

8. Risk Assessment Outcomes

8.1 Airport Drinking Water System

Airport Drinking Water System									
Process Step	Hazardous Event	Potential Result of Hazardous Event	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total Risk Rank (CCP Threshold = 21)	Critical
Source Water	Water Supply Shortfall	Loss of raw water.	Monthly groundwater level monitoring.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	5	3	15	No
	Sudden Changes to Raw Water Characteristics (e.g., Turbidity, pH)	Loss of raw water	Quarterly groundwater monitoring program, O. Reg. 170 Schedule 23 and 24 sampling. Critical Control Point – Turbidity POE (AIT04): <ul style="list-style-type: none">Hi Hi – 1.00 NTU	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	2	2	4	No
	Contamination of Source Water (runoff/spill)	Chemical or biological contamination of source water.	Raw and treated water samples are collected weekly and analyzed by an accredited laboratory. Quarterly water samples are collected from various monitoring wells and analyzed by an accredited laboratory. O. Reg. 169/03 MAC Levels. Daily sampling and monitoring (online monitoring and daily distribution grab samples). Source Protection	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water SOP 04-09 Reporting an Adverse Condition	1	3	4	12	No
	Raw Water Pump/Motor Failure	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Second production well for redundancy. Sections B.40.50 and B.40.60 – Airport O&M Manual	1	2	1	2	No
	Well Casing Collapse	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Second production well for redundancy. Sections B.40.50 and B.40.60 – Airport O&M Manual	1	2	1	2	No
Primary Disinfection	Chemical Feed Pump Failure	Loss of disinfection.	SCADA will alarm and shut down the raw water well pump when the online chlorine analyzer analyzes a minimum low chlorine residual. Critical Control Point: POE Cl₂ (AIT03): <ul style="list-style-type: none">Hi Hi – 1.50 mg/LLo Lo – 0.60 mg/L UPS and Diesel Gen Set provide backup power. SOP 30-09 Maintenance and Calibration of Monitoring Equipment	If the duty chlorine pump fails, SCADA will switch to the standby chlorine pump until repairs can be made to the failed pump. <i>Note: If CT requirements not met, report to MOH and SAC as per O. Reg. 170/03</i>	2	5	1	10	No

Airport Drinking Water System									
Process Step	Hazardous Event	Potential Result of Hazardous Event	Available Monitoring, Control Measures and Critical Control Point	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total Risk Rank (CCP Threshold = 21)	Critical
Chlorine Contact Pipe	Failure of the Contact Pipe	Inadequate contact times and potentially the loss of treated water being provided to the distribution system.		Use certified water trucks to transmit treated water from another drinking water system to the distribution system via a fire hydrant. Or tanker trucks can be used as a temporary reservoir to meet CT requirements. Section 7.4 - Emergency Response Contingency Plan	2	5	4	40	Yes
Elevated Storage Reservoir	Maintenance or Low Water	Loss of treated storage.	The County inspects reservoirs approximately every 5-7 years. SCADA will shut down outlet when Lo level alarm is reached. Critical Control Point – Level (m) (LIT01): <ul style="list-style-type: none">Hi Hi – 7.60 mLo Lo – 3.50 m Critical Control Point – Discharge Pressure (PIT01): <ul style="list-style-type: none">Hi Hi - 460 kpaLo Lo – 360 kpa	The elevated storage reservoir can be bypassed. Section 7.4 - Emergency Response Contingency Plan	2	2	1	4	No
Distribution	Watermain Break	Loss of pressure. Contamination of distribution water.	Customers typically call advising of service disruptions or water flowing from the ground. Leak detection program. Maintain positive distribution pressure.	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03 A contractor to assist with the repair is available 24/7 (See Element 13)	3	3	3	27	Yes
	Loss of Chlorine Residual (Secondary Disinfection)	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. Critical Control Point: Secondary Disinfection Residual <ul style="list-style-type: none">0.30 mg/L (free)	SOP 14-09 Procedure for Required Action In The Event of a Low Chlorine Residual In The Distribution System Refer to Ontario Regulation 170/03.	2	4	3	24	Yes
	Backflow	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. By-law 116-06 (Backflow).	SOP 04-09 Reporting an Adverse Condition	1	4	4	16	No
	Sustained Pressure Loss	Loss of water, possible contamination of distribution water.	SCADA monitors pressure zones. By-law 116-06 (Backflow). Critical Control Point: Weekly Distribution Pressure Checks <ul style="list-style-type: none">Less than 30 kPA	SOP 53-11 Procedure for Responding to Watermain Breaks	1	3	4	12	No
Control Systems	Power Failure	Loss of monitoring devices.	Back-up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.	Section 2 G.40 –Airport O & M Manual	3	2	1	6	No

Airport Drinking Water System									
Process Step	Hazardous Event	Potential Result of Hazardous Event	Available Monitoring, Control Measures and Critical Control Point	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total Risk Rank (CCP Threshold = 21)	Critical
Entire System	Power Failure (Grid)	Loss of treated water supply.	Back-up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.	Section 2 G.40 –Airport O & M Manual	3	1	1	3	No
	Power Failure (Back Up Power)	Loss of treated water supply.	SCADA would advise of loss of power.	The County would obtain the services of back-up power portable generator from a local rental company.	2	4	1	8	N
	Long Term Impacts of Climate Change	Loss of raw/source water. Loss of treated water supply. Damage to equipment/infrastructure - inability to produce/provide water.	Groundwater level monitoring/reporting. Weather Forecast reports		1	2	2	4	No
	Extreme Weather Events	Loss of raw/source water. Loss of treated water supply. Damage to equipment - inability to produce water. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	4	1	4	No
Facility Security	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination.	Locks, alarms and daily site visits by Operations staff.		1	4	1	4	No
Cyber Security	Loss of internet and electronic records.	Loss of treated water supply. Loss of SCADA.	Data loggers on electronic analyzers would continue to record regulatory parameters.	Security for the SCADA system is handled by the County's integrator and IT Department. Some of the security measures include the SCADA system not physically being connected to the internet. This is like a CCTV system where there is a network but no outside connections direct to the internet. When a connection is required to view the SCADA system there are firewalls in place, VPN's required and multiple passwords required on specific platforms to gain access	2	2	1	4	No

8.2 Cainsville Distribution System

Cainsville Distribution System									
Process Steps	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Point	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total Risk Rank (CCP Threshold =21)	Critical
Source Water	Contamination of Water Supply	Chemical /Biological contamination of source water (Supplied by City of Brantford).	Chlorine residuals (via grab samples) are taken from distribution systems daily and weekly. Distribution grab samples are collected and analyzed weekly by an accredited laboratory. Communication with the City of Brantford is essential. Critical Control Point – Chamber Pressure (PIT02): <ul style="list-style-type: none">Lo Lo – 300 kpa	SOP-04-09 Reporting an Adverse Condition Close valve between the Brantford and Cainsville Distribution systems.	1	3	2	6	No
Storage	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination. Loss of Water	Security fences and locked gates. Alarms on building and daily site visits by Water Operations staff. Critical Control Point – Level (PIT01): <ul style="list-style-type: none">Hi Hi – 7.00 mLo Lo – 3.20 m		1	3	1	3	No
Distribution	Watermain Break	Loss of pressure/contamination of distribution water.	Customers typically call advising of service disruptions or water flowing from the ground. Leak detection program. Maintain positive distribution pressure.	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C651-05 Disinfecting Watermains and Ontario Regulation 170/03 A contractor to assist with the repair is available 24/7 (See Element 13).	3	3	3	27	Yes
	Loss of Chlorine Residual (Secondary Disinfection)	Contamination of distribution water.	Distribution system maintenance via sampling (daily and weekly grab samples) and scheduled distribution system flushing. Critical Control Limit: Secondary Disinfection Residual <ul style="list-style-type: none">0.80 mg/L (combined)	SOP 14-09 Procedure for Required Action In The Event of a Low Chlorine Residual In The Distribution System. Ontario Regulation 170/03.	2	4	3	24	Yes
	Long Term Impacts of Climate Change	Loss of treated water supply. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	2	2	4	No
	Extreme Weather Events	Loss of treated water supply. Damage to equipment - inability to produce water. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	4	1	4	No

Cainsville Distribution System									
Process Steps	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Limit	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total Risk Rank (CCP Threshold =21)	Critical
Distribution	Backflow	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. By-law 116-06 (Backflow).	SOP 04-09 Reporting an Adverse Condition	1	4	4	16	No
	Sustained Pressure Loss	Loss of water, possible contamination of distribution water.	SCADA monitors pressure zones. By-law 116-06 (Backflow). Critical Control Limit – Cainsville Chamber Pressure (PIT02) <ul style="list-style-type: none">Lo Lo – 300 kpa Critical Control Point: Weekly Distribution Pressure Checks <ul style="list-style-type: none">Less than 30 kPA	SOP 53-11 Procedure for Responding to Watermain Breaks	1	3	4	12	No
Facility Security	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination.	Locks, alarms and daily site visits by Operations staff.		1	4	1	4	No
Cyber Security	Loss of internet and electronic records.	Loss of treated water supply. Loss of SCADA.	Data loggers on electronic analyzers would continue to record regulatory parameters.	Security for the SCADA system is handled by the County's integrator and IT Department. Some of the security measures include the SCADA system not physically being connected to the internet. This is like a CCTV system where there is a network but no outside connections direct to the internet. When a connection is required to view the SCADA system there are firewalls in place, VPN's required and multiple passwords required on specific platforms to gain access	2	2	1	4	No

8.3 Mt. Pleasant Drinking Water System

Mt. Pleasant Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Source Water	Water Supply Shortfall	Loss of raw water.	Monthly groundwater level monitoring.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	5	3	15	No
	Sudden Changes to Raw Water Characteristics (e.g., Turbidity, pH)	Loss of raw water	Quarterly groundwater monitoring program, O. Reg. 170 Schedule 23 and 24 sampling. Critical Control Point – Turbidity POE (NIT07): <ul style="list-style-type: none">Hi Hi – 1.00 NTU	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	2	2	4	No
	Contamination of Source Water (runoff/spill)	Chemical or Biological contamination of source water.	Raw and treated water samples are collected weekly and analyzed by an accredited laboratory. Quarterly water samples are collected for various monitoring wells and analyzed by an accredited laboratory. O. Reg. 169/03 MAC Levels. Daily sampling and monitoring (online monitoring and daily distribution grab samples). Source Protection	SOP 04-09 Reporting an Adverse Condition	1	3	4	12	No
	Raw Water Pump/Motor Failure	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Second well and well pump which can provide raw water for treatment.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.6 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – Mt. Pleasant O&M Manual	1	1	3	3	No
	Well Casing Collapse	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Second well and well pump which can provide raw water for treatment.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.6 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – Mt. Pleasant O&M Manual	1	1	3	3	No
Treated Water Supply	Exceedance of the Systems Rated Capacity and PTTW Daily Taking Limit	Loss of treated water supply through high water use in the late spring and summer months.	Daily review of SCADA to ensure point of entry volumes do not exceed the systems rated capacity. Outdoor water use program and outdoor water use restrictions.	SOP-100-22 Mt. Pleasant Water Restrictions	4	3	1	12	No
Primary Disinfection	Chemical Feed Pump Failure	Loss of disinfection.	SCADA will alarm and shut down the raw water well pump when the online chlorine analyzer analyzes a minimum low chlorine residual. Critical Control Point: POE Cl₂ (AIT10): <ul style="list-style-type: none">Hi Hi – 1.30 mg/LLo Lo – 0.35 mg/L UPS and Diesel Gen Set provide backup power. SOP 30-09 Maintenance and Calibration of Monitoring Equipment	If the duty chlorine pump fails, SCADA will switch to the standby chlorine pump until repairs can be made to the failed pump. <i>Note: If CT requirements not met, report to MOH and SAC as per O. Reg. 170/03</i>	1	4	1	4	No

Mt. Pleasant Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Reservoir	Maintenance or Low Water	Inadequate contact times and potentially the loss of treated water being provided to the distribution system.	Two (2) independent reservoirs. Flow can be transferred to reservoir one or two for maintenance. SCADA will shut down pumps when Lo Lo level is reached. Critical Control Point: Reservoir 1 Level (LIT201): <ul style="list-style-type: none">Hi Hi – 4.05 mLo Lo – 1.80 m Reservoir 2 Level (LIT202) <ul style="list-style-type: none">Hi Hi – 4.05 mLo Lo – 1.80 m		1	3	1	3	No
High Lift Pumps	Pump Failure	Loss of treated water / pressure to the distribution system.	Critical Control Point: <ul style="list-style-type: none">SCADA monitors pump activity and alarms with pump failure. Multiple back-up high lift pumps. Diesel Gen Set provides backup power. Critical Control Point – POE Pressure (PIT03): <ul style="list-style-type: none">Lo Lo – 300 kpa	Four (4) high lift pumps capable of providing water to the distribution system.	1	1	1	3	No
Distribution	Watermain Break	Loss of pressure/contamination of distribution water.	Customers typically call advising of service disruptions or water flowing from the ground. Leak detection program. Maintain positive distribution pressure.	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03. A contractor to assist with the repair is available 24/7 (See Element 13).	3	3	3	27	Yes
	Loss of Chlorine Residual (Secondary Disinfection)	Contamination of distribution water.	Distribution system maintenance via sampling (daily and weekly grab samples) and scheduled distribution system flushing. Critical Control Point: Secondary Disinfection Residual <ul style="list-style-type: none">0.30 mg/L (free)	SOP 14-09 Procedure for Required Action In The Event of a Low Chlorine Residual In The Distribution System. Refer to Ontario Regulation 170/03.	2	4	3	24	Yes

Mt. Pleasant Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Distribution	Backflow	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. By-law 116-06 (Backflow).	SOP 04-09 Reporting an Adverse Condition	1	4	4	16	No
	Sustained Pressure Loss	Loss of water, possible contamination of distribution water.	SCADA monitors pressure zones. By-law 116-06 (Backflow). Critical Control Point: Weekly Distribution Pressure Checks <ul style="list-style-type: none">Less than 30 kPA	SOP 53-11 Procedure for Responding to Watermain Breaks	1	3	4	12	No
Control Systems	Power Failure	Loss of monitoring devices.	Back-up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.	Section 2 G.40 – Mt. Pleasant O & M Manual	2	4	1	8	No
Entire System	Power Failure	Loss of treated water supply.	Back-up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.	Section 2 G.40 – Mt. Pleasant O & M Manual	3	4	1	12	No
	Power Failure (Back Up Power)	Loss of treated water supply.	SCADA would advise of loss of power.	The County would obtain the services of back-up power portable generator from a local rental company.	2	4	1	8	N
	Long Term Impacts of Climate Change	Loss of raw/source water. Loss of treated water supply. Damage to equipment/infrastructure - inability to produce/provide water.	Groundwater level monitoring. Weather Forecast reports		1	2	2	4	No
	Extreme Weather Events	Loss of raw/source water. Loss of treated water supply. Damage to equipment - inability to produce water. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	4	1	4	No

Mt. Pleasant Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Facility Security	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination.	Locks, alarms and daily site visits by Operations staff.		1	4	1	4	No
Cyber Security	Loss of internet and electronic records.	Loss of treated water supply. Loss of SCADA.	Data loggers on electronic analyzers would continue to record regulatory parameters.	Security for the SCADA system is handled by the County's integrator and IT Department. Some of the security measures include the SCADA system not physically being connected to the internet. This is like a CCTV system where there is a network but no outside connections direct to the internet. When a connection is required to view the SCADA system there are firewalls in place, VPN's required and multiple passwords required on specific platforms to gain access	2	2	1	4	No

8.4 Paris Drinking Water System

Paris Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Source Water	Water Supply Shortfall	Loss of raw water.	Monthly groundwater level monitoring.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	5	3	15	No
	Sudden Changes to Raw Water Characteristics (e.g., Turbidity, pH)	Loss of raw water	Quarterly groundwater monitoring program, O. Reg. 170 Schedule 23 and 24 sampling. Critical Control Point – Turbidity POE (AIT7703): <ul style="list-style-type: none">Hi Hi – 2.00 NTU	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	2	2	4	No
	Contamination of Source Water (runoff/spill)	Chemical or biological contamination of source water.	Raw and treated water samples are collected weekly and analyzed by an accredited laboratory. Quarterly water samples are collected from various monitoring wells and analyzed by an accredited laboratory. O. Reg. 169/03 MAC Levels. Daily sampling and monitoring (online monitoring and daily distribution grab samples). Source Protection	SOP 04-09 Reporting an Adverse Condition	1	3	4	12	No
		Bethel Sewage Pumping Station (SPS) Overflow	SPS has overflow alarm that would notify of an overflow.	Alarm of overflow at the SPS facility would trigger the shutdown of the Bethel Water Treatment Facility until it could be determined if the groundwater was impacted.	2	2	2	8	No
	Raw Water Pump/Motor Failure	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Multiple wells.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.4 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – Gilbert, Telfer and Bethel O&M Manuals	1	1	3	3	No
	Well Casing Collapse	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Multiple wells.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.4 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – Gilbert, Telfer and Bethel O&M Manuals	1	1	3	3	No

Paris Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 24)	Critical
Primary Disinfection	Chemical Feed Pump Failure	Loss of disinfection.	SCADA will alarm and shut down the raw water well pump when the online chlorine analyzer analyzes a minimum high / low chlorine residual. Critical Control Point – Bethel Cl₂ POE (AIT639 and AIT617) <ul style="list-style-type: none">1.30 mg/L0.50 mg/L Critical Control Point – Gilbert Cl₂ POE (AIT7701 and AIT6201) <ul style="list-style-type: none">1.30 mg/L0.50 mg/L Critical Control Point – Telfer Cl₂ POE (AIT7701) <ul style="list-style-type: none">1.30 mg/L0.50 mg/L UPS and Diesel Gen Set provide backup power. SOP 30-09 Maintenance and Calibration of Monitoring Equip.	If the duty chlorine pump fails, SCADA will switch to the standby chlorine pump until repairs can be made to the failed pump. <i>Note: If CT requirements not met, report to MOH and SAC as per O. Reg. 170/03</i>	1	4	1	4	No
	UV Lamp Failure (Bethel and Gilbert Only)	Loss of disinfection.	Duty and standby UV Lamps. SCADA will transfer to standby lamp in the event of a malfunction. Critical Control Point – Bethel UV <ul style="list-style-type: none">Reactor 1 (UV609) Minimum Dose – 20 mj/cm²Reactor 2 (UV610) Minimum Dose – 20 mj/cm² Critical Control Point – Bethel UVT <ul style="list-style-type: none">Reactor 1 UV609 Minimum UVT – 93%Reactor 2 UV610 Minumum UVT – 93% Critical Control Point – Gilbert UV <ul style="list-style-type: none">Reactor 1 (UV3101) Minimum Dose – 40 mj/cm²Reactor 2 (UV3102) Minimum Dose – 40 mj/cm² Critical Control Point – Gilbert UVT (AIT3003) <ul style="list-style-type: none">Upper Aquifer Minimum UVT – 90%	Well pumps will shut down if both UV lamps fail.	3	4	1	12	No

Paris Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 24)	Critical
Reservoir (Gilbert)	Maintenance or Low Water	Inadequate contact times and potentially the loss of treated water being provided to the distribution system.	The County typically inspects reservoirs approximately every 5 years. SCADA will shut down pumps when Lo Lo level is reached. Critical Control Point: Reservoir 1 Level (LIT6001): <ul style="list-style-type: none">Hi Hi – 2.32 mLo Lo – 1.50 m Reservoir 2 Level (LIT6002) <ul style="list-style-type: none">Hi Hi – 2.33 mLo Lo – 1.50 m	Two (2) independent reservoirs. Flow can be transferred to reservoir one or two for maintenance. Bethel and Telfer provide back up to Gilbert. North Paris and Oak Park Elevated Tanks and Sharpe Reservoir provide emergency storage of treated water within the distribution system.	2	2	1	4	No
Contact Chambers (Telfer)	Offline for Maintenance	Inadequate contact times and potentially the loss of treated water being provided to the distribution system.	The County typically inspects contact chambers approximately every 5-7 years.	Two (2) cell contact chambers. Flow can be transferred to chamber one or two for maintenance. Bethel and Gilbert provide back up to Telfer North Paris and Oak Park Elevated Tanks and Sharpe Reservoir provide emergency storage of treated water within the distribution system.	2	2	1	4	No
Chlorine Contact Tank (Bethel)	Maintenance or Low Water	Inadequate contact times and potentially the loss of treated water being provided to the distribution system.	The County typically inspects contact tanks approximately every 5 years. SCADA will shut down pumps when Lo Lo level is reached. Critical Control Point: Reservoir 1 Level (m) (LIT613): <ul style="list-style-type: none">Hi Hi – 2.81 mLo Lo – 2.10 m Reservoir 2 Level (m) (LIT614) <ul style="list-style-type: none">Hi Hi – 2.95 mLo Lo – 2.10 m	Two (2) cell contact tank. Flow can be transferred to cell one or two for maintenance. Gilbert and Telfer provide back up to Bethel. North Paris and Oak Park Elevated Tank and Sharpe Reservoir provide emergency storage of treated water within the distribution system.	2	2	1	4	No
High Lift Pumps	Pump Failure	Loss of treated water / pressure to the distribution system.	Critical Control Point: SCADA monitors pump activity and alarms with pump failure. Multiple back-up high lift pumps. Diesel Gen Set provides backup power. Critical Control Point: Bethel POE Pressure (PIT699) <ul style="list-style-type: none">Hi Hi – 900 kpaLo Lo – 140 kpa Gilbert POE Pressure (PIT7701) <ul style="list-style-type: none">Hi Hi – 800 kpaLo Lo – 350 kpa		1	1	1	1	No

Paris Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Distribution	Watermain Break	Loss of pressure/ contamination of distribution water.	Customers typically call advising of service disruptions or water flowing from the ground. Leak detection program. Maintain positive distribution pressure.	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03. A contractor to assist with the repair is available 24/7 (See Element 13).	4	3	4	48	Yes
	Loss of Residual (Secondary Disinfection)	Contamination of distribution water.	Distribution system maintenance via sampling (daily and weekly grab samples) and scheduled distribution system flushing. Re-chlorination systems potential at Sharpe Reservoir. Critical Control Point: Secondary Disinfection Residual <ul style="list-style-type: none">0.30 mg/L (free)	SOP 14-09 Procedure for Required Action In The Event of a Low Chlorine Residual In The Distribution System. Always refer to Ontario Regulation 170/03.	2	4	3	24	Yes
	Backflow	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. By-law 116-06 (Backflow).	SOP 04-09 Reporting an Adverse Condition	1	4	4	16	No
	Sustained Pressure Loss	Loss of water, possible contamination of distribution water.	SCADA monitors pressure zones. Critical Control Points: Parkhill Booster Station: Discharge Pressure (PIT201): <ul style="list-style-type: none">Hi Hi – 900 kpaLo Lo – 300 kpa Suction Pressure (PIT101) <ul style="list-style-type: none">Hi Hi – 750 kpaLo Lo – 300 kpa Sharpe Reservoir: Discharge Pressure (PIT101): <ul style="list-style-type: none">Hi Hi – 600 kpsLo Lo – 138 kpa By-law 116-06 (Backflow). Critical Control Point: Weekly Distribution Pressure Checks <ul style="list-style-type: none">Less than 30 kPA	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03.	1	3	4	12	No
Control Systems	Power Failure	Loss of monitoring devices and SCADA.	Back up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.		3	2	1	6	No

Paris Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Entire System	Power Failure	Loss of treated water supply.	Back up power - Diesel generator set (automatic transfer switch via SCADA) / UPS. UPS provides temporary power.		3	3	1	9	No
	Power Failure (Back Up Power)	Loss of treated water supply.	SCADA would advise of loss of power.	The County would obtain the services of back-up power portable generator from a local rental company.	2	4	1	8	N
	Long Term Impacts of Climate Change	Loss of raw/source water. Loss of treated water supply. Damage to equipment/infrastructure - inability to produce/provide water.	Groundwater level monitoring. Weather Forecast reports		1	2	2	4	No
	Extreme Weather Events	Loss of raw/source water. Loss of treated water supply. Damage to equipment - inability to produce water. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	4	1	4	No
Facility Security	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination.	Locks, alarms and daily site visits by Operations staff.		1	4	1	4	No
Cyber Security	Loss of internet and electronic records.	Loss of treated water supply. Loss of SCADA.	Data loggers on electronic analyzers would continue to record regulatory parameters.	Security for the SCADA system is handled by the County's integrator and IT Department. Some of the security measures include the SCADA system not physically being connected to the internet. This is like a CCTV system where there is a network but no outside connections direct to the internet. When a connection is required to view the SCADA system there are firewalls in place, VPN's required and multiple passwords required on specific platforms to gain access	2	2	1	4	No

8.5 St. George Drinking Water System

St. George Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk (CCP Threshold = 21)	Critical
Source Water	Water Supply Shortfall	Loss of raw water.	Monthly groundwater level monitoring.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	5	3	15	No
	Sudden Changes to Raw Water Characteristics (e.g., Turbidity, pH)	Loss of raw water	Quarterly groundwater monitoring program, O. Reg. 170 Schedule 23 and 24 sampling.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water	1	2	2	4	No
	Contamination of Source Water (runoff/spill)	Chemical or biological contamination of source water.	Raw and treated water samples are collected weekly and analyzed by an accredited laboratory. Quarterly water samples are collected from various monitoring wells and analyzed by an accredited laboratory. O. Reg. 169/03 MAC Levels. Daily sampling and monitoring (online monitoring and daily distribution grab samples). Source Protection	SOP 04-09 Reporting an Adverse Condition	1	3	4	12	No
	Raw Water Pump Failure	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Multiple wells.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.4 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – St. George O&M Manual	1	1	3	3	No
	Well Casing Collapse	Loss of raw water.	SOP 09-09 Well Inspection Schedule, Maintenance Procedures and Remedial Action Plan Multiple wells.	SOP 01-09 Operating Strategy in the Event of Failure to Produce Water Section 7.4 - Emergency Response Contingency Plan Sections B.40.50 and B.40.60 – St. George O&M Manual	1	1	3	3	No
Primary Disinfection	Chemical Feed Pump Failure	Loss of disinfection	SCADA will alarm and shut down the raw water well pump when the online chlorine analyzer analyzes a minimum low chlorine residual. Critical Control Point – POE Cl₂ (AIT02) <ul style="list-style-type: none">Hi Hi – 1.30 mg/LLo Lo – 0.35 mg/L UPS and Diesel Gen Set provide backup power. SOP 30-09 Maintenance and Calibration of Monitoring Equipment	If the duty chlorine pump fails, SCADA will switch to the standby chlorine pump until repairs can be made to the failed pump. <i>Note: If CT requirements not met, report to MOH and SAC as per O. Reg. 170/03</i>	2	4	1	8	No

St. George Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk CCP Threshold = 21	Critical
Contact Chambers	Maintenance or Low Water	Inadequate contact times. Loss of treated water.	Two (2) cell contact chambers. Flow can be transferred to chamber one or two for maintenance. The Elevated Tank and stand pipe provide emergency storage of treated water within the distribution system. Critical Control Point: Elevated Tank – Level (m) (PIT01) <ul style="list-style-type: none">Hi Hi – 8.82 mLo Lo – 3.8 m Standpipe – Level (m) (PIT02) <ul style="list-style-type: none">Hi Hi – 7.80 mLo Lo – 4.90 m	SOP 24-09 Procedure for Isolating and Flushing the St. George Contact Chambers	2	2	1	4	No
Distribution	Watermain Break	Loss of pressure/ contamination of distribution water.	Customers typically call advising of service disruptions or water flowing from the ground. Leak detection program. Maintain positive distribution pressure.	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03. A contractor to assist with the repair is available 24/7 (See Element 13).	3	3	3	36	Yes
	Loss of Residual (Secondary Disinfection)	Contamination of distribution water.	Distribution system maintenance via sampling (daily and weekly grab samples) and scheduled distribution system flushing. Critical Control Point: Secondary Disinfection Residual <ul style="list-style-type: none">0.30 mg/L (free)	SOP 14-09 Procedure for Required Action In The Event of a Low Chlorine Residual In The Distribution System. Always refer to Ontario Regulation 170/03.	2	4	3	24	Yes
	Backflow	Contamination of distribution water.	Distribution sampling (daily and weekly grab samples) and scheduled distribution system flushing. By-law 116-06 (Backflow).	SOP 04-09 Reporting an Adverse Condition	1	4	4	16	No
	Sustained Pressure Loss	Loss of water, possible contamination of distribution water.	SCADA monitors pressure zones. Critical Control Point: Weekly Distribution Pressure Checks <ul style="list-style-type: none">Less than 30 kPA	SOP 53-11 Procedure for Responding to Watermain Breaks Ontario Watermain Disinfection Procedure, AWWA Standard C-651 Disinfecting Watermains and Ontario Regulation 170/03.	1	3	4	12	No
Control Systems	Power Failure	Loss of monitoring devices.	Back-up power via diesel generator (automatic transfer switch via SCADA) UPS provides temporary power.		3	2	1	6	No

St. George Drinking Water System									
Activity or Process Step	Description of Hazard	Potential Result of Hazard	Available Monitoring, Control Measures and Critical Control Points	Emergency Procedure or Contingency Plan	Probability	Severity	Detectability	Total High Risk CCP Threshold = 21	Critical
Entire System	Power Failure	Loss of treated water supply.	Back-up power diesel generator (automatic transfer switch via SCADA) UPS provides temporary power.		3	3	1	9	No
	Power Failure (Back Up Power)	Loss of treated water supply.	SCADA would advise of loss of power.	The County would obtain the services of back-up power portable generator from a local rental company.	2	4	1	8	N
	Long Term Impacts of Climate Change	Loss of raw/source water. Loss of treated water supply. Damage to equipment/infrastructure - inability to produce/provide water.	Groundwater level monitoring. Weather Forecast reports		1	2	2	4	No
	Extreme Weather Events	Loss of raw/source water. Loss of treated water supply. Damage to equipment - inability to produce water. Damage to equipment/infrastructure - inability to produce/provide water.	Weather Forecast Reports		1	4	1	4	No
Facility Security	Vandalism / Introduction of contaminant	Damage to equipment - inability to produce water. Potential contamination.	Locks, alarms and daily site visits by Operations staff.		1	4	1	4	No
Cyber Security	Loss of internet and electronic records.	Loss of treated water supply. Loss of SCADA.	Data loggers on electronic analyzers would continue to record regulatory parameters.	Security for the SCADA system is handled by the County's integrator and IT Department. Some of the security measures include the SCADA system not physically being connected to the internet. This is like a CCTV system where there is a network but no outside connections direct to the internet. When a connection is required to view the SCADA system there are firewalls in place, VPN's required and multiple passwords required on specific platforms to gain access.	2	2	1	4	No

County of Brant Water Division		
Title: County of Brant Operational Plan		
QMS Reference: D-02-10		
Dated Created: April 16, 2009	Current Revision Date: October 19, 2022	Version Number: 18

REVISION NUMBER	REVISION	DATE OF REVISION (MM/DD/YYYY)	REVISION COMPLETED BY:	CURRENT REVISION NUMBER
1	All Systems: Distribution (Loss of Residual) – Revised to note the chlorine residual concentration that would initiate an operator to open a hydrant to increase residual and the chlorine residual concentration that the operator to stop flushing the system.	October 7, 2013	D. Stevenson	8
2	Airport, Mt. Pleasant and Paris: High Lift Pumps – Loss of Treated Water and System Pressure – Severity re-classed to 1 as there impact to public health.	October 7, 2013	D. Stevenson	8
3	Airport: Source Water – Raw Water Pump Failure - Detectability reassessed to a 3. Now makes this critical as the Airport system only has one production well. Procedures are in the Emergency Response Contingency Plan to deal with this item.	October 7, 2013	D. Stevenson	8
4	Airport: Source Water – Well Casing Collapse - Detectability reassessed to a 3. Now makes this critical as the Airport system only has one production well. Procedures are in the Emergency Response Contingency Plan to deal with this item.	October 7, 2013	D. Stevenson	8
5	Airport, Mt. Pleasant, Paris and St. George: Primary Disinfection - High Lift Pumps – Included UPS and Diesel Gen Set as a Control Measure in event of power loss.	October 7, 2013	D. Stevenson	8
6	All Systems: Distribution – Watermain Break / Leak – Added “maintain positive pressure” as control measure.	October 7, 2013	D. Stevenson	8
7	All Systems: Source Water – Contamination of Source Water – Added Source Protection.	October 7, 2013	D. Stevenson	8
8	Mt. Pleasant, Paris and St. George: – Raw Water Pump Failure and Well Casing Collapse – Detectability reassessed to a 3. This does not make this item critical.	October 7, 2013	D. Stevenson	8
9	Paris: Source Water – Raw Water Pump Failure and Well Casing Collapse – Added multiple wells as a control measure.	October 7, 2013	D. Stevenson	8
10	Airport: Control Systems – Removed gas and diesel pump references during power failure under “available control measures” as a diesel gen set was installed at Airport.	January 21, 2014	D. Stevenson	9
11	Airport: Entire System – Removed gas and diesel pump references during power failure under “available control measures” as a diesel gen set was installed at Airport.	January 21, 2014	D. Stevenson	9
12	Cainsville/KGR – Added SOP-04-09 to Source Water	11/02/2015	D. Stevenson	10
13	Airport, Mt. Pleasant, Paris and St. George –Added O. Reg. 169/03 to Source Water Control Measure.	09/23/2016	D. Stevenson	11
14	Paris (Gilbert, Bethel and Telfer Storage) – Added reference to North Paris Elevated Tank	09/23/2016	D. Stevenson	11
15	Cainsville/KGR – Removed reference to KGR.	12/21/2016	D.Stevenson	12
16	A complete review was conducted as part of the 36 month review. Revisions were made to incorporate the requirements of the Ministry of the Environment document titled “Potential Hazardous Events for Municipal Residential Drinking Water Systems (February 2017)”.	09/06/2018	D. Stevenson	13
17	Revised to note Critical Control Limits for various monitoring points throughout the systems.	04/18/2019	D. Stevenson	14
18	Revised Entire System - Power Failure - into 2 categories, Loss of Grid Power and Loss of Back-up Power. (all systems)	09/23/2019	D. Stevenson	15
19	Revised scoring for Loss of Grid power. No change to critical level. (all systems)	09/23/2019	D. Stevenson	15
20	Added scoring for Loss of Back-up Power. (all systems)	09/23/2019	D. Stevenson	15
21	Added Cyber Security (all systems)	09/23/2019	D. Stevenson	15

REVISION NUMBER	REVISION	DATE OF REVISION (MM/DD/YYYY)	REVISION COMPLETED BY:	CURRENT VERSION NUMBER
22	Airport reassessed and updated to note upgrades to the facility. <ul style="list-style-type: none">Source Water Well pump/Motor Failure and Well Casing Collapse– New WellPrimary Disinfection – Updated CPP’sChlorine Contact Pipe AddedElevated Storage All Systems <ul style="list-style-type: none">Secondary Disinfection Identified	11/30/2020	D. Stevenson	16
23	Cyber Security (All Systems) – The Emergency Procedure or Contingency Plan for this item was updated.	04/13/2022	D. Stevenson	17
24	Section 8.3 – Added Treated Water Supply due to the high water use the system experiences in the late spring and summer months. Section 8.4 – Added to Source Water, Contamination of Source Water – Overflow from the Bethel SPS that is within the 100m well head protection area.	10/19/2022	D. Stevenson	18