APPENDIX 6

Water Infrastructure

1.0 INGERSOLL DWS

1.1 Treatment Overview

Water from each well enters into the associated WTF and is first treated with liquid chlorine to initiate the oxidation of hydrogen sulphide, iron and manganese into filterable oxide particles. At Merritt and Dunn's WTF, ferric chloride is added in addition to optimize hydrogen sulphide removal. The chlorinated water is then conveyed through a pressure filter targeting reduction of hydrogen sulphide, iron and manganese concentration. The filter is equipped with a backwashing system. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

The filtered water is disinfected with chlorine gas or sodium hypochlorite, then conveyed into an underground reservoir to develop contact time. The reservoir is equipped with high lift pumps which supply the water to the distribution system. At Merritt Street WTF, a top-up chlorination system is added to boost up the chlorine level in treated water prior to distribution.

Chemical feed pumps and gas chlorinator are used to add sodium hypochlorite and chlorine gas into the system. Liquid chlorine is stored within designated containers within each WTF. Chlorine gas is stored in V-notch gas chlorinator complete with gas cylinder scale and regulators.

Three WTFs – Merritt Street WTF, Dunn's Road WTF and Thompson Road WTF – are equipped with diesel generators that supply power in an emergency.

1.2 Supply Wells

1.2.1 Well 2

Well 2 is located at 195 Merritt Street within the Town of Ingersoll. It was constructed in 1930, with two connecting sections varying in depth and diameter. Section 1 is 106 m deep with a diameter of 300 mm, and section 2 is deep to 140 m with a diameter of 250 mm. It has a maximum capacity of 2938 m^3/day and is classified as Secure Groundwater. It has a 300 mm nominal diameter stainless steel well casing and screen vent. The well discharges to the Merritt Street Water Treatment Facility and is equipped with a submersible pump with a capacity of a 2938 m^3/day at 50 m TDH.

1.2.2 Well 3

Well 3 is located at 254296 Meatherall Line within the Town of South-West Oxford. It was constructed in 1945 with two connecting sections varying in depth and diameter. Section 1 is 45.7 m deep with a diameter of 300 mm, and section 2 is deep to 117 m with a diameter of 200 mm. It has a 300 mm nominal diameter stainless steel well casing. It has a maximum capacity of 3,283 m^3/day and is classified as Secure Groundwater. The well discharges to the Hamilton Road Water Treatment Facility and is equipped with a submersible pump with a capacity of a 3,283 m^3/day at 61 m TDH.

1.2.3 Well 5

Well 5 is located at 290 Harris Street within the Town of Ingersoll. It was constructed in 1945 to a depth of 109 m and a diameter of 300 mm. It has a 300 mm nominal diameter stainless steel well casing and screen vent. It has a maximum capacity of 3,283 m^3/day and is classified as Secure Groundwater. The well discharges to the Canterbury Street Water Treatment Facility and is equipped with a vertical turbine well pump with a capacity of a 3,283 m^3/day at 61 m TDH. Ingersoll WI 2021 noted this well is "under rehab".

1.2.4 Well 7 (Out of Service)

Well 7 is located at 440 Thomas Street within the Town of Ingersoll. It was constructed in 1977 with three connecting sections varying in depth and diameter. Section 1 is 42 m in depth with a diameter of 337 mm. Section 2 is deep to 96 m with a diameter of 311 mm. Section 3 is 123 m in depth and 250 mm in diameter. The well has a 355 mm diameter outer steel casing, and an inner 203 mm diameter PVC casing. It has a maximum capacity of 4,579 m^3/day and is classified as Secure Groundwater. The well discharges to the West Street Water Treatment Facility and is equipped with a vertical turbine well pump with a capacity of a 4,579 m^3/day at 42 m TDH. This well is currently not in operation.

1.2.5 Well 8

Well 8 is located at 334581 Line 33 Harris Street within the Town of Zorra. It was constructed in 1979 with two connecting sections varying in depth and diameter. Section 1 is 38 m in depth and 355 mm in diameter, and section 2 is deep to 125 m with a diameter of 300 mm. The well has a 355 mm diameter outer steel casing, and an inner 203 mm diameter PVC casing. It has a maximum capacity of 3,283 m^3/day and is classified as Secure Groundwater. The well discharges to the Dunn's Road Water Treatment Facility and is equipped with a submersible well pump with a capacity of a 3,404 m^3/day at 73 m TDH.

1.2.6 Well 10

Well 10 is located at 5 Thompson Road within the Town of Ingersoll. It was constructed in 1987, with two connecting sections varying in depth and diameter. Section 1 is 45 m in depth and 355 mm in diameter, and section 2 is deep to 112 m with a diameter of 300 mm. The well has a 355 mm diameter outer steel casing, and an inner 203 mm diameter PVC casing. It has a maximum capacity of 4,579 m^3/day and is classified as Secure Groundwater. The well discharges to the Thompson Road Water Treatment Facility and is equipped with a vertical turbine well pump with a capacity of a 4,579 m^3/day at 53 m TDH.

1.2.7 Well 11 (Out of Service)

Well 11 is located at 274111 Wallace Line within the Town of South-West Oxford. It was constructed in 1987, with two connecting sections varying in depth and diameter. Section 1 is 43 m in depth and 355 mm in diameter, and section 2 is deep to 115.5 m with a diameter of 300 mm. It has a maximum capacity of 4,579 m^3/day and is classified as Secure Groundwater. The well discharges to the Wallace Line Water Treatment Facility and is equipped with a vertical turbine well pump with a capacity of a 4,579 m^3/day at 53 m TDH. This well is currently not in operation.

1.1 Treatment Facility

1.1.1 Merritt Street Water Treatment Facility

The Merritt Street WTF is located at 195 Merritt Street within the Town of Ingersoll. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.2 m diameter pressure filter with a design capacity of 2,938 m^3/day;
  - A 145 m^3 backwash wastewater tank; and
  - One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 6.5 m TDH to transfer the backwash to the sanitary sewer.

Note that ferric chloride is added to improve filter performance.

- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphide, iron, and manganese;
  - One duty sodium hypochlorite feed pump discharging prior to the reservoir for post-chlorination;

- One duty sodium hypochlorite feed pump discharging after the high lift pumps for top-up chlorination;
- One 4.2 m^3 sodium hypochlorite chemical bulk storage tank; and
- One sodium hypochlorite chemical storage tank.

On-site storage is provided by a 3,144 m^3 in-ground treated water reservoir with baffling which provides chlorine contact time. The reservoir is equipped with two variable frequency drive high lift pumps, each rated at 6,480 m^3/day at 60 m TDH.

Four free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, one monitoring contact time, and one measuring the residual after top-up chlorination.

One 350 kW diesel generator provides power in an emergency.

1.1.2 Hamilton Road WTF

The Hamilton Road WTF is located at 253387 Meatherall Line within the Town of South-West Oxford. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.2 m diameter pressure filter with a design capacity of 3,283 m^3/day;
  - A 158 m^3 backwash wastewater tank; and
  - One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 22.5 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphide, iron, and manganese;
  - One 5.5 m^3 sodium hypochlorite chemical bulk storage tank; and
  - One 9 kg/day V-notch gas chlorinator complete with gas cylinder scale and regulator discharging prior to the reservoir for post-chlorination.

On-site storage is provided by a 184 m^3 in-ground treated water reservoir which provides chlorine contact time. The reservoir is equipped with two variable frequency drive high lift pumps, each rated at 3,888 m^3/day at 76.5 m TDH.

Three free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, and one monitoring residual in the treated water after contact time.

1.1.3 Canterbury Street WTF

The Canterbury Street WTF is located at 290 Harris Street within the Town Ingersoll. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.2 m diameter pressure filter with a design capacity of 3,283 m^3/day;
  - A 156 m^3 backwash wastewater tank; and
  - One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 8.2 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphide, iron, and manganese;
  - One 5.5 m^3 sodium hypochlorite chemical bulk storage tank; and
  - One 9 kg/day V-notch gas chlorinator complete with gas cylinder scale and regulator discharging prior to the reservoir for post-chlorination.

On-site storage is provided by a 175 m^3 in-ground treated water reservoir which provides chlorine contact time. The reservoir is equipped with one variable frequency drive high lift pump, rated at 3,110 m^3/day at 57 m TDH.

Three free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, and one monitoring residual in the treated water after contact time.

1.1.4 West Street WTF (Out of Service)

The West Street WTF is located at 440 Thomas Street within the Town Ingersoll. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.6 m diameter pressure filter with a design capacity of 4,579 m^3/day;
  - A 155 m^3 backwash wastewater tank; and
  - One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 11.1 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphide, iron, and manganese;
  - One 5.5 m^3 sodium hypochlorite chemical bulk storage tank; and
  - One 9 kg/day V-notch gas chlorinator complete with gas cylinder scale and regulator discharging prior to the reservoir for post-chlorination.

On-site storage is provided by a 223 m^3 in-ground treated water reservoir which provides chlorine contact time. The reservoir is equipped with one variable frequency drive high lift pump, rated at 4,579 m^3/day at 42 m TDH. Three free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, and one monitoring residual in the treated water after contact time. The WTF is equipped with transfer switch and connection for portable generator in an emergency. This WTF is currently not in operation.

1.1.5 Dunn's Road WTF

The Dunn's Road WTF is located at 334581 33rd Line within the Town of Zorra. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.2 m diameter pressure filter with a design capacity of 3,283 m^3/day;
  - A 135 m^3 backwash wastewater tank; and
  - One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 1.1 m TDH to transfer the backwash to the sanitary sewer.

Note that ferric chloride is added to improve filter performance.

- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphide, iron, and manganese;
  - One 5.5 m^3 sodium hypochlorite chemical bulk storage tank; and
  - One 9 kg/day V-notch gas chlorinator complete with gas cylinder scale and regulator discharging prior to the reservoir for post-chlorination.

On-site storage is provided by a 202 m^3 in-ground treated water reservoir with baffling which provides chlorine contact time. The reservoir is equipped with one variable frequency drive high lift pump, rated at 3,283 m^3/day at 83 m TDH. Three free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, and one monitoring residual in the treated water after contact time. One 275 kW diesel generator provides power in an emergency.

1.1.6 Thompson Road Water WTF

The Thompson Road WTF is located at 5 Thompson Road within the Town of Ingersoll. The components descriptions are as follows:

- Iron/Manganese/ Hydrogen Sulphide Removal
  - One 3.6 m diameter pressure filter with a design capacity of 4,579 m^3/day;

- A 167 m^3 backwash wastewater tank; and
- One duty and one standby submersible backwash waste pumps rated at 432 m^3/day each at 15 m TDH to transfer the backwash to the sanitary sewer.

- Chlorination
  - One duty sodium hypochlorite chemical feed pump discharging prior to the filter for oxidation of hydrogen sulphides, iron, and manganese;
  - One 5.5 m^3 sodium hypochlorite chemical bulk storage tank; and
  - One 9 kg/day V-notch gas chlorinator complete with gas cylinder scale and regulator discharging prior to the reservoir for post-chlorination.

On-site storage is provided by a 252 m^3 in-ground treated water reservoir with baffling which provides chlorine contact time. The reservoir is equipped with one variable frequency drive high lift pump, rated at 4,579 m^3/day at 58 m TDH. Three free chlorine residual analyzers, one measuring the pre-filter residual, one measuring the post-filter residual, and one monitoring residual in the treated water after contact time. One 175 kW diesel generator provides power in an emergency.

1.1.7 Wallace Line WTF (Out of Service)

The Wallace Line WTF is located at 274111 Wallace Line within the Town of South-West Oxford. It has one dual-cell 200 m^3 in-ground treated water reservoir. This WTF is currently not in operation.

2.0 TILLSONBURG DWS

2.1 Treatment Overview

Water from each well enters into the associated WTF and is first treated with sodium hypochlorite to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed through a series of three pressure filters targeting reduction of iron and manganese concentration. The filtration system is equipped with a backwashing system. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

The filtered water is then conveyed into common header pipes leading to a dual UV Light irradiation system which operate in a duty and standby mode. Once the water has passed through the UV system, sodium hypochlorite is injected again, and the water is conveyed to

reservoirs to develop contact time. The reservoirs are equipped with high lift pumps which draw the water to the distribution system.

Chemical feed pumps and gas chlorinator are used to add sodium hypochlorite and chlorine gas into the system. Liquid chlorine is stored within designated containers within each WTF. Chlorine gas is stored in V-notch gas chlorinator complete with gas cylinder scale and regulators.

The 2021 ADWSS has stated that the microbiological, chemical including organic, and inorganic, nitrate and nitrite, and turbidity assessments of the source water indicates no contamination by surface water. Seven of the ten wells – Wells 1A, 2, 4, 5, 9 and 10 – have in-situ filtration as required by Health Canada for GUDI wells.

2.2 Supply Wells

2.2.1 Well 1A

Well 1A is located at 200 Mall Road in the Town of Tillsonburg. It was constructed in 1974, to a depth of 23.8 m and a diameter of 250 mm. It has a maximum capacity of 2,290 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 250 mm diameter steel casing that extends to 21.97 m. Below the bottom of the casing, a screen is used for filtration. The well discharges to the Mall Road Water Treatment Facility and is equipped with a submersible pump with a capacity of a 2,290 m^3/day at 49 m TDH.

2.2.2 Well 2

Well 2 is located at 124749 Mall Road in the Township of Norwich. It was constructed in 1981, to a depth of 25.3 m and a diameter of 250 mm. It has a maximum capacity of 1,310 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a steel casing, below of which a screen is used for filtration. The well discharges to the Mall Road Water Treatment Facility and is equipped with a submersible pump with a capacity of a 1,313 m^3/day at 49.7 m TDH.

2.2.3 Well 4

Well 4 is located at 164164 Brownsville Road in the Town of Tillsonburg. It was constructed in 1952, to a depth of 21.3 m and a diameter of 406 mm. It has a maximum capacity of 2,995 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a steel casing, below of which a screen is used for filtration. The well discharges to the North Street West Pumphouse and is equipped with a vertical turbine pump with a capacity of a 2,938 m^3/day at 18.9 m TDH.

2.2.4 Well 5

Well 5 is located at 164164 Brownsville Road in the Town of Tillsonburg. It was constructed in 1962, to a depth of 23.3 m and a diameter of 406 mm. It has a maximum capacity of 2,002 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 400 mm diameter steel casing, below of which a screen is used for filtration. The well discharges to the North Street West Pumphouse and is equipped with a vertical turbine pump with a capacity of a 1,529 m^3/day at 15.5 m TDH.

2.2.5 Well 6A

Well 6A is located at 332415 Plank Line Highway 19 in the Town of Tillsonburg. It was constructed in 1990, to a depth of 35.1 m and a diameter of 203 mm. It has a maximum capacity of 1,310 m^3/day and is classified as Secure Groundwater. It has a 200 mm nominal diameter steel well casing, below of which a screen is used for filtration. The well discharges to the Plank Line Water Treatment Facility and is equipped with a submersible pump with a capacity of a 985 m^3/day at 47.5 m TDH.

2.2.6 Well 7A

Well 7A is located at 451 Broadway Street in the Town of Tillsonburg. It was constructed to a depth of 22.9 m and a diameter of 200 mm. It has a maximum capacity of 1,310 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 200 mm diameter steel casing, below of which a screen is used for filtration. The well discharges to the Fairview Water Treatment Facility and is equipped with a vertical turbine pump with a capacity of a 1,313 m^3/day at 64 m TDH.

2.2.7 Well 9

Well 9 is located at 1392 Bell Mill Sideroad in the Town of Tillsonburg. It was constructed in 1988, to a depth of 24.7 m and a diameter of 254 mm. It has a maximum capacity of 1,310 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 250 mm diameter steel casing, below of which a screen is used for filtration. The well discharges to the Bell Mill Sideroad Water Treatment Facility and is equipped with a submersible pump with a capacity of a 1,313 m^3/day at 37 m TDH.

2.2.8 Well 10

Well 10 is located at 1392 Bell Mill Sideroad in the Town of Tillsonburg. It was constructed in 1988, to a depth of 24.7 m and a diameter of 254 mm. It has a maximum capacity of 1,310 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 250

mm diameter steel casing, below of which a screen is used for filtration. The well discharges to the Bell Mill Sideroad Water Treatment Facility and is equipped with a submersible pump with a capacity of a 1,313 m^3/day at 37 m TDH.

2.2.9 Well 11

Well 11 is located at 1266 Bell Mill Sideroad in the Town of Tillsonburg. It was constructed in 1991, to a depth of 24.7 m and a diameter of 254 mm. It has a maximum capacity of 1,310 m^3/day, and is classified as Secure Groundwater. The well has a 250 mm diameter steel casing, below of which a screen is used for filtration. The well discharges to the Bell Mill Sideroad Water Treatment Facility and is equipped with a submersible pump with a capacity of a 1,313 m^3/day at 37 m TDH.

2.2.10 Well 12

Well 12 is located at 165 Rokeby Sideroad in the Town of Ingersoll. It was constructed in 1995, to a depth of 25 m and a diameter of 250 mm. It has a maximum capacity of 1,310 m^3/day and is classified as Secure Groundwater. It has a 250 mm nominal diameter steel well casing, below of which a screen is used for filtration. The well discharges to the Rokeby Road Water Treatment Facility and is equipped with a submersible pump with a capacity of a 1,313 m^3/day at 72.5 m TDH.

2.2.11 North Street West Pumphouse (Well 4 and 5)

The North Street Pumphouse is located at 164164 Brownsville Road and consists of:

- Chlorination
    - One duty 4.54 kg/day gas chlorinator discharging into the raw water header; and
    - Two 68 kg chlorine gas cylinders.

On-site storage is provided by a 106 m^3 in-ground treated water reservoir which also provides contact time.

- High Lift Works
    - One high lift pump rated at 1,529 m^3/day at 35 m TDH; and
    - One high lift pump rated at 3,067 m^3/day at 48.5 m TDH.

Raw water from Well 4 and 5 enters into the pumphouse through separate water lines and gets combined into the common raw water header. Both water lines have an air release valve, a raw water sampling tap and an inline flow meter. Chlorine is injected using one duty

gas chlorinator into the combined water line. The chlorinated water is then conveyed into a 106 m^3 in-ground reservoir to develop contact time.

The pumphouse is equipped with one free chlorine residual analyzer, one turbidity analyzer, and one nitrate analyzer which provide monitoring of the treated water pumping to the Fairview WTF prior to UV disinfection.

2.2.12 Broadway Street Pumphouse (Well 7A)

The Broadway Street Pumphouse is located at 451 Broadway Street and consists of:

- Iron/Manganese Sequestering
  - One shelved sodium silicate chemical feed pump; and
  - One sodium silicate chemical storage tank.
- Chlorination
  - One duty sodium hypochlorite chemical feed pump for pre-chlorination; and
  - One sodium silicate hypochlorite storage tank with spill containment.

Raw water from Well 7A enters into the pumphouse through a raw water sampling tap and an inline flow meter. Sodium silicate is injected for iron and manganese sequestering, followed by the injection of liquid chlorine for disinfection. The pumphouse is equipped with two free chlorine residual analyzers, one of which monitors contact time prior to pumping to the Fairview WTF, and the other monitors the distribution system.

2.3 Treatment Facility

2.3.1 Mall Road Water Treatment Facility

The Mall Road WTF is located at 200 Mall Road. The components descriptions are as follows:

- Iron/Manganese Filtration
  - Three multi-media filters, each rated at 1,201 m^3/day;
  - A 180 m^3 backwash standpipe; and
  - One duty submersible pump rated at 5,702 m^3/day each at 26.9 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination
  - One duty 9.08 kg/day gas chlorinator discharging to the combined raw water header for pre-filter oxidation;
  - One duty 9.08 kg/day gas chlorinator discharging to the combine filter effluent line for post-chlorination; and

- Two 68 kg chlorine gas cylinders

UV disinfection is accomplished by two units following the filters, each rated at 3,603 m^3/day

On-site storage is provided by a 180 m^3 standpipe which also provides chlorine contact time.

- High Lift Works
  - Three high lift pumps each rated at 1,210 m^3/day at 80 m TDH

Two free chlorine residual analyzers, two turbidity analyzers, and one UV transmittance analyzer provide monitoring. A 200 kW diesel generator supplies power in an emergency.

2.3.2 Fairview Water Treatment Facility

The Fairview Water WTF is located at 58 Langrell Avenue. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging after the UV treatment units; and
  - One sodium hypochlorite chemical storage tank.

UV disinfection is accomplished by two units for primary disinfection, each rated at 1,045 m^3/day.

On-site storage is provided by a 180 m^3 standpipe which also provides chlorine contact time.

- High Lift Works
  - Two high lift pumps with variable frequency drives, each rated at 3,888 m^3/day at 40 m TDH; and
  - One high lift pump with a variable frequency drive, rated at 2,160 m^3/day at 25 m TDH.

Two free chlorine residual analyzers, one UV transmittance analyzer and one nitrate analyzer provide monitoring. A 300 kW diesel generator supplies power in an emergency.

2.3.3 Plank Line WTF

The Plank Line WTF is located at 332401 Plank Line. The components descriptions are as follows:

- Chlorination

- One duty 4.54 kg/day gas chlorinator discharging into the raw water header; and
- Two 68 kg chlorine gas cylinders.

One free chlorine residual analyzer and one turbidity analyzer provide monitoring.

The Plank Line WTF is currently not in operation.

2.3.4 Bell Mill Sideroad WTF

The Bell Mill Sideroad WTF is located at 1322 Bell Mill Sideroad. The components descriptions are as follows:

- Iron/Manganese Filtration
  - Three multi-media filters, each rated at 1,313 m^3/day;
  - A 60 m^3 backwash standpipe; and
  - One duty and one standby submersible pumps rated at 432 m^3/day each at 8 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination
  - One duty 22.7 kg/day gas chlorinator discharging to the combined raw water header for pre-filter oxidation;
  - One duty 13.6 kg/day gas chlorinator discharging to the combine filter effluent line for post-chlorination; and
  - Two 68 kg chlorine gas cylinders.

UV disinfection is accomplished by two units following the filters, each rated at 3,931 m^3/day.

On-site storage is provided by a 173 m^3 standpipe which also provides chlorine contact time.

- High Lift Works
  - Three high lift pumps each rated at 1,313 m^3/day at 53 m TDH

Two free chlorine residual analyzers, two turbidity analyzers, and one UV transmittance analyzer provide monitoring. A 175 kW diesel generator supplies power in an emergency.

2.3.5 Rokeby Road WTF

The Rokeby Road WTF is located at 165 Rokeby Sideroad. The components descriptions are as follows:

- Chlorination

- One duty 4.54 kg/day gas chlorinator discharging into the raw water header; and
- Two 68 kg chlorine gas cylinders.

One free chlorine residual analyzer and one turbidity analyzer provide monitoring.

3.0 WOODSTOCK

3.1 Treatment Overview

Water from the Thornton wellfield (Wells 1, 3, 5, 8, and 11) is blended with water from the Tabor wellfield (Wells 2 and 4) to allow for dilution of the nitrates presents in the Thornton wells. The combined raw water is conveyed into a common header pipe leading to a dual UV Light irradiation system which operates in a duty and standby mode for primary disinfection. The water is conveyed into a 350 m^3 standpipe, into which chlorine gas is injected for disinfection. The WTF is equipped with a high lift pumping system, which supplies the Southside WTF reservoir, the Woodstock distribution system and Bower Hill Reservoir, as well as the village of Sweaburg.

Water from Well 6 enters into the Southside WTF and is injected with chlorine gas. The chlorinated water is then conveyed into a contact chamber located within a partitioned section of the 1,820 m^3 in-ground treated water reservoir, which also receives treated water from the Thornton WTF and the Well 9 Pumphouse. The reservoir is equipped with three high lift pumps that supply the Woodstock distribution system.

Raw water from Well 7 enters into the Sutherland Park WTF and is aerated to oxidize hydrogen sulphide, followed by injection of chlorine gas for primary disinfection. The chlorinated water is then conveyed into a 193 m^3 in-ground reservoir to develop contact time. The reservoir is equipped with one high lift pump, which supplies the water to pass through a four-cell filter targeting the reduction of iron and hydrogen sulfide concentration. The filtration system is equipped with a backwashing system which stores the backwash water and cleans the filters. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

Water from Well 12 enters into the Trillium Line WTF and is injected with liquid chlorine for primary disinfection. The chlorinated water is then conveyed through a contact pipe and discharges to the Sweaburg distribution system.

Chemical feed pumps and gas chlorinator are used to add sodium hypochlorite and chlorine gas into the system. Liquid chlorine is stored within designated containers within each WTF. Chlorine gas is stored in V-notch gas chlorinator complete with gas cylinder scale and

regulators. The Thornton WTF and Southside WTF are equipped with diesel generators that supply power in an emergency.

3.2 Supply Wells

3.2.1 Well 1

Well 1 is located at 484981 Sweaburg Road. It was constructed in 1945 to a depth of 30.3 m and a diameter of 400 mm. It has a maximum capacity of 9,100 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 9,072 m^3/day at 62 m TDH. The well discharges to the Thornton WTF.

3.2.2 Well 2

Well 2 is located at 464852 Rivers Road. It was constructed in 1945 to a depth of 20.8 m and a diameter of 400 mm. It has a maximum capacity of 10,000 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 9,936 m^3/day at 14 m TDH. The well discharges to the Thornton WTF. One 100 kW standby diesel generator adjacent to the facility is capable of powering the well in emergency.

3.2.3 Well 3

Well 3 is located at 484981 Sweaburg Road. It was constructed in 1945 to a depth of 16.6 m and a diameter of 400 mm. It has a maximum capacity of 10,000 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 2739 m^3/day at 37.5 m TDH. The well discharges to the Thornton WTF.

3.2.4 Well 4

Well 4 is located at 484981 Sweaburg Road. It was constructed in 1958 to a depth of 23.5 m and a diameter of 460 mm. It has a maximum capacity of 10,000 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 9,936 m^3/day at 55 m TDH. The well discharges to the Thornton WTF. One 100 kW standby diesel generator adjacent to the facility is capable of powering the well in emergency.

3.2.5 Well 5

Well 5 is located at 484981 Sweaburg Road. It was constructed in 1962 to a depth of 27.1 m and a diameter of 400 mm. It has a maximum capacity of 10,000 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 5,901 m^3/day at 51 m TDH. The well discharges to the Thornton WTF.

3.2.6 Well 6

Well 6 is located at 221 Victoria Street. It was constructed in 1931 to a depth of 48 m and a diameter of 400 mm. It has a maximum capacity of 4,500 m^3/day, and is classified as Secure Groundwater. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 2,834 m^3/day at 67 m TDH. The well discharges to the Southside WTF.

3.2.7 Well 7

Well 7 is located at 651 Sutherland Drive. It was constructed in 1968 to a depth of 62.5 m and a diameter of 250 mm. It has a maximum capacity of 3,900 m^3/day, and is classified as Secure Groundwater. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 3,931 m^3/day at 67 m TDH. The well discharges to the Sutherland Park WTF.

3.2.8 Well 8

Well 8 is located at 484981 Sweaburg Road. It was constructed in 1966 to a depth of 14.6 m and a diameter of 250 mm. It has a maximum capacity of 3,200 m^3/day, and is classified as GUDI with effective in-situ filtration. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 3,802 m^3/day at 17.6 m TDH. The well discharges to the Thornton WTF.

3.2.9 Well 9

Well 9 is located at 655 Athlone Place. It was constructed in 1978 to a depth of 61.6 m and a diameter of 350 mm. It has a maximum capacity of 1,300 m^3/day, and is classified as Secure Groundwater. The well is in a pumphouse equipped with a submersible pump with a capacity of a 1,305 m^3/day at 68 m TDH.

3.2.10 Well 11

Well 11 is located at 484847 Sweburg Road within Southwest Oxford Township. It was constructed in 1933 to a depth of 31.9 m and a diameter of 300 mm. It has a maximum capacity of 3,900 m^3/day, and is classified as Secure Groundwater. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 3,888 m^3/day at 41.5 m TDH. The well discharges to the Thornton WTF.

3.2.11 Well 12

Well 12 is located at 454350 Trillium Line within Southwest Oxford Township. It was constructed in 2009 to a depth of 47.55 m and a diameter of 300 mm. It has a maximum capacity of 3,275 m^3/day, and is classified as Secure Groundwater. The well is equipped with a vertical turbine pump with variable frequency drives, with a capacity of a 3,888 m^3/day at 41.5 m TDH. The well discharges to the Thornton WTF.

3.2.12 Well 9 Pumphouse

Well 9 pumphouse is located at 655 Athlone Place and consists of:

- One duty and one standby sodium hypochlorite chemical feed pumps, discharging into the raw water header; and
- One 250 L sodium hypochlorite chemical storage tank with secondary containment.

Raw water from Well 9 enters into its own pumphouse and is disinfected with liquid chlorine using one duty and one standby sodium chlorite chemical feed pumps. The chlorinated water is blended with water from the Thornton WTF connecting to the main reservoir located at the Southside WTF.

The pumphouse is equipped with an online free chlorine analyser which measures the free chlorine concentration of the treated water prior to pumping to the Southside WTP reservoir. Liquid chlorine is stored in a designated container situated on a secondary containment system.

3.3 Treatment Facility

3.3.1 Thornton Water Treatment Facility

The Thornton WTF is located at 484981 Sweaburg Road within South West Oxford Township. The components descriptions are as follows:

UV disinfection is accomplished by two high intensity medium pressure UV reactors for primary disinfection, each rated at 44,928 m^3/day.

- Chlorination
  - One duty and one standby 68 kg/day gas chlorinator for primary disinfection discharging to the standpipe (or high lift header if standpipe is out of service);
  - Dual weigh scale for 68 kg chlorine gas cylinders and manifold system for up to 10 cylinders.

The High Lift Works equipment consists of:

- Two high lift pumps supplying the Southside WTF reservoir, each rated at 11,232 m^3/day at 20 m TDH; and
- Three high lift pumps supplying Woodstock distribution system and the Bower Hill Reservoir, each rated at 11,232 m^3/day at 48 m TDH.

On-site storage is provided by a 350 m^3 standpipe for chlorine contact time. Monitoring is done by one free chlorine residual analyzer and one turbidity analyzer.

3.3.2 Southside Water Treatment Facility

The Southside WTF is located at 221 Victoria Street South within City of Woodstock. The components descriptions are as follows:

- Chlorination
  - One duty 22.7 kg/day gas chlorinator discharging into the Well No. 6 discharge header for primary disinfection;
  - One duty 11.4 kg/day gas chlorinator discharging into the reservoir discharge/effluent; and
  - One duty and one standby 68 kg chlorine gas cylinders.

On-site storage is provided by a 1,593 m^3 in-ground treated water reservoir which could also provides additional chlorine contact time.

- High Lift Works
  - One high lift pump with VFD rated at 22,723 m^3/day at 68.6 m TDH
  - One high lift pump with VFD rated at 19,613 m^3/day at 65 m TDH

- One high lift pump with VFD rated at 14,083 m^3/day at 64 m TDH
- One high lift pump rated at 13,133 m^3/day (off-line)

Monitoring is done by one free chlorine residual analyzer.

3.3.3 Sutherland Park Water Treatment Facility

The Sutherland Park WTF is located at 651 Sutherland Drive within City of Woodstock. The components descriptions are as follows:

- Iron/Manganese Filtration
  - One concrete aeration chamber; and
  - One four-cell filter, rated at 3,931 m^3/day;
- Chlorination
  - One duty and one standby 22.7 kg/day gas chlorinator discharging into the outlet of the aeration chamber; and
  - One duty and one standby 68 kg chlorine gas cylinders.

On-site storage is provided by a 193 m^3 in-ground reservoir for chlorine contact time.

One high lift pump rated at 3,931 m^3/day at 55 m TDH supplies water to the distribution system via aeration chamber and filter.

Monitoring is done by one free chlorine residual analyzer.

3.3.4 Trillium Line Water Treatment Facility

The Trillium WTF is located at 454350 Trillium Line within Southwest Oxford Township. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps feeding upstream of the chlorine contact pipe and an in-line mixer; and
  - One sodium hypochlorite chemical storage tank.

Monitoring is provided by one free chlorine residual analyzer.

3.3.5 Athlone Booster Pumping Station

The Athlone Booster Pumping Station is located at 364 Athlone Avenue. The components descriptions are as follows:

- Chlorination

- One duty and one standby sodium hypochlorite chemical feed pumps discharging into effluent for post-chlorination; and
- One sodium hypochlorite chemical storage tank.

On-site storage is provided by a single cell 2,096 m^3 in-ground reservoir which also provides for adequate contact time.

Four high lift pumps, two of which are equipped with VFDs, supply water from the distribution system to the pumping station. Each pump is rated at 5,443 m^3/day at 49 m TDH.

Monitoring is provided by one free chlorine residual analyzer. One 175 kW diesel generator supplies power in emergency.

3.3.6 Nellis Booster Pumping Station

The Nellis Booster Pumping Station is located at 1235 Nellis Street. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging into the reservoir discharge for post-chlorination; and
  - One sodium hypochlorite chemical storage tank.
- High Lift Works
  - Three high lift pumps with one pump equipped with a VFD, each rated at 8,424 m^3/day at 53.1 m TDH;
  - One high lift pump with VFD rated at 2,765 m^3/day at 53.1 m TDH; and
  - One in-line booster pump rated at 6,048 m^3/day at 22 m TDH.

On-site storage is provided by a dual-cell 4,240 m^3 in-ground reservoir which also provides for adequate contact time.

Monitoring is provided by one free chlorine residual analyzer. One 175 kW diesel generator supplies power in emergency.

3.3.7 Commerce Way Booster Pumping Station

The Commerce Way Booster Pumping Station is located at 1282 Parkinson Road. It is a factory built, prefabricated booster pumping station with a firm capacity of 5,184 m^3/day. Three in-line booster pumps with VFDs supply water from the distribution system to the pumping station, each with a capacity rated at 2,592 m^3/day at 22 m TDH.

3.3.8 Storage

Storage is provided by three facilities within the distribution system, namely Bower Hill Reservoir, East Woodstock Water Tower and Northwest Elevated Storage Tower. The Bower Hill Reservoir is located at west end of Woodstock and consist of three in-ground concrete reservoirs, including one single cell 5,250 m^3 reservoir, one single cell 3,695 m^3 reservoir and one dual-cell 9,320 m^3 reservoir. These reservoirs directly receive and supply water to the Woodstock distribution system, controlling the pumping requirements for all the supply facilities.

The East Woodstock Water Tower is located at the east end of Woodstock. It is an elevated storage tank with a capacity of 5,300 m^3. The tower provides storage for the Nellis Commerce Way boosted pressure zone. It is equipped with one free chlorine residual analyzer.

The Northwest Elevated Storage Tower is located at in the northwest corner of Woodstock. It is an elevated storage tank with a capacity of 3,600 m^3. The tower provides storage for properties north of the Thames River. One flow metre measures the flow between the tower and the distribution system. It is equipped with one standby re-chlorination chemical metering pump feeding sodium hypochlorite into the inlet and outlet pipes. One free chlorine residual analyzer provides monitoring.

4.0 BRIGHT DWS

4.1 Treatment Overview

The Bright Water Treatment Facility is located near the southwestern intersection of Murray Street and Cuthbertson Street in the Village of Bright.

Water from Wells 4A and 5 enters to the Cuthbertson Street Pumphouse and is blended, followed by injection of sodium silicate and liquid chlorine for iron sequestration and disinfection. The chlorinated water is then conveyed through a chlorine pipe that provides necessary contact time.

Following treatment, the water is discharged through a transmission main from the pumphouse to an 86 m^3 reservoir in the Wilson St. WTF Reservoir Control building. The reservoir has one submersible jockey pump and two standby high lift pumps which draw the water to the Cuthbertson St. Pumphouse for distribution.

There are two duty sodium silicate chemical feed pumps that are used to add liquid sodium silicate at one point to the combined waterline. Liquid sodium silicate is stored within a

designated container located in a spill containment basin. There are two duty and two standby chemical pumps which are used to inject liquid chlorine into the system. Liquid chlorine is stored within a designated container located in a spill containment basin as well. A 35 kW diesel generator located outside of the Wilson St. building supplies power in an emergency. The Cuthbertson St. Pumphouse can be powered by a mobile generator as needed.

There is a pressure tank connected to the contact piping that helps smooth the system pressure fluctuations. Four hydro-pneumatic pressure tanks connected to the distribution header provide useable storage and reduce start/stop cycling of the high lift pumps.

4.2 Supply Wells

4.2.1 Well 4A

Well 4A is located on the south side of Cuthbertson Street, approximately 250 m west of Baird Street. It was constructed in 2009 to a depth of 100 m and a diameter of 200 mm. It has a maximum capacity of 406 m^3/day and is classified as Secure Groundwater. The well is equipped with a submersible pump with a capacity of a 328 m^3/day at 62 m TDH. It has a vented and watertight vandal proof cover.

4.2.2 Well 5

Well 5 is located on the south side of Cuthbertson Street, approximately 290 m west of Baird Street. It was constructed in 2003 to a depth of 27.4 m and a diameter of 150 mm. Well 5 is also classified as Secure Groundwater and has a maximum capacity of 259 m3/day. The well is equipped with a submersible pump rated at 259 m3/day at 84 m TDH. It also has a vented and watertight vandal proof cover.

4.2.3 Cuthbertson Street Pumphouse

The Cuthbertson Street Pumphouse is located at 72 Cuthbertson Street and consists of:

- Chlorination
  - Two duty and two standby sodium hypochlorite chemical feed pumps discharging to the raw water header at two injection points
  - One 100 L sodium hypochlorite chemical storage tank
- Iron Sequestration
  - Two sodium silicate chemical feed pumps (one duty for each well) discharging to the raw water header at two injection points
  - One 100 L sodium silicate chemical storage tank

One free chlorine residual analyzer measures the residual in distribution. One 235 L hydropneumatics tank provides control for system pressure.

Raw water from Well 4A and 5 enters the pumphouse through separate water lines and is combined into one common water discharge header. Both water lines have an isolating valve, a flow meter, and a blow off discharge line outside the building. Chlorine is injected using two duty chlorine pumps into the common water line at two injection points. Sodium silicate is added into using two duty sodium silicate chemical feed pumps at two injection points. The chlorinated water is then conveyed through a contact pipe and a transmission main to the Treatment Facility.

The pumphouse is equipped with a new distribution chlorine analyser which measures the free chlorine concentration of the water from the chlorine contact pipe to the Wilson WTF reservoir. Liquid chlorine and liquid sodium silicate are stored in a designated container situated on secondary containment system respectively.

4.3 Treatment Facility

The Wilson St WTF is located at 56 Wilson Street. The components descriptions are as follows:

- Reservoir
  - One single-cell below ground with a rated capacity of 86 m^3
- High Lift Works
  - One duty submersible jockey pump rated at 164 m^3/day at 36 m TDH; and
  - Two standby centrifugal high lift pumps each rated at 245 m^3/day at 45.3 m TDH.

Additional storage is provided by a 180 m^3 above ground water storage tank/standpipe located outside of the Wilson St. WTF. In the case of reservoir maintenance operations, water is supplied directly from the contact pipe to the standpipe.

Two free chlorine analyzers and one turbidity analyzer provide continuous monitoring. One of the chlorine analyzers measures contact time, and one measures residual in the treated water. Four 450 L hydropneumatics pressure tanks provide control for system pressure.

5.0 DRUMBO-PRINCETON DWS

5.1 Treatment Overview

5.1.1 General

The Drumbo-Princeton Water Treatment Facility is located at 93 Peterson Street. Chlorinated water from Well 3 and Pumphouse 1 and 2A enters into the WTF through separate water lines and is blended into one common header. The water is then conveyed through an inline flow meter down into a 516 m^3 in-ground dual-cell reservoir to further develop contact time. The reservoir has three submersible high lift pumps which draw the water to the Drumbo water distribution system. The equipped valves are positioned to direct the flow first through Cell #1 then Cell #2, to maximize the detention time. Two 800 L hydropneumatics pressure tanks connected to the distribution header provide control over system pressure. A 150 kW diesel generator located outside of the WTF supplies power in an emergency. The Well 1 and 2A Pumphouse can be powered by a mobile generator as needed.

Treated water is conveyed through the transmission main connected to the Roper St. Pressure Regulating Station in Princeton, where chlorine residual is monitor and boosted, if necessary, before discharging to the Princeton distribution system.

5.2 Supply Wells

5.2.1 Well 1

Well 1 is located at 135 Wilmot Street North. It was constructed in 1978 to a depth of 50.9 m and a diameter of 150 mm. It has a maximum capacity of 272 m3/day and is classified as Secure Groundwater. The well has a 150 mm diameter steel casing that extends to a depth of 33.2 m below grade. Below the bottom of the casing, a stainless steel screen is used for filtration. The well discharges to the Well No. 1 Pumphouse and is equipped with a submersible pump with a capacity of a 363 m3/day at 85 m TDH.

5.2.2 Well No. 1 Pumphouse

The Well No. 1 Pumphouse is located at 135 Wilmot Steet North and consists of:

- Iron Sequestration
    - One duty and one standby standby sodium silicate chemical feed pumps discharging prior to the chlorine contact pipe; and

- One 100 L sodium silicate chemical storage tank complete with spill containment.

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging prior to the chlorine contact pipe; and
  - One 100 L sodium hypochlorite chemical storage tank complete with spill containment.

Raw water from Well 1 enters into the eastern side of the Pumphouse. The water line has a raw water sampling tap and flow control valve. Liquid sodium silicate is injected into the raw water, followed immediately by the injection of liquid chlorine. The water is then conveyed in a westerly direction past an inline flow meter and out into a chlorine contact pipe which discharges to the main Drumbo-Princeton WTF.

Liquid chlorine and sodium silicate are stored within designated containers situated within a secondary containment system. There is one hydropneumatics pressure tank that helps control the system pressure.

Also, there is a sewage control equipment located within the Pumphouse.

5.2.3 Well 2A

Well 2A is located at 807115 Oxford Road 29. It was constructed in 2002 to a depth of 43.3 m and a diameter of 150 mm. It has a maximum capacity of 337 m^3/day and is classified as Secure Groundwater. The well has a 150 mm diameter steel casing that extends to a depth of 39.6 m below grade. Below the bottom of the casing, a stainless steel screen is used for filtration. The well discharges to the Well No. 2 Pumphouse and is equipped with a submersible pump with a capacity of a 363 m^3/day at 85 m TDH.

5.2.4 Well No. 2A Pumphouse

The Well No. 2A Pumphouse is located at 807115 Oxford Road 29 and consists of:

- Iron Sequestration
  - One duty and one standby standby sodium silicate chemical feed pumps discharging prior to the chlorine contact pipe; and
  - One 60 L sodium silicate chemical storage tank complete with spill containment.

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging prior to the chlorine contact pipe; and

- One 60 L sodium hypochlorite chemical storage tank complete with spill containment.

Raw water from Well 2 enters into the eastern side of the Pumphouse. The water line has a raw water sampling tap and flow control valve. Liquid sodium silicate is injected into the raw water, followed immediately by the injection of liquid chlorine. The water is then conveyed in a westerly direction past an inline flow meter and out into a chlorine contact pipe which discharges to the main Drumbo-Princeton WTF.

Liquid chlorine and sodium silicate are stored within designated containers situated within a secondary containment system. There is one hydropneumatics pressure tank that helps control the system pressure. Also, there is a sewage wet well level monitor located within the Pumphouse.

5.2.5 Well 3

Well 3 is located at 93 Peterson Street. It was constructed in 1994 to a depth of 29 m and a diameter of 200 mm. It has a maximum capacity of 717 m^3/day and is classified as Secure Groundwater. The well has a 200 mm diameter steel casing that extends to a depth of 33.2 m below grade. Below the bottom of the casing, a stainless steel screen is used for filtration. The well is equipped with a submersible pump with a capacity of a 717 m^3/day at 36 m TDH.

Raw water from Well 3 passes a raw water sampling tap, and is then injected with liquid chlorine. The water is then conveyed into an underground contact loop prior to re-entering the Drumbo-Princeton WTF building at the same location.

For the chlorination, there is one duty and one standby sodium hypochlorite chemical pump. These pumps and liquid chlorine are stored within a designated container situated adjacent to the southern interior building wall in a secondary containment berm with a grated cover. There is also one hydropneumatics pressure tank that helps control the system pressure.

5.3 Treatment Facility

5.3.1 Drumbo-Princeton Water Treatment Facility

The Drumbo-Princeton WTF is located at 93 Peterson Street. The components descriptions are as follows:

- Reservoir
  - One dual-cell in ground reservoir with a rated capacity of 516 m^3
    - Cell #1 (working volume of 169.4 m^3)

    - Cell #2 (working volume of 257.7 m^3)
- High Lift Works
    - Two duty and one standby submersible centrifugal high lift pump, each rated at 1106 m^3/day at 58 m TDH.

Three free chlorine analyzers monitor contact time for each well prior to the WTF reservoir, and one online free chlorine analyzer and one turbidity analyzer measure residual and turbidity in the treated water before discharging to the Drumbo distribution system. Two 800L hydropneumatics pressure tanks provide control for system pressure.

5.3.2 Roper Street Pressure Regulating Station

The Roper Street Pressure Regulating Station is located at 12 Roper Street in Princeton. The components descriptions are as follows:

- Pressure Control
    - Two combination pressure sustaining and reducing control valves; and
    - One duty and one standby vertical multistage centrifugal pump, each rated for 268 m^3/day at 48.5 m TDH with VFD
- Re-chlorination
    - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the Princeton Transmission Main header; and
    - One sodium hypochlorite chemical storage tank complete with spill containment.

Additional on-site storage is provided by a 271 m^3 above ground water storage tank/standpipe in diameter of 6.82 m located within the Pressure Regulating Station. Two online chlorine analyzers monitor the free chlorine residual as water enters and leaves the Pressure Regulating Station. Two 341 L hydropneumatics pressure tanks connected to the distribution header provide useable storage and reduce start/stop cycling of the high lift pumps.

6.0 PLATTSVILLE DWS

6.1 Treatment overview

The Plattsville Water Treatment Facility is located on the north side of Oxford Road 42 adjacent to the east of the Nith River in the Village of Plattsville.

Water from Well 1 and 2 enters the WTF through separate water lines and is blended, followed by injection of liquid chlorine for disinfection and then sodium silicate and for iron

sequestration. The water is then conveyed through a chlorine pipe that provides necessary contact time. Following treatment, the water is conveyed back into the WTF through a dedicated water line to pass by analyzers then out to the distribution system.

There are two duty chemical pumps which are used to inject liquid chlorine into the system. One duty and one standby chemical pump are used to inject sodium silicate. Liquid chlorine and sodium silicate are stored within designated containers. An 80-kW diesel generator mounted on a concrete pad located to the north of the Plattsville Treatment Plant supplies power in an emergency.

6.2 Supply Wells

6.2.1 Well 1

Well 1 is located at 826689 Oxford Road 42. It was constructed in 1979 to a depth of 15.2 m and a diameter of 200 mm. It has a maximum capacity of 2290 m^3/day and is classified as Secure Groundwater. The well has a 200 mm diameter steel casing that extends to a depth of 12.2 m below grade. A 200 mm diameter stainless steel liner was installed in 2010 to a depth of 12.71 m below the top of the casing. Below the bottom of the casing, a 3.1m screen is used for filtration. The well is equipped with a submersible pump with a capacity of a 1123 m^3/day at 67 m TDH.

6.2.2 Well 2

Well 2 is located at 826689 Oxford Road 42. It was constructed in 1979 to a depth of 18 m and a diameter of 380 mm. It has a maximum capacity of 2290 m^3/day and is classified as Secure Groundwater. The well has a variable diameter casing over its depth that extends to a depth of 10.7 below grade. A PVC liner of variable diameter was installed in 2005 to a depth of 14.9 m below the top of the casing. Below the bottom of the casing, a 3.1 m screen is used for filtration. The well is equipped with a submersible pump with a capacity of a 1728 m^3/day at 79 m TDH.

6.3 Treatment Facility

6.3.1 Plattsville Water Treatment Facility

The Plattsville Water Treatment Facility is located at 73 Albert Streat West and consists of:

- Chlorination
    - Two duty sodium hypochlorite chemical feed pumps discharging prior to the chlorine contact pipe; and

    - One sodium hypochlorite chemical storage tank
- Iron Sequestration
    - One duty and one standby sodium silicate chemical feed pumps discharging prior to the chlorine contact pipe; and
    - One sodium silicate chemical storage tank

Raw water from Well 1 and 2 enters into the treatment facility through separate lines and is then combined into a common header. Both water lines have a raw water sampling tap and flow control valve. The combined water is conveyed in an easterly direction past a flow meter. Liquid chlorine is injected into the combined raw water, followed by the injection of liquid sodium silicate. The water passes by a free chlorine analyzer then into a 134 m long chlorine contact pipe to develop contact time. A dedicated water line conveys the treated water back into the facility to pass by a free chlorine analyzer and a turbidity analyzer. Then the treated water is discharged to the distribution system.

6.3.2 Storage

An elevated storage tank located at 876749 Hofstetter Road provides a storage capacity of 1892 m^3. The tower receives water from the distribution system and is equipped with standby re-chlorination devices to boost up the chlorine level in treated water if needed. One flow meter measures the flow between the tower and the distribution system. It is further equipped with one free chlorine residual analyzer.

7.0 NORWICH DWS

7.1 Treatment Overview

Water from each well enters into the associated WTF and is first treated with liquid chlorine to initiate the oxidation of iron and manganese. At Norwich Main Street WTF, sodium silicate is added in addition for iron sequestering. The chlorinated water is then conveyed through a chlorine contact pipe to develop contact time.

At Norwich Pitcher Street WTF, following the chlorine injection, water is directed through a series of two pressure filters targeting the reduction of iron and manganese concentration. The filtration system is equipped with a backwashing system. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

The filtered water is disinfected with sodium hypochlorite again, then conveyed into an elevated tower followed by a chlorine contact pipe for contact time development. In the

case of tower maintenance, the post-filtration water is directed through bypass contact piping to address contact time requirements.

Chemical feed pumps are used to add sodium silicate and sodium hypochlorite into the system. Liquid sodium silicate and chlorine are stored within designated containers within each WTF. Norwich Pitcher Street WTF and Otterville WTF are equipped with diesel generators that supply power in an emergency.

7.2 Supply Wells

7.2.1 Norwich Well 2 (Well N2)

Well N2 is located at 6 Pitcher Street. It was upgraded in 2012 to meet regulatory requirements. It was constructed to a depth of 33.4 m and a diameter of 250 mm. It has a maximum capacity of 1,633 m^3/day, and is classified as Secure Groundwater. The well has a 255 mm diameter outer steel casing, and an inner 194 mm diameter steel casing. The inner casing is sealed with a cement grout that extends to a depth of 30.8 m. The well discharges to the Norwich Pitcher Street Treatment Facility and is equipped with a submersible pump with a capacity of a 1,633 m^3/day at 92 m TDH.

7.2.2 Norwich Well 4 (Well N4)

Well N4 is located at 325864 Norwich Road. It was constructed to a total depth of 26 m, with two connecting sections varying in depth and diameter. Section 1 is 21.7 m deep with a diameter of 300 mm, and section 2 is deep to 26 m with a diameter of 250 mm. It has a maximum capacity of 2,290 m^3/day and is classified as Secure Groundwater. The well discharges to the Norwich Pitcher Street Treatment Facility and is equipped with a submersible pump with a capacity of a 2,290 m^3/day at 64.4 m TDH.

7.2.3 Norwich Well 5 (Well N5)

Well N5 is located at 6 Pitcher Street. It was put into production in 2008. It was constructed to a depth of 40 m and a diameter of 250 mm. It has a maximum capacity of 821 m^3/day, and is classified as Secure Groundwater. The well has a 250 mm diameter steel casing, and an inner 194 mm diameter steel casing. The casing is sealed with a cement grout that extends to a depth of 30.9 m. The well discharges to the Norwich Pitcher Street Treatment Facility and is equipped with a submersible pump with a capacity of an 821 m^3/day at 92 m TDH.

7.2.4 Otterville Well 3 (Well O3)

Well O5 is located at 225687 Otterville Road. It was constructed in 1989, to a depth of 13.1 m and a diameter of 200 mm. It has a maximum capacity of 655 m^3/day, and is classified as Secure Groundwater. The well has a 250 mm diameter steel casing that extends to 9.1 m. Below the bottom of the casing, a 3.1 m screen is used for filtration. The well discharges to the Otterville Treatment Facility and is equipped with a submersible pump with a capacity of a 655 m^3/day at 59 m TDH.

7.2.5 Otterville Well 4 (Well O4)

Well O4 is located at 225687 Otterville Road. It was constructed in 1990, to a depth of 13.1 m and a diameter of 200 mm. It has a maximum capacity of 655 m^3/day, and is classified as Secure Groundwater. The well has a 250 mm diameter steel casing that extends to 9.1 m. Below the bottom of the casing, a 3.1 m screen is used for filtration. The well discharges to the Otterville Treatment Facility and is equipped with a submersible pump with a capacity of a 655 m^3/day at 59 m TDH.

7.2.6 Springford Well 4 (Well S4)

Well S4 is located at 592611 Oxford Road 13. It was constructed in 2000, to a depth of 23.8 m and a diameter of 150 mm. It has a maximum capacity of 262 m^3/day, and is classified as Secure Groundwater. The well has a 150 mm diameter steel casing that extends to 20.7 m. Below the bottom of the casing, a 2.1 m screen is used for filtration. The well discharges to the Springford Treatment Facility and is equipped with a submersible pump with a capacity of a 262 m^3/day at 72 m TDH.

7.2.7 Springford Well 5 (Well S5)

Well S5 is located at 592611 Oxford Road 13. It was constructed in 2002, to a depth of 25.9 m and a diameter of 150 mm. It has a maximum capacity of 262 m^3/day, and is classified as Secure Groundwater. The well has a 150 mm diameter steel casing that extends to 21.3 m. Below the bottom of the casing, a 3.4 m screen is used for filtration. The well discharges to the Springford Treatment Facility and is equipped with a submersible pump with a capacity of a 262 m^3/day at 72 m TDH.

7.3 Treatment Facility

7.3.1 Norwich Main Street Water Treatment Facility

The Norwich Main Street WTF is located at 325864 Norwich Road within the Village of Norwich. The components descriptions are as follows:

- Iron/Manganese Sequestering
  - One duty and one standby sodium silicate chemical feed pumps discharging to the raw water header for sequestering iron; and
  - One 300 L sodium silicate chemical storage tank with a spill
- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the raw water header for oxidation of iron and manganese; and
  - One 300 L sodium hypochlorite chemical storage tank with a spill containment.

A total of 190 m of 400 mm diameter contact piping is installed for chlorine contact time prior to water entering the distribution system.

Two free chlorine residual analyzers and one turbidity analyzer provide monitoring.

7.3.2 Norwich Pitcher Street Water Treatment Facility

The Norwich Pitcher Street WTF is located at 6 Pitcher Street within the Village of Norwich. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the raw water header for oxidation of iron and manganese;
  - One duty and one standby sodium hypochlorite feed pumps discharging after the filters for post-chlorination; and
  - One 750 L sodium hypochlorite chemical storage tank with a spill containment.
- Iron/Manganese Removal
  - Two 2 m diameter catalytic pressure filters, each rated at 1,164 m^3/day;
  - A 140 m^3 backwash storage tank; and
  - Two backwash waste pumps, each rated at 432 m^3/day each at 7.5 m TDH to transfer the backwash to the sanitary sewer.

On-site storage is provided by a 2,034 m^3 elevated storage tank that provides chlorine contact time prior to water entering the distribution system.

Two free chlorine residual analyzers and one turbidity analyzer provide monitoring. A 155 kW diesel generator supplies power in an emergency.

7.3.3 Otterville Water Treatment Facility

The Otterville WTF is located at 225687 Otterville Road within the Village of Otterville. The components descriptions are as follows:

- Chlorination
  - Two duty sodium hypochlorite chemical feed pumps (one for each well) discharging to the well raw water headers for oxidation of iron and manganese;
  - One sodium hypochlorite chemical storage tank with a secondary containment.

A total of 190 m of 300 mm diameter contact piping is installed for chlorine contact time prior to water entering the distribution system.

Two free chlorine residual analyzers and one turbidity analyzer provide monitoring. A 125 kW diesel generator mounted on a concrete pad located to the north of the Otterville WTF supplies power in an emergency.

7.3.4 Springford Water Treatment Facility

The Springford WTF is located at 592611 Oxford Road 13 within the Village of Springford. The components descriptions are as follows:

- Chlorination
  - Two duty and two standby sodium hypochlorite chemical feed pumps (two for each well) discharging to the well raw water headers for oxidation of iron and manganese;
  - One duty sodium hypochlorite chemical feed discharging to Norwich supply for re-chlorination
  - One sodium hypochlorite chemical storage tank with a secondary containment.

A total of 175 m of 200 mm diameter contact piping is installed for chlorine contact time prior to water entering the distribution system. Two free chlorine residual analyzers and one turbidity analyzer provide monitoring.

7.3.5 Distribution System

7.3.5.1 OTTERVILLE-SPRINGFORD WATER DISTRIBUTION

Provides potable water to approximately 1700 residents in the combined communities of Otterville and Springford. There are around 48 valved fire hydrants in the Otterville

Distribution Sub-system. The two distribution systems are lined by a pipeline which extends along the Otterville Road right of way.

7.3.5.2 NORWICH WATER DISTRIBUTION

Norwich to Springford Transmission Main is approximately 9 km of 250 mm watermain was installed from Norwich WTF to the Springford WTF. This interconnecting watermain is providing treated water to the Springford WTF and subsequently to the Otterville-Springford distribution system. Water pressure is maintained by a 1965 m^3 water tower. 114 fire hydrants available for fire and maintenance requirements

7.3.6 Storage

In addition to the elevated storage tank located at the Norwich Pitcher Street WTF, an elevated tower located at 49 Mill Street within the Village of Otterville, provides a storage capacity of 1,440 m^3. It has an overflow height of 45.73 m and a diameter of 14.6 m. The tower receives water directly from the Otterville WTF and can provide additional contact time. It is equipped with one free chlorine residual analyzer that continuously monitors chlorine concentration of the water within the tower.

8.0 BEACHVILLE DWS

8.1 Treatment Overview

The Beachville Water Treatment Facility is located at 434706 West Hill Road, approximately 10 m south of Well 1. Liquid chlorine is injected to the water after it enters the WTF. The chlorinated water is then conveyed through a chlorine pipe that provides necessary contact time.

Following treatment, the water is discharged to a 40 m^3 reservoir that provides additional contact time. It is equipped with three high lift pumps which supply treated water to the distribution system.

One duty and one standby chemical pump are used to inject liquid chlorine into the well pump header. Liquid chlorine is stored within a designated container. A 50 kW diesel generator located outside of the facility supplies power in an emergency. Six hydro-pneumatic pressure tanks provide useable storage and reduce start/stop cycling of the high lift pumps.

8.2 Supply Wells

Well 1 is located at 434706 West Hill Road. It was constructed in 1973 to a depth of 91.4 m and a diameter of 200 mm. It has a maximum capacity of 657 m^3/day and is classified as Secure Groundwater. The well is equipped with a submersible pump with a capacity of a 657 m^3/day.

8.3 Treatment Facility

The West Hill Road WTF is located at 434706 West Hill Road and consists of:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pump discharging to the well pump header
  - One 100 L sodium hypochlorite chemical storage tank
- High Lift Works
  - One duty submersible high lift pump rated at 138 m^3/day at 55 m TDH; and
  - Two in-line centrifugal pumps each rated at 657 m^3/day at 55 m TDH.

100 m of 300 mm diameter pipe and 15 m of 75 mm diameter watermain loop provides the required contact time.

On-site storage is provided by a single-cell 40 m^3 treated water reservoir which also provides chlorine contact time. In the case of reservoir maintenance, the well pump supplies water directly from the contact pipe to the distribution system through a reservoir bypass pipe equipped with shutoff valve. One free chlorine residual analyzer measures the residual in the water discharging prior to the distribution system. Six hydropneumatics tank provides a total volume of 340 L for system pressure control.

9.0 BROWNSVILLE DWS

9.1 Treatment Overview

The Brownsville Water Treatment Facility and Reservoir is located at 292197 Culloden Line, on the west side of Culloden Line, and approximately 570 m south of Brownsville Road in the Village of Brownsville.

Water from Wells 5 and 6 enters to their associated pumphouse for treatment. Liquid chlorine is injected to raw water for disinfection. The chlorinated water is then combined in Well 6 Pumphouse, conveyed through a chlorine pipe that provides necessary contact time.

Following treatment, the water is discharged to a dual-cell 197.5 m^3 reservoir on the Culloden Line. The reservoir has three submersible high lift pumps which draw the water to the distribution system. The pumps are contacted in a pump chamber separate from the reservoir.

Each pumphouse is equipped with one duty and one standby sodium hypochlorite chemical feed pumps that are used to add liquid chlorine to the raw water. Liquid chlorine is stored within a designated container. A 35 kW diesel generator located outside of the WTF and Reservoirs building supplies power in an emergency. Each pumphouse is also equipped with a hydro-pneumatics tank that helps smooth the system pressure fluctuations. Six additional hydro-pneumatic pressure tanks connected to the distribution header provide useable storage and reduce start/stop cycling of the high lift pumps.

9.2 Supply Wells

9.2.1 Well 5

Well 5 is located at 163470 Brownsville Road in the Village of Brownsville. It was constructed in 1990 to a depth of 46.9 m and a diameter of 200 mm. It has a maximum capacity of 196 m^3/day, and is classified as Secure Groundwater. The well has a 200 mm diameter steel casing, below which is a concrete pad. The well is equipped with a submersible pump with a capacity of a 199 m^3/day at 55 m TDH. The well discharges to Well 5 pumphouse for treatment.

9.2.2 Well 6

Well 5 is located at 292238 Culloden Line in the Village of Brownsville. It was constructed in 1998 to a depth of 32.3 m and a diameter of 150 mm. It has a maximum capacity of 183 m^3/day, and is classified as Secure Groundwater. The well has a 150 mm diameter steel

casing, below which is a concrete pad. The well is equipped with a submersible pump with a capacity of a 173 m^3/day. The well discharges to Well 6 pumphouse for treatment.

9.2.3 Well 5 Pumphouse

Well 5 Pumphouse is positioned northwest of Well 5, located on the south side of Brownsville Road, and approximately 500 meters west of Culloden Line. It was constructed in 2005 and consists of:

- Chlorination
- One duty and one standby sodium hypochlorite chemical feed pumps discharging into well header; and
- One 65 L sodium hypochlorite chemical storage tank.

Raw water from Well 5 enters into the Pumphouse through a raw water sampling tap. The water is disinfected by injected liquid chlorine and conveyed to Well 6 Pumphouse, through an 890 m of 75 mm diameter pipe for chlorine contact time. A 326 L hydropneumatics tank is installed for system pressure control.

9.2.4 Well 6 Pumphouse

Well 6 Pumphouse is positioned adjacent to the Well 6 head and was constructed in 2005. It consists of:

- Chlorination
- One duty and one standby sodium hypochlorite chemical feed pumps discharging into well header; and
- One 65 L sodium hypochlorite chemical storage tank.

Raw water from Well 6 enters into the Pumphouse through a raw water sampling tap. The water is disinfected by injected liquid chlorine and conveyed through a 380 m length of 100 mm diameter pipe for chorine contact time. Chlorinated water from Pumphouse 5 and 6 is combined into a 300 mm diameter header connected to a 15 m length watermain for additional contact time. The combined flow then discharges to the Brownsville WTF and Reservoir.

The Pumphouse is equipped with two free chlorine residual analyzers, one monitoring contact time prior to WTF, and one measuring the residual downstream in the distribution system. A 326 L hydropneumatics tank is installed for system pressure control.

9.3 Treatment Facility

The Brownsville WTF and Reservoir consists of:

- Reservoir
  - One dual-cell in-ground reservoir with a rated capacity of 197.5 m^3
- High Lift Works Chamber
  - One submersible high lift pump rated at 156 m^3/day at 42.7 m TDH; and
  - Two submersible high lift pumps each rated at 449 m^3/day at 38.1 m TDH.

One free chlorine analyzer measures residual in the treated water before discharging to the Brownsville distribution system. Six 235 L hydropneumatics pressure tanks provide control for system pressure.

10.0 DEREHAM CENTRE DWS

10.1 Treatment Overview

The Dereham Centre WTF(Pumphouse) is located at 312894 Dereham in the Community of Dereham Centre. Water from Wells 2 enters into the Pumphouse, followed by injection of liquid chlorine to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed through a dual-filter system targeting reduction of arsenic, iron and manganese concentration. The filtration system is equipped with a backwashing system which stores the backwash water and cleans the filters. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

The filtered water is then conveyed to a 36.6 m^3 dual-cell reservoir to develop contact time. The reservoir has three high lift pumps which draw the water to the Dereham Centre distribution system.

There is one duty and one standby chemical pump which are used to inject liquid chlorine into the system before the filters. Liquid chlorine is stored within a designated container. A 50 kW diesel generator located outside of the pumphouse supplies power in an emergency.

10.2 Supply Wells

10.2.1 Well 2

Well 2 is located at 312894 Dereham Line. It was constructed in 2000 to a depth of 36 m and a diameter of 150 mm. It has a maximum capacity of 78 m^3/day, and is classified as Secure Groundwater. The well has a 150 mm diameter steel casing which extends to a

depth of 34.4 m. Below the bottom of the casing, a screen is used for filtration. The well is equipped with a submersible pump with a capacity of a 78 m^3/day at 55 m TDH.

10.3 Treatment Facility

10.3.1 Dereham Centre WTF(Pumphouse)

The Dereham Centre Pumphouse is located at 312894 Dereham. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the raw water header for oxidation of iron and manganese;
  - One sodium hypochlorite chemical storage tank
- Arsenic/Iron/Manganese Removal
  - Two MD-80 pressure filters;
  - A backwash storage tank; and

On-site storage is provided by a 36.6 m^3 dual-cell in-ground treated water reservoir which also provides chlorine contact time.

- High Lift Works
  - One lead, one lag, and one standby high lift pumps each rated at 69 m^3/day at 62.5 m TDH.

One free chlorine residual analyzer and one turbidity analyzer provide monitoring. Two hydropneumatics tanks with a 137 L total useable storage provides control over system pressure.

11.0 MOUNT ELGIN

11.1 Treatment Overview

The Mount Elgin Water Treatment Facility is located near the northwestern intersection of Mount Elgin Road and Plank Line in the Village of Mount Elgin. The newly operational Greydon WTF is located near the southwest side of the same intersection.

Water from Well 3A enters the WTF and is treated with liquid chlorine to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed to a 426.8 m^3 dual-cell

underground reservoir to develop contact time. The reservoir has three high lift pumps which draw the water to the Mount Elgin distribution system.

There is one duty and one standby chemical pump which are used to inject liquid chlorine into the system. Liquid chlorine is stored within a designated container located. A 40 kW diesel generator supplies power in an emergency. Six hydro-pneumatic pressure tanks connected to the distribution header provide useable storage and reduce start/stop cycling of the high lift pumps.

Water from Well 5 enters the Mount Elgin Greydon WTF and is conveyed through a membrane contactor degassing system targeting the removal of hydrogen sulphide and methane. The degassing system consists of cartridges filters and membrane contactors, upstream of which carbon dioxide is injected for pH adjustment. The gas stream is directed to activated carbon filters prior to discharge to the atmosphere.

The filtered water is then treated with sodium hypochlorite for disinfection and oxidization of remaining sulphide. The chlorinated water is conveyed through 75 m of 400 mm piping for contact time.

There is one duty and one standby chemical pump which are used to inject liquid chlorine into the system. Liquid chlorine is stored within a designated container. Two trains of carbon dioxide injection system are used for pH adjustment. Liquid carbon dioxide is stored within a designated tank. A 150-kW natural-gas-powered generator supplies power in an emergency.

11.2 Supply Wells

11.2.1 Well 3A

Well 3A was constructed in 1990 and is yet connected to the DWS. It has a diameter of 200 mm and a depth of 61 m. Well 3A is classified as Secure Groundwater and has a maximum capacity of 328 m^3/day.Well 3A constructed with a 200 mm diameter steel casing that extends to a depth of 55.2 m. Below the bottom of the casing, a screen is used for filtration. The well equipped with a submersible pump with a capacity of 328 m^3/day at 60 m TDH.

11.2.2 Well 5

Well 5 was constructed in 2011 and connected to the DWS in 2014. It has a diameter of 200 mm and a depth of 60 m. Well 5 is classified as Secure Groundwater and has a maximum capacity of 1322 m^3/day.Well 5 constructed with a 150 mm diameter steel casing that extends to a depth of 54.5 m. Below the bottom of the casing, a screen is used for

filtration. The well equipped with a submersible pump with a capacity of 864 m^3/day at 125 m TDH with VFD.

11.3 Water Treatment

11.3.1 Mount Elgin Water Treatment Facility

The Mount Elgin WTF is located at 333271 Plank Line. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the well header for disinfection; and
  - One 100 L sodium hypochlorite chemical storage tank.

On-site storage is provided by a 426.8 m^3 dual-cell in-ground treated water reservoir which also provides chlorine contact time.

- High Lift Works
  - Two high lift pumps each rated at 873 m^3/day at 51.6 m TDH; and
  - One high lift pump rated at 207 m^3/day at 55.6 m TDH.

One free chlorine residual analyzer and one turbidity analyzer provide monitoring. Six 325 L hydropneumatics tanks provide control for system pressure.

11.3.2 Mount Elgin Graydon Well 5 Treatment Facility

The Mount Elgin Graydon Well 5 WTF is located at 324062 Mount Elgin Road. The components descriptions are as follows:

- Hydrogen Sulfide/Methane Removal
  - Two membrane contactor degassing trains, each rated at 432 m^3/day
  - Each train equipped with one 1 micro nominal and cartridge filter, one 1 micro absolute cartridge filter, and two membrane contractors in series; and
  - Two activated carbon filters in parallel by two vacuum blowers for hydrogen sulfide removal, each rated at 260 m^3/hr.
- pH Adjustment
  - Two trains of CO_2 injection system, each at 7.5 kg CO_2/hr; and
  - One 2.9 m^3 liquid carbon dioxide storage tank.
- Chlorination

- One duty and one standby sodium hypochlorite chemical feed pumps discharging downstream of the membrane contactor degassing for disinfection; and
- One 300 L sodium hypochlorite chemical storage tank with spill containment.

Five runs of chlorine contact piping, each with a length of 15 m in length and a diameter of 400 mm, provides contact time for primary disinfection.

One free chlorine residual analyzer and one turbidity analyzer provide monitoring. Six 325 L hydropneumatics tanks provide control for system pressure.

11.4 Water Distribution and Storage

11.4.1 Distribution System

- Length of system
- Pipe material and age
- Pressure range/elevation range (based on Criteria set by County/MECP)
- Pumping stations, standpipes
  - RFP noted "Assess opportunities for water infrastructure decommissioning" Culloden Water Pumphouse (Ingersoll Wallace Line) and Well, Township of South-West Oxford
- General description of environment and potential constraints
- Potential for future expansion (if required)

11.4.2 Storage

On-site storage is provided by a 426.8 m^3 dual-cell in-ground treated water reservoir located at the Mount Elgin WTF

12.0 HICKSON DWS

12.1 Treatment Overview

The Hickson Water Treatment Plant is located at 531 John Street in the Village of Hickson.

Water from Well 2 enters into the WTF and is injected with liquid chlorine to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed to a dual-cell 68 m^3 in-ground reservoir to develop contact time. The reservoir has three high lift pumps which draw the water to the distribution system. There are two chemical pumps which are

used to inject liquid chlorine into the system before the reservoir. Liquid chlorine is stored within a designated container. A 35 kW diesel generator supplies power in an emergency.

12.2 Supply Wells

Well 2 is located at 531 John Street. It was constructed in 1992 to a depth of 53 m and a diameter of 150 mm. It has a maximum capacity of 300 m^3/day, and is classified as Secure Groundwater. The well has a 150 mm diameter cast iron casing which extends to a depth of 33.5 m. The well is equipped with a submersible pump with a capacity of a 337 m^3/day at 31 m TDH.

12.3 Treatment Facility

The Hickson WTF is located at 531 John Street. The components descriptions are as follows:

- Chlorination
  - Two sodium hypochlorite chemical feed pumps discharging to the raw water header for disinfection; and
  - One 40 L sodium hypochlorite chemical storage tank.

On-site storage is provided by a dual-cell 68 m^3 in-ground reservoir with baffling which provides chlorine contact time.

- High Lift Works
  - One lead, one lag, and one standby high lift pumps each rated at 199 m^3/day at 61 m TDH

One free chlorine residual analyzer and one turbidity analyzer provide monitoring. Four 325 L hydropneumatics pressure tanks provide control for system pressure.

13.0 INNERKIP DWS

13.1 Treatment Overview

The Innerkip Water Treatment Plant is located at 715570 County Road 4 in the Village of Innerkip.

Water from Wells 1 and 2 enters into the WTF and is blended, followed by injection of liquid chlorine to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed through two filters targeting reduction of iron and manganese concentration. The filtration system is equipped with a backwashing system which stores the backwash water

and cleans the filters. All backwash water is conveyed to two setting lagoons with gravity discharge to an adjacent creek.

The filtered water is then merged into a common header pipe. Liquid chlorine is injected again, and the water is conveyed to a 690 m^3 standpipe reservoir with baffling to develop contact time. The reservoir has four high lift pumps which draw the water to the distribution system.

There are two duty and one standby chemical pump which are used to inject liquid chlorine into the system before and after the filters. Liquid chlorine is stored within a designated container located on a grated secondary containment system. A 125 kW diesel generator supplies power in an emergency. Two 341 L hydropneumatics tanks provide control over system pressure.

- Number of wells
- Location
- PTTW – by system or by field
- Water quality improvements at out of service production wells

13.2 Supply Wells

13.2.1 Well 1

Well 1 is located at 715572 County Road 4. It was constructed in 2002 to a depth of 34.5 m and a diameter of 200 mm. It has a maximum capacity of 1,728 m^3/day, and is classified as Secure Groundwater. The well has a 200 mm diameter cast iron casing which extends to a depth of 18.9 m. The well is equipped with a submersible pump with a capacity of a 1,296 m^3/day at 31 m TDH.

13.2.2 Well 2

Well 2 is located at 715572 County Road 4. It was constructed in 2002 to a depth of 35.4 m and a diameter of 200 mm. It has a maximum capacity of 1,296 m^3/day, and is classified as Secure Groundwater. The well has a 200 mm diameter cast iron casing which extends to a depth of 15.9 m. The well is equipped with a submersible pump with a capacity of a 1,296 m^3/day at 31 m TDH.

13.1 Water Treatment

The Innerkip WTF is located at 715570 County Road 4. The components descriptions are as follows:

- Chlorination
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the raw water header for oxidation of iron and manganese.
  - One duty sodium hypochlorite feed pump discharging after the filters for post-chlorination; and
  - One 200 L sodium hypochlorite chemical storage tank
- Iron/Manganese Removal
  - Two iron/manganese filters, each rated at 1,175 m^3/day;
  - Two 431 m^3 backwash setting lagoons; and
  - Two submersible pumps rated at 3456 m^3/day each at 7 m TDH to transfer the backwash to the catch basin.

On-site storage is provided by a 690 m^3 standpipe reservoir which also provides chlorine contact time.

- High Lift Works
  - Three high lift pumps each rated at 821 m^3/day at 42 m TDH; and
  - One high lift pump rated at 225 m^3/day at 53 m TDH.

Two free chlorine residual analyzers and one turbidity analyzer provide monitoring. Three 341 L hydropneumatics tanks provides control over system pressure

14.0 TAVISTOCK DWS

14.1 Treatment Overview

The Tavistock Water Treatment Plant is located at 18 Hendershot Street in the Village of Tavistock.

Water from Well 1, 2A, and 3 enters into the WTF and is blended, followed by injection of liquid chlorine for disinfection. Sodium silicate is then injected to sequester iron. Following the chemical injection, the treated water is directed into an elevated storage reservoir leading to a contact pipe system to develop contact time.

There are two duty chemical pumps which are used to inject liquid chlorine to the raw water header. One duty chemical pump is used to inject sodium silicate following chlorine

injection. Liquid chlorine and sodium silicate are stored within designated containers respectively. A 150 kW diesel generator supplies power in an emergency.

14.2 Supply Wells

14.2.1 Well 1

Well 1 is located at 18 Hendershot Street. It was constructed in 1967 to a depth of 19.5 m and a diameter of 200 mm. It has a maximum capacity of 1,296 m^3/day, and is classified as Secure Groundwater. The well has a 200 mm diameter cast iron casing, which extends to a depth of 16.5 m. Below the bottom of the casing, a 3.1 m screen is used for filtration. The well has a pumphouse constructed on top of it, equipped with a submersible pump with a capacity of 1,296 m^3/day at 83 m TDH.

14.2.2 Well 2A

Well 2A is located at 17 Decew Street. It was constructed in 1995 to a depth of 48 m and a diameter of 300 mm. It has a maximum capacity of 2,765 m^3/day, and is classified as Secure Groundwater. The well has a 300 mm diameter cast iron casing, which extends to a depth of 36 m. The bottom of the casing is left open in a limestone material. The well is equipped with a submersible pump with a capacity of 2,765 m^3/day at 79 m TDH.

14.2.3 Well 3

Well 3 is located at 18 Hendershot Street. It was constructed in 1991 to a depth of 48 m and a diameter of 330 mm. It has a maximum capacity of 4,320 m^3/day, and is classified as Secure Groundwater. The well has a 330 mm diameter cast iron casing, which extends to a depth of 34.7 m. The bottom of the casing is left open in a limestone material. The well is equipped with a submersible pump with a capacity of 2,765 m^3/day at 75 m TDH.

14.2.4 Tavistock Water Treatment Facility

The Tavistock WTF is located at 18 Hendershot Street. The components descriptions are as follows:

- Chlorination
  - Two duty sodium hypochlorite chemical feed pumps discharging to the raw water header for disinfection; and
  - One 500 L sodium hypochlorite chemical storage tank.
- Iron Sequestering

- One duty sodium silicate chemical feed pump discharging to the raw water header following chlorination; and
- One 500 L sodium silicate chemical storage tank.

On-site storage is provided by a 1,600 m^3 elevated storage reservoir which also provides chlorine contact time. One chlorine residual analyzer and one turbidity analyzer provide monitoring.

14.2.5 Distribution System

- Length of system
- Pipe material and age
- Pressure range/elevation range (based on Criteria set by County/MECP)
- Pumping stations, standpipes
  - RFP noted "Assess opportunities for water infrastructure decommissioning" Culloden Water Pumphouse (Ingersoll Wallace Line) and Well, Township of South-West Oxford
- General description of environment and potential constraints
- Potential for future expansion (if required)

The distribution system services an approximate residential population of 2700 and services 886 facilities. The system has approximately 70 hydrants and 17 kilometers of water mains.

15.0 THAMESFORD DWS

15.1 Treatment Overview

Raw water from the four wells enters the treatment plant and is blended to allow for dilution of the nitrates present in Well 1, 2 and 4, as well as the notable amount of sodium present in Well 3. It is followed by injection of liquid chlorine to initiate the oxidation of iron and manganese. The chlorinated water is then conveyed through a series of three filter systems targeting reduction of the oxidated iron and manganese. The filtration system is equipped with a backwashing system which stores the backwash water and cleans the filters. All backwash water is conveyed to a designated backwash tank for eventual disposal to the sanitary sewer system.

The filtered water is then conveyed into a common header pipe leading to a dual UV Light irradiation system which operates in a duty and standby mode. Once the water has passed through the UV system, liquid chlorine is injected again, and the water is conveyed to a 200

m^3 reservoir to develop contact time. The reservoir has three high lift pumps which draw the water to the Thamesford Water Tower for primary disinfection via additional contact time.

There are a two duty and two standby chemical pumps which are used to inject liquid chlorine into the system before the filters and after the UV system. Liquid chlorine is stored within a designated container located in the north part of the Treatment Plant. A 180 kW diesel generator mounted on a concrete pad located to the north of the Thamesford Treatment Plant supplies power during power outages.

The components descriptions are as follows:

- Iron/Manganese Removal System:
  - Three iron/manganese filters, each rated at 1,837 m^3/day;
  - A 63 m^3 backwash storage tank; and
  - One duty and one standby submersible pumps rated at 432 m^3/day each at 7 m TDH to transfer the backwash to the sanitary sewer.
- Chlorination System:
  - One duty and one standby sodium hypochlorite chemical feed pumps discharging to the raw water header for oxidation of manganese;
  - One duty and one standby sodium hypochlorite feed pumps discharging after the UV units for post-chlorination; and
  - One sodium hypochlorite chemical storage tank

UV disinfection is accomplished by two units following the filters, each rated at 5,391 m^3/day.

The High Lift Works equipment consists of:

- Two fixed speed high lift pumps each rated at 1,797 m^3/day at 63 m TDH; and
- One fixed speed high lift pump rated at 2,591 m^3/day at 63 m TDH.

Monitoring is done by two free chlorine residual analyzers and one turbidity analyzer.

15.2 Supply Wells

15.2.1 Well 1

River Well 1 is located at 250 Allen Street. It was constructed in 1979 to a depth of 14.6 m and a diameter of 250mm. It has a maximum capacity of 2,290 m^3/day, and is classified as GUDI with effective in-situ filtration. The well has a 500 mm diameter outer steel casing and an inner 250 mm diameter steel casing. The larger casing extends to a depth of 9.5 m and the smaller casing extends to a depth of 8.8 m. Below the bottom of the outer casing, a 4.9

m screen is used for filtration. The well has a pumphouse constructed on top of it, equipped with a submersible pump with a capacity of a 2,287 m^3/day at 42 m TDH.

15.2.2 Well 2

River Well 2 was constructed in 1987 as a standby to Well 1. It has a diameter of 300mm and a depth of 9.4 m. Well 2 is also classified as GUDI and has a maximum capacity of 2,290 m^3/day. It was constructed with a 490 mm diameter outer steel casing extending to a depth of 3.1 m, and an inner 325 mm diameter steel casing extending to 6.4 m. A 3.1 m screen is used for filtration. The well is in a pumphouse equipped with a submersible pump with a capacity of 2,160 m^3/day.

15.2.3 Well 3

River Well 3 was constructed in 1995 and is located in 202 Stanley Street. It has a 250mm diameter and a depth of 78.3 m. The well is classified as a true groundwater well and has a maximum flow rate of 1,305 m^3/day. It was constructed with a 275 mm diameter steel casing which extends to 24.7 m. The pumphouse uses submersible pump with a capacity of a 1,304 m^3/day, and also has a monitoring well located near it.

15.2.4 Well 4

River Well 4 is located at 250 Allen Street. The well is also classified as GUDI with effective in-situ filtration. It was constructed in 2021 to a depth of 78.3 m. It has a 250 mm nominal diameter 316 stainless steel well casing and screen (60 slot), and a natural filter pack. A pumphouse with a capacity of 2,290 m^3/day at 50m TDH is constructed on top of the well.

15.2.5 River Wells Pumphouse

The River Wells Pumphouse is located at 250 Allen Street and consists of:

- Three sodium hypochlorite chemical feed pumps, each discharging to Wells 1, 2 and 4 raw water headers; and
- One sodium hypochlorite chemical storage tank.

Raw water from Well 1, 2 and 4 enters into the pumphouse through separate water lines. Each water lines have an air release valve, a raw water sampling tap, an inline flow meter, and a chlorine injection point. Chlorine is injected using two duty chlorine pumps into each water line. The raw water from the three lines is then combined in a watermain directed to the WTP.

The pumphouse is equipped with an online free chlorine analyser which measures the free chlorine concentration of the raw water prior to pumping to the Thamesford WTP. Liquid chlorine is stored in a designated container situated on a secondary containment system.

15.3 Water Distribution and Storage

15.3.1 Distribution System

The Ontario Design Guidelines for DWS (ODGDWS) provides average values for per capita demand if the flow records suggest that unaccounted-for-water exceeds 15% of average daily demand, and recommends the cause of the unaccounted-for-water determined and reduced or eliminated as much as is practical. The OC 2018 – 2021 Rate Model provided by the County shows that average losses or unaccounted water is about 12% over the 3 years.

15.3.2 Storage

Storage is provided by a 2,050 m^3 elevated water storage tower located at to the southeast of the WTP. The tower receives water directly from the main treatment plant and can also be used to develop contact time for adequate disinfection. One flowmetre measures the flow into the tower from the treatment plant and a second one measures the flow from the tower to the distribution system. The tower is equipped with one free chlorine residual analyzer and one turbidity analyzer.