Drinking Water Quality Management

Emergency Action Plan

Emergency Action Plan Distribution

Organisation	Position	Person
Local Government Counter Disaster Committee	Chair	**Col Meng**
Local Government Counter Disaster Committee	Executive Officer	**Stuart Holley**
Mackay Regional Council	Chief Executive Officer	**Barry Omundson**
Mackay Regional Council	Director Engineering and Commercial Infrastructure Executive Officer	**Jason Devitt**
Mackay Regional Council	Chief Operating Officer Water & Waste Services Executive Officer	**David Brooker**
Mackay Regional Council	Manager Water Treatment	**Stuart Boyd**
Department of Natural Resources and Mines	Dam Safety Central Department	**West Regional Office**

Document Control Sheet

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Revision Records:

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1	Original Document	All	Noel Ralph	9/2011
2	Second Revision	Al	LB	9/2014

1. Enacting Emergency Action Plan

Part 1 – Loss of Water Treatment Plant or Supply Infrastructure
Part 1 of this Emergency Action Plan details the actions, roles and responsibilities under the following circumstances:

- Failure of Water Treatment Plant or Supply Infrastructure;
- Water Treatment Plant or Supply Infrastructure failure Is Imminent As Observed By Mackay Regional Council Staff;
- Water supply quality failure Is Imminent As Determined By operator or testing authority.

Part 2 – Emergency Events
Part 2 of this Emergency Action Plan details potential Emergency Events at Water Treatment Plant or Supply Infrastructure and the subsequent action list.

An Emergency Event Report is to be provided to the Executive Manager Water Services within thirty (30) days of the incident.

The Emergency Report is to include the following:

- Description of event
- Quality readings
- Description of observed damage
- Photo's
- Details of communication and actions during emergency
- How the EAP was implemented during the event and comments on the adequacy of the EAP and any changes proposed.

2.Purpose:

Emergency response in the event of a Drinking Water Quality (including E-coli; turbidity, chemical, pesticides, other)

Applies to: Mackay Water Services Infrastructure

When to Use: Drinking Water Quality is below health standards.

Key triggers to be as follows:

- **Level 1** – When advice is received regarding formation of possible raw water quality issues.
- **Level 2 –** When water Treatment plant is struggling to maintain water quality
- **Levels 3 – 5 –** Loss of Water Production and Activation of Councils Emergency Response Sub plan.

Related SOPs: To be used in conjunction with Mackay Regional Councils Emergency Response Sub Plan:

- Nebo Road Water Treatment Plant Operations Manual

Enquiries: Plan Contact: Chief Operating Officer, Mackay Water & Waste Services Mobile: 0409 273 507; Email:david.brooker@mackay.qld.gov.au

IRP Manager: Manager Water Treatment Stuart Boyd Mobile: 0438 388 847

Safety Conditions:

- Crews are not to attempt any operational work in the field if there is any danger of injury.
- The Chief Operating Officer can and will issue a stand down order if there is a risk of potential injury to staff.
- Monitoring of hours worked is to be carried out to ensure adequate rest breaks / fatigue management.

1 Procedure

Situation Analysis:

Assess Incident Level against proforma on the next page and implement response procedures relevant to nominated level of incident.

Level	Trigger	Procedure	Action Complete (incl Signature)	Resources	Responsible Party	External Assistance
Level 1 – Insignificant (Monitor)	**This phase may be triggered when advice is received that a raw water quality is compromised**	• Alert members of the Incident Management Team and Site Management Team(s) of the potential threat • Update list of names, phone numbers and method of contact for all officers and deputies to whom specific responsibilities have been delegated • Review "critical infrastructure" plans, "critical supply points" (water services) for initial assessment of potential impact • Initiate alternate raw water supply. • Monitor incoming supplies from alternate source.	☐ ..... ☐ ..... ☐	• EM Sub Plan contact list • Map of critical infrastructure • Map of critical supply points ,low pressure zones,	Executive Manager, MWS	
		• Initial advice to EPA of the potential impact and mitigation strategies • Review high level storage (water) • Review quantities and location of key materials (e.g. chlorine, lime, pipe repair materials and equipment) • Ensure all crews have appropriate valve keys	☐ ..... ☐ ..... ☐ ..... ☐	• Environmental Management System (EMS) • SCADA	Manager, Operations	• •
		• Establish job numbers for recording cost/wages/time associated with the event • Confirm call centre scripts to ensure communications are consistent across Council	☐ ..... ☐		Manager, Business Services	
Level 2 – Minor (Standby Alert)	**This phase is triggered when a the water treatment plant is struggling to produce**	• Establish Incident Management Team and Site Team • **<u>Incident Management Team</u>** to: o Establish an incident room within Mackay Water and arrange means for advising Councils Emergency/Disaster Coordination centre on the status of reservoir levels, reticulation pressure, main breaks, loss of electricity supply to any waterworks facility(including advice on restoration of services)	☐ ..... ☐	Mackay Water Emergency Management Sub plan	Executive Manager, MWS	
		o Brief the site team and ensure that the site team has adequate resources to provide an effective response o Establish Depot Control Centre o Ensure all reservoir storages are filled o Provide advice to DERM on situation (and planned impact minimisation strategies)	☐ ..... ☐ ..... ☐ ..... ☐	• Environmental Management System (EMS)	Manager, Operations	

Level	Trigger	Procedure	Action Complete (incl Signature)	Resources	Responsible Party	External Assistance
	water or asset failure prevents the supply of water.	o Arrange for the Water Treatment Works to be continuously attended during the event	☐			
		o Arrange for public information and warnings to be issued in relation to safe use of water and conservation of water supplies, in accordance with the *Pubic Information and Warnings Operational Plan*	☐		Manager, Business Services	
		Site Team to: o Brief workers on the situation o Ensure sodium hypochlorite vats topped up at all outer treatment plants o Ensure all hand held radios are checked, charges and issued. o Ensure field staff have contact details for resources	☐ ..... ☐ ..... ☐ ..... ☐		Manager, Operations	
Level 3 – Moderate	**Triggered when Councils Emergency Response Sub Plan activated**	**Incident Management Team** to: o Invoke a total water ban[1]. o Provide hourly advice to Councils Emergency/Disaster Coordination centre on the status of reservoir levels, reticulation pressure, main breaks, o Manage fatigue among the workforce o Provide regular briefings to site team on changing conditions o Provide regular updates to EPA on status	☐ ..... ☐ ..... ☐ ..... ☐ ..... ☐		Executive Manager, MWS	
		o Receive calls from the Councils call centre, prioritise and issue to site team. o Arrange for public information and warnings to be issued in relation to safe use of water, conservation of water supplies, sewerage spillages, and restrictions on the use of the sewer system in accordance with the *Pubic Information and Warnings Operational Plan*	☐ ..... ☐		Manager, Business Services	
		Site Team to: o Provide a network status report to the Incident Management team every hour. The advice to the Incident Management team to include the status of reservoir levels, reticulation pressure, main breaks to any water services facility (including advice on restoration of services),. o Respond to call-outs	☐ ..... ☐			

[1] A total water ban is required under3.8.2 of Council Emergency Response sub-plan

Level	Trigger	Procedure	Action Complete (incl Signature)	Resources	Responsible Party	External Assistance
Level 4 – Major		**As above**				
Level 5 - Catastrophic		**As above**				•

Post Water Quality Recovery

Trigger	Procedure	Action Complete (incl Signature)	Resources	Responsible Party	External Assistance
As advised by Director of Engineering Services at the "stand down" of emergency	**General Business Recovery:** • Preliminary assessment of damage caused by and advise Councils Local Disaster Management Group↑	☐		Executive Manager, MWS	
	• Mobilise water tankers to provide contingency supplies to critical supply points↑	☐		Manager, Operations	
	• Instigate financial accounting and cost recovery for the business	☐		Manager, Business Services	
	Water: • Re-establish primary secondary pumping facilities • Re-establish water treatment facilities	☐		Manager, Operations	
	• Update public information and warnings in relation to safe use of water and conservation of water supplies, in accordance with the *Pubic Information and Warnings Operational Plan*	☐		Manager, Business Services	

4.0 Incident Response Protocol Summary

Level	Descriptor	Definition	Consequence							Examples	Procedures	Authority
			Financial	Publicity /Reputation	OH&S	Assets	Public Health	Service Delivery	Environmental			
Level 1	**Insignificant**	An event that can be dealt with by the site resources without any additional assistance	<$50,000.	Of interest to individuals only	First Aid injuries – superficial injury with little/no treatment.	No damage to asset.	Insignificant exposure, no illness or aesthetic impact on customers.	Isolated customer complaints	Low environmental impact. Minor clean up / reinstatement required.	• Minor/moderate asset failures • Sewer chokes/collapse on reticulation • Minor treatment plant process problems (resolved in <6rs) • Minor IT interruption	• Event managed by site manager or operational manager. • Response addressed under **standard operating procedures**	• **Site manager/ Manager, Operations**
Level 2	**Minor**	An event that may require additional resources form within the business. The Executive Manager, MW is notified	> $500,000 but < $500,000.	Of interest to local community only.	Minor injury/illness requiring medical treatment.	Minimal damage but no reduction in performance or efficiency to asset or systems.	Minor exposure, unlikely to result in illness, however some localised customer aesthetic issues.	Multiple customer complaints	Localised environmental impact. Clean up / reinstatement required.	• Mains burst requiring system reconfiguration • Disruption to supply • Widespread power outage • Minor environmental breach • WH&S incident • Failure of treatment systems • Failure of business systems	• Response includes assessment of site safety, environmental impact and customer impact and broadly addressed in accordance with **standard operating procedures** • Event reported to Director, Mackay Water and Waste and Council	• **Executive Manager, Mackay Water**
Level 3	**Moderate**	An event which involves the potential for adverse outcomes (e.g. publicity, environmental impact, loss of supply)	>$500,000 but < $2 million.	Potential for adverse publicity	Lost Time Injuries <13 weeks. Severe injury or illness with a long period off work. Widespread minor illness.	Some damage to asset and corresponding reduction in either system efficiency or performance.	May result in illness in localised area and / or results in aesthetic impact within a localised area.	Service disruption >5 hours disruption for ~5% of customers. <4 hours duration to special needs customers.[2]	Moderate environmental impact relating to statutory requirements, but a short recovery period (weeks). Required to inform regulatory body.	• Contamination of supply • Sabotage/Terrorism • Major disruption to operating processes and/or business systems • Extended disruption to supply • Significant burst main in CBD • Potential significant spill to environment and resultant regulatory investigation	• **Incident Response Plans activated** • Event reported to Council (Event may require coordination with other directorates to minimise impact, prevent or minimise injury, damage or loss) • Mackay Water communications room established	• **Director, Water and Waste**
Level 4	**Major**	An event which requires substantial off-site coordination and major levels of external resourcing to prevent and/or minimise injury, damage or loss	<2 million but < $5 million.	Significant media coverage.	Lost Time Injuries >13 weeks. Severe injuries/ harm to person, including permanent impairment. Widespread serious illness	Major damage to asset with significant reduction in either system performance or efficiency OR period offline.	Exposure causes confirmed illness within a system and / or results in aesthetic impact within disinfected supply system	Widespread customer complaints. Service disruption >24 hours for ~10% of customers. 4-8 hours duration to special needs customers[1].	Major environmental impact which requires extended recovery period (months). Required to inform regulatory body. Significant financial costs associated with court action, fines and recovery costs.	• Major Storm • Earthquake • Terrorist attack	• Council **activates its Local Disaster Management Plan** • Mackay Water incident response plans enacted • Mackay Water communications room established and	• **Executive Officer – Mackay Local Disaster Management Group** w assistance form Director, Water and Waste
Level 5	**Catastrophic**	An event which is beyond the capability of a single Council Divisions would involve all of Mackay City Council and may also involve emergency services.	>$5 million.	Significant media coverage. Potential loss of community confidence in organisation. Enraged stakeholder with potential intervention	Fatality, or Permanent disablement	Destruction of asset with major period offline. ANCOLD Scale- dam failure	Exposure results in confirmed life threatening / severe illness and / or death to one or more customers. Aesthetic impacts reported across a disinfected supply system.	>1 day loss of supply to >10,000 customers. >8 hours duration to special needs customers[1].	Environmental incident resulting in widespread long term damage, requiring long term recovery period (years). Required to inform regulatory body. Very significant financial costs associated with court action, fines and recovery.	• Major event affecting thousands of people and potential damage in millions.	• States Emergency Services in control • Council **activates its Local Disaster Management Plan** • Mackay Water incident response plans enacted • Mackay Water communications room established and	• **State Emergency Services** • Executive Officer – Mackay Local Disaster Management Group w assistance form Director, Water and Waste

[2] Special needs customers (e.g. industry, hospitals, schools, childcare, dialysis machines, etc.)

5. Drink Water Risk Assessment.

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
Extreme (5)	Mackay	M44	Reservoir & Reticulation	Vandalism & sabotage	
	Sarina	S43	Reservoir & Reticulation	Vandalism & sabotage	
High (4)	Calen	C5	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Eton	E6	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Finch Hatton	F5	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Gargett	G5	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Mackay	M40	Reticulation	Underdose or no dose of chlorine	
	Marian	MA5	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Midge Point	MP4	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Mirani	MI5	Reservoir	Contamination through vents and animal access e.g. green tree frogs	
	Sarina	S20	Filtration	Filter breakthrough	
		S21	Filtration	Filter ripening	
		S38	Reticulation	Underdose or no dose of chlorine	
	Water Services	GL1	General	Security	
High (5)	Calen	C3	Source Water - Bores	Softener operation	
	Eton	E5	Reticulation	Long retention/contact time in system	
	Finch Hatton	F4	Reticulation	Long retention/contact time in system	
	Gargett	G4	Reticulation	Long retention/contact time in system	
	Mackay	M51	Raw Water Intake - Bores	Tampering and Vandalism	
	Marian	MA4	Reticulation	Long retention/contact time in system	
	Midge Point	MP3	Reticulation	Long retention/contact time in supply pipe	
	Mirani	MI4	Reticulation	Long retention/contact time in system	
High (6)	Bloomsbury	B3	Source Water - Bores	Stormwater event in O-Connell River	
		ORB6	O'Connell River Basin	Illegal access to catchment (vandalism, sabotage)	
	Calen	C2	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle Stormwater event	
	Mackay	PRB10	Pioneer River Basin	Illegal access to catchment (vandalism, sabotage)	
	Midge Point	MP1	Source Water - Bores	Stormwater event in Proserpine River	
		MP2	Source Water - Bores	Vandalism & tampering of bores	
		PB6	Proserpine Basin	Illegal access to catchment (vandalism, sabotage)	
	Sarina	PCB10	Plane Creek Basin	Algal blooms in Middle Creek Dam	
		PCB7	Plane Creek Basin	Illegal access to catchment (vandalism, sabotage)	
Low (7)	Bloomsbury	B1	Source Water - Bores	Leaching from O'Connell River into aquifers	
		B2	Source Water - Bores	Leaching from O'Connell River into aquifers and bore location in organic material	
		ORB3	O'Connell River Basin	Crop cultivation (generally on river banks, pump leaks)mainly sugar cane some market gardening	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
	Eton	E2	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Finch Hatton	F1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Gargett	G1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Koumala	K1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Mackay	M19	Disinfection	Interaction of chlorine with organics	
		M23	Oxidation	Overdosing/underdosing of potassium permanganate	
		M32	Reticulation	Construction of new mains	
		M33	Reticulation	Use of tools and equipment in both sewer and water systems	
		M35	Reticulation	Corrosion of metal pipes	
		M38	Reticulation	Poor water quality from Port Authority	
		M43	Reservoir	Inadequate protection of reservoirs	
		M45	Reticulation	Asset Maintenance	
		M6	Raw Water Intake - Dumbleton Weir - Infrastructure	Integrity, life expectancy and condition of raw water mains including valves	
		PRB11	Pioneer River Basin	Recreational activities in catchment	
		PRB5	Pioneer River Basin	Crop cultivation (generally on river banks, pump leaks) mainly sugar cane some market gardening	
	Marian	MA1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Midge Point	PB3	Proserpine Basin	Crop cultivation (generally on river banks, pump leaks) mainly sugar cane some market gardening	
	Mirani	MI1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Sarina	PCB3	Plane Creek Basin	Crop cultivation (generally on river banks, pump leaks) mainly sugar cane some market gardening	
		PCB8	Plane Creek Basin	Recreational activities in catchment	
		S2	Source Water - Bores - Armstrong Beach	Bedrock minerals leaching in groundwater	
		S23	Disinfection	Overdose	
		S24	Disinfection	Interaction of chlorine with organics	
		S33	Reticulation	Construction of new mains	
		S34	Reticulation	Use of tools and equipment in both sewer and water systems	
		S41	Reticulation	Asset Maintenance	
		S42	Reservoirs	Inadequate protection of reservoirs	
Low (8)	Bloomsbury	B4	Source Water - Bores	Herbicide leaching into groundwater from waterways and from land users e.g. sugarcane spraying	
		ORB5	O'Connell River Basin	Wildfire (followed by storm leading to ash runoff)	
	Eton	E3	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Finch Hatton	F2	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Gargett	G2	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Koumala	K2	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Mackay	M1	Raw Water Intake - Dumbleton Weir	Storm event - rapidly changing raw water quality leading to pathogen breakthrough	
		M13	Flocculation & Sedimentation	Failure of sludge draw-off/removal system in sedimentation tank	
		M18	Disinfection	Overdose	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
		M2	Raw Water Intake - Dumbleton Weir	Drought and dry season - changes in water quality including increased risk of blue green algae leading to cyanotoxins being present in treated water	
		M20	Disinfection	Equipment failure	
		M22	pH/Alkalinity Pre-adjustment	Overdosing/underdosing of caustic	
		M24	pH/Alkalinity Post-adjustment	Underdose or failure to dose caustic	
		M29	Reticulation	Cross connections - greywater systems, rainwater tanks, sewerage, storm water, tanker connections, illegal connections	
		M31	Reticulation	Contamination of spare pipes and reticulation equipment (eg. spraying of herbicides near stockpiles, animal waste)	
		M37	Reticulation	Loss of pressure	
		M48	Raw Water Intake - Bores	Herbicide and pesticide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
		PRB7	Pioneer River Basin	Hogans Pocket Waste Disposal Facility and illegal dumping (leachate and chemical runoff)	
		PRB9	Pioneer River Basin	Wildfire (followed by storm leading to ash runoff)	
	Marian	MA2	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Midge Point	PB5	Proserpine Basin	Wildfire (followed by storm leading to ash runoff)	
	Mirani	MI2	Source Water - Bores	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
	Sarina	PCB6	Plane Creek Basin	Wildfire (followed by storm leading to ash runoff)	
		S18	Flocculation & Sedimentation	Failure of sedimentation tank including failure of scraper leading to sludge build-up and failure of sludge draw-off/removal system	
		S25	Disinfection	Equipment failure	
		S3	Source Water - Bores - Marwood	Herbicide leaching into aquifers from waterways and from land users e.g. sugarcane spraying	
		S30	Reticulation	Cross connections - greywater systems, rainwater tanks, sewerage, storm water, tanker connections, illegal connections	
		S32	Reticulation	Contamination of spare pipes and reticulation equipment (eg. spraying of herbicides near stockpiles, animal waste)	
		S37	Reticulation	Loss of pressure in power outages	
		S5	Raw Water Intake - Plane Creek Weir	Storm event - Rapidly changing raw water quality	
		S6	Raw Water Intake - Plane Creek Weir	Drought and dry season - changes in water quality including increased risk of blue green algae leading to cyanotoxins being present in treated water	
Low (9)	Bloomsbury	ORB1	O'Connell River Basin	Forestry & National Parks (some logging, some cattle grazing leases, illegal dumping, herbicides [applied under power lines & in transport and infrastructure corridors])	
	Mackay	M36	Reticulation	Stagnant water in dead ends and inability to effectively clean mains	
		M41	Reticulation	Overdose of chlorine	
		M42	Reticulation	Interaction of chlorine with organics	
		M5	Raw Water Intake - Dumbleton Weir	Intake screen blockage (weed and sediment build-up) - difficult to maintain screens	
		PRB1	Pioneer River Basin	Forestry & National Parks (some logging, some cattle grazing leases, illegal dumping, herbicides [applied under power lines & in transport and infrastructure corridors])	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
	Midge Point	PB1	Proserpine Basin	Forestry & National Parks (some logging, some cattle grazing leases, illegal dumping, herbicides [applied under power lines & in transport and infrastructure corridors])	
	Sarina	S11	Raw Water Intake - Infrastructure	Capacity, integrity and life expectancy of mains from pump station to plant	
		S12	Raw Water Intake - Infrastructure	Power back-up for pump station - loss of water supply on power failure	
		S13	Raw Water Intake - Infrastructure	Weir well failure - flooding of well	
		S36	Reticulation	Lack of adequate chlorine residual due to water age, low flow and dead ends and inability to effectively clean mains	
		S39	Reticulation	Overdose of chlorine	
		S40	Reticulation	Interaction of chlorine with organics	
		S8	Raw Water Intake - Plane Creek Weir	Intake screen blockage inside pump well from debris (weeds/logs) or sediment	
Medium (6)	Bloomsbury	B5	Reticulation	Sediments and biofilms on pipes	
	Calen	C4	Reticulation	Sediments and biofilms in pipes	
	Eton	E1	Source Water - Bores	Saline intrusion into aquifer	
	Mackay	M15	Filtration	Filter breakthrough	
		M34	Reticulation	Low alkalinity stormwater dissolving cement in pipes and reservoirs	
		M39	Reticulation	Connections to raw water	
		M47	Raw Water Intake - Bores	Saline intrusion into aquifer	
	Midge Point	PB7	Proserpine Basin	Turnover/stratification in Peter Faust Dam	
	Sarina	S1	Source Water - Bores - Bally Keel & Marwood	Saline intrusion into aquifer	
		S22	Disinfection	Underdose or failure to dose	
		S35	Reticulation	Loss of supply due to catastrophic main break, loss of pressure	
Medium(7)	Bloomsbury	ORB2	O'Connell River Basin	Animals (domestic & feral) - Cattle [grazing (erosion and sedimentation), dead animals in waterways & weirs, fertilisers, feedlots (manure management), direct access to waterways]- Poultry farms [dead animals, manure management]- Pig farms [dead animals, manure management]- Feral pigs [digging and wallowing (erosion and sedimentation)]	
		ORB4	O'Connell River Basin	Unsealed roads	
	Calen	C1	Source Water - Bores	Bedrock minerals leaching in groundwater	
	Eton	E4	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
	Finch Hatton	F3	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
	Gargett	G3	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
	Koumala	K3	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
	Mackay	M10	Activated Carbon Adsorption	Failure of PAC dosing into river water dosing tank	
		M11	Coagulation	Underdosing chemicals	
		M12	Coagulation	Overdosing chemicals	
		M14	Flocculation & Sedimentation	Floc carryover and poor water quality from sedimentation tank	
		M16	Filtration	Fiter ripening	
		M17	Disinfection	Underdose or failure to dose	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
		M21	Fluoridation	Underdose or failure to dose and overdose (incl. equipment failure)	
		M25	pH/Alkalinity Post-adjustment	Overdose caustic	
		M26	Clear Water Tanks & Balance Tanks	Sediment becoming re-entrained	
		M28	Reticulation	Main breaks - both water and sewer	
		M3	Raw Water Intake - Dumbleton Weir	Accidental fuel or chemical spills (agricultural, highway along river) Terrorist activity - contamination with toxins or hydrocarbons	
		M30	Reticulation	Backflow from commercial properties (eg. hospitals, laboratories, abbatoirs)	
		M4	Raw Water Intake - Dumbleton Weir	Stratification and turnover - decrease in water quality	
		M49	Raw Water Intake - Bores	Pathogens leaching into aquifers from waterways, from land users and from septic tanks located above aquifers	
		M50	Raw Water Intake - Bores	Development in the vicinity of the bores	
		M52	Raw Water Intake - Bores - Infrastructure	Lowlift pumps failure	
		M7	Raw Water Intake - Dumbleton Weir - Infrastructure	Capacity and life expectancy of pump station and pumps including electrical issues	
		M8	Raw Water Intake - Dumbleton Weir - Infrastructure	Power back-up for pump station - loss of water supply on power failure	
		M9	Coagulation	Failure of chemical dosing systems	
		PRB12	Pioneer River Basin	Marian Sugar Mill (drainage/stormewater runoff, chemical bund failures)	
		PRB13	Pioneer River Basin	Oxygen reducing material (from sugar cane farms - residues left on fields after harvest washed into waterways)	
		PRB2	Pioneer River Basin	Animals (domestic & feral) - Cattle [grazing (erosion and sedimentation), dead animals in waterways & weirs, fertilisers, feedlots (manure management), direct access to waterways] - Poultry farms [dead animals, manure management] - Pig farms [dead animals, manure management] - Feral pigs [digging and wallowing (erosion and sedimentation)]	
		PRB3	Pioneer River Basin	On site sewage management systems (OSSMSs) (both rural and commercial)	
		PRB4	Pioneer River Basin	Sewer pump stations (pump failure/blockage, storm events, power failure)	
		PRB6	Pioneer River Basin	Unsealed roads	
		PRB8	Pioneer River Basin	Accidental spills (fuel [fuel tankers transporting to mines], chemicals, cane bins, sugar trucks, cane trams, molasses)	
	Marian	MA3	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
	Midge Point	PB2	Proserpine Basin	Animals (domestic & feral) - Cattle [grazing (erosion and sedimentation), dead animals in waterways & weirs, fertilisers, feedlots (manure management), direct access to waterways] - Poultry farms [dead animals, manure management] - Pig farms [dead animals, manure management] - Feral pigs [digging and wallowing (erosion and sedimentation)]	
		PB4	Proserpine Basin	Unsealed roads	
	Mirani	MI3	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
	Sarina	PCB1	Plane Creek Basin	Animals (domestic & feral) - Cattle [grazing (erosion and sedimentation), dead animals in waterways & weirs, fertilisers, feedlots (manure management), direct access to waterways] - Poultry farms [dead animals, manure management] - Pig farms [dead animals, manure management] - Feral pigs [digging and wallowing (erosion and sedimentation)]	
		PCB2	Plane Creek Basin	On site sewage management systems (OSSMSs) (both rural and commercial)	
		PCB4	Plane Creek Basin	Unsealed roads	
		PCB5	Plane Creek Basin	Accidental spills (fuel [fuel tankers transporting to mines], chemicals, cane bins, sugar trucks, cane trams, molasses)	
		PCB9	Plane Creek Basin	Oxygen reducing material (from sugar cane farms - residues left on fields after harvest washed into waterways)	
		S14	Coagulation	Failure of chemical dosing systems	
		S15	Coagulation	Underdosing chemicals	
		S16	Coagulation	Overdosing chemicals	
		S17	Flocculation & Sedimentation	Failure of mixers	
		S19	Flocculation & Sedimentation	Failure of sedimentation tank including loss of sludge blanket and sludge overflow	
		S26	Fluoridation	Underdose or failure to dose and overdose (incl. equipment failure)	
		S28	Clear Water Tank	Sediment becoming retrained	
		S29	Reticulation	Main breaks - both water and sewer	
		S31	Reticulation	Backflow from commercial properties (eg. hospitals, laboratories, abbatoirs)	
		S4	Source Water - Bores	Pathogens leaching into aquifers from waterways and from land users e.g. cattle	
		S46	Activated Carbon Adsorption	Failure of PAC dosing system	
		S7	Raw Water Intake - Plane Creek Weir	Accidental fuel or chemical spills (agricultural, highway along river) Terrorist activity - contamination with toxins or hydrocarbons	
	Water Services	GL2	General	Operator error	
#N/A	Finch Hatton	F6	Source Water - Cattle Creek	(blank)	
(blank)	Koumala	K4	Reservoir	There is no current access to the Koumala reservoir for inspections, cleaning or maintenance	
	Mackay	M27	Clear Water Tanks & Balance Tanks	Chlorine contact time - sufficient contact time is provided in clear water tank and balance tanks	
		M46	Reticulation	Developers construction - considered but not rated as a hazard as works undertaken by developers are inspected by MRC Planning Division	
		PRB14	Pioneer River Basin	Quarries considered to be minor and not significant - assessment not required	
	Sarina	S10	Raw Water Intake - Infrastructure	Capacity and life expectancy of pump station and pumps not considered to require assessment as current pumps were installed in 2009	
		S27	Clear Water Tank	Chlorine contact time - sufficient contact time is provided with baffle in clear water tank	
		S44	Reticulation	Developers construction - considered but not rated as a hazard as works undertaken by developers are inspected by MRC Planning Division	

Residual Risk4	Scheme	Risk ID	Process Step	Hazardous Event & Source of Hazardous Event	Level of Incident
		S45	Reticulation	Corrosion of metal pipes - considered but not rated as a problem at Sarina	
		S9	Raw Water Intake - Infrastructure	Mains cleaning (biofilm build-up, metals sediment) assessment considered to be not required due to no historical record of incident and mains are of short length	
	Water Services	GL10	General	Inappropriate quality of unknown specification of materials used in treatment resulting in release of contaminants into treated water, inefficient or no treatment	
		GL11	General	Lack of training	
		GL12	General	Disgruntled employees & Vandalism	
		GL13	General	Site wide power failure	
		GL14	General	Local powerfailure (e.g. Loss of switchboard)	
		GL3	General	Information Management System (incl. lack of communication)	
		GL4	General	Lack of response to exceedance (incl. lack of resources)	
		GL5	General	Inadequate maintenance due to lack of resources and scheduling	
		GL6	General	Lack of suitably trained specialised contractors e.g. divers	
		GL7	General	Availability of spares - Asset Management System	
		GL8	General	Inadequate calibration - schedule maintenance	
		GL9	General	Failure of cricial monitoring devices - schedule maintenance	