth
Laboratory Manager

LRN: 219966

Date Sampled: 01-07-2014 11:00am

Kowanyama - Bore No 1

Received at Lab: 02-07-2014 09:40am

	Method	Analyte	Result	LOR	Guideline	Date Started
Metals						
219970	ICPMS Metals - Total	ICPMS Aluminium	0.007 mg/L	<0.005		02-07-2014
		ICPMS Arsenic	<0.001 mg/L	<0.001	≤ 0.01 mg/L	02-07-2014
		ICPMS Cadmium	<0.0001 mg/L	<0.0001	≤ 0.002 mg/L	02-07-2014
		ICPMS Copper	0.041 mg/L	<0.001	≤ 2.0 mg/L	02-07-2014
		ICPMS Iron	0.090 mg/L	<0.01		02-07-2014
		ICPMS Lead	0.002 mg/L	<0.001	≤ 0.01 mg/L	02-07-2014
		ICPMS Manganese	0.004 mg/L	<0.001	≤ 0.5 mg/L	02-07-2014
219968	ICPOES Metals - Total	ICPOES Silicon	20 mg/ L SiO2	<0.10		03-07-2014
		Calcium	0.90 mg/L	<0.20		03-07-2014
		Magnesium	0.71 mg/L	<0.10		03-07-2014
		Potassium	3.0 mg/L	<0.10		03-07-2014
		Sodium	160 mg/L	<1		03-07-2014
		Total Hardness	5.2 mg CaCO3 / L	<1		03-07-2014
General Chemistry						
219968	Solids - Total Dissolved	Total Dissolved Solids	340 mg/L	<1		02-07-2014
Physical Properties						
219968	EC, pH, Alkalinity	Electrical Conductance	610 uS/cm	<1		02-07-2014
		pH	8.1	<0.1		02-07-2014
		Total Alkalinity	220 mg CaCO3 / L	<0.1		02-07-2014
219968	Turbidity		0.2 NTU	<0.1		03-07-2014
Nutrients and Anions						
219968	Anions - Fluoride	Fluoride	1.5 mg/L	<0.02	≤ 1.5 mg/L	03-07-2014
219968	Anions	Sulphate	<1 mg/L	<1		07-07-2014
		Chloride	64 mg/L	<0.1		07-07-2014

LRN: 219967

Date Sampled: 01-07-2014 11:00am

Kowanyama - Bore No 2

Received at Lab: 02-07-2014 09:40am

Method	Analyte	Result	LOR	Guideline	Date Started
Metals					
219973 ICPMS Metals - Total	ICPMS Aluminium	0.005 mg/L	<0.005		02-07-2014
	ICPMS Arsenic	<0.001 mg/L	<0.001		02-07-2014
	ICPMS Cadmium	<0.0001 mg/L	<0.0001		02-07-2014
	ICPMS Copper	0.038 mg/L	<0.001		02-07-2014
	ICPMS Iron	0.130 mg/L	<0.01		02-07-2014
	ICPMS Lead	0.013 mg/L	<0.001		02-07-2014
	ICPMS Manganese	0.004 mg/L	<0.001		02-07-2014
219971 ICPOES Metals - Total	ICPOES Silicon	20 mg/ L SiO2	<0.10		03-07-2014
	Calcium	0.76 mg/L	<0.20		03-07-2014
	Magnesium	0.71 mg/L	<0.10		03-07-2014
	Potassium	2.9 mg/L	<0.10		03-07-2014
	Sodium	160 mg/L	<1		03-07-2014
	Total Hardness	4.8 mg CaCO3 / L	<1		03-07-2014
General Chemistry					
219971 Solids - Total Dissolved	Total Dissolved Solids	350 mg/L	<1		02-07-2014
Physical Properties					
219971 Turbidity		0.2 NTU	<0.1		03-07-2014
219971 EC, pH, Alkalinity	Electrical Conductance	620 uS/cm	<1		02-07-2014
	pH	8.2	<0.1		02-07-2014
	Total Alkalinity	220 mg CaCO3 / L	<0.1		02-07-2014
Nutrients and Anions					
219971 Anions - Fluoride	Fluoride	1.4 mg/L	<0.02	≤ 1.5 mg/L	03-07-2014
219971 Anions	Sulphate	<1 mg/L	<1		07-07-2014
	Chloride	71 mg/L	<0.1		07-07-2014

Explanatory Notes for this Project

Responsibility for sampling lies with the CUSTOMER. Samples analysed as received.

Cairns Regional COUNCIL
Water and Waste

Client: Kowanyama Aboriginal Shire Council

Project No: 071064
Report ID: 10404
Date Issued: 11-Jul-2014

LRN: 226109

Kowanyama - Bore No 2

Date Sampled: 08-07-2014 1:30pm
Received at Lab: 09-07-2014 09:33am

	Method	Analyte	Result	LOR	Guideline	Date Started
Metals						
226110	ICPMS Metals - Total	ICPMS Lead	0.001 mg/L	<0.001	≤ 0.01 mg/L	09-07-2014

Guideline Compliance Comment:
This sample meets the NH&MRC (2011) guidelines for drinking water for the parameters tested.

Explanatory Notes for this Project

Responsibility for sampling lies with the CUSTOMER. Samples analysed as received.

The water quality from the bores has remained consistent throughout the wet and dry seasons over the years. No obvious events were identified when assessing a spreadsheet of all daily routine water quality data records on site.

As a result of the assessment of these results, only relevant results were included in the Risk Assessment table.

No water quality complaints have been received from the community however some community members would rather not have chlorine added for disinfection of the water. One failed water sample came back from the Cairns laboratory in 2013-2014 recorded year of high E-coli reading , another sample was taken and was found to be ok so was put down to incorrect sampling technique.

22/11/2013

E.coli detection at school est. 1 CFU /100ML	***caused by incorrect sampling technique***

.

5 Assessment of Risks

5.1 Methodology

The methodology used for the risk assessment has been adopted from the OWSR publication *Preparing a Drinking Water Quality Management Plan Supporting Information (Sept 2010).* The definitions of likelihood, consequence and uncertainty are presented below.

Rare	Occurs less than or equal to once every 5 years
Unlikely	Occurs more often than once every 5 years and up to once per year
Possible	Occurs more often than once per year and up to once a month (12/yr.)
Likely	Occurs more often than once per month (12/yr.) and up to once per week (52/yr.)
Almost Certain	Occurs more often than once per week (52/yr.)

Consequence	Descriptors
Insignificant	Isolated exceedence of aesthetic parameter with little or no disruption to normal operation
Minor	Potential local aesthetic, isolated exceedence of chronic health parameter
Moderate	Potential widespread aesthetic impact or repeated breach of chronic health parameter
Major	Potential acute health impact, no declared outbreak expected
Catastrophic	Potential acute health impact, declared outbreak expected

Likelyhood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium (6)	High (10)	High (15)	Extreme (20)	Extreme (25)
Likely	Medium (5)	Medium (8)	High (12)	High (16)	Extreme (20)
Possible	Low (3)	Medium (6)	Medium (9)	High (12)	Highh (15)
Unlikely	Low (2)	Low (4)	Medium (6) Low	Medium (8)	Highh (10)
Rare	Low (1)	Low (2)	(3)	Medium (5)	Medium (6)

Level of Uncertainty	Definition
Certain	There is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring; or The processes involved are thoroughly understood.
Confident	There is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or for the duration of seasonal events; or There is a good understanding of the processes involved.
reliable	There is at least a year of continuous monitoring data available, which has been assessed; or There is reasonable understanding of the processes Involved.
Estimate	There is limited monitoring data available; or There is limited understanding of the processes involved.
Uncertain	There is limited or no monitoring data available; or The processes are not well understood.

5.2 Acceptable Risk

Risks scored as Low were classified as acceptable risks. Risks with a rating of medium and higher in the risk assessment (unacceptable risks) have an associated item entered in the Improvement Plan later in this document. In a few places a risk score of Low also has an improvement action. In these places, the uncertainty level was high (estimate) hence it was decided to implement an improvement (or best practice). These risks will be re-evaluated during review of the DWQMP to ascertain that the risk level remains low (with an improved uncertainty level).

5.3 Hazard identification, risk assessment and uncertainty matrices

Catchment and source infrastructure

Hazard	Hazardous event	Max risk			Existing preventive measures / barriers	Res risk			Uncertainty	Risk management improvement action	Relevant procedures & records
		Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level			
Bacteria (harmful)	Local pooling around bore head causing	Catastrophic	Possible	High	Bore head is raised and sealed to Australian and Qld Got standards.	Minor	Rare	Low	Confident		NA
Fluoride	Natural geology	Moderate	Almost certain	High	Draft factsheet on fluoride impacts and management options for community developed	Minor	Almost certain	High	Confident	Approve and distribute factsheet to community	NA
No water	Bore collapse, blocked screen	Major	Rare	Medium	2 bores, periodic inspections of bore head area(inspection sheet filled in)	Insignificant	Rare	Low	Confident		
Blockage of bores	Natural iron oxidizing bacteria cause blockage or increased sediment	Moderate	Possible	Medium	Natural aeration (drops from >.5m down inlet into reservoir)	Minor	Possible	Medium	Estimate	Chlorination of bores and assessment of presence and any future controls is scheduled for 2012. (DWQMPIP item 2)	NA
Metals, radiological (arsenic, manganese)	Natural geology	Moderate	Likely	High	Snapshot monitoring data shows no other hazards identified in local groundwater	Insignificant	Rare	Low	Reliable		NA

Disinfection process

Hazard	Hazardous event	Max risk			Existing preventive measures / barriers	Res risk			Uncertainty	Risk management improvement plan
		Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Bacteria (no residual)	Chlorine dose pump failure	Major	Possible	High	2 pumps, SCADA alarms, daily inspections	Minor	Unlikely	Low	Confident	

	Insufficient chlorine contact time	Major	Possible	High	No short circuiting (Filled from top, mushrooms over). >30 minutes contact time prior to first customer	Minor	Unlikely	Low	Confident	NA
	Insufficient mixing of chlorine	Major	Possible	High	No short circuiting (Filled from top, mushrooms over).	Minor	Unlikely	Low	Estimate	Install solar bee mixers
	No chlorine stock	Major	Possible	High	Level in chlorine tank monitored via SCADA and alarmed, inspection Through work schedules. Regularly stocked	Minor	Unlikely	Low	Confident	
	Poor / weak chemical strength (Purchased). Degrading strength of chlorine (storage)	Major	Possible	High	Residual chlorine tested daily in treated water to adjust / increase chlorine dose rate	Minor	Unlikely	Low	Confident	
	Low dose	Major	Possible	High	SCADA alarms, daily inspections, Residual chlorine tested daily at reticulation sites to adjust / increase chlorine	Minor	Unlikely	Low	Confident	
Chemical	Overdose of chlorine	Major	Possible	High	SCADA alarms, daily inspections, Residual chlorine tested daily to adjust / increase chlorine dose rate	Minor	Unlikely	Low	Confident	
	Chlorate	Minor	Likely	Moderate	Staff write the date delivered on each drum on arrival. Stock used from oldest to newest.	Minor	Possible	Medium	Confident	

Reservoirs

Hazard	Hazardous event	Max risk			Existing preventive measures / barriers	Res risk			Uncertainty	Risk management improvement plan
		Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Bacteria (no residual chlorine)	Vermin entry, rainfall runoff from reservoir roof	Major	Possible	Medium	Both reservoirs roofed and water proofed, vermin proofed. Inspected as per work schedules. Disinfection.	Minor	Rare	Low	Confident	
Turbidity, iron deposits	Sediment build up	Moderate	Possible	Medium	Reservoirs drained and cleaned annually (as per work schedule)	Minor	Unlikely	Low	Reliable	
No water	Bore to reservoir pumps not working	Moderate	Possible	Medium	2 pumps, SCADA alarms, daily inspections, can fill through natural bore head	Insignificant	Rare	Low	Confident	
Structural integrity	From pH reacting with cement walls	Minor	Likely	Medium	Epoxy coating on reservoir insides	Insignificant	Rare	Low	Confident	

Reticulation

Hazard	Hazardous event	Max risk			Existing preventive measures / barriers	Res risk			Uncertainty	Risk management improvement plan
		Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Bacteria (harmful)	Pipe breaks / main breaks (age, pressure)	Major	Possible	High	New and refurbished water Mains (2011). Australian standards for main breaks repairs. Disinfection.	Minor	Unlikely	Low	Reliable	
Bacteria or chemical	Backflow from reticulation sites	Major	Rare	Medium	Potential backflow points have mechanisms preventing this. E.g. Backflow Swing checks valves. RPZs, air brakes on tanks - located e.g.	Moderate	Rare	Low	Reliable	

					systems, residential houses with storage tanks (all QBuild), hospital, batching plant.					
Turbidity	Pipe breaks / main breaks (age, pressure)	Moderate	Possible	Medium	New and refurbished water Mains (2011). Disinfection.	Minor	Unlikely	Low	Reliable	
No water	Pipe breaks / main breaks (age, pressure)	Moderate	Possible	Medium	New and refurbished water mains (2011)	Minor	Unlikely	Low	Confident	
	Failure of transfer pumps	Moderate	Possible	Medium	3 pumps, daily inspections.	Minor	Unlikely	Low	Confident	

Whole of Service

Hazard & Hazardous event	Max risk			Existing preventive measures / barriers	Res risk			Uncertainty	Risk management improvement plan
	Consequence	Likelihood	Risk level		Consequence	Likelihood	Risk level		
Vandalism	Major	Possible	Medium	Bores and reservoirs fenced and secured.	Minor	Rare	Low	Confident	
SCADA failure	Major	Possible	Medium	24 hour technical service support from Cairns. Backup generator for power failure. Daily visual inspections of equipment monitored by SCADA.	Minor	Rare	Low	Confident	Upgrading SCADA system to stage 4.
Untrained staff (formally)	Major	Possible	Medium	On the job training, external training	Minor	Possible	Low	Reliable	Explore opportunities to upgrade staff skills.
Standard operating procedures	Major	Possible	High	SOPs present	Minor	Unlikely	Low	Confident	Ongoing – revised as required.
Staff safety - chemical handling	Major	Rare	Medium	Staff have been trained, no accidents	Minor	Rare	Low	Confident	

6 Managing Risks

6.1 Risk Management Improvement Program

The risk management improvement actions from the hazard identification and risk assessment matrices have been reproduced in the below table as the risk management improvement program.

Catchment and source infrastructure

Item	Hazard	Hazardous event	Risk management improvement action	Priority	Timeframe	Responsibility
1	Fluoride	Natural geology	Approve and distribute factsheet to community members	High	Oct 2012	ESM, Council, QH
2	Iron	Natural iron bacteria blocking bore screens and equipment	Shock treatment of bores planned to prevent growth of iron oxidizing bacteria (with Blue Block product)	Medium	Oct 2012	ESM
3	All	Significant change to scheme setup when third bore becomes operational	Update plan when operational E.g. schematic, risk assessment; monitoring and resubmit plan to OWSR	High	Suspended until further notice	ESM

Disinfection process

Item	Hazard	Hazardous event	Risk management improvement action	Priority	Timeframe	Responsibility
4	Bacteria (no disinfection residual)	Insufficient mixing of chlorine	solar bee mixers have been installed and reconfigured pipework back to original design	High	completed	ESM

Whole of Service

Item	Hazard and Hazardous event	Risk management improvement action	Priority	Timeframe	Responsibility
5	SCADA failure	Constantly up grading , system over hauled in 2014 so SCADA systems better communicate with each other	medium	On going	ESM
6	Increase relevant staff qualifications	Identify opportunities to upgrade staff skills (e.g. from Cert II to Cert III in Water & Sewerage).	High	On going	ESM
7	Operation and maintenance procedures	Include document control on procedures and records.	High	On going	ESM
8	Operation and maintenance procedures	Review to see that all maintenance activities are documented (as per preventive measures).	Medium	On going	ESM
9	Incident and Emergency response	Prepare community alert templates in preparation (e.g. obtain Qld Health templates)	Medium	On going	ESM

6.2 Operation and maintenance procedures

The following work checklists, records and procedures are used in the operation of the drinking water scheme. The ESM is responsible for delegating the tasks on the checklists.

Item Name	Date
Daily data record sheet (WQ monitoring results)	On going
Kowanyama Essential Services Work Schedule for Operation and Maintenance of Infrastructure – Daily and Weekly Checklist	On going
Kowanyama Work Schedule for Operation and Maintenance of Infrastructure – Monthly and Yearly Checklist	On going
Manufacturer's manuals for calibration of online monitoring (pH, chlorine); and for.	
SAMP customer complaint recording form	On going
SAMP incident report (internal)	On going
SAMP infrastructure repair record	On going
Water Alert notification template (developed by Qld Health)	NA

A paper copy of test records are kept in folders in the water shed office. Progress on meeting checklist actions is displayed on a chart on the walls of the water shed office and is reported to Council monthly by the ESM.

The ESM is responsible for developing and maintaining these documents and these are stored electronically on the ESM's computer. These documents are updated as needed. A version control book is used to record a summary of any changes to these documents, the date of change as well as the version number. An improvement plan item has been noted to include version identifiers on each procedure/checklist.

6.3 Management of incidents and emergencies

The following levels of Incidents and Emergencies are used.

Alert Level	Description	Key management response(s)	Position(s) responsible
Level 3 or High: Emergency	• outbreak of waterborne disease • declared disaster or emergency situation by the Council or state/national government *Requires coordination across the provider (Council) departments and is likely to require external resourcing and support from agencies, such as Office of the Water Supply Regulator, Queensland Health, local disaster management groups, emergency responders QFRS, Police*	Activate emergency response plan / disaster management plan *Refer to summary of actions and procedures.*	As per Council's lines of authority. For e.g. could be the ESM or CEO
Level 2 or Medium: Incident	• non-compliance (typically against the ADWG values) • Event (anything that has happened or is likely to happen, in relation to a drinking water service that may have an adverse effect on public health). Examples include natural disaster (flood, drought), bushfire, inability to operate system within acceptable operational limits, contamination of source water,	Activate drinking water incident response and reporting protocols. Ensure all control measures identified in the DWQMP are functioning effectively. Emergency response plan / disaster	ESM

	contamination of treated water, terrorism. *Incident likely to be managed within the team responsible for drinking water operations and management in line with their DWQMP. In some cases, it may require coordination across the provider departments (Council) and external resources and support, such as from OWSR, Queensland Health. Possible customer complaints.*	management plan on standby. *Refer to summary of actions and procedures.*	
Level 1 or Low: Operational exceedence	• Exceedences of operational limits (e.g. low or elevated chlorine in reticulation, pH). *Incident can be managed within the water operations team. An incident is not declared and the issue can be managed by local team in line with their DWQMP.*	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations and maintenance records and procedures. Incident response and reporting protocols on standby. *Refer to summary of actions and procedures*	ESO (i.e. acts as a leading hand) or ESM.

Response Actions
Most spare parts for components in the scheme are able to be flown in during the wet season if required when roads are cut-off.

The following summary of actions applies to each level of incident or emergency.

All level 2 and 3 incidents and emergencies are notified to the ESM who remains on call by mobile phone on **0408 078 876**. The water staff has been instructed on incident and emergency response protocols in order to operate autonomously where they have responsibility. An incident reporting flowchart is displayed on the wall of the water shed office.

Notification of Alerts about water quality
If an alert about the quality of the water was required to be distributed to the community the most effective method would likely be by posters and subsequent word of mouth.

Customers with vulnerable health may need to be notified by phone such as:

- Hospital
- School
- Retirement home

Alert Level	Key management response(s)	Brief summary of actions	Documented Plans & Procedures
Level 3 or High: Emergency	Activate Council's emergency response plan / disaster management plan	• Notify CEO immediately • Coordinate notification, investigation and response of water related aspects • Consider what community notification / messaging is needed (e.g. do not drink alert, boil water alert or bottled/emergency water distribution) • Coordinate community messaging, for e.g. boil water alert, do not drink alert as required • Notify OWSR as soon as practicable on **1300 596 709** (24/7), as per reporting requirements	Emergency response / disaster management plan, including communications protocols, alert templates (boil water, do not drink, availability of emergency supply).
Level 2 or Medium: Incidents	Activate drinking water incident response and reporting protocols. Ensure all control measures identified in the DWQMP are functioning effectively. Emergency response plan / disaster management plan of Council on standby.	• Ensure ESM is aware as soon as possible. • Notify OWSR on **1300 596 709** (24/7), as per reporting requirements • Ensure all control measures identified in the DWQMP are functioning effectively. • Commence investigation to determine cause if not traceable through the DWQMP • Arrange for re-samples to be taken where required • Instigate immediate remediation actions, including isolation of affected area where possible • Review associated laboratory reports and operational records. • Ensure emergency response plan / disaster management plan is on standby if the need arises.	Incident response and reporting protocols. OWSR Water Quality and Reporting Guideline. Kowanyama DWQMP.
Level 1 or Low: Operational exceedence	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations and maintenance records and procedures. Incident response and reporting protocols on standby.	• Notify Leading Hand or ESM • Review operations and maintenance records for anomalies • Commence investigation to determine cause, if not identifiable through operational records • Instigate immediate remediation actions • Ensure all control measures identified in the DWQMP are functioning effectively. • Increase operational monitoring frequency where required • Ensure incident response and reporting protocols are on standby if the need arises. • In case of customer complaints, coordinate investigation and resolution, including obtaining water samples where required	Operations and maintenance schedules. Kowanyama DWQMP.

Incident responses and learning's from incidents are discussed informally with staff rather than being done by formal training sessions.

		709 (24/7), as per reporting requirements	
Level 2 or Medium: Incidents	Activate drinking water incident response and reporting protocols. Ensure all control measures identified in the DWQMP are functioning effectively. Emergency response plan / disaster management plan of Council on standby.	• Ensure ESM is aware as soon as possible. • Notify OWSR on **1300 596 709** (24/7), as per reporting requirements • Ensure all control measures identified in the DWQMP are functioning effectively. • Commence investigation to determine cause if not traceable through the DWQMP • Arrange for re-samples to be taken where required • Instigate immediate remediation actions, including isolation of affected area where possible • Review associated laboratory reports and operational records. • Ensure emergency response plan / disaster management plan is on standby if the need arises.	Incident response and reporting protocols. OWSR Water Quality and Reporting Guideline. Kowanyama DWQMP.
Level 1 or Low: Operational exceedence	Ensure all operational steps identified in the DWQMP are functioning effectively. Check and act upon operations and maintenance records and procedures. Incident response and reporting protocols on standby.	• Notify Leading Hand or ESM • Review operations and maintenance records for anomalies • Commence investigation to determine cause, if not identifiable through operational records • Instigate immediate remediation actions • Ensure all control measures identified in the DWQMP are functioning effectively. • Increase operational monitoring frequency where required • Ensure incident response and reporting protocols are on standby if the need arises. • In case of customer complaints, coordinate investigation and resolution, including obtaining water samples where required	Operations and maintenance schedules. Kowanyama DWQMP.

Incident responses and learning's from incidents are discussed informally with staff rather than being done by formal training sessions.

6.4 Service Wide Support – Information Management

The records of (daily) water quality testing by staff are kept indefinitely in a folder in the water shed. Water quality result sheets from the external laboratory are retained in hardcopy and on computer too.

Completed water operation and maintenance checklists, laboratory results and SCADA trends are also submitted in the ESM's monthly report to Council and Council retains records for at least 5 years.

The work checklists and form templates are stored on the ESMs hard drive and available from that

computer. Calibration of the spectrophotometer (measuring pH, Cl, turbidity) in the water shed office

is undertaken
externally and recorded on a sticker on it.

7 Operational and Verification Monitoring

All SCADA alarms on pump failure, power outages etc show on screen of the SCADA computer in the water shed, as well as sending a text message to the ESM's mobile phone. The ESM then directs responses to be undertaken.

The current operational monitoring program is presented below. The Environmental Health Worker normally collects the operational monitoring samples for chlorine around town and has also been taught by the Essential Services Manager. The ESM is responsible for assessing the operational and verification monitoring water quality results weekly and investigating any trends.

The operational monitoring program is appropriate to confirm and maintain the effective operation of the preventive measures due to the broad spectrum of sampling sites throughout the community. These parameters will ensure that the most significant hazard of harmful bacteria should not be present.

7.1 Operational Monitoring

In addition to periodic inspections of infrastructure as scheduled in the work checklists, water quality monitoring is also undertaken to ensure that the preventive measures remain functioning properly. The water quality monitoring sites in the reticulation have been selected to be at the extremities. The combination of chlorine measurement at the reservoir outlet and grab samples in the reticulation provides an indication of the chlorine demand in the system.

The following sample sites are used are used for operational monitoring:

- Water Shed (Long 141.746935, Lat -15.475666)
- Bore 1 (141.747404, -15.472237)
- Bore 2 (141.738764, -15.471058)

Reticulation sites:

- School (Long 141.745187, Lat -15.472174)
- Airport tap (141.749818, -15.482089)
- Hospital (141.746160, -15.475852)
- Trudy residence (141.745898, -15.470154)
- China residence (141.742983, -15.469419)

The following schedule is undertaken.

Process step / location in system	Parameter	Associated hazard	Sampling			Target limit	Action if target limit is not met	Critical limit	Action if critical limit is exceeded
			Frequency	Method	Analysis				
Online chlorine analyzer at reservoir outlet (Water Shed)	Residual free chlorine	Bacteria (harmful). Also checks low/high chlorine dose	Continuous	Online analyzer	Online	>0.2mg/L, <2mg/L	Retest, check dosing pumps or calibration of instrument, further action dependent on findings, tell ESM.	>5mg/L <0.02mg/L	Retest, check dosing pumps or calibration of instrument, further action dependent on findings, tell ESM.
	pH	Ineffective disinfection	Continuous	Online analyzer	Online	-	-	6.5 – 8.5	Assess why there has been a change from normal (e.g. Overdose of chlorine, bore change)
Reticulation sites	Residual free chlorine	Bacteria (harmful)	Daily	Grab sample	In-house	>0.05mg/L, <2mg/L	Retest, check dosing pumps or calibration of instrument, further action dependent on findings, tell ESM.	>5mg/L	Tell ESM, consider retest, and check calibration of instrument.
	pH	Bacteria (harmful)	Weekly	Grab sample	In-house	-	Retest, check calibration of instrument, further action	6.5-8.5	Tell ESM, consider retest, check calibration of

Process step / location in system	Parameter	Associated hazard	Sampling			Target limit	Action if target limit is not met	Critical limit	Action if critical limit is exceeded
			Frequency	Method	Analysis				
							dependent on findings, tell ESM. No ability to adjust pH exists.		instrument.
Bores	Turbidity	Bacteria (harmful)	Weekly	Grab sample	In-house	5 NTU	Ensure residual chlorine level is maintained. Increase dose rate as required.	10NTU	Ensure residual chlorine level is maintained. Increase dose rate as required.

Online instruments are calibrated when they are considered to differ significantly from the laboratory results obtained by staff.

7.2 Verification Monitoring (Reportable to DERMS)

Verification monitoring is used to confirm product quality and does not occur in real-time to allow immediate corrective actions. The current verification monitoring program is presented below. The Essential Services Officer normally collects the verification samples for *E. coli* and has been trained by the Essential Services manager as well as having Certificate II training water and sewerage. The verification monitoring program design is appropriate because of the lack of any other risks identified in the risk assessment, and the *E. coli* frequency is required for this community size. The sample sites were selected to be at places people gather.

Naturally occurring fluoride does not have a required monitoring frequency and is often stable at this level. The samples are transported to the Cairns laboratory in bins with ice bricks every Tuesday (flight days). The ESM is responsible for assessing water quality results as they become available.

The following sample sites are used:

- Bore 1 (Long 141.747404, Lat -15.472237)
- Bore 2 (141.738764, -15.471058)
- Pumps into town from the two reservoirs
- Council Office (141.747359, -15.472664)
- School (141.745187, -15.472174)
- Airport tap (141.749818, -15.482089)
- Hospital (141.746160, -15.475852)
- Water Shed (141.746935, -15.475666)

The following schedule is undertaken.

Parameter	ADWG or regulation value	Associated Hazard	Frequency, method		Analyzing authority	Response to exceedence
			Bores	Town		
E. coli, Total coliforms, Heterotrophic Plate Count	0 CFU/100mL *E. coli*	Pathogens (indicated by *E. coli* as an easy to monitor indicator)	Weekly, grab samples from each site are sent to Cairns lab	Weekly, grab samples from each site are sent to Cairns lab	Cairns Water lab	*E. coli* - Refer to tables describing incident and emergency management. Notify OWSR for town samples and complete incident reporting forms. Ensure residual chlorine level is maintained. Increase dose rate as required. Ensure bore head structural integrity and reservoir security, review sampling method used, retest, and investigate TC and HPC used as a microbiological indicator that system integrity may need investigation and increased disinfection.
Fluoride	<1.5mg/L	Fluoride	every	-	Cairns Water lab	Notify OWSR, ensure that control measure of factsheet is still being circulated
Complete water analysis	Refer to ADWG	Metals, physical & aesthetic parameters	Yearly	-	Cairns Water Lab	Assess any new hazards.

Kowanyama tests weekly at various locations for E-coli detection with the new E-coli testing apparatus and samples are sent every three months for verification of results to the Cairns laboratory. We also do fluoride readings, Heterotrophic plate counts and total coliforms IN Cairns when these samples are sent.

9 Appendix 2 – Snapshot Monitoring Water Quality Results

E-coli- temp plate used for weekly reading not saved on computer

Hospital					0			0
China					0			0
Airport					Closed			0
School					0			0
Trudy					0			0
Pool								0

Temp plate used for daily water testing saved monthly on computer

Kowanyama Aboriginal Shire Council

WATER SUPPLY - DAILY DATA RECORDS

Only fill out the cells highlighted in yellow as there are formulas included that will automatically calculate the daily average.

PUMPS	DATE:	MONDAY 8/11/2014	TUESDAY 8/12/2014	WEDNESDAY 8/13/2014	THURSDAY 8/14/2014	FRIDAY 8/15/2014	SATURDAY 8/16/2014	SUNDAY 8/17/2014	TOTAL Mon - Fri
pH Pump 1									
hours									0
pH Pump 2									
hours									0
Bore 1									
Kiloliters									0
Hours									0
Starts									0
Bore 2									
Kiloliters									0
Hours									0
Starts									0
Bore 3									
Kiloliters									0
Hours									0
Starts									0
Bore 4									

Kiloliters									0
Hours									0
Starts									0
Observation Bore Depth Meters									
Rainfall									0
Clear water storage level 1.0ML	Formula = 1*#%								0.00
Clear water storage level 0.8ML	Formula = 0.8*#%								0.00

pH Reading									
	Hospital	8.13	8.21	8.19	8.30	8.00			8.17
	China	8.12	8.07	8.19	8.15	7.97			8.10
	Airport	Closed	Closed	Closed	Closed	Closed			0.00
	School	8.10	8.22	8.23	8.26	8.18			8.20
	Trudy	8.06	8.29	8.19	8.30	8.19			8.21
	Pool								0.00
Chlorine FREE (CL2)									
	Hospital	0.05	0.20	0.28	0.16	0.25			0.19
	China	0.04	0.20	0.46	0.36	0.34			0.28
	Airport	Closed	Closed	Closed	Closed	Closed			0.00
	School	0.01	0.26	0.42	0.37	0.49			0.31
	Trudy	0.11	0.27	0.38	0.39	0.52			0.33
Chlorine Total (CL2)	Pool								
	Hospital	0.02	0.16	0.27	0.09	0.23			0.15
	China	0.03	0.17	0.41	0.34	0.34			0.26
	Airport	Closed	Closed	Closed	Closed	Closed			0.00
	School	0.01	0.26	0.37	0.32	0.46			0.28
	Trudy	0.15	0.23	0.33	0.38	0.52			0.32
	Pool								0.00
Fluoride	Every 3 months								
	`								0.00
									0.00

									0.00
									0.00
7									0.00
									0.00
Turbidity									
	Hospital				0.48	1.81			2.29
	China				0.75	1.16			1.91
	Airport				Closed	Closed			0.00
	School				0.43	1.86			2.29
	Trudy				0.64	0.69			1.33
	Pool								0.00

SEWERAGE SUPPLY - DAILY DATA RECORDS

Only fill out the cells highlighted in yellow as there are formulas included that will automatically calculate the daily average.

BORE PUMPS	**DATE:**	MONDAY 8/11/2014	TUESDAY 8/12/2014	WEDNESDAY 8/13/2014	THURSDAY 8/14/2014	FRIDAY 8/15/2014	SATURDAY 8/16/2014	SUNDAY 8/17/2014	TOTAL Mon - Fri
Main Sewer Station 1									
Pump Hours pump 1									0
Starts									0
Clean level probe									
Pump Hours pump 2									
Starts									
Macerator Hours									
Basket									
Clean pits									
Main Flow meter 1									0
Sewer Station 2									
Pump Hours pump 1									0
Starts									

Clean level probe									
Pump Hours pump 2									
Starts									
Basket									
Clean Pits									
Main Flow meter 2									0
Daily Run Time									0
Tavern Station									
Pump Hours pump 1									0
Starts									0
Pump Hours pump 2									0
Starts									0
Hose Pits									
Cabin Station									
Pump Hours pump 1									0
Starts									0
Pump Hours pump 2									0
Starts									0
Hose Pits									
	DATE:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Mon - Fri
E-coli	**location**	8/11/2014	8/12/2014	8/13/2014	8/14/2014	8/15/2014	8/16/2014	8/17/2014	
	Hospital					0			0
	China					0			0
	Airport					Closed			0
	School					0			0
	Trudy					0			0
	Pool								0