



# Drinking Water Quality Management Plan 2022 Report



Document Title: **FY 22, Brisbane Airport Drinking Water Quality Management Report**

Document Location: Brisbane Airport Corporation Pty Limited\ORG - Airport Facilities - Energy and Utilities\DWQMP 2022

Version: 6.0

Issue Date: **December 2022**

Prepared: Atiq Rehman

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## Glossary of terms

ADWG 2004	Australian Drinking Water Guidelines (2004). Published by the National Health and Medical Research Council of Australia
ADWG 2011	Australian Drinking Water Guidelines (2011). Published by the National Health and Medical Research Council of Australia
<i>E. coli</i>	<i>Escherichia coli</i> , a bacterium which is considered to indicate the presence of faecal contamination and therefore potential health risk
HACCP	Hazard Analysis and Critical Control Points certification for protecting drinking water quality
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
MPN/100mL	Most probable number per 100 millilitres
CFU/100mL	Colony forming units per 100 millilitres
<	Less than
>	Greater than
BAC	Brisbane Airport Corporation
UU	Urban Utilities

## 1. Introduction



This report documents the performance of Brisbane Airport's drinking water service with respect to water quality and performance in implementing the actions detailed in the drinking water quality management plan (DWQMP) as required under the Water Supply (Safety and Reliability) Act 2008 (the Act).

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

This report has been prepared for the period July 2021 to June 2022.

## **2. Overview of Operations**

*Service Provider Name – Brisbane Airport Corporation Limited*

*Service Provider identification Number (SPID) – 545*

Brisbane Airport Corporation (BAC) receives potable water supply from Queensland Urban Utilities (QUU) water system, which is an external service provider. The supply chain is as follows:

- a. Seqwater provides water treatment to produce and store potable water at a series of locations around the South-east Queensland area
- b. Water is transported via Seqwater owned bulk water transport infrastructure into QUU owned infrastructure
- c. QUU (local water distributor) purchases water from Seqwater (formally the SEQ Water Grid manager)
- d. BAC purchases water from QUU, which is received from the Wellers Hill supply scheme via a twin DN300 connection at Sugarmill Road.

BAC owns and operates the trunk services on-airport for potable water and plans for, designs, constructs and maintains these services. Works on these services cannot proceed without approval from BAC. All water reticulation services are designed to achieve BAC's levels of service. All water utilities are designed and installed to Australian Standards and all environmental and Airport Building Controller requirements.

## **3. Actions taken to implement the DWQMP**

### **3.1. DWQMP approval conditions**

On 22 August 2022 BAC submitted the updated DWQMP to the Department of Regional Development, Manufacturing and Water (RDMW).

An information notice was received from RDMW 28 August 2022 to approve the amended DWQMP.

BAC can confirm that it complies with the DWQMP approval conditions.

### **3.2. Risk management improvement program.**

The current approved DWQMP risk management approach was different to previous versions. All risks to the BAC water service were assessed by the risk assessment team as acceptable. For this reason, there is no risk management improvement plan in the current BAC DWQMP or this report. See Appendix B for the identified unmitigated and mitigated risks.

### **3.3. Amendments made to the DWQMP**

On 22 August 2022 BAC submitted the updated DWQMP to the Department of Regional Development, Manufacturing and Water (RDMW). There were two minor amendments during the reporting period. RDMW approved the minor amendments in a letter dated 28 August 2022.

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

Routine sampling is conducted under contract by QUU SAS Laboratory which is NATA accredited.

Please refer to Appendices A Table 1 -'Summary of water quality criteria compliance' and Table 2: Reticulation E. coli verification monitoring. All results have met with the recommended values in the Australian Drinking Water Guidelines including standards in the Public Health Regulations 2005.

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

This financial year there was **one** instance where the Regulator was notified under sections 102 or 102A of the Act.

### **5.1. Non-compliance with the water quality criteria.**

Compliance with 98% annual value was achieved for this reporting period.

### **5.2. Prescribed incidents or Events reported to the Regulator**



Incident Description:

#### **DWI-545-22-09606**

On the 12 May 2022, BAC received notification from SAS laboratory, E.Coli was detected in a routine water sample taken on the 11 May 2022. Sample Number 22/03819, location "Aerotech park North – Pandanus Ave" site returned 3 MPN/100mL above the limit of 0.0 MPN/100mL. SAS laboratory notified BAC Utilities Engineer via phone and email. Local area network was flushed, with re sampling taking place on 13-May, 17-May and 20-May. These secondary samples returned results of Negative. The E.Coli presence was reported to the department via phone then submission of WSR0017 13/05/2022).

### **6. Customer complaints related to water quality**

Brisbane Airport is required to report on the number of complaints, general details of complaints, and the responses undertaken.

No complaints were received from customers in relation to water quality during this reporting period.

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

BAC completed the internal review of the DWQMP on 12/8/2022.

This review followed the prompts from the relevant guideline as applicable, and also considered the outcomes of the most recent audit. The outcome of the review was that the DWQMP was current, reflects our risks and how we manage them appropriately, and has only recommended very minor changes. In part this is because we anticipate more significant changes to the infrastructure in the next 2 year cycle, after which, a more comprehensive amendment will be warranted.

Historically there have been low residual chlorine levels recorded at most locations throughout the BAC network. The levels recorded at the QUU intake on Sugarmill Road are also traditionally low although during the winter months there is generally some residual chlorine recorded.

BAC's new Chlorine Dosing Unit (CDU) has been operating since early 2021. BAC is working towards increasing the total chlorine to 1.5 mg/L through as much of the reticulation as possible. The target dose rate is varied seasonally and can be as high as 3.5 mg/L at the point of dosing. A low total chlorine alarm is set at 0.5 mg/L, with a high alarm at 4 mg/L.

BAC has actively engaged with QUU to find solutions to increase the residual chlorine levels at the intake. BAC continues to use a specialist contractor to scour the mains to remove any potential biofilm from the internal walls of the pipework.

BAC has upgraded all water testing sample points to QUU's standard sampling points enclosures made of stainless steel.

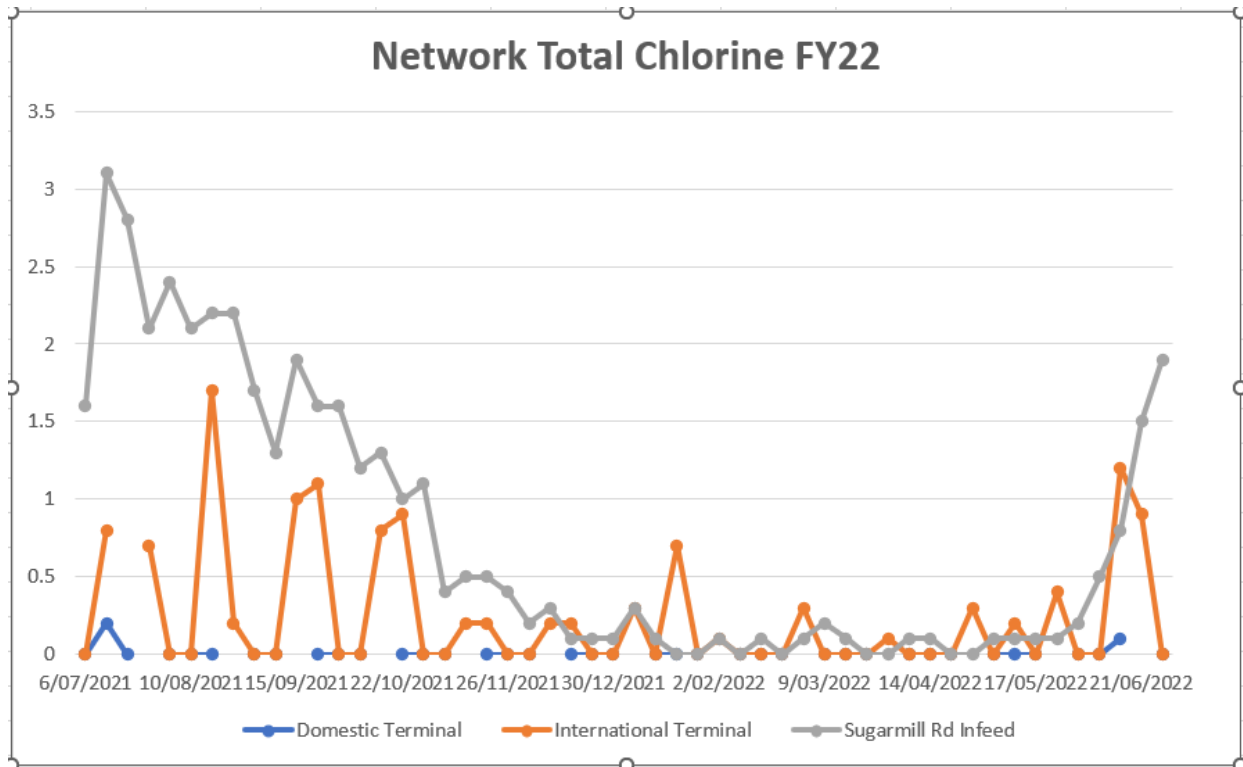


Chart 1 – BAC Network Chlorine FY22

### 7.1. New Hazards identified

There have been no new hazards identified during the reporting period.



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

TABLE 1 Summary of water quality criteria compliance

Test Parameter	Unit of Measurement	Total No of samples collected	Max Concentration / Count	Exceedance Count*
Temperature - Field	° C	183	28.3	0
Free Chlorine	mg/L	188	0.3	0
Total Chlorine	mg/L	188	3.1	0
Coliforms Colilert	MPN/100mL	191	1000	0
E. coli Colilert	MPN/100mL	191	3	1
HPC	cfu/mL	110	1800	0
pH	pH Unit	108	8.6	0
Ammonia N	mg/L	108	0.74	0
Nitrite+Nitrate as N	mg/L	108	2.5	0
Nitrite N by FIA	mg/L	108	0.50	0
Nitrate N by FIA (Calc)	mg/L	108	2.0	0
Monochloroacetic Acid	ug/L	108	<10	0
Dichloroacetic Acid	ug/L	108	20	0
Trichloroacetic Acid	ug/L	108	29	0
Bromochloroacetic Acid	ug/L	108	15	0
Monobromoacetic Acid	ug/L	108	19	0
Dibromoacetic Acid	ug/L	108	11	0
Total Haloacetic Acids	µg/L	108	<60	0
Chloroform	µg/L	108	59	0
Bromodichloromethane	µg/L	108	49	0
Chlorodibromomethane	µg/L	108	38	0
Bromoform	µg/L	108	26	0
THMs Total	µg/L	108	160	0
Aluminium ICPMS	mg/L	27	0.13	0
Iron ICPMS	mg/L	27	0.260	0
Manganese ICPMS	mg/L	27	0.020	0
Lead ICPMS	mg/L	27	0.002	0
Fluoride	mg/L	27	0.84	0
Copper ICPMS	mg/L	27	0.140	0
Zinc ICPMS	mg/L	27	0.064	0
>C6-C10 Fraction	ug/L	9	<10	0
>C10-C16 Fraction	ug/L	9	<50	0
>C16-C34 Fraction	ug/L	9	<50	0
>C34-C40 Fraction	ug/L	9	<50	0
Benzene	ug/L	9	<1	0
Toluene	ug/L	9	<2	0
Ethyl Benzene	ug/L	9	<1	0
meta & para-Xylene	ug/L	9	<2	0
ortho-Xylene	ug/L	9	<1	0
1.2.4-Trimethylbenzene	ug/L	9	<1	0
1.3.5-Trimethylbenzene	ug/L	9	<1	0

\* Exceedence count = number of samples that did not meet the water quality criteria.

Table 2 - Reticulation *E. coli* verification monitoring

Year	2021						2022					
Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	15	13	17	15	15	17	15	15	17	15	18	17
No. of samples collected in which <i>E coli</i> is detected	0	0	0	0	0	0	0	0	0	0	1	0
No. of samples collected in previous 12 month period	188	186	184	184	184	184	184	184	184	184	184	185
No. of failures for previous 12 month period	0	0	0	0	0	0	0	0	0	0	0	1
% of samples that comply	100	100	100	100	100	100	100	100	100	100	100	99.5
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 3 Unmitigated Risk Assessment

Hazard Category	Primary Hazard	Source/ Hazardous event	Risk rating			Uncertainty	Comments
			Consequence	Likelihood	Rating		
Physical	Manganese (aesthetic)	High Fe, Mn or turbidity levels in upstream water supply resulting in aesthetically unpleasing water.	Minor	Rare	Low 2	Confident	Historically no issues observed in Sugarmill Road Infeed
Physical	Manganese (health)	High Mn concentration (in excess of the health guidelines) from upstream water supply exceeding health guideline	Moderate	Rare	Low 3	Certain	No aesthetic issues, and even less likely for health related issues
Microbial	Protozoa	Protozoan contamination from upstream water supply. Or, recontamination from mains breaks, reservoir ingress or backflow. Recycled water cross connection.	Catastrophic	Rare	Medium 6	Confident	Boiling water not feasible, contamination would likely result in airport needing to shut down operations or provide bottled water
Microbial	Bacteria	Bacterial contamination from upstream water supply. Or recontamination from mains breaks, reservoir ingress or backflow. Recycled water cross connection.	Catastrophic	Rare	Medium 6	Certain	Disinfection from Seqwater, redosed by Seqwater, BAC chemical dosing unit.
Microbial	Viruses	Ineffective treatment by upstream provider. Or recontamination from mains breaks, reservoir ingress or backflow. Recycled water cross connection.	Catastrophic	Rare	Medium 6	Reliable	Disinfection from Seqwater, redosed by Seqwater, BAC chemical dosing unit.
Microbial	Opportunistic Pathogens	<i>Legionella/ Naegleria/ Acanthamoeba/ Mycobacteria</i> establishment in reticulation due to long residence time and loss of residual	Major	Rare	Medium 5	Confident	Chloramine residual is topped up from the chemical dosing unit - target is 2.5-3.5 mg/L total chlorine post dosing.
Chemical	MIB/ Geosmin	Algal blooms in catchment resulting in taste or odour	Moderate	Possible	Medium 9	Reliable	Minimal complaints at BAC
Chemical	Algal Toxins	Toxins in raw water supply not removed by treatment	Moderate	Rare	Low 3	Estimate	Most algal toxins are oxidised by chlorine so no additional actions would be required to remove by normal operations.

Hazard Category	Primary Hazard	Source/ Hazardous event	Risk rating			Uncertainty	Comments
			Consequence	Likelihood	Rating		
Chemical	TDS	High TDS from raw water causing scaling issues	Minor	Possible	Medium 6	Reliable	Black Snake Creek can increase TDS to UU, but BAC customers are not impacted by the change.
Chemical	Heavy metals	Ineffective treatment by upstream provider. Leaching of Fe/Mn/Pb from aged assets.	Minor	Unlikely	Low 4	Confident	Upstream results indicate this is unlikely
Chemical	Taste and Odour - chloramines	Incorrect ratio of chlorine to ammonia from upstream treatment resulting poor taste, odour. Change of disinfection regime could also result in taste and odour issues due to chlorine.	Minor	Likely	Medium 8	Confident	Minimal complaints at BAC
Chemical	Chlorate	High chlorate concentrations resulting from upstream chlorination and re-chlorination	Moderate	Possible	Medium 9	Confident	Chlorate advised to be reported above 0.8 mg/L
Chemical	Total Chlorine	Upstream chlorine/ chloramine overdose	Moderate	Rare	Low 3	Certain	Chlorine slightly above guideline is unlikely to cause any health effect but can encourage customers to use a less safe source.
Chemical	Fluoride	Fluoride overdose	Moderate	Rare	Low 3	Certain	Seqwater has CCPs for fluoride, and interlocks to prevent overdose. Historically never impacted BAC.
Chemical	Disinfection Byproducts - HAAs and THMs	disinfection by-products exceed health guideline value.	Minor	Rare	Low 2	Confident	Upstream providers manage effectively. Historical data demonstrates no values above guideline. Actively managed upstream. No change expected from chemical dosing unit at BAC.
Chemical	Pesticides	Pesticides not removed by water treatment.	Minor	Rare	Low 2	Estimate	No known issues impacting UU
Radiological	Radiological	Radiological compounds not removed by water treatment.	Minor	Rare	Low 2	Estimate	Seqwater testing
Supply	Supply - Loss of Supply	Drought, treatment plant failure, asset failure resulting in complete loss of water supply	Catastrophic	Rare	Medium 6	Confident	Listed as high criticality risk in BAC asset management plan
Supply	Supply - Insufficient Pressure	Failure in upstream water distribution system resulting in lost pressure	Moderate	Rare	Low 3	Confident	There are multiple points of supply into the Sugarmill Road Infeed location via Wellers Hill or Bartleys Hill Reservoirs
Physical	Turbidity	Disturbance of sediment and entrainment into potable water supply, causing visible turbidity.	Minor	Unlikely	Low 4	Confident	Has not been an issue historically
Microbial	Contamination - sabotage	Terrorism event, unauthorised intentional contamination causing microbial contaminant to enter potable network	Catastrophic	Rare	Medium 6	Reliable	Drinking water unlikely to be target of sabotage at an international airport, airport security, high pressure mains limit ability to introduce contaminants

Hazard Category	Primary Hazard	Source/ Hazardous event	Risk rating			Uncertainty	Comments
			Consequence	Likelihood	Rating		
Microbial	Contamination - unintentional	Poor work practices leading to contamination during maintenance or construction activities	Catastrophic	Unlikely	High 10	Reliable	Possible to recontaminate a closed system through poorly controlled maintenance or construction activities
Chemical	Hydrocarbons	Organic chemicals leaching into plastic pipes	Moderate	Possible	Medium 9	Reliable	UU has had one incident where a fuel spill contaminated a main.
Chemical	Chemical recontamination	Pipe burst resulting in chemicals (pesticides, heavy metals) flowing into water distribution network, backflow from non-potable cross connection	Minor	Unlikely	Low 4	Confident	Inherent control of high system pressure makes ingress unlikely
Chemical	PFAS	Firefighting foams historically used at Airport - contaminated groundwater infiltrating water network	Moderate	Rare	Low 3	Confident	System integrity should exclude these chemicals
Chemical	Monochloramine	overdosing due to set point over background	Moderate	Almost Certain	High 15	Estimate	Risk due to chemical dosing unit
Chemical	chlorine	dosing chlorine above ADWG 5mg/L	Moderate	Likely	High 12	Estimate	Reduced risk as would require multiple failures within system including dosing through breakpoint.
Chemical	Ammonia	overdose of ammonia or failure to dose sodium hypochlorite	Moderate	Almost Certain	High 15	Estimate	Risk due to chemical dosing unit
Chemical	Disinfection Byproducts - NDMA	UU ceased monitoring as it had not been detected, slight increase in risk as redosing	Moderate	Rare	Low 3	Estimate	Investigate during or shortly after commissioning of chemical dosing unit
Chemical	pH	Overdose of Sodium hydroxide	Moderate	Almost Certain	High 15	Estimate	Risk due to chemical dosing unit
Whole of System	Lack of Staff Knowledge	O&M procedures not properly documented	Major	Possible	High 12	Estimate	Considered if there were no procedures
Whole of System	Operations error	Lack of Staff and Contractor training leading to hazard	Major	Possible	High 12	Estimate	Considered if there were no training
Whole of System	Loss of Knowledge	Lack of staff retention leading to loss of knowledge	Major	Possible	High 12	Estimate	Considered for loss of key staff
Chemical	Lead	solder from copper pipe repairs leaches into water supply	Minor	Unlikely	Low 4	Confident	Have been 2 recent detections - appear related to copper piping and solder, but not commonly encountered over last 5 years.
Cyber Security	Cyber attack/ or other loss of control systems	Cyber attack targeting control systems. Other failure of SCADA system.	Minor	Rare	Low 2	Certain	All valves within reticulation are manual; SCADA previously was only for pressure and flow monitoring. SCADA control of chemical dosing unit. UU will have access to this part of the system. Hazards from chemical dosing unit are assessed differently. Complete loss of SCADA system would not impact delivery of water.

Area	Primary hazard	Other hazards managed by same barriers	Hazardous Event	Maximum Risk	Existing Preventive Measure	Residual Risk				Documented Procedure	Comments
				Risk Level		Consequence	Likelihood	Risk Level	Uncertainty		
BAC Infeed	Protozoa		Protozoan contamination from upstream water supply/ ingress into UU network through reservoirs/ mains breaks/ backflow	Medium 6	Reliance on Seqwater to appropriately treat water, and for UU to manage distribution network to prevent ingress. Incident response including communication BAC/UU/customers	Catastrophic	Rare	Medium 6	Confident	not applicable	Transferred risk from upstream providers
BAC Infeed	Bacteria	Viruses	Bacterial/Viral contamination from upstream water supply/ ingress into UU network through reservoirs/ mains breaks/ backflow	Medium 6	Reliance on Seqwater to appropriately treat water, and for UU to manage distribution network to prevent ingress. Residual disinfection. Incident response including communication BAC/UU/customers. Chloramine dosing.	Catastrophic	Rare	Medium 6	Certain	not applicable	Transferred risk from upstream providers
BAC Infeed	MIB/ Geosmin	Other organic compounds	Breakthrough of treatment processes	Medium 9	Reliance on Seqwater to appropriately treat water. Communication between BAC/UU/customers.	Moderate	Possible	Medium 9	Confident	not applicable	Transferred risk from upstream providers
BAC Infeed	Supply - Loss of Supply		Simultaneous failure of 2 mains at Sugarmill Road	Medium 6	Asset management, planned works require hydraulics coordinator to manage. Incident response including communication between BAC/UU/customers	Catastrophic	Rare	Medium 6	Confident	Asset Management Plan, Isolation procedures, flushing procedures, (Mains repair by contractors), SEQ D&C Code, Backflow prevention device register	BAC and UU to consider sharing pressure signals
BAC Infeed	TDS		Source water has high TDS/ increasing with chlorination (if sodium hypochlorite)	Medium 6	No control measures, risk not changed	Minor	Possible	Medium 6	Confident	not applicable	Transferred risk from upstream providers
Chemical Dosing facility	Monochloramine		Overdose of both chemicals	High 15	Dosing systems set to correct ratio, UU and BAC will both receive alarms, UU to be contracted to operate and maintain dosing system. Interlocks in system.	Moderate	Unlikely	Medium 6	Reliable	Procedures currently being developed - UU will be required to operate as per contract requirements.	System is set to top up the incoming dose - changes in the delivered water chloramine residual typically occur over several weeks. Online instruments alarm at high total chlorine residual.
Chemical Dosing facility	Chlorate		Breakdown of stock solution, and addition to background from bulk supply	Medium 9	UU to manage stocks in accordance with their other sites. Minimum volume kept on site, replacement if strength is below trigger level	Moderate	Possible	Medium 9	Reliable	UU to manage chemical dosing and testing	commence investigative monitoring
Chemical Dosing facility	Ammonia		Overdose of ammonia/ underdose of hypochlorite / incorrect ratio	High 15	Dosing systems set to correct ratio, UU and BAC will both receive alarms, UU to be contracted to operate and maintain dosing system. Interlocks in system.	Moderate	Possible	Medium 9	Estimate	Procedures currently being developed - UU will be required to operate as per contract requirements.	PLC set to deliver an appropriate ratio, system interlocked. Routine monitoring, calibration, inspection.
BAC Distribution Network	Bacteria	Viruses. Opportunistic pathogens	Recontamination from BAC mains breaks or backflow.	Medium 6	Residual Disinfection through most of network, Water main repair and construction procedures. Backflow prevention devices and register, Incident response including communication BAC/UU/customers Emergency response plan initiated UU/BAC communications forum Chloramine dosing.	Catastrophic	Rare	Medium 6	Certain	Isolation procedures, flushing procedures, (Mains repair by contractors), SEQ D&C Code, Backflow prevention device register/ inspections/ maintenance	Loss of residual would need to be accompanied by a contamination event to result in bacterial pathogens
BAC Distribution Network	Bacteria	Viruses. Opportunistic pathogens	Cross connection to recycled water	Medium 6	Different pipe sizes Pressure differential Different coloured pipes Trained operator works on systems Accurate as constructed diagrams Residual disinfection in drinking water mains, redosing of chloramine.	Catastrophic	Rare	Medium 6	Certain	Asset management plan	The systems are generally well separated, and any plumbing works are inspected by hydraulics team before they are signed off.
BAC Distribution Network	Protozoa	Chemical contaminants	Cross connection to recycled water	Medium 6	Different pipe sizes Pressure differential Different coloured pipes Trained operator works on systems Accurate as constructed diagrams	Catastrophic	Rare	Medium 6	Confident	Asset management plan	The systems are generally well separated, and any plumbing works are inspected by hydraulics team before they are signed off. Chemical contaminants managed in the same way, but unmitigated risk considered low.
BAC Distribution Network	Protozoa		Recontamination from BAC mains breaks or backflow.	Medium 6	Water main repair and construction procedures. Incident response including communication BAC/UU/customers Emergency response plan initiated UU/BAC communications forum	Catastrophic	Rare	Medium 6	Confident	Isolation procedures, flushing procedures, (Mains repair by contractors), SEQ D&C Code, Backflow prevention device register/ inspections/ maintenance	Backflow
BAC Distribution Network	Opportunistic Pathogens		Loss of chlorine residual leading to colonisation and growth of opportunistic pathogens in BAC distribution network/ Backflow of contaminated water from customer storage into potable network.	Medium 5	Residual disinfection Backflow prevention Backflow device maintenance procedures Routine and ad hoc flushing of areas in International Terminal/Outer buildings Removal of dead ends at International Terminal complete Mains flushing Chloramine dosing.	Major	Rare	Medium 5	Confident	Backflow prevention device register/ inspections/ maintenance	Considered unlikely to be in source water given that residual disinfection to BAC is > 0.5 mg/L chloramine. Regrowth unlikely as there is a chloramine redosing facility.

Area	Primary hazard	Other hazards managed by same barriers	Hazardous Event	Maximum Risk	Existing Preventive Measure	Residual Risk				Documented Procedure	Comments
				Risk Level		Consequence	Likelihood	Risk Level	Uncertainty		
BAC Distribution Network	Supply - Loss of Supply		Significant on site mains failure	Medium 6	Looped mains, zoned operation of reticulation network, asset management, planned works require hydraulics coordinator to manage. Incident response including communication between BAC/UU/customers	Catastrophic	Rare	Medium 6	Confident	not applicable	BAC and UU to consider sharing pressure signals
BAC Distribution Network	Contamination - sabotage		Terrorism event, unauthorised intentional contamination causing microbial contaminant to enter potable network	Medium 6	Backflow prevention Security checks - includes AFP and QPS checks Pressurised system	Catastrophic	Rare	Medium 6	Confident	Backflow prevention device register, restricted site access	High pressure generally prevents the ability to force contaminants into this system
BAC Distribution Network	Contamination - unintentional		Poor work practices leading to contamination during maintenance or construction activities	High 10	Watermain repair and construction procedures, including testing. Standard construction practices including flushing and disinfection procedures. BAC has adopted SEQCode D&C procedures, including testing and disinfection procedures for new mains connections	Catastrophic	Rare	Medium 6	Reliable	Isolation procedures, flushing procedures, (Mains repair by contractors), SEQ D&C Code, Backflow prevention device register/ inspections/ maintenance	Repairs are contracted out, but all isolations are done by hydraulics team. This ensures that procedures are followed.
BAC Distribution Network	Hydrocarbons		Pipes can be pervious to hydrocarbons	Medium 9	Australian Standards for materials, survey has identified separation from fuel areas to trunk mains	Moderate	Rare	Low 3	Reliable	not applicable	Incident response if there was an issue
Staff Capability and Awareness	Lack of Staff Knowledge		O&M procedures not properly documented	High 12	Documented and agreed/formalised procedures	Major	Unlikely	Medium 8	Confident	As above	Staff are trained and have a high level of knowledge of the system.
Staff Capability and Awareness	Operations error		Lack of Staff and Contractor training leading to hazard	High 12	Training - sampling, back flow prevention all O&M procedures Operator qualifications. Awareness of water quality issues Reporting/communication with hydraulics team	Major	Unlikely	Medium 8	Confident	Training records	Staff are trained and have a high level of knowledge of the system.
Staff Capability and Awareness	Loss of Knowledge		Lack of staff retention leading to loss of knowledge	High 12	Low staff turnover, record keeping-central maintenance management system, training of new staff	Major	Unlikely	Medium 8	Reliable	Record keeping, central maintenance management system.	Turnover is sufficiently low, and new staff are well supported to build knowledge specific to their roles at BAC. UU to be contracted to operate chemical dosing facility.