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Township of Asphodel-Norwood

Schedule B Municipal Class Environmental Assessment for Potable Water Storage in the Village of Norwood – Phase 2 Report (FINAL)



Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

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1.0 Introduction

1.1 Background

The Village of Norwood (Village) is one of two villages in the Township of Asphodel-Norwood (Township) within the south-eastern portions of Peterborough County and is located along Highway 7, around 30 km east of the City of Peterborough. The Village has a population of approximately 2,100 (Township) and is serviced by four (4) municipal wells, chlorine disinfection water treatment plant (WTP), one (1) municipal water tower (standpipe), and a dedicated distribution system comprised of approximately 13 km of water piping that is owned and operated by the Township.

A 2020 Infrastructure Assessment Report, completed by Engage Engineering Ltd. (Engage Report), identified the Village's standpipe did not have adequate storage for the current population and it has insufficient capacity to service projected growth over the next 20 years and beyond. As such, the Township is considering options for additional potable water storage capacity in the Village to ensure continued provision of safe drinking water well into the future.

In December 2020, the Township retained J.L. Richards & Associates Limited (JLR) to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for the Village's potable water storage system to evaluate alternate potable water storage solutions that will service the community for the next 20 years or more.

The objectives of this Class EA are as follows:

- To summarize background information related to the Township's potable water system, including historical water demands, growth projections (prepared by Engage), expected water demands for the 20-year and build-out planning horizons and existing standpipe conditions;
- To identify system constraints associated with the existing potable water storage system and to establish a problem and opportunity statement;
- To identify and evaluate possible alternative solutions to address the problem and opportunity statement in terms of economic consequences, overall feasibility, ability to address the problem, and potential impacts to the surrounding environment;
- To identify preliminary design concepts for the preferred solution;
- To identify environmental impacts and mitigation measures of the preferred solution, and
- Consult with agencies, public and other stakeholders throughout the process.

1.2 Class Environmental Assessment Process

The *Ontario Environmental Assessment Act* (EA Act), enacted in 1976, formally recognizes the Municipal Class Environmental Assessment (Class EA) process and outlines requirements for EA approval. The Municipal Class EA applies to municipal infrastructure projects, including roads, water, and wastewater projects. To ensure that environmental impacts and effects are considered for each project per the EA Act, proponents are required to generally follow the planning process set out in the Municipal Class EA Guidelines, prepared by the Municipal Engineers Association (MEA) (2015) (www.municipalclassea.ca). The Class EA process includes the following stages:

Phase 1: Problem and opportunity identification.

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- Phase 2: Identification and evaluation of alternative solutions to determine a preferred solution to the problem or opportunity. This Phase also compiles an environmental 'inventory', identifies impacts, and outlines mitigation measures.
- Phase 3: Identification and evaluation of design concepts for the preferred solution. A detailed evaluation of the environmental effects and mitigation measures will be addressed during this project Phase.
- Phase 4: Complete and place Environmental Study Report on Public Record. The Report will document Phases 1 through 3 and summarize the consultation undertaken throughout the planning process and is considered valid for a 10-year period.
- Phase 5: Implementation and monitoring.

Since projects may vary in their environmental impact, they are classified in terms of the following schedules:

- Schedule 'A' projects usually have minimal environmental effects and generally include normal or emergency operational and maintenance activities. These projects are pre-approved under the Class EA planning process. Projects within this category are subject to Phases 1 and 5.
- Schedule 'A+' projects are pre-approved projects similar to Schedule 'A', however, the public is to be advised prior to project implementation.
- Schedule 'B' projects have potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with affected parties. Generally, these projects include improvements and minor expansions to existing facilities. Projects within this category are subject to Phases 1, 2 and 5.
- Schedule 'C' projects have potential for greater environmental impacts and are subject to all five (5) Class EA Phases. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

Based on the following excerpt from the MEA Guidelines, this project is being undertaken as a Schedule 'B' Class EA, and thus Phases 1 and 2 of the Class EA process will be completed:

"6. Establish new or expand/replace existing water storage facilities".

1.3 Project Team

The following Project Team was involved in carrying out this Class EA:

Proponent: Township of Asphodel-Norwood
2357 County Road 45
P.O. Box 29
Norwood, Ontario K0L 2V0
Telephone: (705) 639-5343

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Prime Consulting Engineer: J.L. Richards & Associates Limited
863 Princess St., Suite 203
Kingston, ON K7L 5N4
Telephone: (613) 544-1424

Natural Heritage Sub-Consultant: Cambium Inc.
625 Fortune Crescent #1
Kingston, ON K7P 0L5
Telephone: (613)389-2323

The Township, as the Proponent, retained JLR to undertake the Class EA component of the project in December 2020 and has actively participated in directing and administering this Class EA. The Township was also responsible for issuing notices to the public and communicating with stakeholder agencies. JLR provided project coordination, undertook technical reviews and investigations, advised/liaised with stakeholders, prepared the Phase 1 and Phase 2 Reports, chaired project meetings, and organized and attended the Public Information Centre (PIC).

1.4 Methodology

Phase 1 of this Class EA involved the evaluation of existing conditions of the Township's water storage system, identification of population growth and associated water storage requirements for the 20-year and build-out planning timeframes, establishment the Township's WaterCAD® hydraulic model of the distribution system for existing and future servicing scenarios to supplement findings. A Problem/Opportunity Statement was generated to serve as the basis for Phase 2. The Phase 1 Report is attached in Appendix A.

Phase 2 of this Class EA will identify and evaluate alternatives to determine a preferred servicing solution to the Problem/Opportunity Statement identified in Phase 1. Hydraulic modelling was used to simulate the impact of each alternative servicing solution on the distribution system. Section 2.0 summarizes the activities completed as part of Phase 2. A natural heritage study report was completed by Cambium Inc. (Appendix D) which supported the natural environment evaluation and considerations for mitigation measures.

A Public Information Centre was held on October 18, 2021, which included a presentation, and question/answer period to review the work completed for this Class EA.

1.5 Phase 1 Problem and Opportunity Statement

The following Problem / Opportunity Statement has been used as the basis for proceeding to Phase 2 of this Class EA:

The existing drinking water system in the Village of Norwood is facing a number of constraints, including insufficient treated water storage capacity, deteriorated standpipe conditions, low pressure concerns and fire flow issues in certain areas of the distribution system.

There is an opportunity to ensure that the Township has a solution that will address the current water storage constraints in the potable water supply system both now and in the future.

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2.0 Phase 2 - Identification and Evaluation of Alternative Solutions

The main objective of Phase 2 of a Class EA is to identify and evaluate possible alternative solutions to the Problem/Opportunity Statement identified in Phase 1. All reasonable potential solutions to the problem, including the 'Do Nothing' option, are considered. Class EAs for water distribution system projects generally result in the identification and review of a broad range of solutions. It is also important to note that the objective of Phase 2 is to focus on determining an overall "generalized solution" to the problem and not necessarily all of the intricate details which are typically further explored and developed during Phase 5 of a Schedule 'B' Class EA referred to as Implementation (i.e., preliminary and detailed design stage). The following sections describe the evaluation and selection methodology for reviewing alternative solutions, the identification and review of alternatives solutions, and the identification of a preferred servicing solution.

2.1 Evaluation and Selection Methodology

In order to facilitate the evaluation and selection of the preferred solutions during Phase 2, a transparent and logical three-part assessment process was established. This process included:

- Initial screening of alternatives;
- Detailed evaluation of screened alternatives;
- Establishment of servicing solutions based on pre-screened alternatives; and
- Selection of a preferred servicing solution.

The first evaluation stage considered the overall feasibility of the potential solutions and identified those alternatives that fully address the Problem/Opportunity Statement as identified in the Phase 1 Report. This step ensures that unrealistic alternatives were not carried forward to a more detailed evaluation stage.

Based on the initial screening process, a detailed assessment of the shortlisted alternatives was conducted, which included the development of an Opinion of Probable Costs (OPC). Evaluation criteria were developed based on a review of the background information, experience on similar assessments and in consultation with Township staff. The evaluation was conducted using criterion in the following four major criteria categories:

- Natural and Cultural Environment;
- Engineering and Technical Considerations;
- Social and Community Well Being; and
- Economic Environment.

Each criterion was assigned a colour to reflect its level of impact relative to other criteria. The relative level of impact for each criterion for each potential solution was then assessed based on the colour weighting system summarized in Table 1. The option that has the least negative impact or has the strongest positive impact was recommended as the preferred solution and presented to stakeholders to solicit input before finalizing.

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Table 1: Detailed Evaluation Impact Level and Colouring System

Impact Level	Colour	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

The OPC for each servicing solution were based on a Class 'D' estimate, generally defined as follows:

- Work Definition: A description of the intended solutions with such supporting documentation as is available.
- Intended Purpose: To aid in the screening of various servicing solutions prior to recommending a preferred solution (not intended to establish or confirm budgets).
- Opinion of Probable Cost: 2021 dollar value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each servicing solution and includes allowances for design elements that have not fully been developed. Class 'D' OPCs developed for this assignment are expected to be within +/- 30%. The OPCs were developed based on past experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Class EA is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters (e.g., pipe size, storage volume, etc.) should be confirmed during detailed design. Any provided estimate of costs or budget is an OPC that is based on historic construction data and does not include labour, material, equipment, manufacturing, supply, transportation or any other cost impacts in relation to COVID-19. JLR shall not be responsible for any variation in the estimate caused by the foregoing factors but will notify the Township of any conditions which JLR believes may cause such variation upon delivery of the estimate.

2.2 Initial Screening of Alternatives

General solutions that were considered for initial screening were broken down as follows:

- Approach
 - Approach 1: Do Nothing
 - Approach 2: Construct New Storage
- Location
 - Option 1: Existing Water Treatment Plant
 - Option 2: Entrance of Landfill Site Driveway
 - Option 3: Township Public Works Building (On Top of the Esker)
 - Option 4: Intersection of County Road 42 and Asphodel 10th Line (Engage Report Option)
- Configuration
 - Configuration 1: Below-Grade Reservoir and Pumping Station
 - Configuration 2: At-Grade Reservoir and Pumping Station
 - Configuration 3: Elevated Storage Tank
 - Configuration 4: Standpipe

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2.2.1 Approach

Approach 1: Do Nothing

The Do Nothing approach generally examines what may occur if none of the alternatives are implemented; it is generally carried forward for detailed review for comparison.

Approach 2: Construct New Storage

This approach generally requires construction of a new water storage facility to provide the additional storage. The new storage could be a standpipe, elevated storage tank, below-grade or at-grade reservoir with pumping station. This approach would address storage, pressure and fire flow capacity limitations associated with the system and is therefore recommended to be carried forward for detailed evaluation.

2.2.2 Location

Three (3) potential locations were proposed for the new water storage in the Existing & Future Conditions Review – Norwood Infrastructure Assessment report by Engage Engineering Ltd. in 2020 (Refer to Appendix B), which included:

- The existing WTP site.
- The Public Works Building on Highway 7.
- Intersection of County Road 42 and Asphodel 10th Line.

Engage Report has recommended that a Municipal Class EA study be undertaken to determine the most appropriate location and type of future treated water storage.

For Phase 2 of the Class EA, the three (3) locations identified in the Engage Report are being carried forward into the evaluation. A new site location at the entrance of the landfill site has been added upon consultation with the Township. Detailed description of each location is as follows. Refer to Figure 1 for the general location of these options.

Option 1 –Existing Water Treatment Plant

Being one (1) of the Engage Report proposed locations, this site is located at 42 Ridge street. The future water storage will be located within the existing WTP site, adjacent to the existing standpipe. There is sufficient space available at the north and northeast portion of the WTP site for the additional storage infrastructure. Additionally, there are four drinking water wells on site. Two (2) wells are located to the east of the WTP building, while two (2) wells are located to the west.

It is recommended that this site be carried forward into the detailed evaluation.

Option 2 – Entrance of Landfill Site Driveway

This site is located at a green space by 187 County Road 40, close to the entrance of the Township's transfer station and Mill Pond Forest trail. This site is proposed due to its close proximity to the new/future development area to the west of County Road 40. Currently, this area experiences low pressure and fire flow.

The Township's watermain passes near this site and runs along County Road 40. To connect the water storage facility, a 100-meter new watermain section is needed to bring water to the site, along with significant watermain upgrades along County Road 40.

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The site is also in proximity to Hydro One high voltage transmission towers and lines. Upon consultation with Hydro One, certain horizontal offset and infrastructure clearance are to be considered in order to eliminate impact of this project on Hydro One's infrastructure.

Immediately adjacent to the Ouse River, construction activities on this site will likely have negative impact on the aquatic environment, i.e., habitat of the turtles and fishes.

A pre-consulting meeting was held to discuss the feasibility of this option with Otonabee Region Conservation Authority (ORCA). According to Watershed Planning & Regulations Policy Manual, 2012 as updated in 2015, Policy 2.4(1) and 2.4.1(1), this site is within the floodplain and upstream of where the Two-Zone Special Policy Area begins. These policies are prohibitive of new institutional development and any development that may be considered an essential service.

To build a storage facility at this location, the capital cost will be significantly higher than the other options due to the low ground elevation and mitigation measures required for construction in the floodplain.

Therefore, this option is not carried forward into the detailed evaluation.

Option 3 – Township Public Works Building (On Top of the Esker)

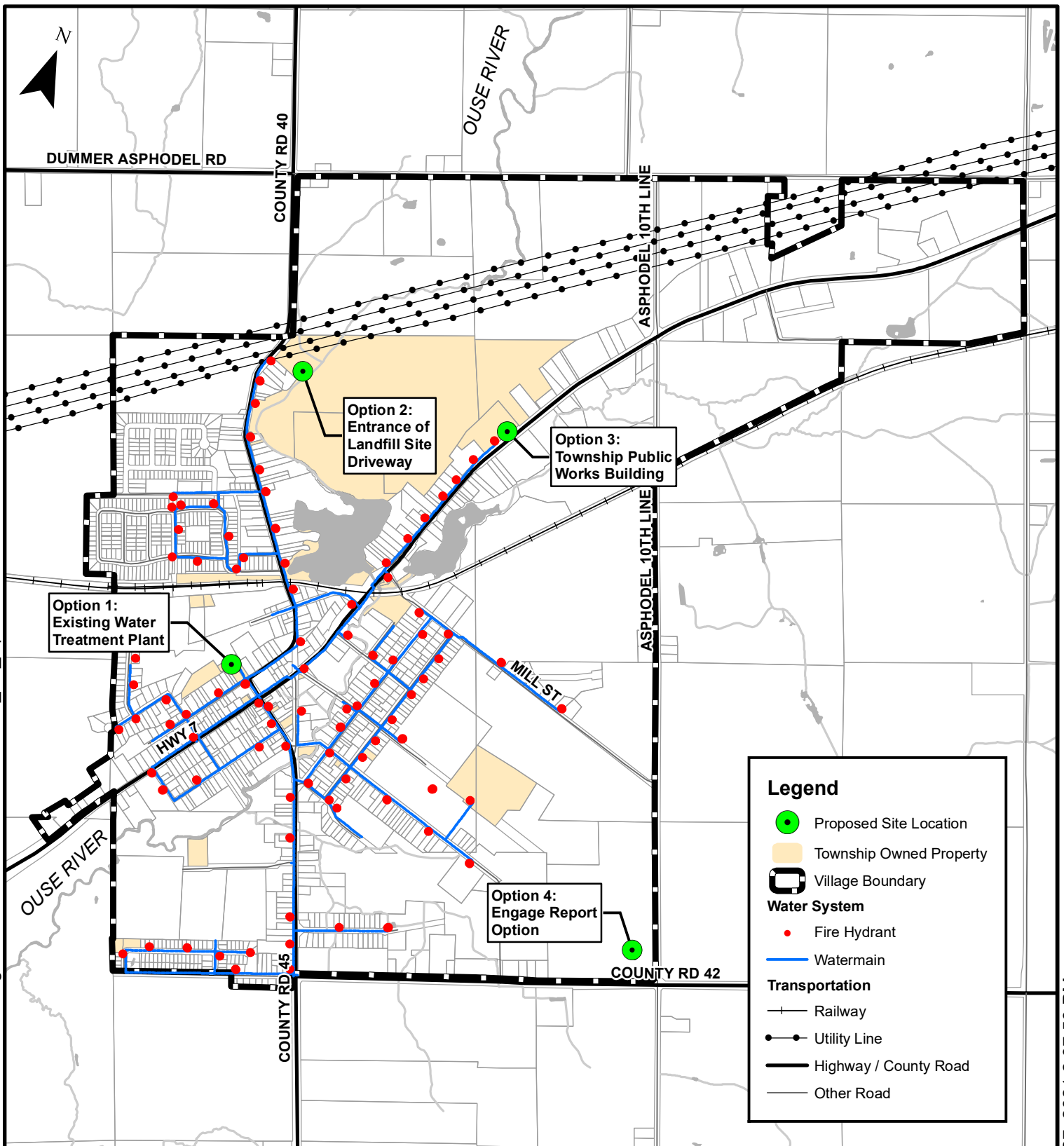
Being one (1) of the Engage Report proposed locations, this site is located at 4439 Hwy 7, behind the township-owned Public Works Building. The Township's watermain terminates at the Public Works Building on Highway 7. Watermain extension is needed to bring water to the top of the Esker. The new water storage facility will be constructed on top of the esker behind the public works building, which provides the advantage of higher ground elevation resulting in a lower height of the water storage and subsequently lower construction costs.

It is recommended that this option be carried forward for detailed evaluation.

Option 4 – Engage Report Option (Intersection County Road 42 and Asphodel 10th Line)

Being one of the Engage Report proposed locations, although this site has sufficient space for additional storage infrastructure, the land is not owned or leased by the Township. In addition, there is no watermain that connects to this location currently. The Township has decided to not carry this option forward.

Based on the initial screening, Option 1 and 3 should be carried forward to detailed evaluation.



PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

POTENTIAL LOCATIONS FOR FUTURE STORAGE - INITIAL SCREENING

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2.2.3 Configuration

There are generally four (4) configurations available for water storage, including a below-grade reservoir and pumping station, an at-grade reservoir and pumping station, a composite elevated tower and a standpipe. Each configuration was reviewed for initial screening to determine whether it would be carried forward for detailed evaluation at the short-listed locations previously identified.

Configuration 1: Below-Grade Reservoir and Pumping Station

A typical below-grade reservoir is constructed of reinforced concrete and covered with earth and vegetation. In addition to potentially more appealing aesthetics, an advantage of this configuration is that the reservoir tank can be arranged to have two (2) or more cells that can be taken offline independently, enabling maintenance or inspection activities to proceed without losing all of the storage capacity of the facility. The pumping station can be arranged to be at-grade or below-grade, but at-grade buildings are more typical and operator friendly.

On the other hand, a reservoir plus pumping station configuration relative to an elevated tower is generally more complex to maintain and would require higher operating and maintenance costs (related to the new pumping station). The new pumping station would require redundant pumping capacity (domestic and fire protection) to allow flexible operations to remove a pump from service for routine maintenance or respond to a potential equipment failure. Additionally, pumping capacity will be required to meet the full range of everyday domestic demands up to fire protection demands. It is noted that the existing water distribution system is currently configured to store fire protection water in the standpipe. Increased electrical consumption will result from continual pump operation required to maintain adequate water distribution system pressure at all times. In the event of a power failure, the pumping station must be equipped with a backup power supply, such as diesel driven generators. The below-grade and pumping station will have the highest capital and life cycle costs among the four (4) configurations. In addition, to fill the below-grade reservoir local pressure reduction will be required to prevent tank overflowing since the existing well pumps at the WTP are sized to pressurize the water distribution and fill the standpipe.

Based on the footprint, complex system operation, high capital and life cycle costs, it is recommended that the below-grade storage and pumping station configuration not be carried forward for detailed evaluation.

Configuration 2: At-Grade Reservoir and Pumping Station

Modern at-grade reservoirs are typically constructed of reinforced concrete or coated/glass-fused-to steel with the latter being the least costly to construct. Glass-fused-to-steel tanks are preferred due to ease of installation, longevity, and lower maintenance. One disadvantage with at-grade tanks is that during maintenance or inspection, all storage capacity is unavailable, since there are no internal baffles to allow parts of the tank to remain in service. Due to the wide variety of diameters and heights available for at-grade steel tanks, the area required is flexible, and usually takes up less space than a below-grade reservoir of comparable size. One advantage of an at-grade reservoir over a below-grade reservoir is that the depth at which rock is encountered has less of a bearing on the cost of the reservoir, since it sits above the ground, rather than within.

The at-grade reservoir and pumping station will have the slightly lower capital and life cycle costs compared to below-grade reservoir and pumping station. However, similar to a below-grade reservoir, an at-grade reservoir configuration requires the same pumping station infrastructure, which relative to an elevated tank is generally a more complex system resulting in increased operating and maintenance costs. Based on the footprint, complex system operation, high capital

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and life cycle costs, at-grade reservoir and pumping station is recommended not be carried forward for detailed evaluation.

Configuration 3: Composite Elevated Tank

Composite elevated tanks are typically coated steel or glass-fuse-to-steel tanks located at the top of a pedestal or other support structure. The water level in the elevated tank sets the pressure in the water distribution system. The functional/usable capacity of an elevated tank is the volume of water that can be stored in the tank between the high and low water levels. Thus, provided the tank is of sufficient height, the diameter of the tank determines the functional capacity. Given the desire for minimal downtime and decreased maintenance, a glass-fused-to-steel tank can be a preferable option. A glass-fused-to-steel tank would be designed to sit atop a concrete pedestal to avoid the maintenance activities associated with a coated steel support structure and internal tank coating. Because the elevated tank water level corresponds to the instantaneous pressure in the system, no additional pumping station is required beyond the existing WTP well pumps that fill the elevated tank. An elevated tank needs relatively lower operation and maintenance requirements when compared to a continually operating pumping station with more equipment, valves and ancillary systems to maintain a pressurized system. Since the elevated tank water level sets the pressure in the system, it does not require more sophisticated control systems to ensure safe and reliable water distribution system operation.

The main difference between capital and life cycle costs associated with a below- or at-grade reservoir and pumping station configuration compared to an elevated tank configuration is largely due to the pumping station.

The elevated composite tank will have significant lower cost than a below- or at-grade reservoir and pumping station. However, the cost of a composite elevated tank is typically higher than a standpipe. As an example, to achieve an operating capacity of 3,000 m³, capital costs may range from \$3 M (standpipe) to \$5M (elevated tank).

The Township has indicated that the financial considerations are a major component of the evaluation process in selecting the preferred alternatives. The elevated tower offers similar functionality and simplicity as a standpipe. However, the capital cost is significantly more. As such, this configuration is not recommended to be carried forward for detailed evaluation.

Configuration 4: Standpipe

Standpipes are essentially ground storage tanks constructed to a height that will provide adequate system pressure in the operating range. Their diameter is constant from the ground to the top, and they are completely filled with water. The typical material of construction for a standpipe can be glass-fused-to-steel, coated steel or a combination of both. The glass-fused-to-steel tank offers the advantage of easier installation, longevity, and minimal shutdown time for maintenance.

A standpipe blends the characteristics and performance of both ground storage and elevated storage tank, with its taller design allowing water above the operating range to typically provide gravity-fed pressure. Chlorine contact time can also be provided within the standpipe when it is located at the WTP site before treated water reaches the distribution system. Standpipes are often used in small systems where less volume is needed, or in situations where the site has a high ground elevation relative to the system pressure.

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Based on the configuration, size of the Norwood water distribution system, operational complexity, capital and lifecycle costs, it is recommended that the standpipe configuration be carried forward for detailed evaluation.

Climate Change Considerations

Since the elevated tower and standpipe do not require pumping, there is reduced energy consumption associated with these two (2) configurations. Instead of pumping two (2) (or more) times, the elevated tower and standpipe configuration only requires one-time pumping in this application, making these configurations more energy efficient.

By selecting the standpipe configuration, less building materials are required as compared to the other three (3) configurations, which would generally lead to reduced greenhouse gas (GHG) emissions during material manufacturing and construction phase. This ultimately contribute to less environmental impact.

2.2.4 Initial Screening Summary

Table 2 provides a summary of the advantages and disadvantages of each alternative reviewed for initial screening.

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Table 2: Summary of Initial Screening of Alternatives

General Solution	Description	Advantages	Disadvantages	Carried Forward?
Approach	Approach 1 - Do Nothing	In accordance with the Class EA process, this option is generally carried forward to detailed evaluation for comparison.		✓
	Approach 2 - Construct New Storage	- Addresses potable water storage requirements as defined by the MECP - Hydraulic Grade Line can be raised - Addresses the pressure deficiency - Addresses the fire flow deficiency	Higher capital cost	✓
Location	Option 1 – Existing Water Treatment Plant	- Limited distribution system upgrade requirements - Met minimum screening requirements - Ideally located in Institution Zone	Close to drinking water wells	✓
	Option2 – Entrance of Landfill Site Driveway	Ideally located close to the new development area and area currently experiencing low pressure	- Close distance to Hydro One infrastructure - Located within the floodplain and not in compliance with permitted use identified in ORCA Special Policy Area - Cost prohibitive	✗
	Option 3 – Township Public Works Building (On Top of the Esker)	- Met minimum screening requirements - Higher elevation at this location	To be discussed during detailed evaluation	✓
	Option 4 – Engage Report Option	Has sufficient space for additional storage infrastructure	Not owned by Township	✗
Configuration	Configuration 1 – Below-Grade Reservoir and Pumping Station	- Low visibility of the reservoir - Less potential to impact the public - Operational flexibility to isolate separate cells for maintenance	- Not typical for a small distribution system - Largest footprint - Continuous pump operation contributing to higher energy consumption - High operating and maintenance requirements - Increased equipment for redundancy and reliability	✗

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			Potentially higher construction costs below-grade	
	Configuration 2 - At Grade Reservoir and Pumping Station	- Moderate visibility - Operational flexibility to isolate separate storage tanks for maintenance or upset	- Not typical for a small distribution system - Medium footprint - Continuous pump operation contributing to higher energy consumption - High operating and maintenance requirements - Increased equipment for redundancy and reliability	x
	Configuration 3 - Composite Elevated Tank	- Least complex operation - Consistent with current system operating configuration (i.e., fill/drain from standpipe)	- High visibility - Storage no longer available during maintenance or inspection - Higher construction costs comparing to standpipe	x
	Configuration 4 - Standpipe	- Smallest footprint - Least complex operation - Lowest energy, operating and maintenance costs - Least capital costs - Consistent with current system operating configuration (i.e., fill/drain from standpipe)	- High visibility - Storage no longer available during maintenance or inspection	✓

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2.3 Potable Water Storage Servicing Solutions

The initial screening has eliminated a number of approaches, site locations and storage configurations. The remaining feasible alternatives are:

- Approach 1 – Do nothing
- Approach 2 – Construct new storage
- Location 1 – Existing water treatment plant
- Location 3 – Township Public Works Building (On top of Esker)
- Configuration 4 – Standpipe

These different aspects are then carried forward and consolidated into the three servicing solutions as identified in Table 3. The proposed servicing solutions focus on the combinations of the various aspects of the storage facility:

Table 3: Potable Water Storage Servicing Solutions

Servicing Solution No.1	Do Nothing	Approach 1 – Do Nothing
Servicing Solution No.2	Construct New Standpipe at Existing WTP	Approach 2 - Construct New Storage Location 1 - Existing Water Treatment Plant Configuration 4 - Standpipe
Servicing Solution No.3	Construct New Standpipe at Public Works Building on Top of Esker	Approach 2 - Construct New Storage Location 3 - Township Public Works Building (On Top of the Esker) Configuration 4 - Standpipe

Overall, the three (3) servicing solutions involve do nothing, or the construction of a standpipe at two (2) short-listed locations within the Village. It has been assumed that the site conditions are consistent with that at the existing standpipe site, and that the construction requirements of the new standpipe for each location being considered would also be similar.

2.4 Detailed Evaluation of Servicing Solutions

Each servicing solution carried forward for detailed evaluation was reviewed in terms of its impact on the natural and cultural environment, engineering and technical considerations, social and community well-being, and economic environment in accordance with the evaluation methodology described in Section 2.1. Hydraulic modelling of each servicing solution was undertaken for the existing and future demand scenarios to confirm distribution system pressures, available fire flows, and to identify potential future distribution system upgrade requirements for each option. A description of each servicing solution is provided below.

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2.4.1 Servicing Solution 1: Do Nothing

The 'Do Nothing' alternative is generally equivalent to the status quo and typically carried forward as a baseline for review of other alternatives. In this case, the 'Do Nothing' alternative would involve rehabilitation and continued operation of the existing standpipe, which, as discussed previously in Phase 1 Report, is significantly undersized with respect to MECP design guidelines for storage requirements. In addition, 2018 Greatario Capital Asset Management plan noted that, every 10 years, the interior of the standpipe would require dry inspection and the exterior would require inspection and cathodic protection testing. A complete inspection of tank interior and cathodic protection system would also need to take place. The 2018 Greatario inspection report suggested the overall condition of the exterior and interior of the standpipe as good and fair, respectively. The recommended action plan called for the installation of cathodic protection in the near future.

Since this option does not address the storage, pressure, fire flow and condition issues, it is not being considered further.

2.4.2 Servicing Solution No. 2: Construct New Standpipe at Existing WTP

As described in Section 3.4.2 in the Phase 1 Report, there is an existing water storage deficit of 166 m³, an expected water storage deficit of 1,601 m³ in the short-term by year 2030 and 1,980 m³ by the year 2040.

For this Class EA, the design usable storage volume for a new standpipe is 3,000 m³ which is consistent with the 20-year design horizon of this Class EA as per Phase 1 Report Table 6 – Potable Water Storage Requirements. The usable storage volume is defined as the combined volume of fire storage, equalization storage and emergency storage. In addition to usable storage. There is also unusable storage volume in the standpipe. The unusable volume (or dead storage) is typically provided to maintain system pressure, which means a minimum water level needs to be maintained to achieve the system pressure requirements. The water volume in the dead storage is unavailable to the system at all times. The unusable volume changes from location to location, depending on the ground elevation of each site. As such, total standpipe storage volume is different for each servicing solution.

This servicing solution involves constructing a new standpipe at the existing WTP. The WTP is the site of the existing standpipe and generally consists of open space, the WTP building, municipal drinking water wells, the standpipe and access road. Located in the existing WTP site, this servicing solution offers a convenient location for operation and maintenance.

The standpipe will be constructed to the west of the existing standpipe at a similar ground elevation of 220m. The standpipe will be approximately 36 m in height (9 meters taller than the existing standpipe), providing a sufficient HGL raise to address the storage, pressure and fire flow deficits. Table 4 provides a summary of the proposed standpipe characteristics.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Table 4: Servicing Solution No.2 – New Standpipe Summary

Standpipe Usable Volume (Approximate)	3,000	m ³
Standpipe Total Volume (Approximate)	4,000	m ³
HGL	255	m
Ground Elevation	220	m
Liquid Height	35	m
Total Standpipe Height	36	m
Standpipe Diameter (Approximate)	12	m

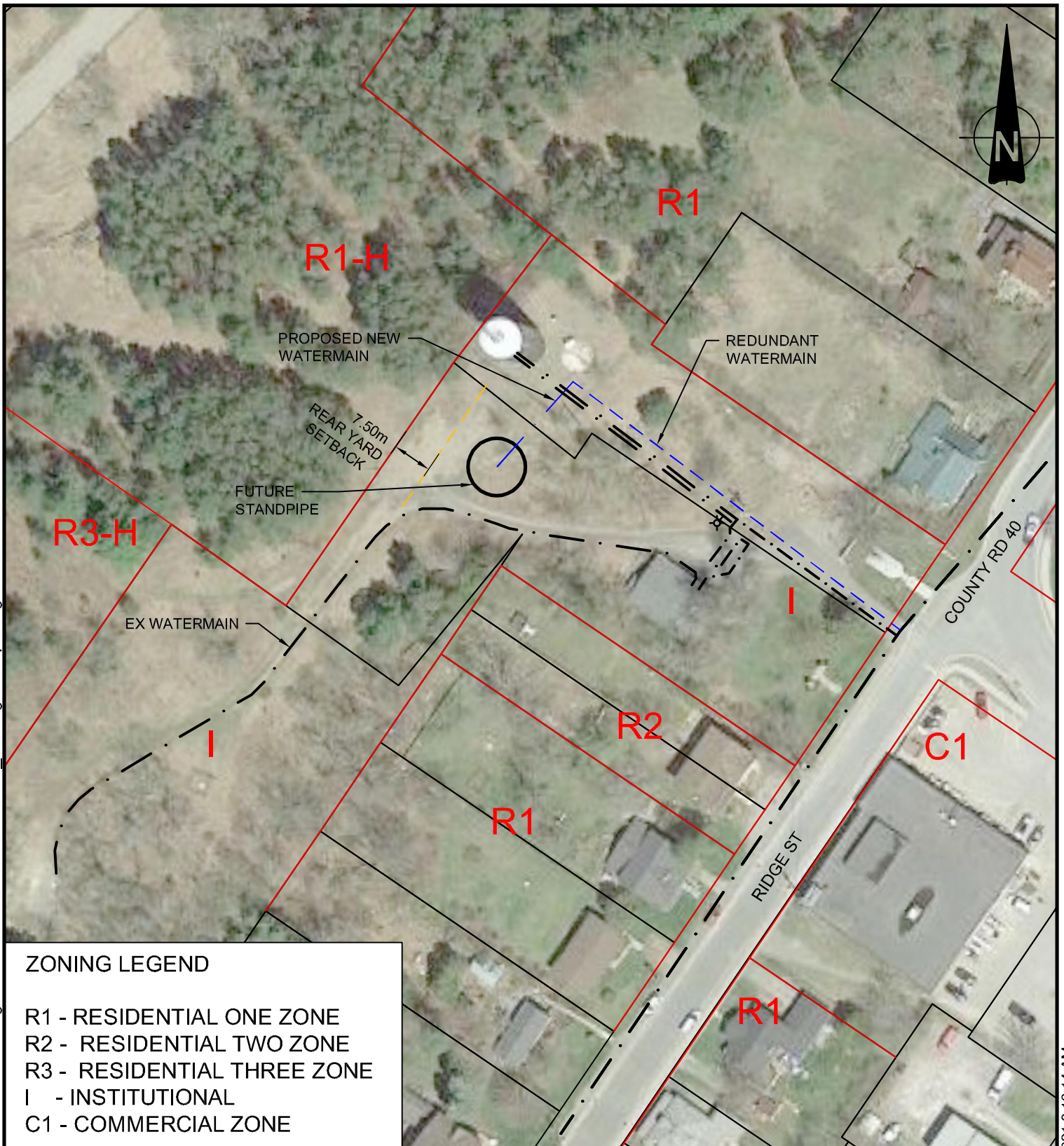
The location of the future standpipe, proposed watermain, and the property boundaries are shown in Figure 3. As demonstrated in the figure, the standpipe will sit within Institutional (I) Zone, which requires a 7.5-meter rear yard setback according to the zoning by-law of the Township.

This location is adjacent to a wooded area. Some impact on the natural environment is anticipated. Since there is no waterway running close to the site. As such, no/minimal impact on the aquatic environment is anticipated. The site has four (4) drinking water wells and is located within the Wellhead Protection Area. Two (2) wells are located to the west of the future standpipe while two (2) wells are located to the east. The vulnerability score for this site is the highest due to the close distance of the standpipe to groundwater wells. Building an above-ground water storage standpipe at 220 m elevation with an anticipated excavation depth of 2 m to 3 m, it stays above the existing water table, which is at 204 m elevation. Therefore, the construction of the new standpipe will have minimal impact to the groundwater water quality and has been confirmed by Otonabee Conservation Authority in the pre-consultation meeting. Refer to Appendix C for pre-consultation meeting minutes and Appendix F for Hydrogeology Review by D.M. Willis Associates Limited (D.M. Willis).

It is noted, however, that the property is located near commercial and residential properties, making the high-rise standpipe visible to the nearby community. Ultimately, the construction and erection of a larger standpipe will have a greater impact on the social community relative to other locations that are near the Village's outer perimeter.

It should be noted that the Township utilizes the volume in the existing standpipe to satisfy chlorine contact time requirements (i.e., CT volume). By locating the new standpipe on the existing WTP site, it maintains the current chlorine contact time management strategy by utilizing volume in the new standpipe without the need for additional CT piping in the WTP. A new standpipe at this location would require minimal watermain upsize and extension to connect to the system. It is recommended that a new watermain be added between the new standpipe and distribution system for redundancy in the event that a break occurs along the existing 250 mm watermain section that would eliminate both sources of potable water to the system (i.e. WTP and standpipe). Minor site electrical, instrumentation and control work are required to allow for an active mixing system to be installed in the standpipe.

As illustrated previously, the HGL will be raised for the Norwood drinking water system. Since the standpipe is being filled by the well pumps, the existing well pumps will need to be upgraded to accommodate the increase in HGL. A separate Class EA for the WTP will be triggered if the well pump capacity increases beyond the current rated capacity.



ZONING LEGEND

- R1 - RESIDENTIAL ONE ZONE
- R2 - RESIDENTIAL TWO ZONE
- R3 - RESIDENTIAL THREE ZONE
- I - INSTITUTIONAL
- C1 - COMMERCIAL ZONE

PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

SERVICING SOLUTION NO. 2 - EXISTING WATER TREATMENT PLANT
(DECOMMISSION THE EXISTING STANDPIPE)



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DESIGN: IY

DRAWN: KTK

CHECKED: SS

JLR #: 29837

DRAWING #:

FIGURE 2

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

The hydraulic water model which was developed as part of the Phase 1 Report was used to assess the proposed water storage standpipe and increased HGL at existing WTP under steady state scenarios. The model was simulated assuming no well pumps operating under existing average day, maximum day plus fire flow, and peak hour demand conditions to compare the future resulting levels of service with the MECP design criteria and with the existing levels of service. The results for each scenario are discussed below, and the detailed results and model schematics are included in Appendix E.

Average Day Demand

Under average day demand, the anticipated pressures were assessed using the future 20-year HGL of 255 m. This is expected to represent the higher end of the daily system pressure range. Using the 20-year equalization storage volume ('B' component from the MECP guidelines: 1,196 m³) and a proposed standpipe diameter of 13 m, a lower operating HGL of 246 m was assumed to represent the lower end of the daily system pressure range. It is noted that the assumed operating bandwidth is large (9 m) and the actual operating bandwidth will be determined at the detailed design stage. The pressure results under existing (HGL 242 m) and future average day demand conditions (HGL 246 m, HGL 255 m) are compared in the table below, which shows the percentage of model junction nodes within each stated pressure range.

Table 5: Servicing Solution No. 2 – Pressures Under Average Day Demand

Servicing Solution No.2 – Average Day Demand				
Pressure (kPa)		HGL 242 m (Existing)	HGL 246 m (LWL)	HGL 255 m (HWL)
From	To			
	<=275	2%	0%	0%
>275	<=350	25%	12%	0%
>350	<=480	73%	88%	32%
>480	<=550	0%	0%	67%
>550	<=700	0%	0%	1%
>700		0%	0%	0%

The results indicate that increasing the HGL in the water storage standpipe will improve the system pressures, as would be expected. Overall, the pressure results under the increased HGL are expected to be within an operating pressure range of 345 kPa (50 psi) to 552 kPa (80 psi), as recommended by MECP design guidelines and the Ontario Code & Guide for Plumbing, respectively. At the lower HGL, 12% of junction nodes are expected to experience pressures below 350 kPa with a minimum of 299 kPa. At the higher HGL, there is one (1) junction node near the intersection of Alma Street and Victoria Street (Junction J27) which is expected to experience pressures higher than 550 kPa due to its lower topographical elevation.

Maximum Day Demand Plus Fire Flow

Using the future 20-year HGLs of 246 m and 255 m (assumed normal operating bandwidth), the model was used to determine the maximum expected fire flow available at each junction node without allowing any point in the system to experience pressures less than 140 kPa (20 psi), as required by MECP design guidelines. The available fire flow results under existing (HGL 242 m)

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

and future maximum day demand conditions (HGL 246 m, HGL 255 m) are compared in the table below, which shows the percentage of model hydrant nodes within each stated fire flow range.

Table 6: Servicing Solution No. 2 – Available Fire Flows Under Maximum Day Demand

Servicing Solution No.2 – Maximum Day Demand + Fire Flow				
Available Fire Flow (L/s)		HGL 242 m (Existing)	HGL 246 m (LWL)	HGL 255 m (HWL)
From	To			
	<=30	7%	2%	2%
>30	<=45	17%	19%	11%
>45	<=75	44%	32%	18%
>75	<=100	17%	28%	32%
>100	<=150	6%	8%	23%
>150	<=250	10%	10%	7%
>250		0%	1%	7%

The results indicate that increasing the HGL in the water storage standpipe will improve the fire flow availability throughout the system. Similar to existing conditions, some hydrant nodes at the outer extents of the system are expected to provide minimal fire flow (<30 L/s), even with the raised HGL. The Ontario Building Code (OBC) fire flow targets range between 30 L/s (1,800 L/min) and 150 L/s (9,000 L/min), depending on the specific building properties used for the calculation.

It is noted that the existing water distribution pipe network has several opportunities for watermain looping, which would improve the fire flow availability in certain areas. Further investigation of these looping opportunities under a separate study could lead to improvements in the water distribution system's redundancy and reliability.

Peak Hour Demand

Under peak hour demand, the anticipated pressures were assessed similarly to the average day demand scenario, using the future 20-year HGLs of 246 m and 255 m (assumed normal operating bandwidth). The pressure results under existing (HGL 242 m) and future peak hour demand conditions (HGL 246 m, HGL 255 m) are compared in the table below, which shows the percentage of model junction nodes within each stated pressure range.

Table 7: Servicing Solution No. 2 – Pressures Under Peak Hour Demand

Servicing Solution No.2 – Peak Hour Demand				
Pressure (kPa)		HGL 242 m (Existing)	HGL 246 m (LWL)	HGL 255 m (HWL)
From	To			
	<=275	2%	0%	0%
>275	<=350	27%	15%	0%
>350	<=480	71%	85%	32%
>480	<=550	0%	0%	67%
>550	<=700	0%	0%	1%
>700		0%	0%	0%

Township of Asphodel-Norwood

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The results indicate that increasing the HGL in the water storage standpipe will improve the system pressures, as would be expected. All of the pressure results for existing areas under the increased HGL are expected to exceed the minimum operating pressure of 276 kPa (40 psi) as recommended by MECF design guidelines. At the higher HGL, there is one (1) junction node near the intersection of Alma Street and Victoria Street (Junction J27) which is expected to experience pressures higher than 550 kPa due to its lower topographical elevation.

Servicing Solution No. 2 Conclusions

Overall, existing pressure and fire flow availability appears to be generally consistent with related guidelines, with the few exceptions noted above. Raising the HGL in the water storage standpipe will have a direct impact on improving pressures and fire flows throughout the distribution system. The detailed results and model schematics are included in Appendix E. It is expected that the HGL will be raised gradually over time as required by the growth, and the future operating bandwidth and pump upgrades will be assessed during the detailed design stage of the new water storage standpipe.

It is important to note the following limitations of the hydraulic water model:

- Water demands for future growth were not accounted for in the water model,
- Junction and hydrant node elevations are approximate; and
- The model results have not been validated through a field pressure and flow monitoring program.

Preliminary Opinion of Probable Costs

It is estimated that the cost to construct a new standpipe at the existing WTP is approximately \$2,900,000, including engineering, contingency and project management, but excluding HST.

2.4.3 Servicing Solution No. 3: Construct New Standpipe on Top of the Esker behind Public Works Building

This servicing solution involves constructing a new standpipe on top of the Esker behind the Public Works Building. Located within the Institution zone, 15 m front yard setback and 6 m side yard setback are required. There is significant the watermain extension and upgrades required to bring water from the WTP to this location.

The ground elevation is 230 m at this location, which is 10 m higher than the existing WTP. The higher ground elevation at this site offers the benefit of reduced standpipe height which in turn leads to generally lower standpipe cost. Refer to Table 9 for standpipe characteristics.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Table 8: Servicing Solution No.3 – Standpipe Summary

Standpipe Usable Volume (Approximate)	3,000	m ³
Standpipe Total Volume (Approximate)	3,000	m ³
HGL	255	m
Ground Elevation	230	m
Liquid Height	25	m
Total Standpipe Height	26	m
Standpipe Diameter (Approximate)	13	m

Building the standpipe on the esker provides the advantage of reducing the height of the standpipe. However, site preparation, including clearing and grubbing of the tree area, increases the site preparation cost. A roadway is required to for construction and subsequently to allow maintenance access up to the esker. Significant watermain extension is required to connect the existing watermain from Highway 7 to the standpipe. The location is adjacent to a wooded area, impact on the natural environment is anticipated during construction. Since there is no waterway running close to the site, no/minimal impact on the aquatic environment is anticipated.

It is noted that the property is in close proximity to residential homes and commercial lots, making the high-rise standpipe visible to the nearby community. The construction and erection of a standpipe will have some impact on the social community.

Two (2) watermain upgrade/extension routes have been developed in consultation with the Township.

- Route A: A new 400 m long 250 mm diameter watermain will follow the north property boundary line of the Public Works Building site and turn east and then south to climb up to the standpipe location. Watermain upsizing will be required to increase the existing watermain to 250 mm from the WTP to this site along Highway 7, with a total length of approximately 1,400 m. Since Highway 7 is a major traffic corridor, any work along the highway will require approvals and permits from the Ministry of Transportation of Ontario (MTO). Work planning can be challenging with this option. Refer to Figure 4. This watermain route has been used as the basis for the detailed evaluation.
- Route B: A 1,000 m long 250mm diameter new watermain will connect the standpipe to the watermain on County Road 40. The watermain route will generally follow the green space to the north of the existing landfill site. Watermain upsizing will be required to upsize the watermain to 250mm from the WTP to this site, with a total length of 1,400m. The proposed watermain will cross a creek. Refer to Figure 5 for watermain route.

With this Servicing Solution, additional chlorine contact time will need to be provided at the WTP. The chlorine contact time will be accomplished through additional piping at the WTP.

The hydraulic water model which was developed as part of the Phase 1 Report was used to assess the proposed water storage standpipe and increased HGL at this location under the steady state maximum day demand plus fire flow scenario. The model was simulated assuming no well pumps operating to compare the future resulting level of service with the existing level of service. The results are discussed below, and the detailed results and model schematics are included in Appendix E.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Maximum Day Demand Plus Fire Flow

Using the future 20-year higher HGL of 255 m with the water storage standpipe at the Public Works Building, the model was used to determine the maximum expected fire flow available at each junction node without allowing any point in the system to experience pressures less than 140 kPa (20 psi), as required by MECF design guidelines. The available fire flow results under existing (Water Treatment Plant, HGL 242 m) and future maximum day demand conditions (Public Works Building, HGL 255 m) are compared in the table below, which shows the percentage of model hydrant nodes within each stated fire flow range.

Table 9: Servicing Solution No. 3 – Available Fire Flows Under Maximum Day Demand

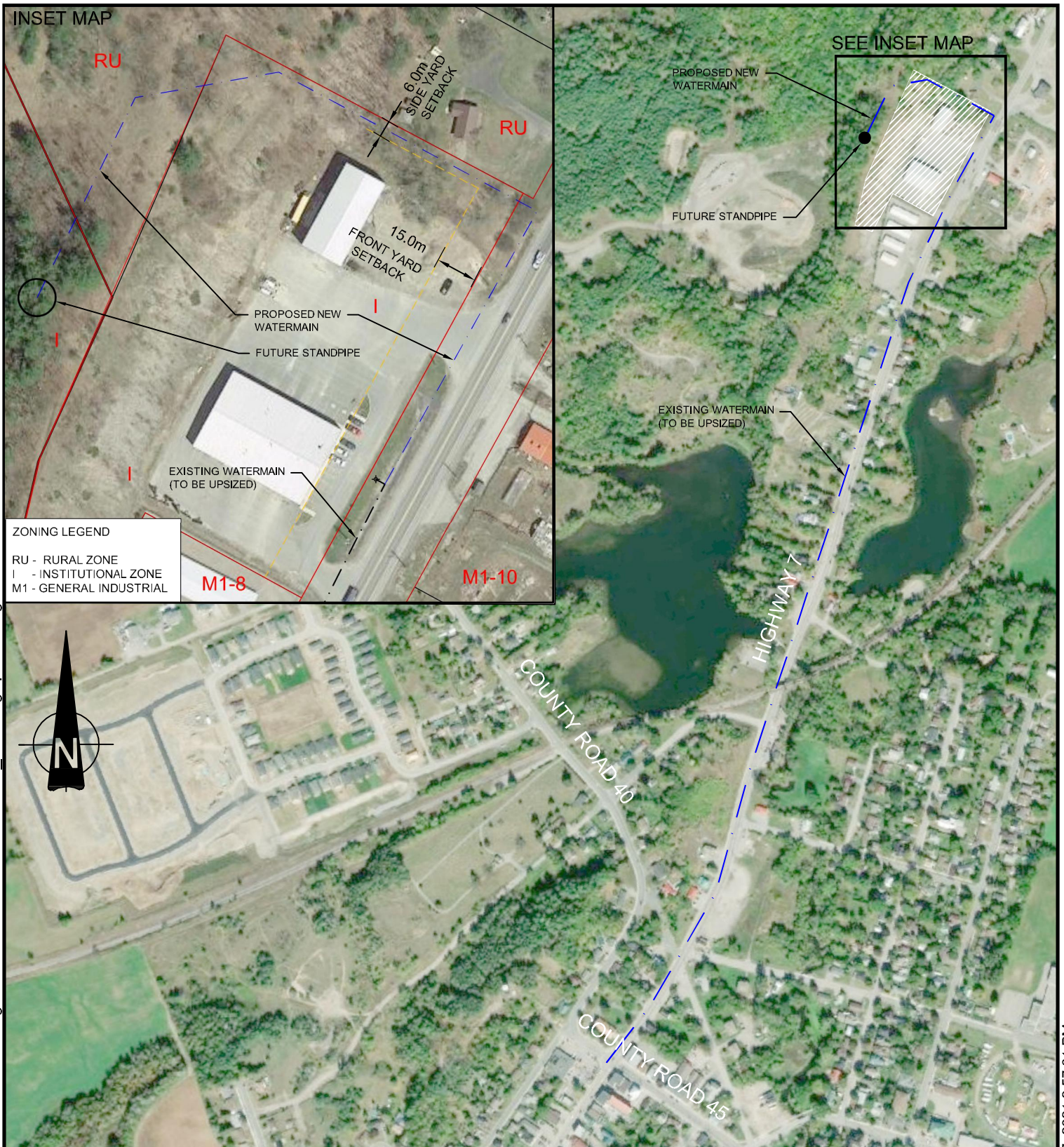
Maximum Day Demand + Fire Flow			
Available Fire Flow (L/s)		Water Treatment Plant (HGL 242 m)	Public Works Building (HGL 255 m)
From	To		
	<=30	7%	2%
>30	<=45	17%	14%
>45	<=75	44%	52%
>75	<=100	17%	21%
>100	<=150	6%	4%
>150	<=250	10%	3%
>250		0%	2%

A water storage standpipe at the Public Works Building on top of the Esker would require watermain upgrades to supply fire flow from the new water storage location. It was found that a 250 mm diameter watermain upgrade (approximate length 1,400 m) along Highway 7 between the WTP and the Public Works Building, along with a raised HGL of 255 m, is expected to provide a comparable level of service to existing conditions at the current HGL of 242 m, as shown in the table above. The noted watermain upgrades were used to demonstrate that over 1,400 m of pipe replacement would achieve only similar results to existing conditions, and therefore the costs are unlikely to be justified.

Servicing Solution No. 3 Conclusions

Due to the extensive watermain upgrades required to maintain a similar level of service if the water storage were to be moved to this location, the Public Works Building is not a feasible option from the technical standpoint.

File Location: P:\29000\29837-000 - Norwood Storage EA\5-Production\7-Plan\29837 - ServicingOption3.dwg



PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

SERVICING SOLUTION 3A - TOWNSHIP PUBLIC WORKS BUILDING



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DESIGN: IY

DRAWN: KTK

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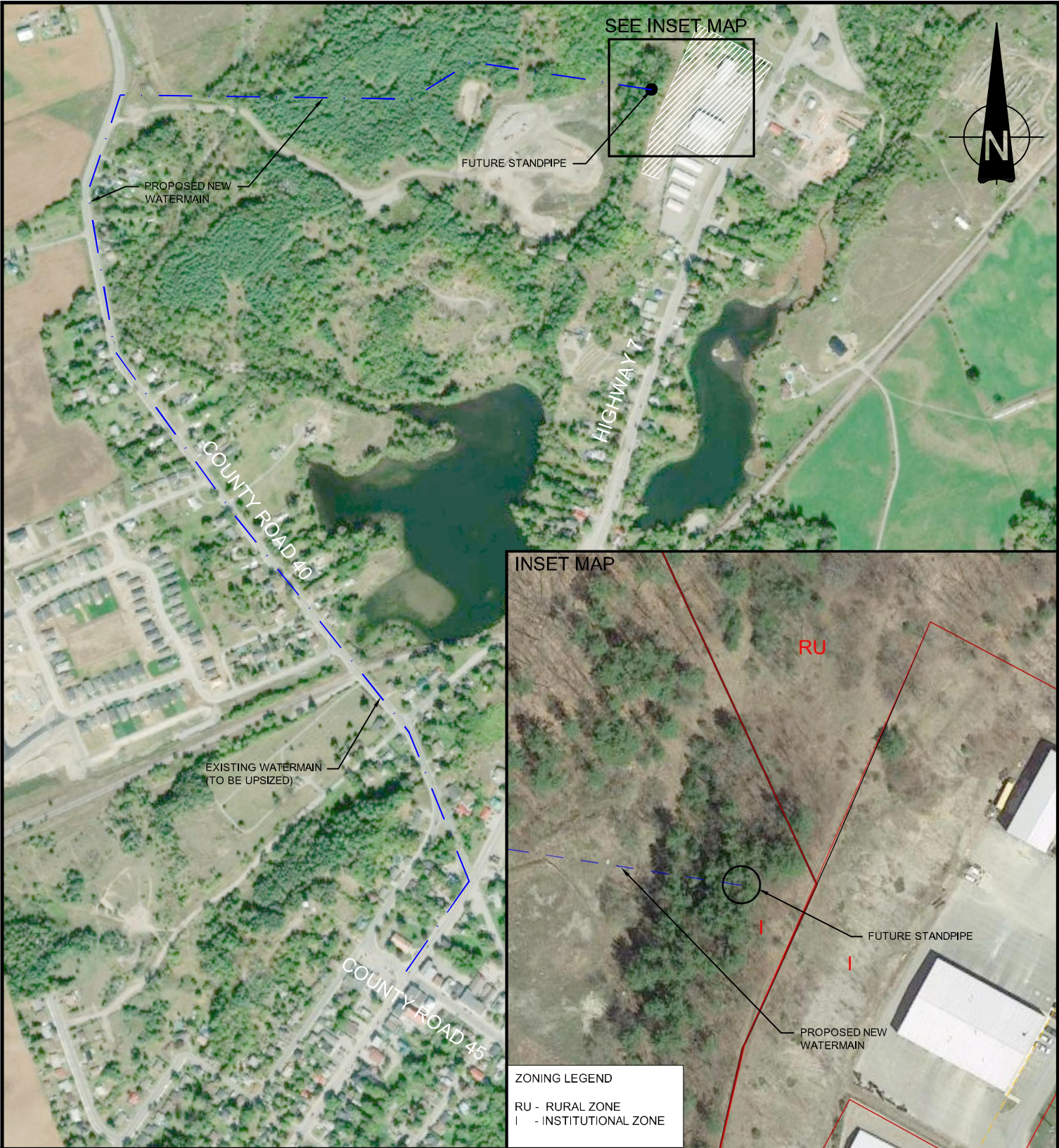
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FIGURE 4

PLOT DATE: Monday, September 27, 2021 2:57:31 PM

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PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: SERVICING SOLUTION 3B - TOWNSHIP PUBLIC WORKS BUILDING

 J.L. Richards ENGINEERS - ARCHITECTS - PLANNERS	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: IY	DRAWING #: FIGURE 4
		DRAWN: KTK	
		CHECKED: SS	
		JLR #: 29837	

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Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Preliminary Opinion of Probable Cost

It is estimated that the cost to construct a new standpipe at the Public Works Building along with watermain upgrades is approximately around \$5,000,000 and \$5,500,000, including engineering, contingency and project management, but excluding HST.

In summary, the amount of work required for Servicing Solution No.3 makes it cost prohibitive to proceed.

2.5 Summary of Evaluation

The evaluation process consisted of a review of the short-listed combinations in consideration of the criteria described in Table 13.

Table 10: Summary of Evaluation Criteria

Criteria	Description
Natural Environment Considerations	Natural features, natural heritage areas, Areas of Natural and Significant Interest, designated natural areas, watercourses and aquatic habitat
Social and Cultural Environment Considerations	Proximity of facilities to residential, commercial and institutions, archeological and cultural features, designated heritage features, well or wellhead protection areas, land-use and planning designations
Technical Feasibility	Constructability, maintaining or enhancing water quality, reliability and security of drinking water system, ease of connection to existing infrastructure and operating and maintenance requirements, addresses aging infrastructure, expandability
Financial Considerations	Capital costs, Operation and Maintenance costs

The relative impact for each criterion to each potential Servicing Solution was assessed based on whether the alternative is 'Preferred', 'Less Preferred', 'Least Preferred' or 'Not Feasible' with respect to that criterion. The four (4) evaluation criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the EA stage.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Table 11: Evaluation Matrix

	Servicing Solution No. 2 – New Standpipe at Water Treatment Plant	Servicing Solution No. 3 – New Standpipe at Public Works Building on Top of Esker
Natural Environment	- The existing site is already developed. There will be minimal impact to the natural environment since the new standpipe will be built within the existing site. - The new standpipe will be built on top of the Esker. No major impact is anticipated to build on the Esker. - There is no waterway adjacent to the site. - The site currently has four drinking water wells. This site is located within the Wellhead Protection Area and is closest to the wells comparing to the other options. Minimal impact to drinking water quality is anticipated due to above-grade design.	- The new standpipe will be built on top of the Esker. No major impact is anticipated to build on the Esker. - Site clearing will be required at the standpipe, as well as the roadway/watermain construction. Some impact to the natural environment is anticipated. - There is no waterway adjacent to the site. - This site may be within 50 m of an Earth Science ANSI area. Minimal impact is anticipated.
Evaluation	Preferred	Preferred
Social and Cultural Environment	- New standpipe will be visible to nearby community. - Noise, increased traffic and reduced air quality is anticipated during construction.	- New standpipe will be visible to nearby community. - Noise, increased traffic and reduced air quality is anticipated during construction. - Additional impact anticipated from watermain upgrades and extensions, as compared to Servicing Solution No.2.
Evaluation	Less Preferred	Less Preferred
Technical Feasibility	- The site is located at the higher elevation point in the village. - The new standpipe will be able to provide chlorine contact time (CT) required before the drinking water reaches the first customer. - Minimal watermain upsizing and extension required to connect to the new standpipe. - Minor site electrical service is required.	- This site is situated at the end of the drinking water system. - The chlorine contact time (CT) will be accomplished through additional piping at the WTP - Extensive watermain upsizing is required along HWY 7 (Route A) or County Road 40 (Route B) from the WTP to the site. - Significant watermain extension is required to bring water to the top of the Esker. - The site is located at the high elevation point in the village.
Evaluation	Preferred	Least Preferred

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Financial Considerations	• Moderate cost for the new standpipe • Least cost for watermain extension • Least cost for site services • No cost for CT piping	• Lowest cost for the new standpipe. • Highest cost for watermain extension and upsizing • Additional CT piping at WTP required
Evaluation	Preferred	Least Preferred
Overall Evaluation	Preferred	Least Preferred

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

3.0 Source Water Protection

The recent amendments to the Municipal Engineers Association (MEA) Class EA guideline in October 2015 require a Proponent to identify, during the Class EA and Master Planning process, if the proposed undertaking occurs within a source water protection vulnerable area.

This section intends to identify whether or not the proposed EA project is located within a vulnerable area and its potential impact on the source water protection.

According to the Trent Conservation Coalition Source Protection Plan Map as shown in Figure 7, Location 1 – Existing Water Treatment Plant is situated within the Well Head Protection Area (WHPA). Trent Conservation Coalition Source Protection Plan (August 18, 2020) defines the WHPA and vulnerability scores. The most vulnerable area has an assigned vulnerability score of 10 (out of 10). It is also noted that, the activity of constructing new above-grade water storage is not a Prescribed Drinking Water Threats activity.

It was confirmed by Otonabee Region Conservation Authority (refer to Appendix C), there do not appear to be any significant drinking water threats associated with the proposed new standpipe construction.

It is indicated in the hydrogeology review of D.M. Wills (refer to Appendix F) that the groundwater level is located at about 204 m whereas the construction will take place at 220m level. The excavation will have a minor impact on the water table.

The Otonabee Region Conservation Authority (See Appendix C) also commented that

“A Transport Pathway may be created during the construction. Transport pathways are anthropogenic features on the landscape that can redirect the natural flow of water to surface water sources or disturb the surface above an aquifer which increases the rate or quantity of flow to a groundwater source. In either case, a drinking water source may be impacted. Examples of Transport Pathways include boreholes, unused or abandoned wells, pits, quarries, construction activities involving deep excavations, and underground storm, sanitary or water distribution system infrastructure. Section 27 of Ontario Regulation 287/07 requires municipalities to notify the Source Protection Authority Chairperson, Source Protection Committee Chairperson, and the applicant if they become aware of a proposal that will create or modify a Transport Pathway in a Vulnerable Area.”

It is recommended that a detailed hydrogeological and geotechnical study be undertaken in the preliminary design to address the concern from the Otonabee Region Conservation Authority.

Township of Asphodel-Norwood Schedule B Class EA for Potable Water Storage – Phase 2 Report

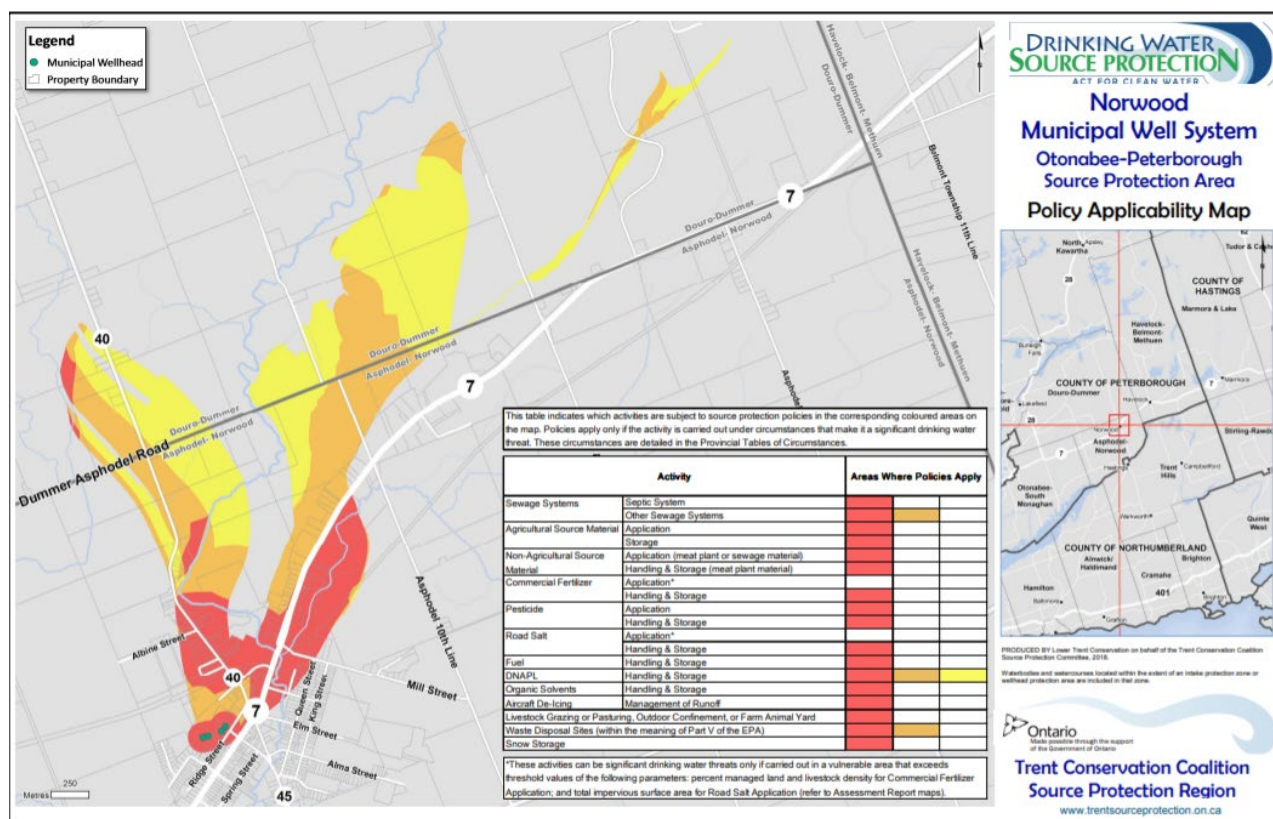


Table 4.4: Meanings of Policy Applicability Map Colours by Type of Vulnerable Area

Type of Vulnerable Area	Map Colours and Vulnerability Scores		
Wellhead Protection Area	10	8	WHPA-C (2,4,6)
Intake Protection Zone	10	9	8

Sample Policy Header

groundwater

surface water

Figure 5: Norwood Municipal Well System Policy Applicability Map from Trent Conservation Coalition Source Protection Plan

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

4.0 Public and Stakeholder Consultation

Effective consultation is key to successful environmental assessment planning. Through an effective consultation program, the proponent can generate meaningful dialogue between project planners and stakeholders, including, but not limited to, the public, stakeholder agencies, and interest groups.

4.1 Stakeholder Review Agency Consultation

A Project Initiation Notice was issued on July 9th, 2021 and posted on the Township's website <https://www.antownship.ca/en/township-services/water-and-wastewater.aspx#>.

Project Initiation Notices were also distributed directly to potential stakeholders and landowners located within 50m of the four potential site locations, with a request to provide comments if applicable. Refer to Appendix C for a copy of the Notice.

A Public Information Centre (PIC) Notice was originally issued on October 4th, 2021. A revised PIC notice was issued on October 18th, 2021. The PIC notices were posted on the Township's website <https://www.antownship.ca/en/township-services/water-and-wastewater.aspx#>

PIC notices were also distributed directly to identified stakeholders, landowners located within 50 m of the four potential site locations and other local residents who expressed interest in receiving project notifications. Refer to Appendix C for PIC notice.

A project mailing list was kept up to date throughout the project identifying stakeholders that required full documentation, partial documentation, and other parties that either declined participation unless the project scope changes to affect their respective agency or provided no response. Refer to Appendix C for stakeholder comments received, and responses provided and an updated stakeholder distribution list.

Table 12: Review Agency Comments

REVIEW AGENCY COMMENTS / RESPONSES	
Review Agency Ministry of Environment, Conservation and Parks (MECP)	
Comments:	1. The MECP Letter provided general guidance on the Class EA Process, Schedule 'B' Process, MECP contacts, MECP technical review details and consultation with First Nations and Métis Communities, and climate change considerations.
Responses:	1. JLR will address these comments in the Phase 2 Report and subsequent public consultation process.
Review Agency Hydro One	
Comments:	1. Hydro One discouraged Site Location 2 – Entrance from the Landfill Site from Hydro One Transmission perspective. Refer to Appendix C for the correspondence.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

REVIEW AGENCY COMMENTS / RESPONSES
Responses: 1. A pre-consultation meeting was held on August 25, 2021 to discuss the risks and concerns with Site Location 2. Hydro One provided the mitigation measures in a follow-up email on September 21, 2021 which JLR incorporated into the design. Refer to Appendix C.
Review Agency Otonabee Region Conservation Authority (ORCA)
Comments: 1. A pre-consultation meeting was held on August 11, 2021 to discuss the proposed site locations. Refer to Appendix C for the meeting minutes. 2. ORCA indicated that the proposed sites at WTP, landfill and Public Works Building are all within the Wellhead Protection Area. 3. For Site Location 1 – WTP site, the drinking water threat is minimal based on the above-grade construction activities proposed. The risk ORCA foresees is that the construction may disturb the transport pathway, depending on the amount of excavation. 4. ORCA indicated that the Clean Water Act does not restrict the site development. 5. There is generally no concern for Site Location 2 – Landfill site and Location 3 – Public Works Building. See Appendix C for detail information. 6. A study is suggested to undertake in preliminary design and mitigation measures will be taken regarding on the possibility to create a transport pathway. 7. ORCA sent a follow-up email from Terri Cox on August 12 with Wellhead Protection Area and transport pathway information
Responses: 1. JLR will address these concerns in the Phase 2 report.
Review Agency Ministry of Heritage, Sport, Tourism, and Culture Industries (MHSTCI)
Comments: 1. MHSTCI sent an email on July 28th, 2021 with Cultural Heritage Resources and Archaeological information. Refer to Appendix C for the correspondence. 2. To determine whether the EA project may impact cultural heritage. MHSTCI indicated that Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes should be completed. 3. The EA project may impact archaeological resources and the project team should screen the project with the MHSTCI Criteria for Evaluating Archaeological Potential to determine if an archaeological assessment is needed. MHSTCI archaeological sites data are available at archaeologicalsites@ontario.ca
Responses: 1. JLR requested the archaeological information for the three potential site locations (Site Location 1 - WTP, Site Location 2 - Entrance of landfill driveway, Site Location 3 - Township Public Works Building (On Top of the Esker) site) on July 30th, 2021 and received confirmation on August 3rd, 2021 that, at the present time no reported archaeological sites are mapping within 300 m of those three locations in Norwood, Ontario. Refer to Appendix C for the correspondence received from archaeologicalsites@ontario.ca.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

4.2 Public Consultation

Some comments and responses were received when distributing Project Initiation Notices and PIC Notice.

Table 13: Public Comments

REVIEW AGENCY COMMENTS / RESPONSES
Interested Public Member 1
Comments: An interested public member sent an email on October 4th, 2021, asking the following questions: • There is a lot of talk as to the amount of water which is actually available in the ground to warrant growth of the system? • Is the present standpipe in poor repair - does it need to be replaced or is the need only driven by the desire to grow the system and the number of users? • What will be the cost of this type of project? • Who is going to pay - federal and provincial programs - development charges - developers - or will all this fall back on the users of the system in monthly rate increases?
Responses: These questions were addressed during the PIC.
Interested Public Member 2
Comments: An interested public member mailed a response form on July 26th, 2021 asking to be included in the project distribution list.
Responses: JLR added this contact to the project distribution list (See to Appendix C)

4.3 Project Committee and Consultation Meetings

To facilitate the consultation process and consider feedback from interested parties, the Project Team was formed and met at regular intervals. The Project Team included representatives from the Township of Norwood and JLR. Various meetings were held with the Project Team and the Township to discuss specific concerns (refer to Table 14).

Table 14: Key Project Meetings

Meeting / Date	Meeting Attendees	Comments
Client Meeting No 1 (Project Initiation Meeting) December 16, 2020	Township Representatives JLR	Held to establish the groundwork for initial stages of this Class EA project
Client Meeting No 2 May 5, 2021	Township Representatives JLR	Review draft Phase 1 Report

Township of Asphodel-Norwood

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Meeting / Date	Meeting Attendees	Comments
Client Meeting No 3 July 22, 2021	Township Representatives JLR	Held to discuss the outcome of water modelling and the options analysis
Stakeholder Pre-consultation with ORCA August 11, 2021	Township Representatives JLR Otonabee Region Conservation Authority	Held to discuss the potential risks and concerns constructing the future standpipe in the proposed locations
Stakeholder Pre-consultation with Hydro One August 25, 2021	Township Representatives JLR Hydro One	Held to discuss the mitigation measures constructing the future standpipe at Site Location Option 2 – Landfill Entrance.
Client Meeting No 4 September 7, 2021	Township Representatives JLR	Held to discuss the Phase 2 work
Client Meeting No 5 October 4, 2021	Township Representatives JLR	Held to discuss the Public Information Centre presentation

4.4 Public Information Centre

A Public Information Centre (PIC) was held on Oct 18, 2021, to discuss the Phase 1 and 2 Class EA findings. Refer to Appendix G for a copy of the PIC presentation. The PIC included information presentation and opening discussions with the attendances on the project, including the presentation of the proposed 'preferred servicing solution" (Servicing Solution No. 2: Construct New Standpipe at Existing WTP). In advance of the PIC, notices were posted on the Town's website. A direct mailing was also sent to individuals and stakeholders on the project mailing list. No comment was received after the PIC.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

5.0 Project Description

This section provides a detailed description of the proposed undertaken, project schedule and implementation, OPC and permit and approval requirements.

5.1 Project Overview

As identified in Section 2.5 of this Report, “Servicing Solution No. 2: Construct New Standpipe, at the Existing WTP” has been selected as the preferred solution for this Class EA. The general dimensions of the proposed new standpipe are shown in Table 15 below.

Table 15: Proposed New Standpipe

Standpipe Usable Volume (Approximate)	3,000	m ³
Standpipe Total Volume (Approximate)	4,000	m ³
HGL	255	m
Ground Elevation	220	m
Liquid Height	35	m
Total Standpipe Height	36	m
Standpipe Diameter (Approximate)	12	m
Mixing System	Included	

In addition to the new standpipe, the following components of the project are also anticipated:

- Excavation for foundation.
- Yard piping (i.e., watermain extension and pairing).
- Electrical, instrumentation and control work.
- Fencing.

Originally, the storage, pressure and fire flow issues identified in Phase 1 can be achieved through raising the HGL by 10 m, which brings the height of the standpipe to 32 m. In consultation with the Township, it has been decided to raise the HGL by an additional 3 m to provide capacity and safeguard for future population growth beyond 20 years. This brings the standpipe to 35 m in height. The further increase in the HGL to 255 m (i.e., 13 m raise) provides flexibility in drinking water system operation and allows future development to continue without delay.

It is expected that the HGL will be raised gradually over time as required by the growth, and the future operating bandwidth and pump upgrades will be assessed during the detailed design stage of the new water storage standpipe. In addition, the proposed new standpipe has significantly more volume than the existing standpipe. The daily water turnover of the new standpipe will need to be carefully considered during detailed design and operation of the standpipe to avoid water quality issues.

5.2 Project Schedule and Implementation

Once the Township initiates the design phase, it is anticipated that the project will take approximately two to three (3) years, depending on the approval timeline at that time. The project will proceed in accordance with the following approximate timeline:

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

- Preliminary Design: 4 months
- Detailed Design: 6 months
- Finalize Contract Drawings and Specifications: 1 month
- Approvals: 6 to 12 months
- Tender and Contract Award: 2 months
- Construction: 12-18 months

The time between filing the Schedule 'B' Report and commencement of construction, shall not exceed 10 years in accordance with the Municipal Class EA process. In the event that the Township decides to delay the project and the lapse of time exceeds 10 years, a Schedule 'B' Report amendment is required to review the planning and design process and the current environmental setting to ensure the project and the mitigation measures are still valid given the current planning context.

5.3 Opinion of Probable Costs

It is estimated that the cost to construct a new standpipe at the existing WTP is approximately \$2,900,000, including engineering, contingency and project management, but excluding HST.

Costs have been applied to base construction cost estimates to account for items such as site preparation, supplier's proposal, engineering, project management, permits, approvals, system integration, construction overhead, field investigations, contingencies for construction market fluctuations, etc. It is also noted that a more detailed estimate will be required during the preliminary and detailed design phases of the implementation of the preferred solution.

5.4 Impacts on the Natural, Social and Economic Environments

Construction and operation of the proposed works will lead to potential impacts, both positive and negative, upon the natural, social, and economic environments. Refer to Section 2.5 of this Report for a detailed assessment of these impacts. The following section summarizes potential impacts and presents proposed mitigating measures to reduce any negative impacts.

Natural and Cultural Environment

The screening checklists developed by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI), titled Criteria for Evaluating Archaeological Potential and Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes were completed as part of this Class EA (refer to Appendix C). At the present time no reported archaeological sites are mapping within 300 m of those three (3) locations in Norwood, Ontario. As such, the site was determined to have no/minimal potential for archaeological resources, built heritage and cultural heritage landscapes. No further technical cultural heritage studies were undertaken.

The Otonabee Region Conservation Authority commented after the pre-consultation meeting that, a transport pathway may be created during the construction. It is recommended that a detailed hydrogeological and geotechnical study be undertaken in the preliminary design to address the concern from the Otonabee Region Conservation Authority.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

Engineering and Technical Consideration

With the recommended Servicing Solution No.2, the new standpipe will be completed with a redundant watermain to connect to the drinking water system to improve the water distribution system's redundancy and reliability, i.e., in the event that the existing 250 mm watermain breaks at the WTP, the water can still be made available to the system via the new watermain. This improves the reliability of the water distribution system from the current configuration.

Social/Community Well Being

Other than minor negative impacts due to the noise and activity of construction, the social environment will be positively impacted by the proposed upgrades because of the increased water storage volume and higher hydraulic grade line. There may be some negative impacts as a new standpipe is visible to the nearby community.

The noise from construction can be mitigated via limiting the operation hours of noisy machinery and advance notice to the neighboring property owners. The reduced air quality can be mitigated via promoting offsite manufacturing and onsite assembling practices. The construction vehicles can be hosed down prior to leaving the site to reduce mud carry over onto the streets.

Economic Environment

The economic environment will be impacted negatively with the capital investment required to undertake the proposed construction.

The Township has applied for funding under the Investing in Canada Infrastructure Program (Green Infrastructure Stream). If successful, this funding opportunity can mitigate the financial impacts for the initial construction of the new standpipe.

5.5 Permits and Approvals

A number of approvals are required prior to implementing the proposed works. These may include:

- Amendments to the Drinking Water Works Permit and Municipal Drinking Water License from the Ministry of the Environment, Conservation and Parks (MECP)
- Environmental Activity Sector Registry or Permit to Take Water for Construction dewatering from the MECP, if required
- Site Plan approval from the Municipality
- Building Permit from the Municipality
- Electrical Safety Authority (ESA) Permit
- Screening of the project in accordance with the requirements of the *Canadian Environmental Assessment Act*, should any Federal approvals be required or should funding be provided by the Federal Government for this project.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

6.0 References

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(Conservation, 2020) Watershed Planning & Regulations Policy Manual. Trent Conservation Coalition Source Protection Region. August 2020

(County, 2020). County of Peterborough Master Plan, County of Peterborough. 2020

This report has been prepared for the exclusive use of the Corporation of the Township of Asphodel-Norwood, for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of the Corporation of the Township of Asphodel-Norwood and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

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Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 2 Report

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Issued on: January 20, 2022

Appendix A

Phase 1 Report

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Township of Asphodel-Norwood

Schedule B Municipal Class Environmental Assessment for Potable Water Storage in the Village of Norwood – Phase 1 Report (FINAL)



Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

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Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

1.0 Introduction

1.1 Background

The Village of Norwood (Village) is one of two villages in the Township of Asphodel-Norwood (Township) within the south-eastern portions of Peterborough County and is located along Highway 7, around 30 km east of the City of Peterborough. The Village has a population of approximately 2,100 (Township) and is serviced by four municipal wells, chlorine disinfection water treatment plant, one municipal water tower (standpipe), and a dedicated distribution system comprised of approximately 13 km of water piping that is owned and operated by the Township. Refer to Figure 1 for a Location Plan map.

A 2020 Infrastructure Assessment Report, completed by Engage Engineering Ltd. (Engage Report), identified the Village's standpipe did not have adequate storage for the current population and it has insufficient capacity to service projected growth over the next 20 years and beyond. As such, the Township is considering options for additional potable water storage capacity in the Village to ensure continued provision of safe drinking water well into the future.

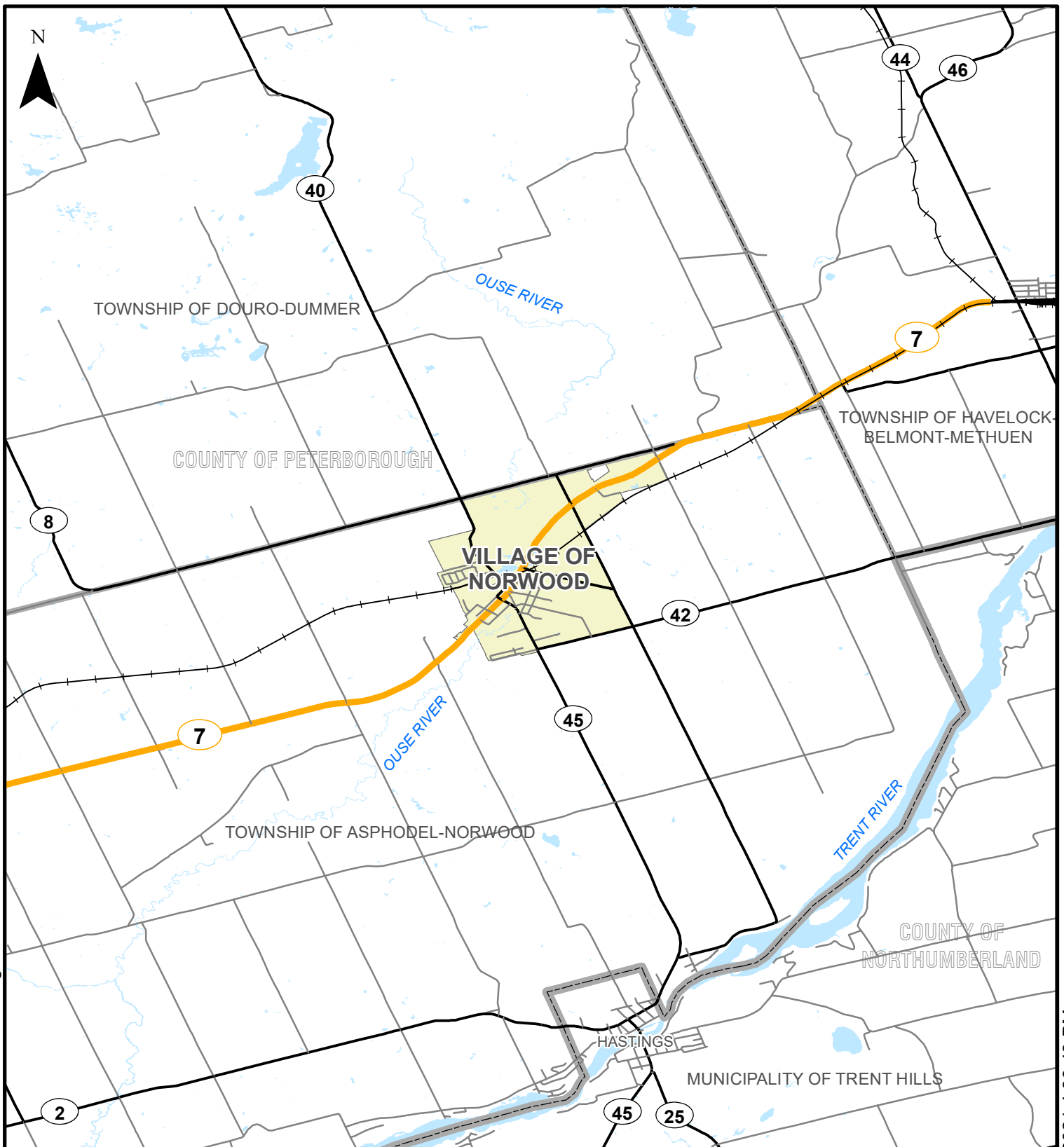
In December, 2020, the Township retained J.L. Richards & Associates Limited (JLR) to undertake a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for the Village's potable water storage system to evaluate alternate potable water storage solutions that will service the community for the next 20 years or more.

The objectives of this Phase 1 Report are:

- To provide an overview of the Class EA process
- To summarize background information related to the Township's potable water system
- To review historical water demands
- To summarize growth projections prepared by Engage and expected water demands for the 20-year and build-out planning horizons based on existing demands
- To identify system constraints associated with the existing potable water storage system
- To identify possible alternative solutions for the potable water storage system that can be considered as part of Phase 2 of the Class EA

1.2 Class Environmental Assessment Process

The *Ontario Environmental Assessment Act* (EA Act), enacted in 1976, formally recognizes the Municipal Class Environmental Assessment (Class EA) process and outlines requirements for EA approval. The Municipal Class EA applies to municipal infrastructure projects, including roads, water, and wastewater projects. To ensure that environmental impacts and effects are considered for each project per the EA Act, proponents are required to generally follow the planning process set out in the Municipal Class EA Guidelines, prepared by the Municipal Engineers Association (MEA) (2015) (www.municipalclassea.ca). The Class EA process includes the following stages:



PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA NORWOOD, ONTARIO

DRAWING:

LOCATION PLAN



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DESIGN: LS
DRAWN: KTK
CHECKED: MM
JLR #: 29837

DRAWING #:

FIGURE 1

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

- Phase 1: Problem and opportunity identification.
- Phase 2: Identification and evaluation of alternative solutions to determine a preferred solution to the problem or opportunity. This Phase also compiles an environmental 'inventory', identifies impacts, and outlines mitigation measures.
- Phase 3: Identification and evaluation of design concepts for the preferred solution. A detailed evaluation of the environmental effects and mitigation measures will be addressed during this project Phase.
- Phase 4: Complete and place Environmental Study Report on Public Record. The Report will document Phases 1 through 3 and summarize the consultation undertaken throughout the planning process and is considered valid for a 10 year period.
- Phase 5: Implementation and monitoring.

Since projects may vary in their environmental impact, they are classified in terms of the following schedules:

- Schedule 'A' projects usually have minimal environmental effects and generally include normal or emergency operational and maintenance activities. These projects are pre-approved under the Class EA planning process. Projects within this category are subject to Phases 1 and 5.
- Schedule 'A+' projects are pre-approved projects similar to Schedule 'A', however, the public is to be advised prior to project implementation.
- Schedule 'B' projects have potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with affected parties. Generally, these projects include improvements and minor expansions to existing facilities. Projects within this category are subject to Phases 1, 2 and 5.
- Schedule 'C' projects have potential for greater environmental impacts and are subject to all five Class EA Phases. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

Based on the following excerpt from the MEA Guidelines, this project is being undertaken as a Schedule 'B' Class EA, and thus Phases 1 and 2 of the Class EA process will be completed with Phase 1 summarized herein:

"6. Establish new or expand/replace existing water storage facilities".

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

2.0 Phase 1 Methodology

2.1 Project Initiation Meeting

A project initiation meeting was held on December 16, 2020, with a representative from the Township to confirm roles and responsibilities and to establish a basis for this Class EA. Refer to Appendix A for Meeting Minutes.

2.2 Compilation and Review of Existing Documentation

To establish a baseline for reference on this project, the Township provided available related documentation to JLR for review. Refer to Appendix A for a list of documentation. As part of Phase 1, GIS mapping from Peterborough County and PDF base maps of infrastructure and parcel fabric were used to develop base maps of the distribution system and study area; available reports were reviewed to determine the related history, existing conditions and planning projections for the study area; and operations data for the water system from 2018 to 2020 were summarized and analyzed. In addition, a species at risk and natural heritage assessment of the study area, including a number of key locations that may be considered for future storage during Phase 2 of the Class EA was completed.

2.3 Hydraulic Water Model

A basic steady state hydraulic water model was developed within the WaterCAD® software platform in order to assess existing conditions of the water distribution system. The water model will also be used in Phase 2 to assess future growth areas and potential water storage locations. The watermain network (which includes hydrant locations and labels, pipe lengths, materials and diameters) was modelled based on Figure 5 – Water Distribution Plan from the Engage Report and updated following subsequent comments received from the Township. The parcel fabric was imported from Figure 5. Pipe roughness coefficients reflect a C-Factor of 100 for 150 mm diameter pipe, 110 for 200 mm diameter pipe, and 120 for 300 mm diameter pipe as recommended in the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems, 2008. Water demands were distributed evenly to all model junction nodes based on 3 years of water production data. Standpipe levels and well pump curves were provided by the Township. Junction and hydrant topographic elevations were approximated based on satellite imagery and as such, the model results provide anticipated system pressures and fire flows based on the available information.

2.4 Public Consultation

Taking into consideration mandatory requirements and objectives of effective consultation with the public and other potential stakeholders, as outlined in the MEA Class EA document, consultation for this project includes a minimum of one project notification to the public and potential stakeholders, and one Public Information Centre. It is recommended that following a review of the draft Phase 1 Report, a Project Initiation Notice is published on the Township's website and that project initiation letters are distributed directly to potential stakeholders. Refer to Appendix B for a proposed stakeholder list and draft notices for the Township's review.

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

2.5 Problem and Opportunity Identification

A problem and opportunity statement was generated from this Class EA Phase 1 stage and is included in Section 4.0 of this Report.

2.6 Phase 1 Report

This Phase 1 Report is the culmination of the first phase of the Class EA process. The Report will be used as a background document for Phase 2 and can be made available to stakeholders upon request.

3.0 Description of Existing Conditions

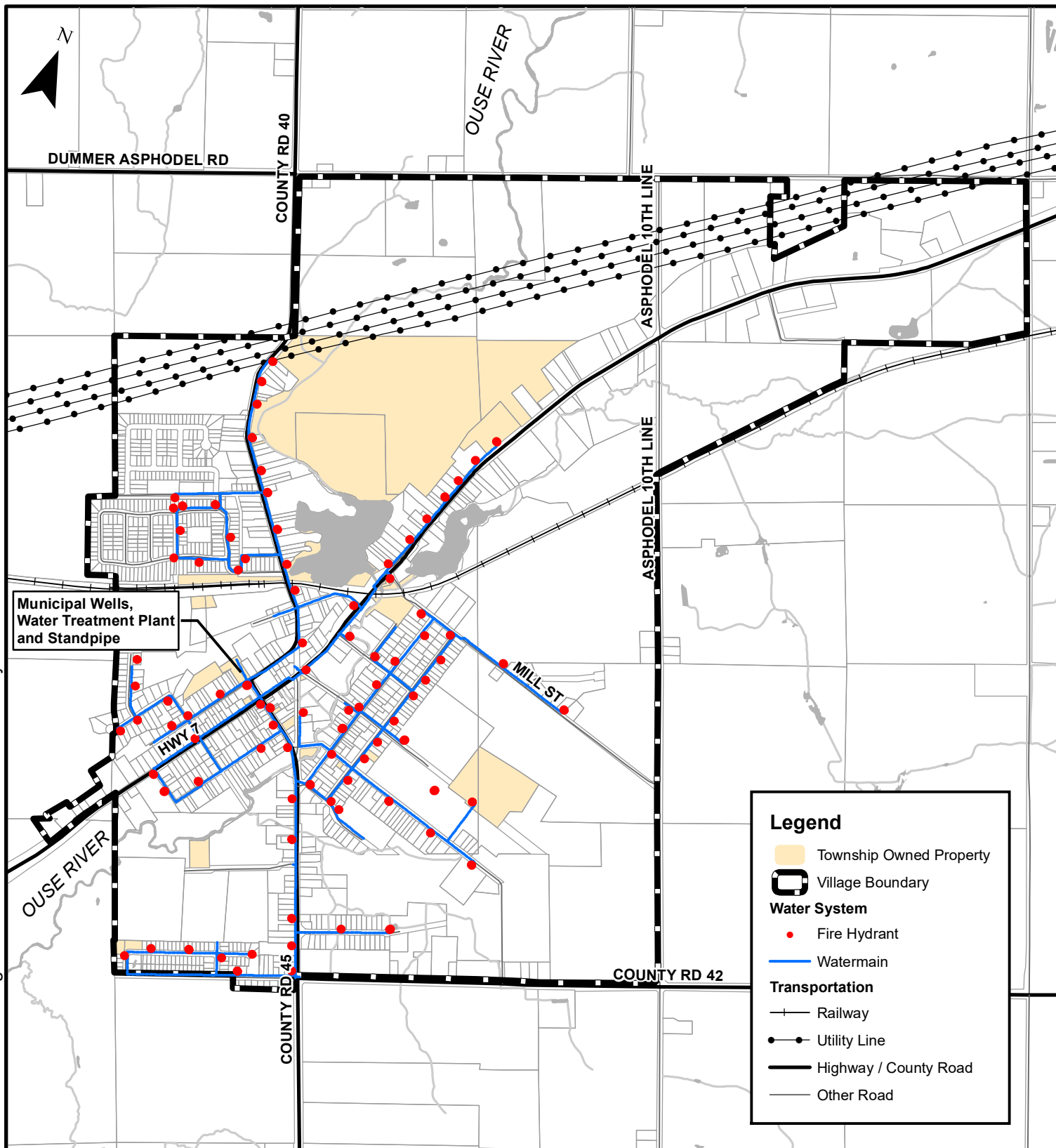
3.1 Existing Potable Water System Infrastructure

The Norwood Drinking Water System generally includes four municipal groundwater wells identified as 1A, 2, 3 and 4, a recently upgraded chlorine disinfection water treatment plant (WTP), one municipal water tower (standpipe), and approximately 13 km of water piping ranging in size from 32 mm to 250 mm in diameter. The distribution system currently consists of a single pressure zone. The wells, WTP and standpipe operate in accordance with a Permit to Take Water (PTTW) No. 7130-BMCT9C, dated March 4, 2020, a Drinking Water License (DWL) No. 133-101, Issue No. 5, dated April 19, 2021 and a Drinking Water Works Permit (DWWP) No. 133-201, Issue No. 4, dated March 4, 2020. Refer to Figure 3 for an overview of the study area and identification of key infrastructure.

All four wells are located on the same site and have been configured to convey raw groundwater through the WTP for treatment prior to distribution. Well 1A was originally constructed in 1948. Wells 2 and 3 were constructed in 1972 and 1994, respectively, while Well 4 was constructed in 2017 to provide additional redundancy. It is noted that there is a Well 1B which is not currently connected to the distribution system and is currently operating as a monitoring well only (MECP, 2019b and Township). The recently upgraded WTP provides primary and secondary disinfection with liquid sodium hypochlorite and adds an orthophosphate blend to raw water as a corrosion control measure. A 21.5 m long, 600 mm diameter serpentine pipe was installed in 2017 to provide chlorine contact time for primary disinfection. Additional contact time is provided in watermain piping to the standpipe and from the standpipe to the first consumer. It is understood that a small portion of standpipe volume supplements contact time requirements in high demand conditions (volumes below the lowest operating level of the tank).

Potable water storage is provided in the Village's single glass fused to steel standpipe, constructed in 1993 (Harvestore, 1993), which has a nominal volume of 1,269 m³ and is located adjacent to the WTP. The tank currently provides all of the treated water storage in the Village for equalization, emergency and fire demand and as previously noted, provides primary disinfection contact time in high demand conditions. It is noted that the standpipe exterior was rehabilitated in 2017 and a 2018 inspection report by Greatario identified the overall condition of the exterior and interior of the tank as good and fair, respectively.

Table 1 provides a brief summary of some of the key characteristics of the Township's existing potable water system infrastructure.



PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA NORWOOD, ONTARIO

DRAWING:

OVERVIEW OF STUDY AREA AND KEY INFRASTRUCTURE

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

Table 1: Village of Norwood's Potable Water System Infrastructure

Parameter	Value
Permit to Take Water (7130-BMCT9C)	1,965 m ³ /day
Municipal Drinking Water License/Permit (133-101/133-201)	1,965 m ³ /day
Water Supply	
Well 1A (constructed 1948) ⁽¹⁾	20.7 m deep; 250 mm diameter ⁽²⁾ 655 m ³ /day (PTTW)
Well 2 (constructed 1972)	21.3 m deep; 250 mm diameter ⁽³⁾ 7.64 L/s (654 m ³ /day) @ TDH 56.69 m ⁽⁴⁾ 655 m ³ /day (PTTW)
Well 3 (constructed 1993)	30.5 m deep; 250 mm diameter ⁽³⁾ 7.64 L/s (654 m ³ /day) @ TDH 48.77 m ⁽⁴⁾ 655 m ³ /day (PTTW)
Well 4 (constructed 2017) ⁽⁷⁾	31.3 m deep; 200 mm diameter ⁽²⁾ 7.64 L/s (659 m ³ /day) @ TDH 59.56 m ⁽⁴⁾ 655 m ³ /day (PTTW)
Water Treatment Plant	
Type	Sodium Hypochlorite Disinfection
Contact Time	21.5 m 600mm contact pipe (serpentine configuration) 62 m 200 mm watermain from Pump house No. 2 to standpipe ⁽³⁾ 6 m standpipe in high demand conditions 69.8 m 250 mm watermain from standpipe to first customer
Water Storage	
Type	Standpipe
Size	7.674 m diameter x 27.4 m height ⁽⁵⁾
Base Elevation	220.56 m
Nominal Volume	1,264 m ³ ⁽⁵⁾
Usable Volume	885 m ³ ⁽⁶⁾
- Per 2018/2019 MECP inspection report, Well 1B was intended to replace Well 1A. The Township has confirmed that the MECP required longer term pump tests to confirm water taking. As such, Well 1B is not connected to the Norwood Drinking Water System at this time. - Norwood Water Treatment Plant Building Expansion Tender Drawings (Wills, 2019) - MECP Drinking Water Works Permit 133-201, Issue No. 4 - Pump curves provided by the Township. - D.M. Wills Norwood Water Treatment Plant Drawings, 2019. - Based on worst case (minimum) standpipe level (depth) of 8.3 m (228.86 m) required in order to maintain minimum 20 psi system pressure (provided by Township) and a high operating depth of 248 m (overflow location), or a total usable depth of 19.14 m. Represents total usable treated water storage. - Well 4 is not currently listed in Drinking Water License (DWL) and Drinking Water Works Permit (DWWP).	

Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

3.2 Current Water Demands

Table 2 summarizes historical potable water demands for the Norwood Drinking Water System, as calculated from operating data provided by the Township for 2018 through to 2020. In general, the Village appears to be operating at an average day production rate of 7.7 L/s and a maximum day production rate of 12.9 L/s. This is equivalent to an average daily per capita consumption rate of 315 L/c/d based on a serviced population of 2,100 (Township), ignoring contribution from industrial, commercial and institutional users, which is typical for communities of similar size and comparable to the MECP Water Distribution Design Guidelines (2008) that identifies typical values between 270 and 450 L/c/d.

Table 2: Historic Potable Water Demands (January 2018 to November 2020)

Year	Average Day Demand	Maximum Day Demand
2018	6.9 L/s (594 m ³ /d)	11.8 L/s (1,023 m ³ /d)
2019	7.3 L/s (634 m ³ /d)	10.1 L/s (874 m ³ /d)
2020	8.8 L/s (758 m ³ /d)	12.9 L/s (1,113 m ³ /d)
Average/Max (2018-2020)	7.7 L/s (662 m³/d)	12.9 L/s (1,113 m³/d)

It is acknowledged that other reports (Engage, 2020 and Wills, 2018) reviewed historical demand data for the past 10 years. Historical data reviewed under those reports is generally consistent with the past 3 years, and therefore, average day and maximum day values from the past 3 years was used as the baseline assessment of 'existing conditions' for this study.

3.3 Planning Projections and Future Design Basis

As previously noted, an infrastructure assessment for future growth within the Village was recently completed by Engage Engineering on behalf of the Township which included the identification of proposed and anticipated development in Phases 1 (development areas 'most likely to occur' and for which the Township have applications underway), 2 (future development areas identified by the Township but with no official applications) and 3 (distant future development areas). The Engage Report, completed in 2020, also included anticipated water demands associated with each phase of development along with a preliminary capacity assessment of water and wastewater infrastructure. The Township confirmed through the Project Initiation Meeting that each development phase corresponds to the following general timelines: 0-10 years or the year 2030 (Phase 1); 10-20 years or the year 2040 (Phase 2); and 20+ years or build-out (Phase 3). Table 3 summarizes relevant demand projections identified in the Engage Report and used as the design basis for this Class EA.

Table 3: Development and Water Demand Projections in each Development Phase (Engage, 2020)

Parameter	Phase 1 (2030)	Phase 2 (2040)	Phase 3 (Build-out)
Average Day Water Demand (m ³ /day) ⁽¹⁾	1,439	397	1,320
Maximum Day Water Demand (m ³ /day) ⁽¹⁾	2,877	793	2,641
Peak Hour Demand (m ³ /day) ⁽¹⁾	4,316	1,189	3,961
1. Rounded from Table 8 in Infrastructure Assessment Report (Engage, 2020).			

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Based on the projections listed in Table 3 from the Engage Report, and the current demands reviewed in Section 3.2, the total future demands used in this Class EA are summarized in Table 4. It is noted that future maximum day demand identified in Table 9 of the Engage Report appears incorrect. The future maximum daily flows shown in their Table 9 appear to have included the fire flow from their Table 8.

Table 4: Future Demand Projections (Total)

Parameter	Existing (2020)	Phase 1 (2030)	Phase 2 (2040)	Phase 3 (Build-out)
Average Day Water Demand (m ³ /day)	662	2,101	2,498	3,818
Maximum Day Water Demand (m ³ /day)	1,113	3,990	4,783	7,424
Peak Hour Demand (m ³ /day) ⁽¹⁾	1,987	6,303	7,492	11,453
1. Consistent with the Engage Report design criteria, a peak hour peaking factor of 3 was used to determine the existing peak hour demand. Hourly demand data was not reviewed.				

3.4 Existing and Future Servicing Needs

3.4.1 Water Treatment Plant and High Lift Pumping Capacity

In general, the capacity of a treatment system should be equal to or greater than the maximum day demand on the system (MECP, 2008), assuming sufficient treated water storage exists to meet peak hour demands and fire protection. Table 5 provides a summary of related parameters.

Table 5: Water Treatment and Pumping Capacity Review

Parameter	Existing (2020)	Phase 1 (2030)	Phase 2 (2040)	Phase 3 (Build-out)
WTP Rated Capacity (m ³ /day)	1,965			
Well Pump Capacity (m ³ /day) ⁽¹⁾	1,967			
Maximum Day Water Demand (m ³ /day)	1,113	3,990	4,783	7,424
1. Wells 2, 3 and 4 combined (however, note that the PTTW is for a total water taking of 1965 m ³ /day)				

Based on Table 5, the capacity of the WTP and well pumps are insufficient to meet the 1st phase of development envisioned by the Township. Upgrades will be required to increase both the pumping and treatment capacity of the Norwood Drinking Water System to service anticipated development in the next 10 years and beyond. Reviewing options for expanded water treatment and supply capacity would need to be completed under a separate Municipal Class EA.

3.4.2 Water Storage Requirements

In order to establish future potable water storage requirements, the MECP recommends using an 'equivalent service population'; a service population that represents residential and industrial, commercial and institutional (ICI) usage (MECP, 2008). The equivalent service population was estimated assuming a 450 L/c/d average usage to maintain consistency with per capita usage used in Engage's 2020 assessment and which is generally in line with MECP design guidelines.

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Per the 2008 MECP Guidelines, total treated water storage within the system should at least amount to the sum of the required equalization storage, fire storage and emergency storage allowances. Based on these Guidelines, Table 6 provides a summary of the estimated total storage requirements for the Township for the design timeframes being considered.

Table 6: Potable Water Storage Requirements

Parameter	Existing (2020)	Phase 1 (2030)	Phase 2 (2040)	Phase 3 (Build-out)
Equivalent Population ⁽¹⁾	1,472	4,669	5,552	8,485
Fire Flow ⁽²⁾ (L/s)	78	138	152	178
Duration ⁽²⁾ (Hours)	2	2	2	3
A – Fire Storage ⁽³⁾ (m ³)	563	992	1,096	1,918
B – Equalization Storage ⁽⁴⁾ (m ³)	278	998	1,196	1,856
C – Emergency Storage ⁽⁵⁾ (m ³)	210	497	573	944
TOTAL STORAGE REQUIREMENT (m³)	1,051	2,486	2,865	4,718
EXISTING STORAGE (m³)	885	885	885	885
DEFICIT (m³)	166	1,601	1,980	3,833
(1) Estimated to be equal to Average Day Demand (662 m³/d based on past 3 years) / Per Capita Usage of 450 L/c/d (2) Values interpolated from Table 8-1 of MECP Guidelines, 2008 based on equivalent service population (fire flow is described as the largest expected fire flow requirement in L/s and duration is length of time fire flow shall be sustained). (3) Largest expected fire volume = fire flow x duration (4) 25% of Maximum Day Demand (5) 25% of the sum of 'A' and 'B'				

It is noted that the MECP guidelines allow the following: “for situations where the water supply system can supply more, the (calculated) storage requirements can be reduced accordingly”. Because the water treatment and supply system are currently insufficient to meet the Phase 1 development and a separate Municipal Class EA will be required to evaluate options for expanding related treatment and supply capacity, it is difficult to optimize storage requirements with information available at this time. Based on the information available, the existing treated water storage volume is currently marginally insufficient for current demand relative to the MECP requirements, and significantly insufficient for future growth.

3.4.3 Distribution System Capacity and Pressures

The aforementioned hydraulic water model (steady state) was assessed under existing average day, maximum day plus fire flow, and peak hour demand conditions to compare the resulting levels of service with the MECP design criteria. The following general observations were noted for each scenario:

- **Average Day:** The average day demand was simulated assuming no well pumps operating and a standpipe water level of 242.00 m. The simulated pressures were found to range between 260 kPa (37.7 psi) on Albine Street (Junction J79) and 435 kPa (63.1 psi) near

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the intersection of Alma Street and Victoria Street (Junction J27). Some of these results are below an operating pressure range of 345 kPa (50 psi) to 552 kPa (80 psi), as recommended by MECP design guidelines and the Ontario Code & Guide for Plumbing, respectively.

- **Maximum Day + Fire Flow:** The maximum day plus fire flow demand was simulated assuming no well pumps operating and a standpipe water level of 242.00 m. The model was used to determine the maximum expected fire flow available at each junction node without allowing any point in the system to experience pressures less than 140 kPa, as required by MECP design guidelines. The simulated fire flows were found to range between 14 L/s (840 L/min, on a 100 mm diameter water service line) and 232 L/s (13,920 L/min). It is noted that Ontario Building Code (OBC) fire flow targets range between 30 L/s (1,800 L/min) and 150 L/s (9,000 L/min), depending on the specific building properties used for the calculation (which also falls within the range required by the MECP design guidelines noted in Table 7 for the existing equivalent service population).
- **Peak Hour:** The peak hour demand was simulated assuming no well pumps operating and a standpipe water level of 242.00 m. The simulated pressures were found to range between 258 kPa (37.4 psi) on Albine Street (Junction J79) and 432 kPa (62.7 psi) near the intersection of Alma Street and Victoria Street (Junction J27). All of these results exceed the minimum operating pressure of 276 kPa (40 psi) as recommended by MECP design guidelines, except for two (2) junction nodes on Albine Street and Millpond Lane which are located at relatively higher topographic elevations than the rest of the water distribution system.

Overall, existing pressure and fire flow availability appears to be generally consistent with related guidelines, with the few exceptions noted above. This Class EA provides an opportunity to consider ideal locations for new storage that may improve the overall level of service of the distribution system.

3.4.4 Water Quality

A review of Annual Reports and MECP Inspection Reports for the Norwood Drinking Water System for the past 4 years was complete. Treated water and distribution samples are tested for microbiology (total coliforms, E Coli.), chlorine residual, trihalomethanes, turbidity, phosphorus, lead and a variety of other organic and inorganic compounds. The following exceedances were reported, for which the MECP has noted that proper corrective actions had been taken:

- Odour in distribution system (due to painting/sealing at WTP in 2017)
- Sodium in distribution system
- Total coliform in distribution system during watermain repair in 2017

Two watermain breaks in the past 4 years were also noted and repaired, including:

- Main break near Alma and King on May 25, 2018
- Main break on Albine St on November 8, 2019

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Generally speaking, water quality does not appear to be a concern with the existing distribution system and demand requirements.

3.5 Other Considerations

3.5.1 Reliability and Redundancy

As previously noted, a single elevated tank provides all of the treated water storage in the Village. In the event of an emergency or planned shut-down of the standpipe (during interior rehabilitation, for example), the wells would be relied on to supply domestic system demand on a continuous basis, and fire protection from the communal water distribution system would not be available for the duration of the standpipe shut-down. Furthermore, primary disinfection contact time would be limited during the shut-down.

Through this Class EA process, there may be opportunities to improve the reliability and redundancy of the overall distribution system by addressing the above-noted constraints.

3.5.2 Land Use and Planning

In general, the County of Peterborough Official Plan (1994 with amendments consolidated to 2020) sets out a general direction for planning and development in Peterborough County, and also includes the lower tier Official Plan for the Township of Asphodel-Norwood which describes public policy of planning for future growth and land use designations. The Township's Comprehensive Zoning By-law No. 2009-08 outlines specific development requirements and setbacks for zones throughout the Township. Any future development for future water storage will need to consider the requirements of these two documents. Refer to Figure 3 for mapping related to current land use constraints for the study area identified in the Official Plan.

3.5.3 Species at Risk and Other Natural Heritage Features

As part of the Class EA process, JLR retained Cambium Inc. (Cambium) to complete a Preliminary Species at Risk (SAR) Screening Assessment for the Village of Norwood. Through the Cambium Report dated March 10, 2021, located in Appendix C, a variety of “special concern species” (not afforded habitat protection under the ESA), “threatened or endangered species” (habitat protected under the ESA) and “federally listed species” were identified as having the potential to be located throughout the study area. In addition, a number of natural heritage features were also identified throughout the study area and illustrated in Figure 1 of the Report. As noted in the Report, the study area has two provincially significant wetlands (PSWs), including the Ouse River Middle Complex and Norwood South Complex, a locally significant wetland, Norwood East Wetland, and various unevaluated wetlands in the study area. An Earth Science Area of Natural and Scientific Interest (ANSI) is also mapped along the northern boundary of the Village.

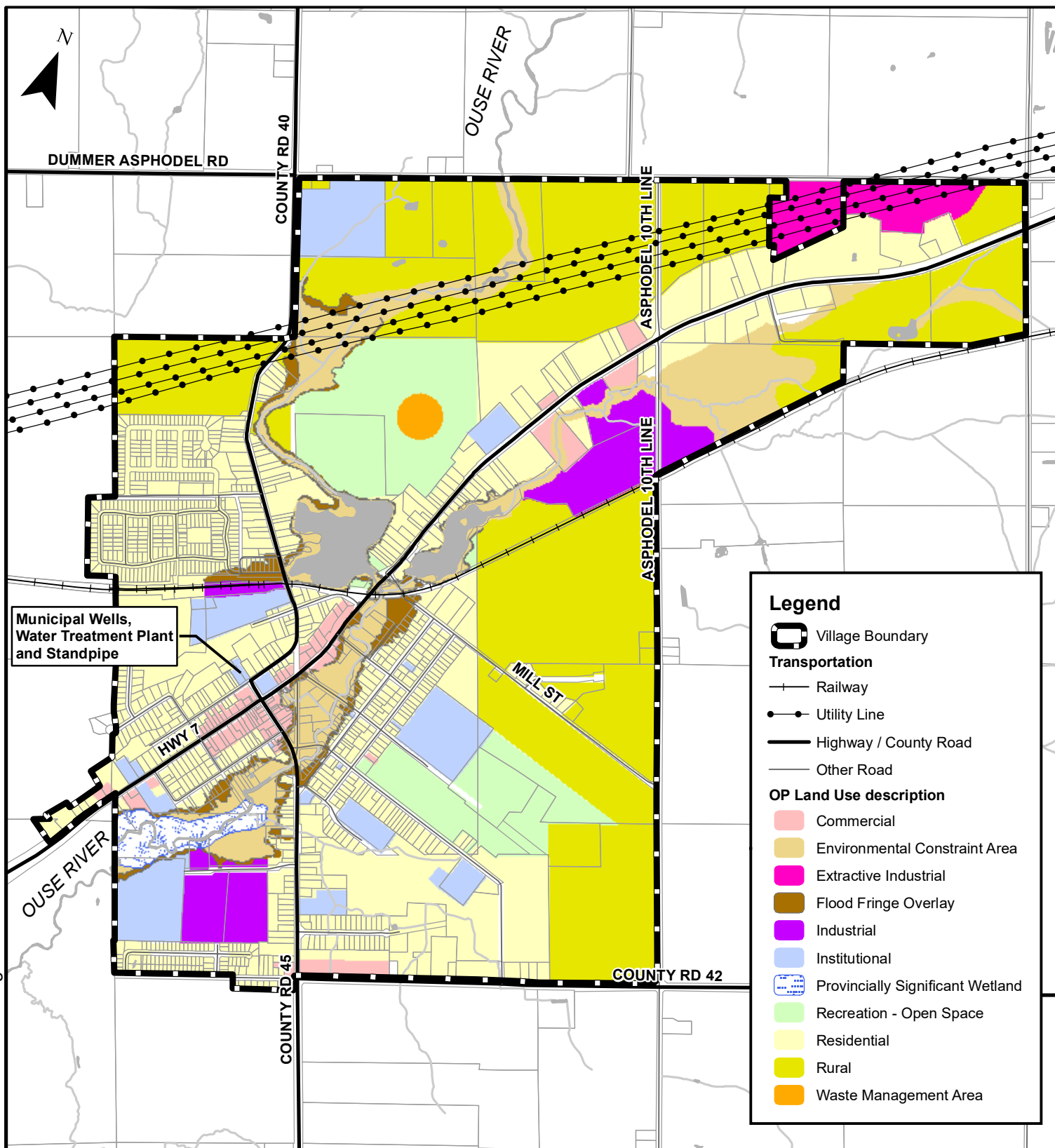
Cambium also provided site specific SAR and other natural heritage features commentary for three specific locations that may be considered during Phase 2 of the Class EA for potential future storage as identified in the Engage Infrastructure Assessment Report (2020), which included:

- Northwest of the intersection of Ridge Street and County Road 40 (existing WTP and standpipe location);
- Northwest quadrant of Asphodel 10th line and County Road 42; and
- 4440 highway 7 (behind the Asphodel Public Works building).

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Refer to Figures 2, 3 and 4 of the Cambium Report for specific location features. Site specific information will be considered as part of the review of potential storage locations during Phase 2.



PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA NORWOOD, ONTARIO

DRAWING:

LAND USE CONSTRAINTS

Township of Asphodel-Norwood

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of the Class EA, which may be supplemented with field studies for more detailed information if applicable. Refer to Appendix C for more information.

4.0 Problem / Opportunity Statement

The following Problem / Opportunity Statement will be used as the basis for proceeding to Phase 2 of this Class EA:

The existing drinking water system in the Village of Norwood is facing a number of constraints, including insufficient treated water storage capacity, deteriorated standpipe conditions, low pressure concerns and fire flow issues in certain areas of the distribution system.

There is an opportunity to ensure that the Township has a solution that will address the current water storage constraints in the potable water supply system both now and in the future.

5.0 Phase 2 – Identification of Alternative Solutions

As part of Phase 2 of the Class EA, alternative solutions to address the Problem/Opportunity Statement will be considered and evaluated against any environmental, social and economic impacts. General solutions that will be considered can be broken down as follows:

- Overall Approach
 - o Do Nothing
 - o Maintain the Existing Standpipe and Construct New Storage
 - o Decommission the Existing Standpipe and Construct New Storage
- Location of New Storage - Potential locations will be determined based on relevant criteria established with the Township, including the 3 locations already identified in the 2020 Engage Report
- Configuration of New Storage – such as below grade, at grade, elevated storage or standpipe.

Through the evaluation of alternative solutions, including consideration of public consultation, a preferred alternative will be selected and presented in the Phase 2 Report that will be placed on public record for a 30-day review period.

6.0 References

(Cambium, 2021). Preliminary Species at Risk Screening – Municipal Class Environmental Assessment, Treated Water Storage Facility, Township of Asphodel-Norwood, ON. Cambium Inc. March 10, 2021.

(Engage, 2020). Existing & Future Conditions Review – Norwood Infrastructure Assessment. Engage Engineering Ltd. July, 2020.

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(Greatario, 2018). Complete Inspection Report (Norwood Standpipe). Greatario Services. July 6, 2018.

(Harvestore, 1993). Village of Norwood Standpipe Drawing. A.O. Smiths Harvestore Products, Inc. June 7, 1993.

(MECP, 2017). Norwood Drinking Water System Compliance Inspection Report 2017/2018. Ministry of the Environment, Climate and Parks. December 12, 2017.

(MECP, 2019a). Norwood Drinking Water System Compliance Inspection Report 2018/2019. Ministry of the Environment, Climate and Parks. March 5, 2019.

(MECP, 2019b). Norwood Drinking Water System Compliance Inspection Report 2019/2020. Ministry of the Environment, Climate and Parks. November 22, 2019.

(Township, 2017). Norwood Drinking Water System Annual Report (January 1, 2017 to December, 2017). The Corporation of Asphodel-Norwood. 2017.

(Township, 2018). Norwood Drinking Water System Annual Report (January 1, 2018 to December, 2018). The Corporation of Asphodel-Norwood. 2018.

(Township, 2019). Norwood Drinking Water System Annual Report (January 1, 2019 to December, 2019). The Corporation of Asphodel-Norwood. 2019.

(Wills, 2019). Norwood Water Treatment Plant Building Expansion (Issued for Tender Drawings) – D.M. Wills Associates Limited. March, 2019.

(Wills, 2018). Norwood Water Treatment Plant Well upgrades Design Brief. D.M. Wills Associates Limited. November, 2018.

This report has been prepared for the exclusive use of the Corporation of the Township of Asphodel-Norwood, for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of the Corporation of the Township of Asphodel-Norwood and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

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Township of Asphodel-Norwood

Schedule B Class EA for Potable Water Storage – Phase 1 Report

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

A handwritten signature in black ink, appearing to read 'M Morkem', is written over the signature line.

Matthew Morkem, P.Eng
Senior Civil Engineer

Township of Asphodel-Norwood
Schedule B Class EA for Potable Water Storage – Phase 1 Report

Appendix A

Project Initiation Meeting
Minutes

Asphodel Norwood Water Storage Municipal Class Environmental Assessment

Kick-off Meeting (Meeting No. 1) MINUTES

Attendance: Kyle Beacock Township of Asphodel-Norwood kbeacock@antownship.ca
Matthew Morkem J.L. Richards & Associates Limited mmorkem@jlrichards.ca
Lauren Scanlan J.L. Richards & Associates Limited lscanlan@jlrichards.ca

The meeting commenced at 1:30 p.m. on Wednesday, December 16, 2020 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

<u>ITEM</u>	<u>ACTION BY</u>	<u>DUE BY</u>
1.1 Introduction		
.1 JLR (MM) noted the purpose of the meeting was to discuss the overall work plan and schedule for the project and discuss the Township's preliminary thoughts on storage solutions.	INFO	
1.2 Contacts / Roles & Responsibilities		
.1 Township: Kyle Beacock will be primary point of contact	INFO	
.2 JLR: Matthew Morkem (Project Manager) will be primary point of contact, supported by Lauren Scanlan as required.	INFO	
1.3 Engineering Agreement / Purchase Order		
.1 Agreement is underway. JLR to provide requested documents to Township's CAO.	JLR (MM)	Jan 4 '21
1.4 Confirmation of Scope and Schedule		
.1 JLR (MM) confirmed overall intent is to wrap the Class EA study up by the end of October, 2021 per the original RFP and proposal. Given the later project start date, Phase 1 activities will begin in the new year, 2021.	INFO	
1.5 Deliverables		
.1 Key deliverables will be the Phase 1 and Phase 2 Reports, Natural Heritage Study as well as public consultation supporting documents as required.	INFO	
1.6 Meetings and Presentations		
.1 Refer to JLR proposal for minimum proposed meeting milestones with the Township. One Public Information Centre and Council meeting is proposed to review the Phase 1 and 2 results prior to finalizing the Phase 2 report.	INFO	

Asphodel Norwood Water Storage Municipal Class Environmental Assessment

Kick-off Meeting (Meeting No. 1) MINUTES

<u>ITEM</u>	<u>ACTION BY</u>	<u>DUE BY</u>
1.7 List of Requested Documentation		
.1 The Document Request List was reviewed and updated during the meeting. Refer to updated list with notes for information. The Township is pulling together the documents. JLR (LS) to send a large file request to the Township to drop files into. <u>Post-Meeting Note:</u> Large file request sent.	INFO	
1.8 Public Consultation Plan and Stakeholders List		
.1 The Township does not have a general consultation list. JLR (LS) to send a draft stakeholder list for review/comment.	JLR (LS)	Jan 8 '21
.2 The Class EA process requires a minimum of one point of public contact for a Schedule B project. This will be the Public Information Centre at the end of Phase 2. JLR also intends to circulate a Project Initiation Notice once the stakeholder list is finalized and the existing system has been reviewed. Township to confirm method for issuing notice (at minimum, a PDF notice would be provided for posting to the website, and JLR would circulate list by direct mailing to stakeholders).	JLR (LS) TOWNSHIP	Jan '21 Jan '21
1.9 Planning – Growth Projections		
.1 The Township confirmed that the Norwood Infrastructure Assessment (2020) represented current development projects that can be used as the basis for this Class EA. Timing of “Phases” identified in the study were generally identified by the Township to be: Phase 1 (0 to 10 years); Phase 2 (10-20 years); and Phase 3 (20+ years or build-out).	INFO	
.2 Township to confirm if there are any other known development plans approved or under review not already identified in the 2020 Study.	TOWNSHIP	Jan '21
1.10 Preliminary Discussion on Options		
.1 Township identified two potential locations for additional storage as the current standpipe location (i.e., twin the existing system) or the existing public works property that is at a higher elevation. JLR to consider these locations, in addition to other ideal locations throughout the system.	INFO	
1.11 Next Meeting		
.1 To be confirmed in the new year.	INFO	

Asphodel Norwood Water Storage Municipal Class Environmental Assessment

**Kick-off Meeting (Meeting No. 1)
MINUTES**

Prepared by:

Issued on: December 21, 2020



Lauren Scanlan, M.A.Sc., P.Eng.
Environmental Engineer

Distribution: All attendees

CC:

TOWNSHIP OF ASPHODEL-NORWOOD
Water Storage Class Environmental Assessment

LIST OF REQUIRED DOCUMENTATION – PHASE 1 (REV1)

No.	Description	Action / Status
1.0 GENERAL		
1.1	GIS Mapping of the Parcel fabric	
1.2	Other County GIS data including aerial images, base maps, 0.5 m contour data	
1.3	Township's Current Stakeholder List	<i>JLR to send draft list of stakeholders for review¹</i>
2.0 STUDIES		
2.1	Norwood Infrastructure Assessment (Engage, 2020)	Received (with RFP)
3.0 WATER DISTRIBUTION AND TREATMENT		
3.1	Water System DWWP, License and PTTW	
3.2	Water System Annual Reports (Last 5 Years)	
3.3	MECP Inspection Reports (Last 5 Years)	
3.4	As-Constructed Drawings of Water Infrastructure	<i>Linear infrastructure not required at this stage¹</i>
3.5	GIS Mapping data for Water Distribution System	
3.6	Available data for WTP, Water Storage and Distribution System (Last 5 years)	
3.7	Industrial, Commercial, Institutional water metering records if significant	
3.8	List of watermain breaks or maintenance records	
3.9	Record of Complaints (Water), e.g., taste, noise, odour	
3.10	High Lift Pump curves	
3.11	Summary of any significant improvements to the water distribution and treatment systems (completed and planned)	
3.12	<i>Fire hydrant testing data¹</i>	
4.0 PLANNING		
4.1	Township's Official Plan	<i>Will provide County OP¹</i>
4.2	Zoning By-Law	
4.3	Future Growth Forecasts	<i>Norwood Infrastructure Assessment (Item 2.1 above)¹</i>
4.4	Reports/studies/plans for known development projects	

1. Updated during Kick-Off Meeting on December 16, 2020.

Appendix B

Proposed Stakeholder List,
Notice of Commencement,
and Letter to Stakeholders

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood

Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

MEA REVIEW AGENCIES	MAILING OR EMAILING ADDRESSES	Preference Email or Mail?
PROVINCIAL AGENCIES & MINISTRIES		
CONSERVATION AUTHORITIES - OTONABEE CONSERVATION AUTHORITY	Lori Moloney lmoloney@otonabeeconservation.com	Email
MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS	eanotification.eregion@ontario.ca	Email
OFFICE OF THE FIRE MARSHALL	SEE BELOW	SEE BELOW
MINISTRY OF HEALTH AND LONG-TERM CARE	SEE BELOW	SEE BELOW
MINISTRY OF HERITAGE, SPORT, TOURISM AND CULTURAL INDUSTRIES	Karla Barboza, Team Lead(A), Heritage Heritage Planning Unit Programs and Services Branch Ministry of Heritage, Sport, Tourism and Cultural Industries 401 Bay Street, Suite 1700 Toronto ON M7A 0A7 karla.barboza@ontario.ca	Email
SPORT, RECREATION AND COMMUNITY PROGRAMS DIVISIONS	Ray Dempster, Manager and Bob Freeman, Senior Policy Advisor Sport, Recreation and Community Programs Division Policy Branch: Neil Coburn, Director(A) 777 Bay Street, 18th Floor Toronto, ON M7A 1S5 ray.dempster@ontario.ca bob.freeman@ontario.ca	Mail
MINISTRY OF INDIGENOUS AFFAIRS	CONTACT MECF	
MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING (REGIONAL OFFICE)	Michael Elms, Manager Community Planning and Development Eastern Municipal Services Office Ministry of Municipal Affairs and Housing 8 Estate Lane, Rockwood House Kingston ON K7M 9A8 michael.elms@ontario.ca	Mail
MINISTRY OF NATURAL RESOURCES AND FORESTRY	Attn: Catherine Warren, District Planner (Peterborough Area) Peterborough District Ministry of Natural Resources and Forestry South Tower, 1st Floor 300 Water St, PO Box 7000 Peterborough ON K9J 8M5 catherine.warren@ontario.ca	Email
MINISTRY OF THE SOLICITOR GENERAL	Robert Greene, Director Ministry of the Solicitor General 25 Grosvenor Street, 13th Flr Toronto ON M7A 1Y6 robert.greene@ontario.ca	Email
MINISTRY OF TRANSPORTATION (REGIONAL OFFICE)	Peter Makula, Manager Engineering Office Eastern Region Ministry of Transportation 1355 John Counter Blvd, Postal Bag 4000 Kingston ON K7L 5A3 peter.makula@ontario.ca	Email and mail
HYDRO ONE NETWORKS INC.	SecondaryLandUse@HydroOne.com	Email

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood

Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

FEDERAL AGENCIES		
ENVIRONMENT AND CLIMATE CHANGE CANADA	Wes Plant, Manager Environmental Assessment Section Environmental Protection Branch – Ontario Region Environment and Climate Change Canada 4905 Dufferin St. Downsview ON M3H 5T4 wesley.plant@canada.ca	Email
INDIGENOUS SERVICES CANADA AND CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA		
COUNTIES, DISTRICTS, MUNICIPALITIES AND PLANNING BOARDS		
County of Peterborough	Kari Stevenson k Stevenson@ptbocounty.ca	Email
Township of Selwyn	Tonya Goncalves tgoncalves@selwyntownship.ca	Email
Township of Douro-Dummer	Martina Chait Hartwig martinac@douroddummer.on.ca	Email
Township of North Kawartha	Connie Parent c.parent@northkawartha.ca	Email
Township of Cavan Monaghan	Cindy Page cpage@cavanmonaghan.net	Email
Municipality of Trent Lakes	Jessie Clark jclark@trentlakes.ca	Email
Township of Havelock-Belmont-Methuen	Bionca Boyington bboyington@hbmtpw.ca	Email
Township of Otonabee-South Monaghan	Heather Scott hscott@osmtownship.ca	Email
OTHER		
LOCAL PUBLIC HEALTH UNIT/MEDICAL OFFICER (Peterborough County-City Health Unit)	Dr. Rosana Salvaterra Medical Officer of Health Peterborough County-City Health Unit Jackson Square 185 King St Peterborough, ON K9J 2R8	Mail
Township Fire Department	Darryl Payne Fire Chief Township of Asphodel-Norwood Fire Rescue & Emergency Services 4440 Highway #7, P.O. Box 29, Norwood, Ontario, K0L 2V0	Mail
FIRST NATIONS		
Alderville First Nation	Dave Simpson Consultation Coordinator Alderville First Nation 11696 Second Line Rd ALDERVILLE, ON K0K 2X0 consultation@alderville.ca	Mail
Curve Lake	Katie Haddlesey Chief Operating Officer Curve Lake First Nation 22 Winookeddaa Road Curve Lake, ON K0L 1R0	Mail
Hiawatha First Nation	Tom Cowie Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 tcowie@hiawathafn.ca	Mail
	Sean Davison Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 sdavison@hiawathafn.ca	Mail

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood

Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

Mississaugas of Scugog Island First Nation	Monica Sanford - Community Consultation Administrative Assistant Mississaugas of Scugog Island First Nation Administration Building 22521 Island Road Port Perry, ON L9L 1B6	Mail
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Chippewas of Rama First Nation	Sharday James, Community Consultation Chippewas of Rama First Nation 5884 Rama Road, Suite 200 Rama ON, L3V 6H6	Mail
Mohawks of the Bay of Quinte	Charlotte Gurnsey Consultation Coordinator Mohawks of the Bay of Quinte Administration Building 24 Meadow Drive Tyendinaga Mohawk Territory, ON K0K 1X0	Mail
PROPERTY OWNERS ADJACENT TO PROJECT SITE AND DIRECTLY AFFECTED PUBLIC/LANDOWNERS	REFER TO MAILING LABELS PROVIDED BY THE TOWNSHIP	Mail

Appendix C

Species at Risk Screening
Assessment by Cambium
Inc., dated March 10, 2021



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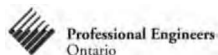
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March 10, 2021

J.L. Richards & Associates Ltd.
203-863 Princess Street
Kingston, ON K7L 5N4

Attn: Matthew Morkem, P.Eng.

**Re: Preliminary Species at Risk Screening - Municipal Class
Environmental Assessment, Treated Water Storage Facility, Township
of Asphodel-Norwood, ON
Cambium Reference # 11913-001**

Dear Mr. Morkem,

Cambium Inc. (Cambium) was retained by J.L. Richards & Associates Ltd. (the Client) to conduct a Preliminary Species at Risk (SAR) assessment in the village of Norwood, Township of Asphodel-Norwood, ON (the Study Area). We understand that the SAR assessment is required in support of a Schedule B Municipal Class Environmental Assessment (MCEA) and Preliminary Engineering Design for a new treated water storage facility.

The following SAR Assessment was completed to assess the potential presence of at-risk species and their habitats in the vicinity of each of the three proposed water storage facility locations detailed in the Existing & Future Conditions Review by Engage Engineering Ltd., dated July 2020 (shown on **Figure 1**), anticipate potential impacts associated with the proposed undertaking, and evaluate compliance with applicable regulation under the Endangered Species Act, 2007 (ESA).

**BACKGROUND INFORMATION REVIEW & HABITAT-BASED SAR
SCREENING**

Existing background information pertaining to the Site and surrounding landscape was compiled and reviewed, as part of a comprehensive desktop exercise, to better understand local biophysical conditions. In southern Ontario, readily available data includes aerial orthophotography, topographic base mapping, and geological records. Natural area records and species occurrences



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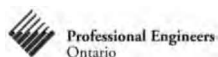
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were obtained from digital resources and reference materials. The comprehensive desktop review for this Site included the following resources:

- Natural Heritage Areas: Make-a-map (Ministry of Natural Resources and Forestry, 2018); Accessed February 25, 2021
- Aquatic Species at Risk Maps - Ontario (Fisheries and Oceans Canada, 2018); Accessed February 25, 2021
- Aquatic Resource Area Summary Data (Government of Ontario, 2015); Accessed February 25, 2021
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2018); Accessed February 25, 2021
- Ontario Breeding Birds Atlas (OBBA) (2001-2005) (Bird Studies Canada, 2005); Accessed February 25, 2021

Cambium employed a habitat-based screening to identify SAR and their habitats on or adjacent to the Site. A list of SAR with potential to occur in the general vicinity of the Study Area has been compiled based on known species' ranges and habitat requirements and review of background information sources. A summary of the results is provided below.

Based on our screening, the Study Area and/or adjacent lands have potential to provide habitat for the following species:

Special Concern Species (not afforded habitat protection under the ESA)

- Snapping Turtle (*Chelydra serpentina*)
- Canada Warbler (*Cardellina canadensis*)
- Common Nighthawk (*Chordeiles minor*)
- Grasshopper Sparrow (*Ammodramus savannarum*)
- Northern Map Turtle (*Graptemys geographica*)

Threatened and Endangered Species (habitat protected under the ESA)

- Barn Swallow (*Hirundo rustica*; threatened)
- Bank Swallow (*Riparia riparia*; threatened)



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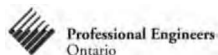
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- Bobolink (*Dolichonyx oryzivorus*; threatened)
- Cerulean Warbler (*Dendroica cerulea*; threatened)
- Chimney Swift (*Chaetura pelagica*; threatened)
- Eastern Meadowlark (*Sturnella magna*; threatened)
- Eastern Wood-pewee (*Contopus virens*; special concern)
- Wood Thrush (*Hylocichla mustelina*; special concern)
- Blanding's Turtle (*Emydoidea blandingii*; threatened)
- Little Brown Myotis (*Myotis lucifugus*; endangered)
- Northern Myotis (*Myotis septentrionalis*; endangered)
- Eastern Small-footed Myotis (*Myotis leibii*; endangered)
- Tri-coloured Bat (*Perimyotis subflavus*; endangered)
- Butternut (*Juglans cinerea*; endangered)

Also, three (3) federally listed species were documented within the Study Area; Midland Painted Turtle (*Chrysemys picta marginata*), Western Chorus Frog (*Pseudacris maculata pop. 1*), and Eastern Milksnake (*Lampropeltis Triangulum*). Impacts to these species and their habitats will not be discussed as the lands are not federally owned and therefore the *Species at Risk Act*, 2002 (SARA) does not apply to these species.

No Critical Habitat for aquatic SAR was mapped by Fisheries and Oceans Canada (DFO) in Ouse River or associated tributaries on or adjacent to the Study Area.

It should be noted that the majority of the SAR species habitats cannot be easily displayed on figures and is described in text in the following sections.

PROPOSED WATER STORAGE FACILITY LOCATIONS

The initial screening was conducted for the village of Norwood, located within the Township of Asphodel-Norwood and Peterborough County. The regional area has several natural heritage features, particularly wetlands, due to topographical influences and the proximity to the Ouse River. Two Provincially Significant Wetlands (PSWs), Ouse River Middle Complex and Norwood South Complex are mapped in the area. A Locally Significant Wetland, Norwood East Wetland, and



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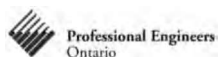
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various unevaluated wetlands are mapped within the regional area. Ouse River, flows through Norwood Mill Pond, centrally located in the community, heading in a southerly direction. An Earth Science Area of Natural and Scientific Interest (ANSI) is mapped on the northern boundary of the Study Area.

According to the Existing & Future Conditions Review by Engage Engineering Ltd., dated July 2020, three (3) locations are being considered for the placement of the treated water storage facility (shown in **Figure 1**). These three locations have been assigned identifiers and were examined in closer detail, as shown in Figures 2, 3 and 4.

For the purpose of this preliminary screening it was assumed that the laydown area required for construction would be located within 250 m of the proposed water storage facility location. Therefore SAR and their habitat were considered within a 250 m radius around each potential water storage location. The Environmental Assessment will identify a technically preferred alternative to determine the location of the water storage facility.

DFO aquatic SAR mapping did not have records for SAR species or critical habitat in the regional area. Cambium's in-field review will visually inspect for the presence of fish habitat in the potential water storage facility locations. The in-field review will also consider roadside ditches and watercourse crossings as protected fisheries habitats that may not be mapped.

SOUTHEAST LOCATION

The southeast (SE) potential treated water storage facility location is located on the northwest quadrant of Asphodel 10th Line and County Road 42 (shown on **Figure 2**). Based on aerial imagery this location is in an agricultural field. A PSW and locally significant wetland are mapped in close proximity, and have therefore been afforded a wetland setback of 120 m and 30 m, respectively. In addition, a mapped unevaluated wetland and watercourse are mapped southwest of the location. A 30 m setback has been applied to the wetland and a 15 m setback has been applied to the watercourse, based on its thermal regime as warmwater. None of these features or setbacks overlap the proposed location or laydown area



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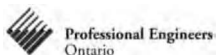
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Natural Heritage Information Centre (NHIC) database records applicable to the Site (UTM Grid Square 18TQ6418) include SAR occurrences for Eastern Meadowlark, Bobolink and Snapping Turtle.

Bobolink and Eastern Meadowlark are two (2) grassland bird SAR frequently observed in this area of Ontario. They are ground nesting birds that each prefer slightly different stages of grassland succession: Bobolink tend to be present in the earlier stages when grasses dominate the vegetation community and few other species are present; Eastern Meadowlark tend to be present later in the successional process when some grasses are being replaced by other herbaceous species (McCracken, 2013). They are often found in hay fields and old agricultural fields. Both species show some sensitivity to the size of available habitat, with five (5) hectares being the smallest area likely to be used by both species and Bobolink being more sensitive to smaller patches (McCracken, 2013). The agricultural fields in this location may provide suitable habitat for this species. Field investigations will confirm if the habitat is suitable for these species.

Snapping Turtle, and Blanding's Turtle may be present in the watercourse and wetlands adjacent to the Site. Both of these species are known to establish nests in loose coarse substrates. As such, the roads' shoulder in the vicinity of the wetlands may be used for nesting.

Finally, this location may provide suitable habitat for other SAR, including Barn Swallow, Grasshopper Sparrow and Butternut trees. The presence of these species will be confirmed through breeding bird surveys and vegetation inventories.

NORTH LOCATION

The north (N) potential treated water storage facility location is located northwest of the intersection of Ridge Street and County Road 40 (shown on **Figure 3**). Based on aerial imagery this location has an existing water storage facility and is surrounded by forested lands to the north and residential properties to the south. Unevaluated wetlands and warmwater waterbodies are mapped in proximity to this location. A 30 m setback has been applied to the wetlands and a 15 m setback



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has been applied to the waterbodies, based on warmwater thermal regime. None of these features or setbacks overlap the proposed location or the laydown area.

Natural Heritage Information Centre (NHIC) database records applicable to the Site (UTM Grid Square 18TQ6319) include a SAR occurrence for Eastern Meadowlark, and Bobolink. Based on aerial imagery the habitats present within close proximity to this location are not suitable for these grassland SAR birds.

The forested lands to the north and northwest of this location may provide suitable habitat for SAR forest birds (Eastern Wood-pewee and Wood Thrush), Butternut and maternity roosting habitat for SAR bats. Field investigations will assess adjacent lands as maternity roosting habitat for bats, search for Butternut trees, and confirm SAR bird presence.

WEST LOCATION

The west (W) potential treated water storage facility location is located behind (northwest) the Asphodel Norwood Public Works building located at 4440 Highway 7 (shown on **Figure 4**). Based on aerial imagery this location is surrounded by forested lands to the north/west and existing development to the south. Unevaluated wetlands and waterbodies are mapped in proximity to this location. A 30 m setback has been applied to the wetlands and a 15 m or 30 m setback has been applied to the waterbodies, depending on thermal regime. An Earth Science ANSI is mapped east of the location, and a 50 m setback was applied to this feature following the Natural Heritage Reference Manual. None of these features or setbacks overlap the proposed location. It is anticipated that the laydown area for construction will be more confined at this location based on the existing buildings.

Natural Heritage Information Centre (NHIC) database records applicable to the Site (UTM Grid Square 18TQ6218) include SAR occurrences of Eastern Meadowlark, and Snapping Turtle. Based on aerial imagery the habitats present within close proximity to this location are not suitable for grassland SAR birds.

Snapping Turtle, and Blanding's Turtle may be present in the waterbodies and wetlands adjacent to the Site. These species are known to establish nests in



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loose coarse substrates. As such, the shoulder of the roads or areas of gravel substrates in the vicinity of the wetlands may be used for nesting.

The forested lands to the north and west of this location may provide suitable habitat for SAR forest birds (Eastern Wood-pewee and Wood Thrush), Butternut and maternity roosting habitat for SAR bats. Field investigations will be required to assess adjacent lands as significant maternity roosting habitat for bats, search for Butternut trees and confirm presence of SAR birds.

CLOSING

This memo provides a preliminary constraint analysis for three (3) potential water storage facility locations. We trust that this memo meets your needs at this point in the preliminary design. If you have any questions or would like to discuss the contents of this letter, please feel free to contact the undersigned at (613) 876.1515. We appreciate the opportunity to provide services for this project.

Best regards,

Cambium Inc.

Matthew Wheeler, B.A. Hons.
Project Manager / Ecologist

MW/djl

Encl. *Figures 1 Local Natural Heritage Features*
 Figure 2 Natural Heritage Features and Constraints – SE Location
 Figure 3 Natural Heritage Features and Constraints – W Location
 Figure 4 Natural Heritage Features and Constraints –N Location

\\camfile\Projects\11900 to 11999\11913-001 J.L.Richards & Associates Limited - NHIA - Treated Water Storage Facility MCEA, Norwood\Deliverables\REPORT - Preliminary SAR\Draft\2021-03-08 LTR - Prelim SAR Assessment.docx





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REFERENCES

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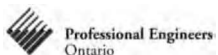
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**PRELIMINARY SPECIES
AT RISK ASSESSMENT**
J L RICHARDS AND ASSOCIATES LTD
Norwood, Ontario

LEGEND

- Potential Water Tower
Locations
- Watercourse - Warm
- Wetland Area
- Locally Significant Wetlands
- Provincially Significant
Wetlands
- ANSI, Earth Science
- Waterbody - Unknown
Thermal Regime
- Waterbody - Warm
- Ecodistrict

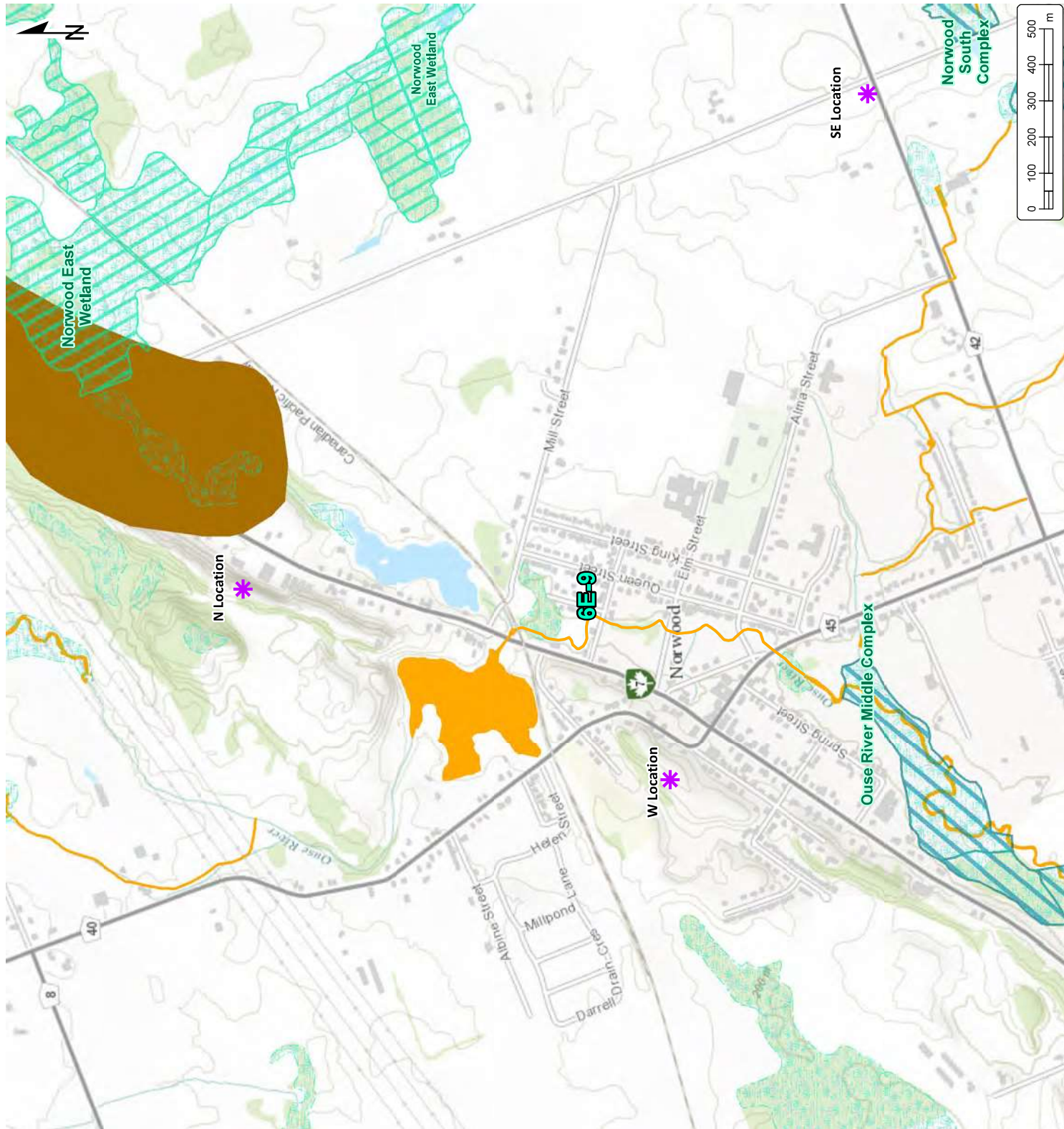
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**LOCAL NATURAL
HERITAGE FEATURES**

Project No.:	11913-001	Date:	March 2021
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Created by:	DJL	Checked by:	MW
Figure:	1		



PRELIMINARY SPECIES
AT RISK ASSESSMENT
J L RICHARDS AND ASSOCIATES LTD
Norwood, Ontario

LEGEND

- Potential Water Tower
Locations
- 120 m Wetland Setback
- 15 m Watercourse Setback
- Potential Grassland SAR Bird
Habitat
- 30 m Wetland Setback
- Watercourse - Warm
- Wetland Area
- Locally Significant Wetlands
- Provincially Significant
Wetlands
- Waterbody - Warm

Notes:

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NATURAL HERITAGE FEATURES
AND CONSTRAINTS - SE LOCATION

Project No.:	11913-001	Date:	March 2021
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Created by:	DJL	Checked by:	MW
Figure:	2		



PRELIMINARY SPECIES
AT RISK ASSESSMENT
J.L. RICHARDS AND ASSOCIATES LTD
Norwood, Ontario

LEGEND

Potential Water Tower
Locations



15 m Waterbody Setback



30 m Wetland Setback



Wetland Area



Waterbody - Warm



Notes:
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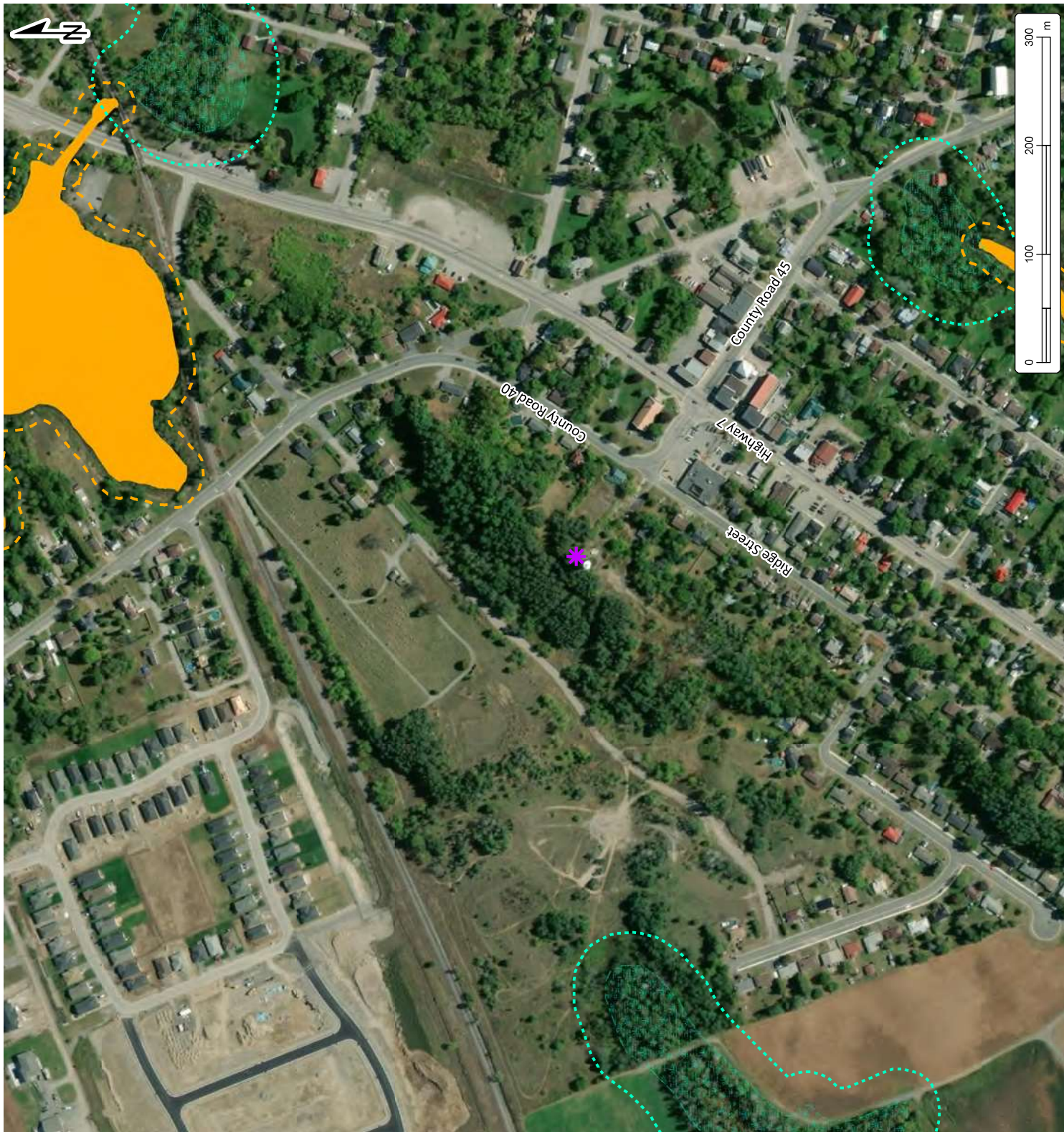
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NATURAL HERITAGE FEATURES
AND CONSTRAINTS - W LOCATION

Project No.: 11913-001
Date: March 2021

Scale: 1:5,000
Projection: NAD 1983 UTM Zone 17N

Created by: DJL
Checked by: MW
Figure: 3



PRELIMINARY SPECIES
AT RISK ASSESSMENT
J L RICHARDS AND ASSOCIATES LTD
Norwood, Ontario

LEGEND

- Potential Water Tower
Locations
- 15 m Waterbody Setback
- 50 m Earth Science ANSI
Setback
- 30 m Waterbody Setback
- 30 m Wetland Setback
- Wetland Area
- ANSI, Earth Science
- Waterbody - Unknown
Thermal Regime
- Waterbody - Warm

Notes:

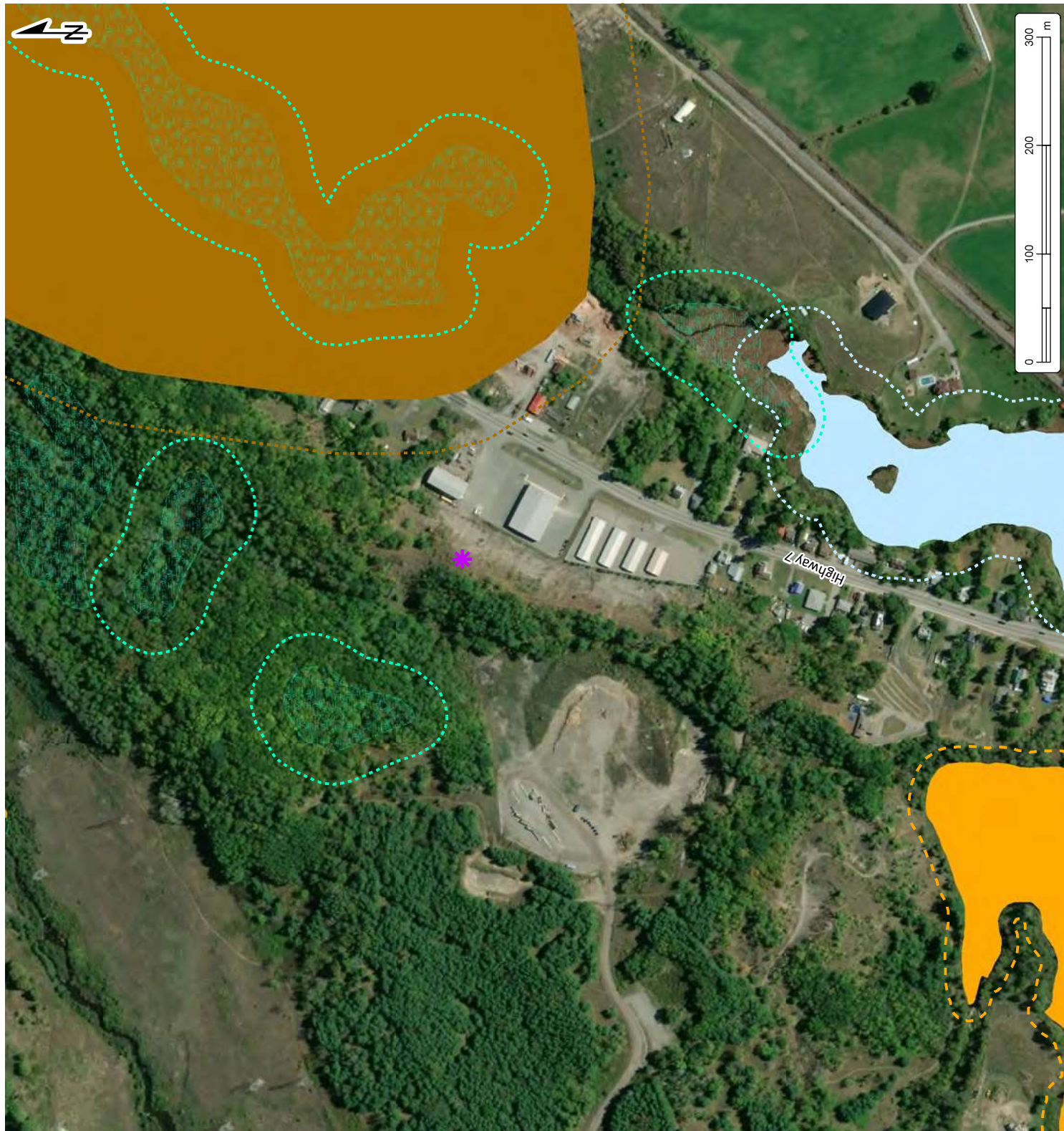
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NATURAL HERITAGE FEATURES
AND CONSTRAINTS - N LOCATION

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Figure:	4		

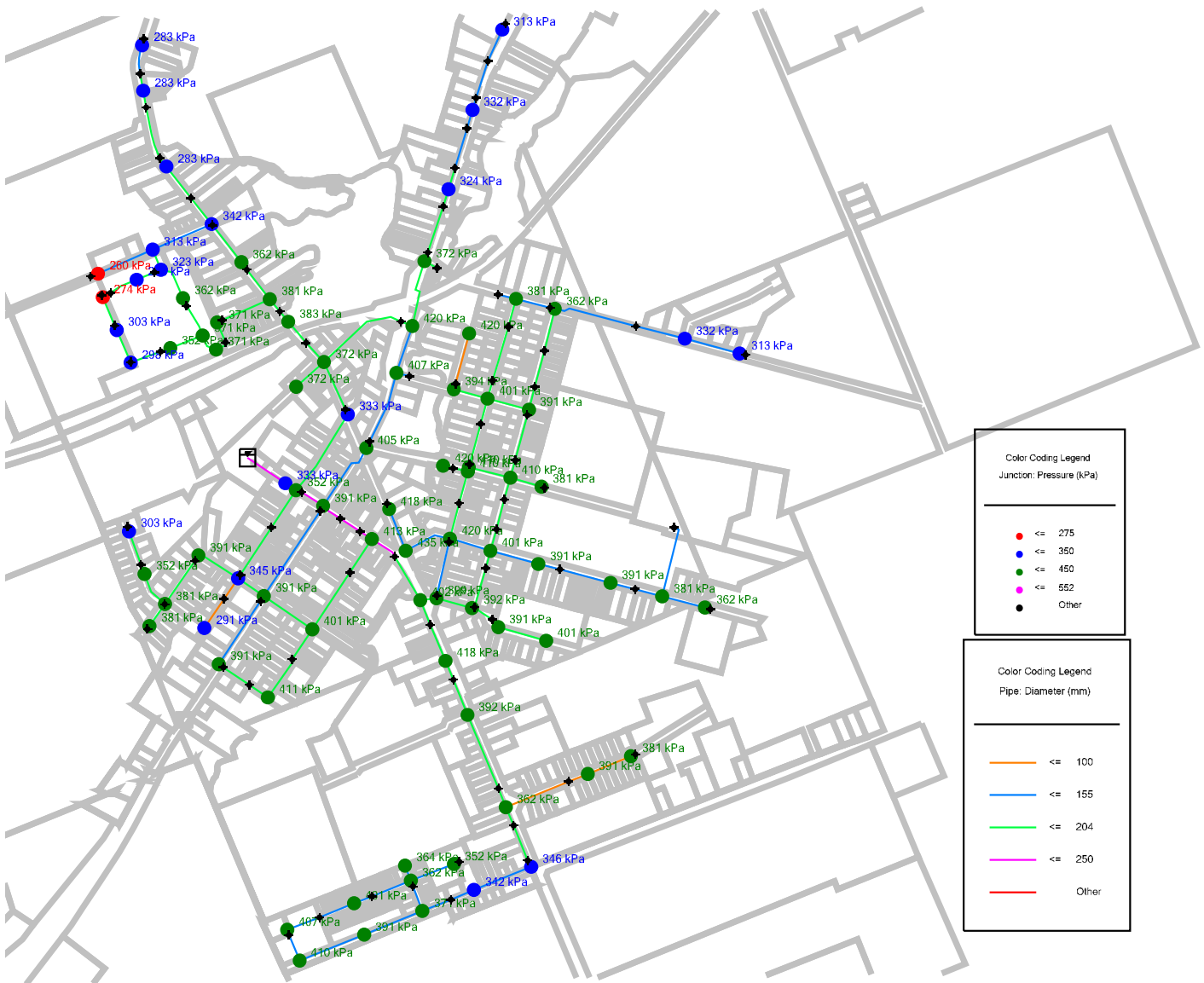


Appendix D

Water Model Figures

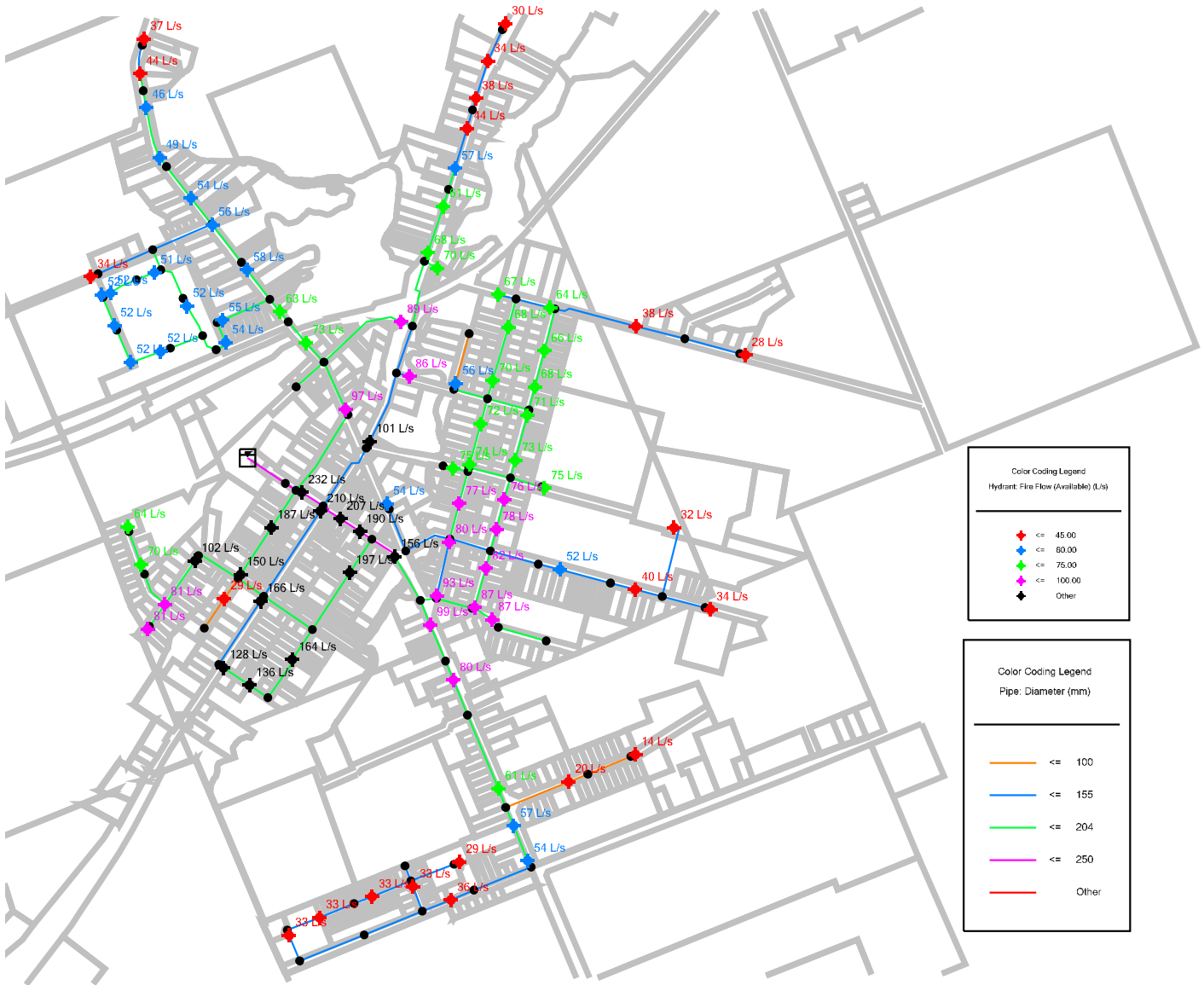
Norwood Water Model (JLR 29837)

Average Day Demand - Pressures



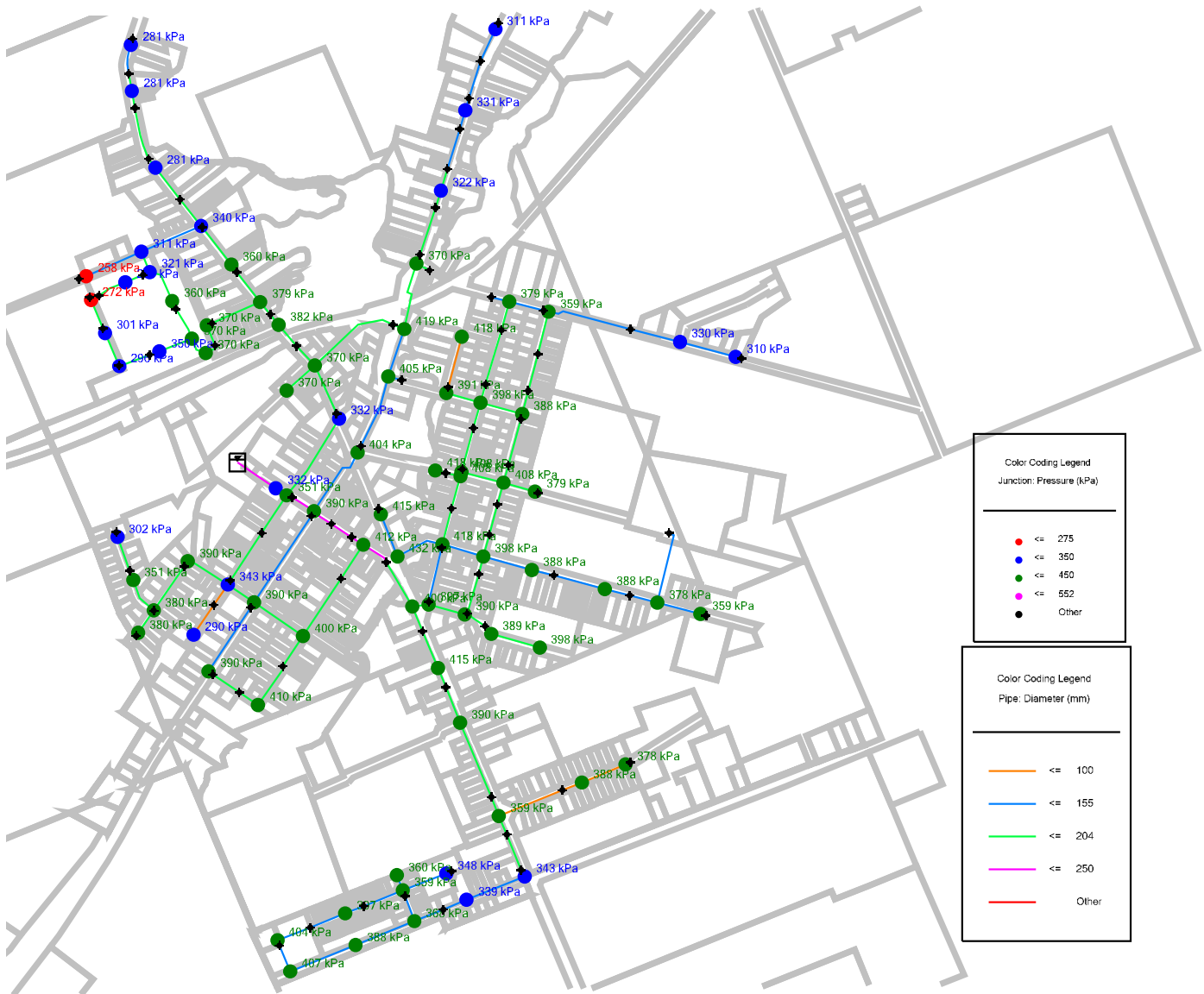
Norwood Water Model (JLR 29837)

Maximum Day + Fire Flow - Available Fire Flows



Norwood Water Model (JLR 29837)

Peak Hour Demand - Pressures





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Appendix B

2020 Infrastructure
Assessment Report by
Engage Engineering Ltd

Existing & Future Conditions Review

Norwood Infrastructure Assessment
Village of Norwood
Engage Project No. 19055

Engage Engineering Ltd.

July 2020

Issued for Submission



REVISION SUMMARY

Revision No.	Revision Title	Date	Revision Summary
1	Existing Conditions	January 15 th , 2020	Issued for Client Review
2	Existing & Future Conditions	April 23 rd , 2020	Issued for Client Review
3	Existing & Future Conditions	July 3 rd , 2020	Issued for Client Review
4	Existing & Future Conditions	July 23 rd , 2020	Issued for Submission

This report was prepared by Engage Engineering Ltd. (Engage) for the Township of Asphodel Norwood and intended for their sole use only. This report is considered our professional work product and remains the property of Engage. Any unauthorized reuse, redistribution of, or reliance upon the report, shall be at the users risk, without liability to Engage.

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1.0 Introduction

1.1 Purpose

Engage Engineering Limited (Engage) has been retained by the Township of Asphodel Norwood (Township) to prepare an infrastructure assessment for future growth within the Village of Norwood (Village). This report summarizes both the existing and future conditions. It presents the conditions of the sanitary collection system and water distribution system within the village as well as identifies plant conditions within both the water and wastewater plants under current and future scenarios.

Future development areas have been established through correspondence with the Township. The future areas for development were separated into three phases: proposed developments, future developments and distant future developments based on the anticipated timeline of the development. Included in Phase 1 are the proposed development areas which are developments that the Township identified as the most likely to occur and have applications underway. Included in Phase 2 are the future development areas identified by the Township as areas that will be developed but do not have applications started. Phase 3 are the distant future development areas which include areas that the Township see being developed at some point in the distant future but are with a lower degree of certainty. The future development areas within each phase are outlined in **Figure 3** and summarized in **Table 1** below.

Table 1 – Future Works Phasing Summary

	Phase 1	Phase 2	Phase 3
No. of Development Areas	3	3	5
Total Area (ha)	58.40	23.34	70.72
No. of Residential Units	589	267	962
No. of Townhouse Units	146	-	20
No. of Retirement Home Units	100	80	-
Industrial Area (ha)	7.97	-	-

Based upon these future development areas, recommended upgrades to the current infrastructure as well as the timing of these upgrades have been identified and described. The ultimate goal of this assessment is for the Township to prepare for future growth of the Village and be aware of the infrastructure upgrades required to support the growth.



2.0 Sanitary Servicing

2.1 Existing Conditions

The existing sanitary collection system and wastewater treatment plant that services the Village of Norwood is owned and operated by the Township of Asphodel-Norwood. The wastewater system is comprised of the following infrastructure:

- One wastewater treatment plant located on Industrial Drive.
- Three municipal pumping stations.
- Gravity collection system consisting generally of 200mm sanitary sewer with varying material types (asbestos concrete, vitrified clay, PVC)

The Township provided treatment plant capacity and sewage flow data for the last ten years of operation, 2010-2019. The data was amalgamated and average daily flows for each year were obtained. A summary of the data is included in **Appendix A**.

The wastewater treatment plant in Norwood has a maximum capacity of 1,500m³/day with records showing the average daily flow of the ten years to be 522m³/day. Therefore, the plant is currently operating at 35% capacity. Refer to **Appendix A** for Norwood treatment plant capacity and sewage flows.

The locations and sizes of the existing sanitary sewers are shown on the Sanitary Collection System Plan included as **Figure 1**. The proposed sanitary sewer upgrades for Norwood Park Phase 3 subdivision have been considered in the existing conditions phase as approval is currently in progress.

2.2 Design Criteria

Design criteria to analyze the wastewater flow for the village has been assembled from MOE and the Township requirements and includes:

- Residential sewage flow of 450 L/person/day.
- Commercial sewage flow of 28 m³/ha/day (0.33 L/s/ha)
- School sewage flow of 70 L/student/day
- Retirement home sewage flow of 450 L/bed/day
- Norwood Fair sewage flow of 25 L/attendee/day
- Townhome units to have capacity of 2.4 persons/unit
- Single detached residential lots to have capacity of 2.5 persons/unit for existing conditions
- Single detached residential lots to have capacity of 3.0 persons/unit* for future conditions
- Harmon peaking formula to be applied to residential flows
- Infiltration rate of 0.09 L/ha/s for inflow and infiltration for existing conditions
- Infiltration rate of 0.28 L/ha/s* for inflow and infiltration for future conditions



*The future condition values were determined by the Township based upon the demographics of the Township and the potential to have separate basement units within a single-family home. The MOE infiltration value was conservatively used for future planning.

2.3 Proposed Flows & Wastewater Treatment Plant Capacity

Sewage flow rates for the existing conditions were analyzed based on MOE guidelines and the existing sewage flow data that was provided by the Township, included in **Appendix A**. The data from the highest demand year, 2010 was conservatively utilized. An infiltration rate of 0.28L/ha/s has been used for the analysis of the future conditions at this time. The Township has indicated that CCTV and rehabilitation work has taken place over the last several of years in order to reduce the amount of inflow and infiltration into the system. Additional time and monitoring is required to confirm the reduction in infiltration and hence sanitary flows prior to a specific value that better represents the current Village conditions can be utilized. This rate will be applied when the information becomes available.

Based on the design criteria outlined above, the total average sewage flows from all future developments has been calculated. The results are summarized in **Table 2** below and detailed calculations are included in **Appendix B**.

Table 2 – Proposed Sewage Flow

Flow Type	Phase 1 Flow (m ³ /day)	Phase 2 Flow (m ³ /day)	Phase 3 Flow (m ³ /day)
Single Family Residential Flow	795.2	360.5	1298.7
Townhome Residential Flow	157.7	-	21.6
Retirement Home Flow	45.0	36.0	-
Industrial Flow	440.7	-	-
Infiltration Flow	1412.8	564.64	1710.9
Average Design Flow	2851.4	961.1	3031.2

The capacity of the existing wastewater treatment plant was analyzed based upon the highest demand year to confirm the residual capacity available to accommodate future development within the Village. The existing flows were combined with the future flows to demonstrate the total flow. The results are presented in **Table 3** below.



Table 3 – Wastewater Treatment Plant Capacity

Flow Type	Average Daily Flow (m ³ /day)	Rated Capacity of Wastewater Treatment Plant (m ³ /day)	Wastewater Treatment Plant Capacity (%)
Existing Flows (to date)	579	1,500	39
EX + Phase 1 Flows	3,430	1,500	229
EX + PH 1 + Phase 2 Flows	4,392	1,500	293
EX + PH 1 + PH 2 + Phase 3 Flows	7,423	1,500	495

The results indicate that based upon the existing flow data, the wastewater treatment plant has some residual capacity for future developments, however, does not have sufficient capacity to accommodate all future development areas identified. A further investigation determined that approximately 289 single family units can be accommodated prior to plant upgrades being required. Single family home developments with less than 289 units will not create a capacity problem within the wastewater treatment plant. The Township will need to be mindful of this allocation on a first come, first serve basis for future development areas. Detailed calculations are included in **Appendix C**. A Municipal Class EA is required to support upgrades to the wastewater treatment plant including assessment of existing plant operations and recommendations for expansion.

2.4 Pumping Stations

Through correspondence with the Township it was determined that the Lions Park pumping station would be investigated. The Belmont Street and Maple Avenue pumping stations are not a concern as they are operating satisfactorily under existing conditions and there is little or no future development potential contributing to these stations.

The Lions Park pumping station currently consists of two submersible pumps rated at 55.1 L/s. The rated peak flow capacity of the pumping station is based on only one pump in service which equates to 4,761m³/day. The background information on the pumping station is included in **Appendix A**. Influent hourly peak flow data for 2017-2020 was obtained from the Township in order to assess the pumping station based on the peak hourly flows. The maximum peak hourly flow from the four years was utilized and is displayed in **Table 4** below and the historical influent flow data is summarized in **Appendix A**.

Based on theoretical peak flow calculations, the pumping station capacity is exceeded under existing conditions as outlined in **Table 4** below. When utilizing the highest hourly peak flow from the historical data, the pumping station is operating at 84% capacity. The discrepancy between the actual and calculated values is not unexpected as the MOE guidelines utilized for the theoretical calculations are conservative. There is some residual capacity in the pumping station if we utilize actual values. A further investigation



determined that based on the actual flow data, approximately 94 single family units can be accommodated prior to pumping station upgrades being required. The capacity of the pumping station will need to be increased during Phase 1 in order to accommodate flows from the future development areas. Calculations are included in **Appendix D**. A Municipal Class EA is required to support upgrades to the Lion's Park pumping station including evaluating the feasibility of upgrading the station versus construction of a new station.

Table 4 – Peak Pumping Station Capacity

Flow Type	Peak Flow (L/s)	Rated Capacity of Pumping Station (L/s)	Pumping Station Capacity (%)
Existing Flows (Actual)	46.5	55.1	84
Existing Flows (Calculated)	64.9	55.1	118
Existing + Phase 1 Flows	155.8	55.1	283
Existing + Phase 2 Flows	175.3	55.1	318
Existing + Phase 3 Flows	236.3	55.1	429

2.5 Forcemain

The existing 200mm diameter forcemain from the Lions Park pumping station to the wastewater treatment plant was analyzed under existing and future peak flows. The velocity was calculated to check if it falls between the MOE guidelines of 0.6-3.0m/s. The friction loss was calculated to determine the total losses in the forcemain. It was concluded that the existing 200mm diameter forcemain is sufficient for the existing peak flows. The forcemain will require to be upgraded for the phase 1 developments as the velocity and friction loss are increased beyond allowable as demonstrated in **Table 5**. A specific unit count cannot be determined as the pumping station upgrades will affect the forcemain upgrades and the two items will need to be coordinated together during the development of the phase 1 lands. It was determined that a 375mm diameter forcemain is adequate for the final future conditions of all developments. With the future flows determined the velocity in a 375mm diameter forcemain will be within the MOE guidelines and the resultant friction losses will be within a reasonable range for typical pump sizing. Instead of a single 375mm diameter forcemain, the Township could also consider leaving the existing forcemain in place and adding a 300mm diameter forcemain, which would provide some redundancy. The forcemain, pumping equipment and the station itself all function as an integrated system. Upgrades or replacement of any of these components should be considered as a system and the effect on all aspects including the forcemain, pumping equipment and the station itself should be considered and understood. This could be completed as part of a municipal Class EA study on the pumping station to determine the best solution that meets both interim and long-term development needs. A summary of the forcemain calculations is included in **Appendix E**.



Table 5 – Forcemain Analysis

Flow Type	Peak Flow (L/s)	Diameter Forcemain (mm)	Velocity (m/s)	Friction Loss (m)
Existing Flows	46.5	200	1.5	9.9
Existing + Phase 1 Flows	155.8	200	5.0	92.3
Existing + Phase 2 Flows	175.3	200	5.6	114.8
Existing + Phase 3 Flows	236.3	200	7.5	199.4
Existing + Phase 3 Flows	236.3	375	2.1	11.2

2.6 Sewer Capacity Analysis

The capacity of the existing sanitary sewers within the Village were analyzed to confirm the current operating conditions. A sanitary sewer design sheet was prepared to document flows, resultant pipe capacities and sewer velocities. Flows and velocities were calculated based on the design criteria and infiltration presented earlier in this report. The sanitary sewer design sheet is included in **Appendix F**.

The Sanitary Drainage Area Plan included in **Figure 2** shows the existing sewer locations with maintenance hole ID numbers and supporting sanitary drainage areas. The drainage area plan was prepared using as-built drawings obtained from the Township. Pipe material, slope and lengths were obtained from as-built drawings provided by the Township. The pipe material for many pipes was not indicated on the as-builts and concrete pipe was assumed.

The future development areas described in Section 1.1 are delineated on the Future Works Sanitary Drainage Area Plan included as **Figure 4**. The unit counts were determined from concept plans where available and by using a density of 14 units/hectare for all other areas. This density was determined by using an average density from Norwood Park Phase 3 and the future development on Mill Street as it was determined that this average would represent a typical density target for future developments.

The capacity of the sewers in both existing and future conditions are included in **Appendix F**. The sanitary system has been analyzed from all major intersections or changes in pipe size. The lowest slope within each section has been conservatively used. The sewer upgrades required for the Norwood Park Phase 3 development have not been included as future upgrades as they are currently underway. Under existing conditions, no sections of sewer are operating above 100% and two sections are operating above 80% capacity. Under future conditions, there are 17 sections of sewer which are operating above 100% capacity and require upgrades. The sections of sewer which require upgrading are identified in red on **Figure 4** and future pipe sizes are summarized in **Table 6** below.

A further investigation was undertaken to identify the approximate number of units that can be accommodated in each stretch of sewer prior to upgrades being required at 80% capacity. The analysis was completed on each section individually and is exclusive to runs



before and after. The Township will need to be mindful of this and look to the lowest unit count downstream that can be accommodated for any given development to see the constraint.

Table 6 – Sanitary Sewer Sizing Summary

Sewer Location	Manhole ID	Existing Pipe Diameter (mm)	# of Units Prior to Upgrade Required	Future Pipe Diameter (mm)
Pine Street	MH2A to MH27	200 mm	142	250 mm
Pine Street	MH27 to MH16	200 mm	102	300 mm
Pine Street	MH16 to MH4	200 mm	175	250 mm
Spring Street	MH4 to MH7	200 mm	50	300 mm
Albine Street	MH17A to MH201	200 mm	55	300 mm
County Road 40	MH201 MH59	200 mm	0	300 mm
County Road 45	MH7 to MH33	200 mm	87	250 mm
Elm Street	MH80 to MH105	200 mm	110	300 mm
Elm Street	MH105 to MH41	200 mm	0	375 mm
Queen Street	MH41 to MH45	200 mm	0	375 mm
Queen Street	MH45 to MH166	200 mm	0	375 mm
Victoria Street	MH97 to MH101	200 mm	105	300 mm
Victoria Street	MH101 to MH166	200 mm	42	375 mm
Pumping Station	MH166 to MH124	250 mm	42	450 mm

2.7 Proposed Sewer

Due to the numerous development areas in the southeast of the Village boundary, new sanitary sewer is being proposed along County Road 42. This sewer will connect into the existing sewer on Victoria Street. The new sewer has been determined as a 300mm diameter sewer which has been assumed to service Phase B of the future development located at 2291 County Road 45 and the lands located at 1552 County Road 42. The approximate location for the new sewer is shown on **Figure 4**.



3.0 Water Servicing

3.1 Existing Conditions

The existing water distribution system that services the Village of Norwood is owned and operated by the Township of Asphodel-Norwood. The municipal drinking water system is comprised of the following infrastructure:

- Four municipal wells, with low lift pumping stations and treatment systems
- One municipal water tower (standpipe) with a capacity of 1283m³
- Approximately 13km of watermain piping ranging in size (from 32mm to 250mm) and material type (black iron, ductile iron, asbestos cement and PVC)

The Township provided the water treatment plant capacity and daily water consumption data for the last ten years of operation, 2010-2019. The data was amalgamated and average daily flows for each year were obtained. A summary of the data is included in **Appendix A**.

As requested by the Township, the data from 2010 has been excluded from the historical averages. It was determined that the data from this year is an outlier and was a result of a watermain break during a road reconstruction project. The data from years 2011-2019 has been utilized in the analysis below. There is generally a decreasing trend in the water consumption which is presumed to be a result of the implementation of water metering as well as the ongoing infrastructure improvements that the Township is undertaking to reduce leakage throughout the Village.

The municipal drinking water system in Norwood has a rated capacity of 1,965 m³/day (maximum flow rate). The locations and sizes of the existing watermains in the Village are shown on the Water Distribution Plan included as **Figure 5**.

3.2 Design Criteria

Design criteria to analyze the future water demand for the Village has been assembled from MOE and the Township requirements and includes:

- Residential water demand of 450 L/person/day.
- Townhome units to have capacity of 2.4 persons/unit
- Single detached residential lots to have capacity of 3.0 persons/unit
- Maximum day factor of 2.00 (based on a future population of 8452)
- Peak hour factor of 3.00 (based on a future population of 8452)
- Minimum fire flow of 2000 L/min
- The minimum pressure of the system shall meet or exceed 40 psi (275 kPa) during normal operating conditions.
- The minimum pressure of the system shall meet or exceed 20 psi (138 kPa) during maximum day plus fire flow conditions.



3.3 Drinking Water Treatment System Capacity

Based on a Statistics Canada Census Profile from 2016 the Village of Norwood has a population of 1,380. Actual water consumption rates of users have been collected over nine years and the data from the highest demand year (2011) has been used for the analysis. The data is included in **Table 7** below.

Table 7 – Existing Water Consumption

Year	Average Daily Flow (m ³ /day)	Minimum Daily Flow (m ³ /day)	Maximum Daily Flow (m ³ /day)
2011	694	461	1,259

Based on the design criteria listed above, the domestic water demands for the future developments have been calculated. The results are included in **Appendix G** and summarized in **Table 8** below.

Table 8 – Future Domestic Water Flow

Flow Type	Phase 1 Flow (m ³ /day)	Phase 2 Flow (m ³ /day)	Phase 3 Flow (m ³ /day)
Average Day Flow	1438.5	396.5	1320.3
Maximum Day Flow	2877.1	792.9	2640.6
Peak Hour Flow	4315.6	1189.4	3960.9
Fire Flow	2880.0	2880.0	2880.0
Maximum Day + Fire Flow	5757.1	3672.9	5520.6

The capacity of the existing Norwood drinking water system was analyzed to confirm if it can accommodate the additional flows to service the future developments. The average maximum daily flow measured over the last nine years was utilized for the existing condition. The results are presented in **Table 9** below.

Table 9 – Norwood Drinking Water System Capacity

Flow Type	Maximum Daily Flow (m ³ /day)	Rated Capacity of Drinking Water System (m ³ /day)	Drinking Water System Capacity (%)
Existing Flows (Average to date)	1,003	1,965	51
EX + Phase 1 Flows	6,760	1,965	344
EX + PH 1 + Phase 2 Flows	7,553	1,965	384
EX + PH 1 + PH2 + Phase 3 Flows	10,194	1,965	519



Based on the above information, the capacity in the drinking water treatment system is not adequate to supply for the future development areas and upgrades will be required to increase the capacity during the development of Phase 1 lands.

The average maximum daily flow measured over the last nine years is 1,003m³/day, resulting in a theoretical available maximum day capacity of 962 m³/day for future development. This equates to approximately 356 additional residential units, assuming 3.0 persons per unit and maximum day demands. Calculations are included in **Appendix H**. A Municipal Class EA is required to support the required upgrades to the water treatment plant including assessment of existing plant capacity and function and identifying the recommended means of expanding the plant capacity.

3.4 Proposed Watermain

Due to the numerous development areas in the southeast of the Village boundary, new watermain is being proposed along County Road 42. This watermain will connect into the existing watermain on Victoria Street. The new watermain has been specified as a 200mm diameter watermain and is assumed to service Phase B of the future development located at 2291 County Road 45 and the lands located at 1552 County Road 42. The approximate location of the new watermain is shown on **Figure 7**.

3.5 Treated Drinking Water Storage

The existing standpipe in the Village of Norwood has a total capacity of 1,283m³. A design brief was unavailable for the original design of the standpipe, therefore as-built drawings were utilized to assess the current conditions of the standpipe. Based upon the current operating conditions of the standpipe the effective volume was determined to be 1063m³. The treated water storage required for both existing and future conditions was determined based upon the MOE guidelines and are summarized in **Table 10** below. Detailed calculations are included in **Appendix I**.

Table 10 – Treated Water Storage

Volume Type	Total Treated Water Storage Requirement (m ³ /l)	Effective Volume in Standpipe (m ³)	Standpipe Capacity (%)
Existing (to date)	1,024	1,063	96
EX + Phase 1	2,008	1,063	189
EX + PH 1 + Phase 2	2,392	1,063	225
EX + PH 1 + PH 2 + Phase 3	4,305	1,063	405

It was determined that the existing standpipe is just adequate for the existing population with very little reserve capacity for future developments. Additional treated water storage is required for any future development areas. A water tower is likely the optimal solution to provide additional treated water storage as well as increase pressures throughout the system. Three potential locations for a new water tower are shown on **Figure 7**. The locations at the southeast of the village boundary and north of the public works building



on Highway 7 were selected based upon existing topography. The third potential location is adjacent the existing standpipe which is advantageous due to the proximity to the existing Water Treatment Plant. The other two locations would require new water treatment facilities in proximity. It is recommended that the Township undertake an investigation to identify the amount of water available in the Esker. Additionally, a Municipal Class EA study should be undertaken to determine the most appropriate location and type of future treated water storage.

3.6 Distribution System Pressures & Fire Flows

The existing system pressures were reviewed to ensure they fall within the MECF guidelines, as outlined below:

- | | |
|-------------------------------------|------------------------------------|
| • Normal Operating Pressure | from 350 to 480 kPa (50 to 70 psi) |
| • Minimum Operating Pressure | >275 kPa (40 psi) |
| • Maximum Operating Pressure | <700 kPa (100 psi) |
| • Maximum day demand plus fire flow | >140kPa (20 psi) |

Hydrant flow testing was obtained from the Township to analyze current system pressures and flows. The results from the flow and pressure testing results for the Village are included in **Appendix A**. Testing was performed on the hydrants in 2016 however not all areas of the distribution system have hydrant test data available, so some areas were not evaluated for existing pressure conditions. The results of the testing generally indicated that the static pressures are above 40 psi and below 70 psi indicating adequate pressures are available throughout the Village according to MOE guidelines. The Township is aware of some low-pressure issues and complaints from users in the system and so a measure should be considered to provide a moderate overall increase in system pressures. The distribution of static pressure ranges throughout the village are included on **Figure 6**.

The total 1 port flow at 20 psi was determined through the flow testing. The flow ranged from 653 gpm to 4275 gpm.

To confirm the available flow at a pressure of 40 psi the Hazen-Williams formula was employed for the minimum and maximum condition at respective hydrants. The minimum flow available within the village at 40 psi is 1257 l/min at hydrant 67 located at 4420 Highway 7. The maximum flow available within the village at 40 psi is 11,129 l/min at hydrant 24 located at 2362 County Road 45. For detailed calculations refer to **Appendix J**.

The approximate elevations for the future developments are included on **Figure 7**. The highest elevation based on GIS contour data has been identified. Based upon this information it may be difficult to achieve adequate pressures with the existing standpipe for some of the developments. The developments include those north of Mill Pond, west of Wellington and the south east corner of the Village boundary based upon their elevations. This will need to be evaluated when the proposed grading for the developments is established, however the new water tower should be designed in order to satisfy pressure requirements as well as treated water storage requirements.



4.0 Summary

Engage has been retained by the Township of Asphodel-Norwood to review the existing municipal services within the Village in order to plan for future growth. The assessment summarizes the existing and future conditions. The conditions of the sanitary collection system and water distribution system as well as plant conditions have been analyzed for both existing and future conditions. Future areas for development were separated into three categories: proposed developments, future developments and distant future developments based on the anticipated timeline of the development. The results have been displayed with respect to the three phases.

The existing gravity sanitary sewer system for the Village of Norwood was analyzed. Based on the calculated flows using the design criteria discussed with the Township, all sections are currently operating below 100% capacity and there are two sections that are operating above 80% capacity. The sanitary sewer system was assessed when all future development areas are considered. This resulted in 17 sections of sewer exceeding 100% capacity which require to be upgraded to accommodate future development areas. The sizing of the proposed sewers to accommodate the additional flows was provided for each section of sewer requiring upgrading. An additional investigation determined the number of units that can be accommodated in each stretch of sewer prior to upgrades being required.

The capacity of the wastewater treatment plant was analyzed based on actual average flow data from ten years of operation. It was concluded that the existing wastewater treatment plant has capacity to accept flows from 289 future residential units. Upgrades will be required to the plant for any additional development exceeding 289 units. It was determined that plant upgrades will be required during Phase 1.

The capacity of the existing Lions Park pumping station was analyzed based on peak flow data. Based on historical hourly flow data, the pumping station is currently operating at 84% capacity and has capacity to accommodate 94 residential units prior to upgrades. It was concluded that upgrades will be required to the pumping station in Phase 1.

The existing 200mm diameter forcemain was analyzed based on peak flow data. The forcemain is adequate for the existing conditions however will need to be upgraded in conjunction with the pumping station upgrades during phase 1. The future size of the forcemain was determined to be 375mm diameter, however the Township could also consider adding an additional forcemain adjacent the existing forcemain to provide redundancy.

The water distribution system was analyzed under existing and future conditions. The capacity of the water treatment plant was analyzed based on actual flow data from ten years of operation. It was determined that there is residual capacity in the water distribution system for 356 future residential units. Upgrades will be required to the water treatment plant for additional development upon this during the Phase 1 developments.



The existing standpipe was analyzed to assess the treated water storage available for future developments. It was concluded that the existing standpipe is just adequate for the existing conditions with very little reserve capacity for future developments. A new water tower should be investigated to increase the treated water supply and increase pressure throughout the system prior to Phase 1 of the future development occurring. Potential locations for a new water tower have been identified and should be investigated further to determine the optimal solution.

The future development areas identified by the Township have a large impact on both the existing sanitary and water systems within the Village. Upgrades are required to both systems in order to support the future growth of the Village.

Prepared by:

Mackenzie Crowley,
EIT

Reviewed by:

Paul Hurley, P. Eng
Principal

Figure 1 - Sanitary Collection System



LEGEND

VILLAGE BOUNDARY

EXISTING SANITARY SEWER

EXISTING SANITARY SEWER
(AS-BUILTS NEEDED)

SANITARY FORCE MAIN

ENGAGE

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Phone: (705) 755-5407

NORWOOD INFRASTRUCTURE
ASSESSMENT

**FIGURE 1 - SANITARY
COLLECTION SYSTEM**

DRAWN: K. SHARIA

APPROVED: P. HURLEY

SCALE: 1:4000

DATE: 2019-11-01

PROJECT No.: 19055

S:\01 - Projects\19000\19055 - Infrastructure Assessment for Growth Plan\02 Design\01 - Drawings\Current Drawings\19055 - SAN_DA.dwg PRINTED: Jul 21, 2020

Figure 2 - Existing Sanitary Drainage Area
Plan



LEGEND

VILLAGE BOUNDARY

EXISTING SANITARY SEWER (AS-BUILTS NEEDED)

EXISTING SANITARY SEWER

SANITARY FORCE MAIN

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

2

No. OF RESIDENTIAL UNITS

1

1.50

INFLTRATION AREA (ha)

SCHOOL AREA

COMMERCIAL AREA

RETIREMENT HOME AREA

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NORWOOD INFRASTRUCTURE ASSESSMENT

FIGURE 2 - EXISTING SANITARY DRAINAGE AREA PLAN

DRAWN: K.SHARIA

APPROVED: P.HURLEY

SCALE: 1:4000

DATE: 2019-11-01

PROJECT No.: 19055

Figure 3 - Future Works Phasing Plan

LEGEND

- VILLAGE BOUNDARY
- PHASE 1: KNOWN PROPOSED DEVELOPMENTS
- PHASE 2: FUTURE DEVELOPMENTS
- PHASE 3: DISTANT FUTURE DEVELOPMENTS



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NORWOOD INFRASTRUCTURE ASSESSMENT

FIGURE 3 - FUTURE WORKS PHASING PLAN

DRAWN: K.SHARIA	APPROVED: P.HURLEY	SCALE: 1:5000	DATE: 2020-07-21	PROJECT No.: 19055
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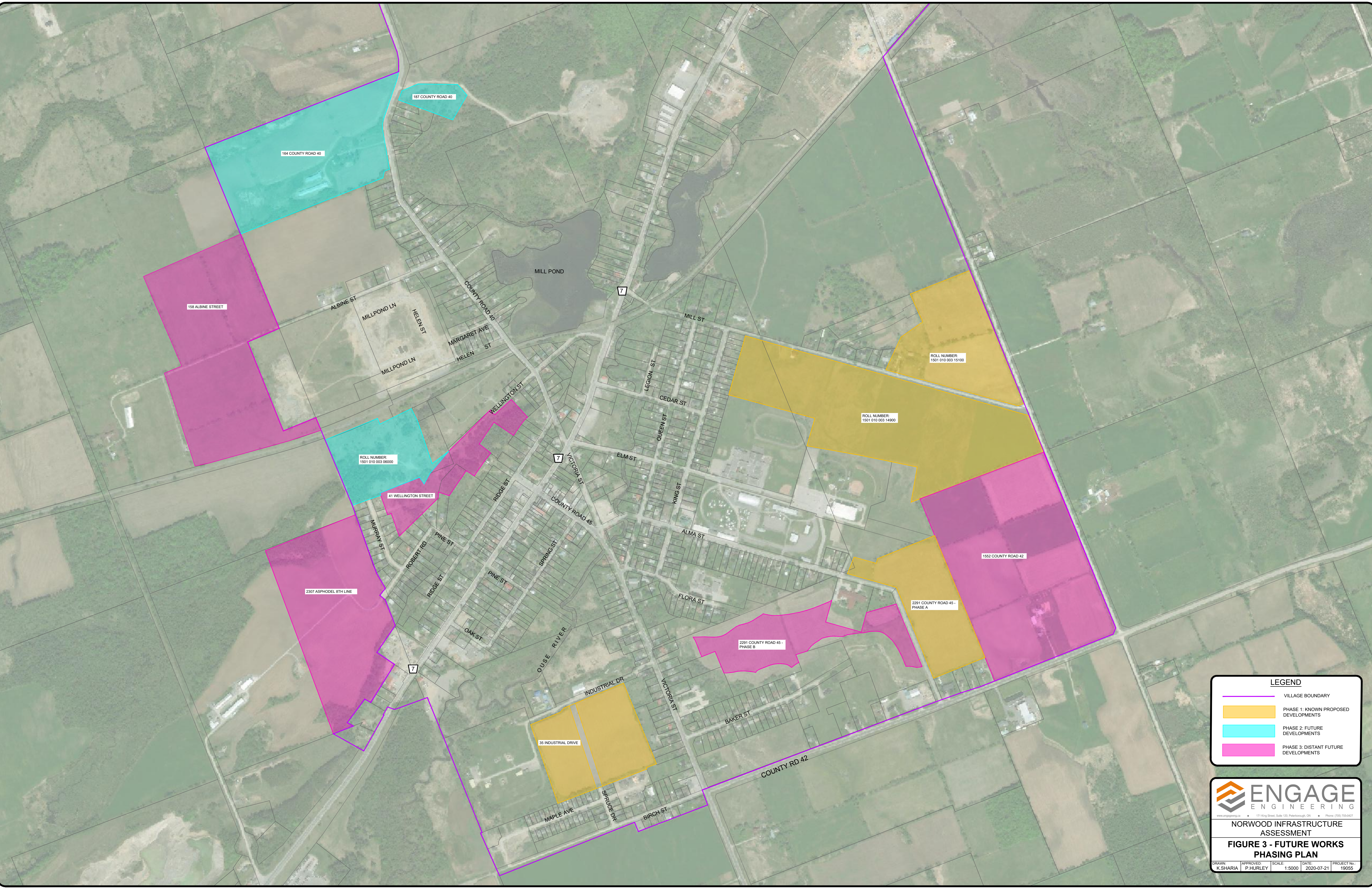


Figure 4 - Future Works Sanitary Drainage
Area Plan

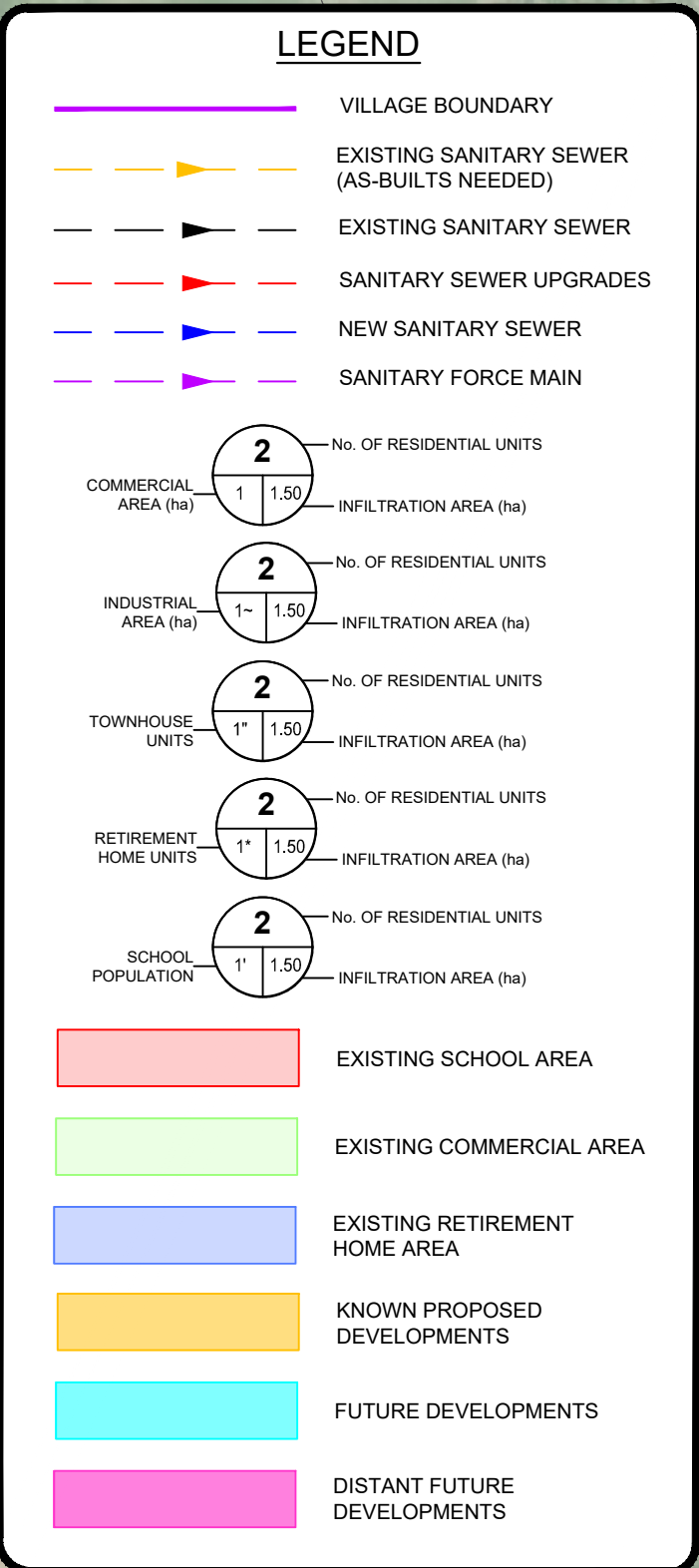


Figure 5 - Water Distribution Plan



LEGEND

VILLAGE BOUNDARY

EXISTING WATER MAIN

EXISTING FIRE HYDRANT

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VILLAGE OF NORWOOD

FIGURE 5 - WATER DISTRIBUTION PLAN

DRAWN: K.SHARIA	APPROVED: P.HURLEY	SCALE: 1:4500	DATE: 2019-11-27	PROJECT NO.: 19055
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Figure 6 - Hydrant Static Pressure Distribution
Plan



LEGEND

VILLAGE BOUNDARY

EXISTING WATER MAIN

EXISTING FIRE HYDRANT

H00

STATIC PRESSURE 40 - 49 psi

H00

STATIC PRESSURE 50 - 59 psi

H00

STATIC PRESSURE 60 - 69 psi

H00

UNTESTED

*

EXISTING WATER TOWER

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VILLAGE OF NORWOOD

FIGURE 6 - HYDRANT STATIC PRESSURE DISTRIBUTION PLAN

DRAWN:
K LAUTENBACH

APPROVED:
P HURLEY

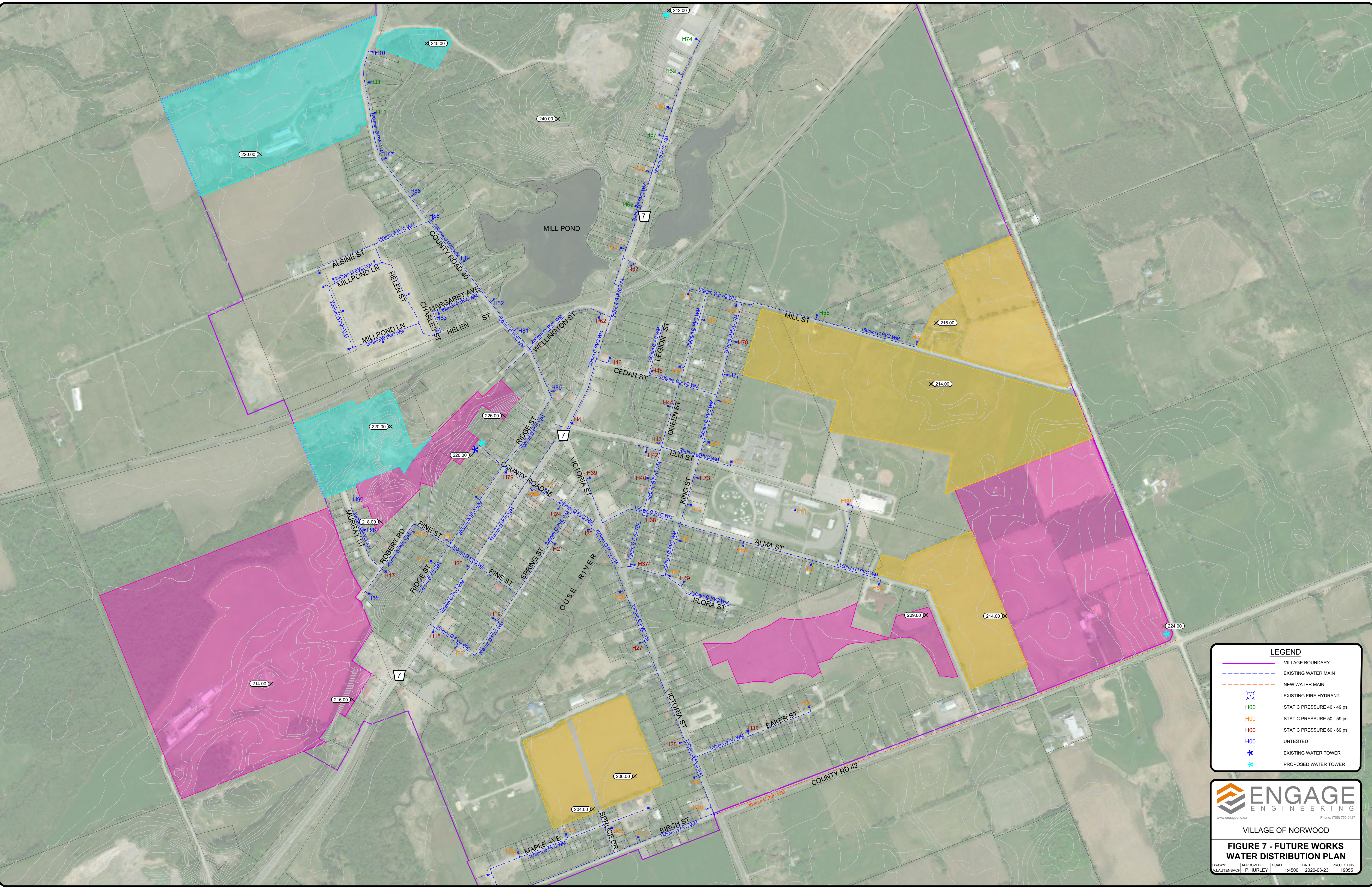
SCALE:
1:4500

DATE:
2020-01-07

PROJECT No.:
19055

S:\01 - Projects\19000\19055 - Infrastructure Assessment for Growth Plan\02 Design\01 - Drawings\Current Drawings\19055 - N&T.dwg PRINTED: Jul 21, 2020

Figure 7 - Future Works Water Distribution
Plan



LEGEND

VILLAGE BOUNDARY

EXISTING WATER MAIN

NEW WATER MAIN

EXISTING FIRE HYDRANT

H00

STATIC PRESSURE 40 - 49 psi

H00

STATIC PRESSURE 50 - 59 psi

H00

STATIC PRESSURE 60 - 69 psi

UNTESTED

*

EXISTING WATER TOWER

*

PROPOSED WATER TOWER

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VILLAGE OF NORWOOD

FIGURE 7 - FUTURE WORKS
WATER DISTRIBUTION PLAN

DRAWN:
A. LAUTENBACH

APPROVED:
P. HURLEY

SCALE:
1:4500

DATE:
2020-03-23

PROJECT No.:
19055

S:\01 - Projects\19000\19055 - Infrastructure Assessment for Growth Plan\02 Design\01 - Drawings\Current Drawings\19055 - WAT.dwg PRINTED: Jul 21, 2020

Appendix A: As-Constructed Servicing Drawings/Background Information

Norwood Water Consumption

Hide?

Year	Average Daily Flow (m3/day)	Minimum Daily Flow (m3/day)	Maximum Daily Flow (m3/day)	Rated Capacity (m3/day)	Percent of Rated Capacity Used Per Year
2010	722	323	1671	1965	37%
2011	694	461	1259	1965	35%
2012	583	267	944	1965	30%
2013	542	416	911	1965	28%
2014	520	391	1148	1965	26%
2015	582	140	1191	1965	30%
2016	543		815	1965	28%
2017	529		860	1965	27%
2018	593		1023	1965	30%
2019	620		874	1965	32%
10-Year Average	593		1070	1965	30%
9-Year Average	578		1003	1965	29%

NO 2010

TWP wants to Omit 2010

Norwood Sewage Flows

Year	Average Daily Flow (m3/day)	Minimum Daily Flow (m3/day)	Maximum Daily Flow (m3/day)	Rated Capacity (m3/day)	Percent of Rated Capacity Used Per Year
2010	579	396	875	1500	39%
2011	566	290	1551	1500	38%
2012	488	378	833	1500	33%
2013	494	397	815	1500	33%
2014	513	372	1786	1500	34%
2015	424	234	590	1500	28%
2016	440		990	1500	29%
2017	565		2081	1500	38%
2018	573		1618	1500	38%
2019	573		1087	1500	38%
10-Year Average	522		2081	1500	35%

Township of Asphodel-Norwood
Village of Norwood and TVE
Fire Hydrant Flows for Colour Coding as per NFPA - USGPM

2016

US Gal per minute	1500 +
US Gal per minute	1000-1500
US Gal per minute	500-1000
US Gal per minute	500 -

Date	Hydrant Number	Street Location	Static Pressure	Pitot Pressure	Residual Pressure	hr Pressure	hf Pressure	1 Port Flow	Total 1 Port Flow at 20 psi
Nov	10	159 County Road 40				-20	0	0	0
Nov	11	163 County Road 40	46	28	30	26	16	888	1154
Nov	12	181 County Rd 40	45	24	31	25	14	822	1124
18-Nov	13	52 Ridge Street	52	32	34	32	18	949	1295
Nov	14	68 Ridge Street	57	48	53	37	4	1163	3865
Nov	15	74 Ridge Street	55	16	52	35	3	671	2529
Nov	16	101 Robert Road	55	40	51	35	4	1061	3424
Nov	17	113 Robert Road	62	32	46	42	16	949	1598
16-Nov	18	Corner of Oak Street & Highway 7	62	18	56	42	6	712	2036
16-Nov	19	54 Spring Street	66	36	52	46	14	1007	1914
16-Nov	20	4222 Highway 7	62	32	55	42	7	949	2498
16-Nov	21	30 Spring Street	60	35	42	40	18	993	1528
16-Nov	22	Corner of Highway 7 & County Road 45	58	42	53	38	5	1087	3251
16-Nov	23	2369 County Road 45	56	60	38	36	18	1300	1890
16-Nov	24	2362 County Road 45	60	54	56	40	4	1233	4275
15-Nov	25	2346 County Road 45	64	45	50	44	14	1126	2089
16-Nov	26	2324 County Road 45	58	32	50	50	8	949	2553
16-Nov	27	2298 County Road 45	63	46	52	43	11	1138	2376

Township of Asphodel-Norwood
Village of Norwood and TVE
Fire Hydrant Flows for Colour Coding as per NFPA - USGPM

Date	Hydrant Number	Street Location	Static Pressure	Pitot Pressure	Residual Pressure	hr Pressure	hf Pressure	1 Port Flow	Total 1 Port Flow at 20 psi
16-Nov	28	2272 County Road 45	66	39	58	46	8	1048	2695
16-Nov	29	2264 County Road 45	59	38	43	39	16	1034	1673
Nov	30	2254 County Road 45	56	40	43	36	13	1061	1839

17-Nov	31	22 Birch Street	57	16	26	37	31	671	738
17-Nov	32	7 Spruce Street	54	16	26	34	28	671	745
17-Nov	33	11 Maple Street	56	22	27	36	29	787	884
18-Nov	34	29 Maple Street	58	21	26	38	32	769	844
21-Nov	35	16 Baker Street	62	28	41	42	21	888	1291
18-Nov	36	40 Baker Street	56	40	43	36	13	1061	1839
17-Nov	37	11 Queen Street	60	38	42	40	18	1034	1592
17-Nov	38	21 Queen Street	60	40	35	40	25	1061	1368
17-Nov	39	38 Victoria Street	62	20	22	42	40	750	770
17-Nov	40	30 Queen Street	60	38	49	40	11	1034	2077
18-Nov	41	4289 Highway 7	60	25	32	40	28	839	1017
17-Nov	42	31 Elm Street	62	32	40	42	22	949	1346
17-Nov	43	40 Queen Street	60	30	40	40	20	919	1336
17-Nov	44	52 Queen Street	60	35	38	40	22	993	1371
17-Nov	45	61 Legion Street	60	12	56	40	4	581	2015
15-Nov	46	Highway 7 & Cedar Street	62	40	42	42	20	1061	1584
17-Nov	47	62 Queen Street	58	44	40	51	18	1113	1953
17-Nov	48	83 Queen Street	58	30	38	38	20	919	1300
17-Nov	49	26 Flora Street	63	20	60	43	3	750	3160
21-Nov	50	44 Elm Street (Norwood High School)	58	32	38	38	20	949	1342
16-Nov	51	Corner of County Road 45 & Birch Street	50	28	30	30	20	888	1105
16-Nov	52	55 Oak Street (St.Pauls School)	50	38	38	50	12	1034	2235
16-Nov	53	Corner of King Street and Mill Street	50	30	32	30	18	919	1211
17-Nov	54	23 Mill Street	58	30	34	38	24	919	1178
21-Nov	55	67 Mill Street	48	18	20	28	28	712	712

Township of Asphodel-Norwood

Village of Norwood and TVE

Fire Hydrant Flows for Colour Coding as per NFPA - USGPM

Date	Hydrant Number	Street Location	Static Pressure	Pitot Pressure	Residual Pressure	hr Pressure	hf Pressure	1 Port Flow	Total 1 Port Flow at 20 psi
21-Nov	56	106 Mill Street	50	18	18	30	32	712	688
21-Nov	57	55 Alma Street	54	32	32	34	22	949	1201
21-Nov	58	79 Alma Street	59	20	22	39	37	750	772

21-Nov	59	99 Alma Street	52	22	28	32	24	787	919
21-Nov	60	Asphodel Norwood Community Centre	54	20	24	34	30	750	803
21-Nov	61	Norwood Fair Grounds	50	24	22	30	28	822	853
15-Nov	62	Corner of Wellington and Highway 7	60	35	42	40	18	993	1528
15-Nov	63	Corner of Mill Street & Highway 7	60	25	30	40	30	839	980
15-Nov	64	12 Belmont Street	54	25	26	34	28	839	932
15-Nov	65	26 Belmont Street	48	25	24	28	24	839	912
15-Nov	66	4388 Highway 7	50	20	22	30	28	750	779
15-Nov	67	4420 Highway 7	48	17.5	16	28	32	702	653
15-Nov	68	4408 Highway 7	50	25	20	30	30	839	839
15-Nov	69	4420 Highway 7	48	19	15	28	30	731	705
17-Nov	70	11 King Street	58	35	40	38	18	993	1486
17-Nov	71	23 King Street	58	38	30	38	28	1034	1220
17-Nov	72	27 King Street	58	38	38	38	20	1034	1463
21-Nov	73	35 King Street	60	35	40	40	20	993	1443
15-Nov	74	4440 Highway 7	49	20	20	29	29	750	750
17-Nov	75	43 King Street	58	38	38	38	20	1034	1463
17-Nov	76	57 King Street	58	35	34	38	24	993	1272
Nov	77	67 King Street				-20	0	0	0
17-Nov	78	79 King Street	61	38	48	41	13	1034	1923
Nov	79	Corner County Road 40 & Ridge Street	61	37	49	41	12	1021	1982
Nov	80	37 County Road 40				-20	0	0	0
Nov	81	59 County Road 40				-20	0	0	0
Nov	82	77 County Road 40				-20	0	0	0
Nov	83	32 Helen Street				-20	0	0	0

Township of Asphodel-Norwood

653

Village of Norwood and TVE

4275

Fire Hydrant Flows for Colour Coding as per NFPA - USGPM

Date	Hydrant Number	Street Location	Static Pressure	Pitot Pressure	Residual Pressure	hr Pressure	hf Pressure	1 Port Flow	Total 1 Port Flow at 20 psi
Nov	84	91 County Road 40				-20	0	0	0
Nov	85	105 County Road 40				-20	0	0	0
Nov	86	123 County Road 40				-20	0	0	0

Nov	87	137 County Road 40				-20	0	0	0
Nov	88	121 Robert Road				-20	0	0	0
Nov	89	6 Murray Street				-20	0	0	0
Nov	90	20 Murray Street				-20	0	0	0
Nov	91					-20	0	0	0
Nov	92					-20	0	0	0
Nov	93					-20	0	0	0
Nov	94					-20	0	0	0
Nov	95					-20	0	0	0
Nov	96					-20	0	0	0
Nov	97					-20	0	0	0
Nov	98					-20	0	0	0
Nov	99					-20	0	0	0
Nov	100					-20	0	0	0
Nov	101					-20	0	0	0
Nov	102					-20	0	0	0
Nov	103					-20	0	0	0
Nov	104					-20	0	0	0
Nov	105					-20	0	0	0
Nov	106					-20	0	0	0
Nov	107					-20	0	0	0
Nov	108					-20	0	0	0
Nov	109					-20	0	0	0
Nov	110					-20	0	0	0

Township of Asphodel-Norwood

Village of Norwood and TVE

Fire Hydrant Flows for Colour Coding as per NFPA - USGPM

Date	Hydrant Number	Street Location	Static Pressure	Pitot Pressure	Residual Pressure	hr Pressure	hf Pressure	1 Port Flow	Total 1 Port Flow at 20 psi
Nov	111					-20	0	0	0
Nov	112					-20	0	0	0

Table 2.3. Ultrasonic Level Transmitter

Tag Number	LIT-203
Number of Transmitters	1
Type	Ultrasonic
Manufacturer	Siemens
Model	Pointek ULS 200
Range (m)	0 – 1.0
High Alarm Setpoint (m)	201.510

Table 2.4. Level Switches

Tag Number	LSH-201	LSH-204
Location	Inlet	Outlet
Trigger Setpoint (m)	201.556	201.606
Type	Switch	Switch
Model	Flygt ENM-10	Flygt ENM-10
Action	Opens Motorized Gate	Notify Operator

2.1.8 Emergency Provisions

In the event of a sewer blockage within the water pollution control plant, sewage can be pumped from the inlet structure to any treatment system as required.

2.2 Raw Sewage Pumping Station

2.2.1 Functional Overview

An adequate hydraulic gradient must be provided to allow wastewater to travel through the plant by gravity. The raw sewage pumping station provides the lift required to reach the starting elevation for the headworks screening and grit removal operations and secondary treatment. The existing raw sewage pumping station is a wet well/dry well type. The dry well was decommissioned and the wet well was reconfigured into a submersible pumping station.

2.2.2 Unit Operation Description and Description of equipment

The raw sewage pumping station receives raw wastewater from the service area and pumps it to the headworks structure. The pumping station is comprised of the following.

2.1.4 Safety Procedures

Any person working in confined spaces must have undergone safety training and must be knowledgeable of such work.

Masks, respiratory equipment and other safety devices must be in place while performing work in such tanks.

2.1.5 Normal Operation

The normal operation of the inlet structure is transporting wastewater into the adjacent headworks and then the secondary treatment system. No monitoring is required.

2.1.6 Bypass Operation

The inlet sewer is the only path for sewage to flow to the water pollution control plant and therefore cannot be bypassed.

2.1.7 Instrumentation and Control

Instrumentation is available to monitor and measure the flow and level handled at the inlet structure. A 200 mm magnetic flowmeter is provided on the forcemain discharging into the inlet structure. This magnetic flowmeter is housed in a below grade maintenance hole structure. The inlet structure consists of three compartments: common inlet chamber, screen/grit channels and common outlet chamber. An ultrasonic level transmitter is located at the common inlet chamber and level switches are located in both inlet and outlet chambers.

Details of the magnetic flowmeter, ultrasonic level instrument and the level switches are summarized in Tables 2.2, 2.3 and 2.4.

Table 2.2. Raw Sewage Flowmeter

Tag Number	FIQT 200
Type	Magnetic
Flow (L/s)	0 – 110
Application	Raw Sewage from Service Area
Model	7ME6910
Manufacturer	Siemens
Chart Recorder	Yes

2.2.2.1 Discharge Header

The common discharge header is a 200 mm diameter pipe which discharges to the headworks structure.

2.2.2.2 Raw Sewage Pumps

Two (2) submersible pumps rated 55.1 L/s at 26.0 m TDH are located in the pumping station, each equipped with a variable frequency drive (VFD). The peak flow capacity of the pumping station is approximately 4,761 m³/d.

Each pump is equipped with the following:

- 150 mm swing check valve and stales steel discharge pipe in the wet well; and
- 200 mm gate valve with extension stem and valve box/cover outside the wet well.

The details of the raw sewage pumps are summarized in Table 2.5.

Table 2.5. Raw Sewage Pump Data

Tag Number	RSP-101, RSP-102
Manufacturer	ITT Flygt
Model Number	AFP 1501-ME 250/6FM
Rated Capacity (L/s)	55.1
Head – TDH (m)	26
Power (kW)	
Supply	575/60/3
VFD Equipment	Yes

2.2.3 Safety Procedures

The following general safety precautions apply to the Raw Sewage Pumping Station:

- submersible pumps
 - electrical hazards
 - isolation and tagging of equipment under maintenance;
 - systems under pressure;
- refer to manuals on individual pieces of equipment for specific safety instruction regarding operation and maintenance;
- watch for and/or be cautious of any abnormal noise, vibration, temperature, pressure, voltage of current;
- use caution in investigating alarms and tripped out equipment. Ensure systems are isolated and tagged before commencing repair or resetting;

2.2.4 Normal Operation

The pumping station is fully automatic, and the pump operation is controlled by the liquid levels in the wet well.

During automatic operation of the raw sewage pumps, the PLC is in full control of the pumping station. However, setpoints for the pump operation have to be entered by the operator. Once setpoints have been entered, changes are rarely needed.

On a rotational basis, each of the two pumps will be used as lead. The PLC will rank the pumps for lead and lag duties and the rankings will be altered every 24 hours. The rotation of the rankings will be undertaken to try and achieve an equal amount of operating time for both pumps.

The typical duty cycle of the pumps is shown in the following Table 2.6.

Each pump duty will have a specific start and stop wet well level which is adjustable at the PLC. When the level reaches the start level of the first pump, the first duty pump will start and operate at 100 percent speed. as the level in the wet well decreases, the speed of the pump will decrease proportionally between the stop and stop level, with the target pump speed at the stop level being 75 percent of the overall pump speed.

On rising wet well level, when the level exceeds the start setpoint for the first duty pump, the first duty pump speed will remain at 100 percent until the start level for the second duty pump is reached. The second duty pump will then start at 100 percent speed and as the level falls in the wet well; its speed will be decreased proportionally to 75 percent speed at the second duty pump stop point.

The initial settings for the raw sewage pumps are summarized in the following Table 2.6.

Table 2.6. Summary of Raw Sewage Pumping Station Setpoints

Pump Duty	Stop Elevation (m)	Start Elevation (m)
1	190.826	191.209
2	190.826	191.409

General

Upon start up of any piece of equipment/instrumentation after installation, maintenance or repair, refer to the manufacturer's pre-starting checks in individual equipment/instrumentation's operation and maintenance manuals.

Refer to the individual manufacturer's safety checks and warnings before starting or placing any equipment into auto model.

Prior to starting motors which have been idle or unheated for extended periods, refer to the manufacturer's instructions.

Ensure all related and dependent systems are available for operation with the raw sewage pumping station.

Manual Start-up

Perform all checks as for automatic start-up.

Set sewage pump control(s) on manual start.

Run

The raw sewage pumps will operate in response to the liquid level in the wet well. When the liquid level rises to a pre-set low level, the duty raw sewage pump will start.

Stop

At any time, a low level in the wet well will cause the duty raw sewage pump to shut down (auto or manual).

At any time, a pump may be stopped by placing the H-O-A switch in the off position.

Switching off all pumps may cause alarms to activate on the wet well liquid level.

Backup Float Mode

A backup to the normal control used through the ultrasonic transmitter is available. This is a float system and is identified as a high level start float. Once the level reaches the high level float, the second pump will start automatically. This float is wired to the pump motor starter and the pumps will run at 100 percent speed when activated. This float will be used as a high alarm at the same time. The float will activate when the liquid level reaches 191.709 m.

2.2.5 Bypass Operation

The raw sewage pumps provide the only means for raw sewage to enter the water pollution control plant and are therefore critical to the plant operation and cannot be bypassed.

2.2.6 Instrumentation and Control

The instrumentation in the raw sewage pumping station includes:

- one (1) ultrasonic level transmitter in the wet well;
- two (2) float switches, one (1) for high and one for low in the wet well.

Details of the instruments are summarized in the following Tables 2.7 and 2.8

Table 2.7. Level Transmitter Details

Tag Number	LIT-107
Location	Raw Sewage Wet Well
Model	
Range (m)	
Power Supply (V/Hz/ph)	120/60/1

Table 2.8. Float Switch Details

Tag Number	LSL-105, LSL-106
Number of Floats	2
Make	Flygt
Model	ENM-10
Power Supply (V/Hz/ph)	120/60/1

2.2.7 Emergency Provisions

A standby generator will provide power to the raw sewage pumping station during any power failure.

2.2.8 Maintenance

For routine and preventive maintenance and equipment cycling for raw sewage pumps, refer to the manufacturer's operation and maintenance manual.

For specific maintenance requirements and troubleshooting for raw sewage pumps, refer to the manufacturer's operation and maintenance manual.

Prior to carrying out any work on the raw sewage pumps, the operator should:

- place the local disconnect switches at the pump in the off position; and
- place lockout tags on the local disconnect switches.

Influent Peak Flow Summary

Project Name: Infrastructure Assessment for Growth Plan
Project No: 19055

Designed By: MC
Date: 2020-06-16

Pumping Station Peak Flows					
Month	Max (L/s)	Time for Max	Min (L/s)	Time for Min	Avg (L/s)
Jan-20	37.81	11/01/2020 05:00:00 PM	31.79	24/01/2020 01:00:00 AM	34.78
Feb-20	43.85	14/02/2020 06:00:00 AM	0.04	09/02/2020 05:00:00 AM	35.66
Mar-20	39.73	03/03/2020 11:00:00 AM	28.92	03/03/2020 04:00:00 AM	35.59
Apr-20	38.25	15/04/2020 01:00:00 PM	35.24	20/04/2020 02:00:00 PM	36.47
May-20	38.22	20/05/2020 10:00:00 PM	35.32	31/05/2020 06:00:00 AM	37.17
Jun-20					
Jul-20					
Aug-20					
Sep-20					
Oct-20					
Nov-20					
Dec-20					
2020 Maximum	43.85				
2020 Average Max	39.57				
Jan-19	40.84	21/01/2019 02:00:00 PM	26.73	08/01/2019 02:00:00 PM	36.35
Feb-19	40.8	28/02/2019 09:00:00 AM	18.78	25/02/2019 07:00:00 AM	35.42
Mar-19	41.73	08/03/2019 10:00:00 AM	17.05	10/03/2019 01:00:00 PM	36.26
Apr-19	45.67	28/04/2019 12:00:00 PM	13.89	28/04/2019 04:00:00 AM	37.2
May-19	39.25	03/05/2019 12:00:00 PM	35.46	05/05/2019 11:00:00 PM	36.34
Jun-19	38.81	24/06/2019 04:00:00 PM	35.64	04/06/2019 02:00:00 AM	36.68
Jul-19	44.46	18/07/2019 03:00:00 PM	34.43	18/07/2019 03:00:00 AM	36.90
Aug-19	37.43	31/08/2019 05:00:00 PM	34.77	23/08/2019 02:00:00 AM	36.13
Sep-19	41.4	24/09/2019 01:00:00 PM	34.13	07/09/2019 02:00:00 AM	36.48
Oct-19	36.63	25/10/2019 04:00:00 PM	33.32	18/10/2019 02:00:00 AM	35.75
Nov-19	38.38	15/11/2019 10:00:00 AM	22.25	22/11/2019 07:00:00 PM	34.21
Dec-19	43.64	19/12/2019 04:00:00 AM	0.04	19/12/2019 03:00:00 AM	34.79
2019 Max	45.67				
2019 Average	40.75				
Jan-18					
Feb-18	41.40	01/02/2018 03:00:00 PM	35.37	01/02/2018 05:00:00 AM	37.19
Mar-18	38.71	30/03/2018 11:00:00 AM	36.17	03/03/2018 03:00:00 AM	37.42
Apr-18	41.42	22/04/2018 10:00:00 AM	36.35	30/04/2018 11:00:00 PM	38.41
May-18	41.31	21/05/2018 10:00:00 PM	32.76	09/05/2018 02:00:00 AM	35.8
Jun-18	42.87	27/06/2018 08:00:00 AM	35.44	28/06/2018 12:00:00 AM	37.08
Jul-18	37.11	19/07/2018 09:00:00 AM	35.03	18/07/2018 02:00:00 AM	36.34
Aug-18	40.07	02/08/2018 03:00:00 PM	34.77	27/08/2018 04:00:00 AM	36.21
Sep-18	40.47	13/09/2018 09:00:00 AM	35.64	06/09/2018 02:00:00 AM	36.29
Oct-18	37.31	08/10/2018 11:00:00 AM	18.16	16/10/2018 10:00:00 PM	35.79
Nov-18	41.62	30/11/2018 09:00:00 AM	26.16	15/11/2018 01:00:00 PM	35.59
Dec-18	43.73	15/12/2018 05:00:00 PM	35.39	26/12/2018 06:00:00 AM	36.54
2018 Max	43.73				
2018 Average	40.55				
Jan-17					
Feb-17					
Mar-17					
Apr-17					
May-17					
Jun-17					
Jul-17	46.47	20/07/2017 02:00:00 PM	0	21/07/2017 12:00:00 PM	34.94
Aug-17	39.62	22/08/2017 12:00:00 PM	0	05/08/2017 12:00:00 PM	33.07
Sep-17	37.47	07/09/2017 04:00:00 PM	0	02/09/2017 03:00:00 PM	32.79
Oct-17	41.64	05/10/2017 02:00:00 PM	35.22	04/10/2017 02:00:00 AM	36.42
Nov-17	37.55	12/11/2017 10:00:00 AM	35.38	29/11/2017 01:00:00 AM	36.18
Dec-17	41.2	21/12/2017 10:00:00 AM	6.81	26/12/2017 05:00:00 PM	35.84
2017 Max	46.47				
2017 Average	40.66				
Overall Max Flow	46.47				
Overall Avg Flow	40.38				

Appendix B: Sewage Flows

Sewage Flows



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2020-06-02

Phase 1 - Known Proposed Developments

Design Criteria			
Residential Sewage Flows:	450	L/p/day	A
No. of Units (Single Family):	589		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes):	146		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Homes):	100		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Drainage Area:	58.40	ha	H
Inflow and Infiltration Rate:	0.28	L/s/ha	I
Industrial Area:	7.97	ha	J
Industrial Flow:	0.64	L/s/ha	K
Calculations			
Single Family Residential Sewage Flows			
	$F_{SF} = (B \times C) A$		
	= 795150	L/day	
	= 9.20	L/s	
	= 795.15	m ³ /day	
Townhome Residential Sewage Flows			
	$F_{TH} = (D \times E) A$		
	= 157680	L/day	
	= 1.83	L/s	
	= 157.68	m ³ /day	
Retirement Home Sewage Flows			
	$F_{RH} = (F \times G) A$		
	= 45000	L/day	
	= 0.52	L/s	
	= 45.00	m ³ /day	
Industrial Flows			
	$F_I = J \times K$		
	= 5.10	L/s	
	= 440709	L/day	
	= 440.71	m ³ /day	
Inflow and Infiltration			
	$F_{I\&I} = H \times I$		
	= 16.35	L/s	
	= 1412813	L/day	
	= 1412.81	m ³ /day	
Total Phase 1 Sewage Flows			
	$F_{NORWOOD} = F_{SF} + F_{TH} + F_{RH} + F_I + F_{I\&I}$		
	= 2851352	L/day	
	= 33.00	L/s	
	= 2851.35	m ³ /day	

Sewage Flows



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2020-06-02

Phase 2 - Future Developments

Design Criteria			
Residential Sewage Flows:	450	L/p/day	A
No. of Units (Single Family):	267		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes):	0		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Homes):	80		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Drainage Area:	23.34	ha	H
Inflow and Infiltration Rate:	0.28	L/s/ha	I
Calculations			
Single Family Residential Sewage Flows			
	$F_{SF} = (B \times C) A$		
	= 360450	L/day	
	= 4.17	L/s	
	= 360.45	m ³ /day	
Townhome Residential Sewage Flows			
	$F_{TH} = (D \times E) A$		
	= 0	L/day	
	= 0.00	L/s	
	= 0.00	m ³ /day	
Retirement Home Sewage Flows			
	$F_{RH} = (F \times G) A$		
	= 36000	L/day	
	= 0.42	L/s	
	= 36.00	m ³ /day	
Inflow and Infiltration			
	$F_{I\&I} = H \times I$		
	= 6.54	L/s	
	= 564641	L/day	
	= 564.64	m ³ /day	
Total Phase 2 Sewage Flows			
	$F_{NORWOOD} = F_{SF} + F_{TH} + F_{RH} + F_{I\&I}$		
	= 961091	L/day	
	= 11.12	L/s	
	= 961.09	m ³ /day	

Sewage Flows



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2020-06-02

Phase 3 - Distant Future Developments

Design Criteria			
Residential Sewage Flows:	450	L/p/day	A
No. of Units (Single Family):	962		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes):	20		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Homes):	0		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Drainage Area:	70.72	ha	H
Inflow and Infiltration Rate:	0.28	L/s/ha	I
Calculations			
Single Family Residential Sewage Flows			
	$F_{SF} = (B \times C) A$		
	= 1298700	L/day	
	= 15.03	L/s	
	= 1298.70	m ³ /day	
Townhome Residential Sewage Flows			
	$F_{TH} = (D \times E) A$		
	= 21600	L/day	
	= 0.25	L/s	
	= 21.60	m ³ /day	
Retirement Home Sewage Flows			
	$F_{RH} = (F \times G) A$		
	= 0	L/day	
	= 0.00	L/s	
	= 0.00	m ³ /day	
Inflow and Infiltration			
	$F_{I\&I} = H \times I$		
	= 19.80	L/s	
	= 1710858	L/day	
	= 1710.86	m ³ /day	
Total Phase 2 Sewage Flows			
	$F_{NORWOOD} = F_{SF} + F_{TH} + F_{RH} + F_{I\&I}$		
	= 3031158	L/day	
	= 35.08	L/s	
	= 3031.16	m ³ /day	

Appendix C: Wastewater Treatment Plant Capacity

WWTP Available Capacity



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-03-30

Design Criteria			
Residential Sewage Flows:	450	L/p/day	A
No. of Persons/Unit (Single Family):	3.0	p/unit	B
Wastewater Treatment Plant Capacity	1,500	m ³ /day	C
Existing Flows (to date)	579	m ³ /day	D
Future Drainage Areas:	152.48	ha	E
No. of Persons in Future Developments:	6,033	p	F
Inflow and Infiltration Rate:	0.28	L/s/ha	G
Calculations			
Residual Capacity			
	$F_{RC} = (C - D)$		
	= 921	m ³ /day	
	= 921000	L/day	H
	= 10.7	L/s	
Average Infiltration Area			
	$A_I = (F / B) / E$		
	= 13.2	units/ha	I
Number of Units (not considering I&I)			
	$U_R = H / (A \times B)$		
	= 682.22	units	J
Inflow and Infiltration			
	$F_{I\&I} = (G / I)$		
	= 0.02	L/s/unit	
	= 1834	L/day/unit	K
	= 1.83	m ³ /day/unit	
Number of Units			
	$U_T = H / (A \times B + K)$		
	= 289	units	

Appendix D: Pumping Station Calculations

Pumping Station Available Capacity



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-07-15

Design Criteria			
Residential Sewage Flows:	450	L/p/day	A
No. of Persons/Unit (Single Family):	3.0	p/unit	B
Rated Capacity of Pumping Station:	55	L/s	C
Existing Flows (to date):	46.5	L/s	D
Future Drainage Areas:	152.48	ha	E
No. of Persons in Future Developments:	6,033	p	F
Inflow and Infiltration Rate:	0.28	L/s/ha	G
Harmon Peaking Factor:	4.50		H
Calculations			
Residual Capacity			
	$F_{RC} = (C - D)$		
	= 8.6	L/s	I
Average Infiltration Area			
	$A_I = (F / B) / E$		
	= 13.2	units/ha	J
Inflow and Infiltration			
	$F_{I\&I} = (G / J)$		
	= 0.02	L/s/unit	K
	= 1834	L/day/unit	
	= 1.83	m ³ /day/unit	
Number of Units			
	$U_T = I / (A \times B \times H + K)$		
	= 94	units	

Appendix E: Forcemain Calculations

Forcemain Existing Conditions



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-06-22

Velocity

$Q_{\text{existing}} =$ 46.5 L/s 737 gpm
 $D_{\text{ex}} =$ 200 mm
 $A =$ 31415.9 mm²

Velocity: $V=Q/A$

$V_{\text{existing}} =$ 1.5 m/s

Hazen Williams - Friction Loss - Imperial

Existing - 8" Forcemain

$hf = 0.002083 \times L \times (100/C)^{1.85} \times (\text{gpm}^{1.85}/d^{4.8655})$

$c =$ 120
 $q_e =$ 737 gpm
 $d =$ 7.982 inches
 $L =$ 2641 ft

$hf =$ 32.3 ft
 $hf =$ 9.9 m

Elevation of forcemain at plant = 199.50

Pump 1 Stop Elevation at PS = 190.759

Head Loss = 8.741 m

Total Loss = 18.6 m

Forcemain Phase 1 Conditions



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2020-06-22

Velocity

$Q_{\text{phase1}} =$ 155.8 L/s 2470 gpm

$D_{\text{ex}} =$ 200 mm

$A =$ 31415.9 mm²

Velocity: $V=Q/A$

$V_{\text{phase1}} =$ 5.0 m/s

Hazen Williams - Friction Loss - Imperial

Existing - 8" Forcemain

$hf = 0.002083 \times L \times (100/C)^{1.85} \times (\text{gpm}^{1.85}/d^{4.8655})$

$c =$ 120

$q_e =$ 2470 gpm

$d =$ 7.982 inches

$L =$ 2641 ft

$hf =$ 302.9 ft

$hf =$ 92.3 m

Elevation of forcemain at plant = 199.50

Pump 1 Stop Elevation at PS = 190.759

Head Loss = 8.741 m

Total Loss = 101.0 m

Forcemain Phase 2 Conditions



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-06-22

Velocity

$Q_{\text{phase2}} =$ 175.3 L/s 2779 gpm

$D_{\text{ex}} =$ 200 mm

$A =$ 31415.9 mm²

Velocity: $V=Q/A$

$V_{\text{phase2}} =$ 5.6 m/s

Hazen Williams - Friction Loss - Imperial

Existing - 8" Forcemain

$hf = 0.002083 \times L \times (100/C)^{1.85} \times (\text{gpm}^{1.85}/d^{4.8655})$

$c =$ 120

$q_e =$ 2779 gpm

$d =$ 7.982 inches

$L =$ 2641 ft

$hf =$ 376.7 ft

$hf =$ 114.8 m

Elevation of forcemain at plant = 199.50

Pump 1 Stop Elevation at PS = 190.759

Head Loss = 8.741 m

Total Loss = 123.5 m

Forcemain Phase 3 Conditions



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2020-06-22

Velocity

$Q_{\text{phase3}} = 236.3 \text{ L/s} \quad 3745 \text{ gpm}$

$D_{\text{ex}} = 200 \text{ mm}$

$A = 31415.9 \text{ mm}^2$

Velocity: $V=Q/A$

$V_{\text{phase3}} = 7.5 \text{ m/s}$

Hazen Williams - Friction Loss - Imperial

Existing - 8" Forcemain

$hf = 0.002083 \times L \times (100/C)^{1.85} \times (\text{gpm}^{1.85}/d^{4.8655})$

$c = 120$

$q_e = 3745 \text{ gpm}$

$d = 7.982 \text{ inches}$

$L = 2641 \text{ ft}$

$hf = 654.1 \text{ ft}$

$hf = 199.4 \text{ m}$

Elevation of forcemain at plant = 199.50

Pump 1 Stop Elevation at PS = 190.759

Head Loss = 8.741 m

Total Loss = 208.1 m

Forcemain Future Conditions



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-06-22

Velocity

$Q_{\text{existing}} = 46.5 \text{ L/s} \quad 737 \text{ gpm}$
 $Q_{\text{future}} = 236.3 \text{ L/s} \quad 3745 \text{ gpm}$
 $D1 = 375 \text{ mm}$
 $A1 = 110447 \text{ mm}^2$

Velocity: $V=Q/A$

$V1_{\text{existing}} = 0.42 \text{ m/s}$
 $V1_{\text{future}} = 2.14 \text{ m/s}$

Hazen Williams - Friction Loss - Imperial

Future - 15" Forcemain

$hf = 0.002083 \times L \times (100/C)^{1.85} \times (\text{gpm}^{1.85}/d^{4.8655})$

$c = 120$
 $q_f = 3745 \text{ gpm}$
 $d = 14.43 \text{ inches}$
 $L = 2641 \text{ ft}$

$hf = 36.7 \text{ feet}$
 $hf = 11.2 \text{ m}$

Elevation of forcemain at plant = 199.50

Pump 1 Stop Elevation at PS = 190.759

Head Loss = 8.741 m

Total Loss = 19.9 m

Appendix F: Sanitary Sewer Design Sheets

Designed By: MC
Date: 2020-02-04

**** confirm**

	assumed
	upgraded for PH.3

Designed By: MC
Date: 2020-02-04

Notes:

Assumed
Upgraded for Norwood Park PH.3
Future Development
Upgraded for Future Development

Appendix G: Water Demand Calculations

Water Demand



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-02

Phase 1 - Known Proposed Developments

Design Criteria			
Domestic Water Demand:	450	L/p/day	A
No. of Units (Single Family):	589		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes)	146		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Home):	100		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Max. Day Peak Factor (MOE):	2.00		H
Peak Hour Peak Factor (MOE):	3.00		I
Fire Flow:	2,000	L/min	J
Industrial Area:	7.97	ha	K
Industrial Water Demand:	0.64	l/s/ha	L
Calculations			
Average Day Demand			
	Q_{AVG}	=	$A \times (B \times C + D \times E + F \times G)$
		=	1438539 L/day
		=	999.0 L/min
		=	1438.5 m ³ /day
Maximum Day Demand			
	Q_{MDD}	=	$Q_{AVG} \times H$
		=	2877078 L/day
		=	1998.0 L/min
		=	2877.1 m ³ /day
Peak Hour Demand			
	Q_{PHD}	=	$Q_{AVG} \times I$
		=	4315617 L/day
		=	2997.0 L/min
		=	4315.6 m ³ /day
Total Demand (MDD + Fire Flow)			
	Q_{TD}	=	$Q_{MDD} + J$
		=	5757078 L/day
		=	3998.0 L/min
		=	5757.1 m ³ /day

Water Demand



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-02

Phase 2 - Future Developments

Design Criteria			
Domestic Water Demand:	450	L/p/day	A
No. of Units (Single Family):	267		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes)	0		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Home):	80		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Max. Day Peak Factor (MOE):	2.00		H
Peak Hour Peak Factor (MOE):	3.00		I
Fire Flow:	2,000	L/min	J
Calculations			
Average Day Demand			
	Q_{AVG}	=	$A \times (B \times C + D \times E + F \times G)$
		=	396450 L/day
		=	275.3 L/min
		=	396.5 m ³ /day
Maximum Day Demand			
	Q_{MDD}	=	$Q_{AVG} \times H$
		=	792900 L/day
		=	550.6 L/min
		=	792.9 m ³ /day
Peak Hour Demand			
	Q_{PHD}	=	$Q_{AVG} \times I$
		=	1189350 L/day
		=	825.9 L/min
		=	1189.4 m ³ /day
Total Demand (MDD + Fire Flow)			
	Q_{TD}	=	$Q_{MDD} + J$
		=	3672900 L/day
		=	2550.6 L/min
		=	3672.9 m ³ /day

Water Demand



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-02

Phase 3 - Distant Future Developments

Design Criteria			
Domestic Water Demand:	450	L/p/day	A
No. of Units (Single Family):	962		B
No. of Persons/Unit (Single Family):	3.0	p/unit	C
No. of Units (Townhomes)	20		D
No. of Persons/Unit (Townhomes):	2.4	p/unit	E
No. of Units (Retirement Home):	0		F
No. of Persons/Unit (Retirement Home):	1.0	p/unit	G
Max. Day Peak Factor (MOE):	2.00		H
Peak Hour Peak Factor (MOE):	3.00		I
Fire Flow:	2,000	L/min	J
Calculations			
Average Day Demand			
	Q_{AVG}	=	$A \times (B \times C + D \times E + F \times G)$
		=	1320300 L/day
		=	916.9 L/min
		=	1320.3 m ³ /day
Maximum Day Demand			
	Q_{MDD}	=	$Q_{AVG} \times H$
		=	2640600 L/day
		=	1833.8 L/min
		=	2640.6 m ³ /day
Peak Hour Demand			
	Q_{PHD}	=	$Q_{AVG} \times I$
		=	3960900 L/day
		=	2750.6 L/min
		=	3960.9 m ³ /day
Total Demand (MDD + Fire Flow)			
	Q_{TD}	=	$Q_{MDD} + J$
		=	5520600 L/day
		=	3833.8 L/min
		=	5520.6 m ³ /day

Appendix H: Water Treatment Plant Capacity

WTP Available Capacity



Project Name: Norwood Infrastructure Assessment
Project No: 19055

Designed By: MC
Date: 2020-03-30

Design Criteria			
Domestic Water Demand:	450	L/p/day	A
No. of Persons/Unit (Single Family):	3.0	p/unit	B
Water Treatment Plant Capacity:	1,965	m3/day	C
Average Maximum Daily Flow:	1,003	m3/day	D
Max. Day Peak Factor (MOE):	2.00		E
Peak Hour Peak Factor (MOE):	3.00		F
Calculations			
Residual Capacity			
	$F_{RC} = (C - D)$		
	= 962	m ³ /day	
	= 962000	L/day	H
Number of Units			
	$U = H / (A \times B \times E)$		
	= 356	units	

Appendix I: Treated Water Storage

Treated Water Storage



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-03

Existing Conditions

Design Criteria

Population:	1,380		A
Suggested Fire Flow (MOE):	79	L/s	B
Duration:	2.0	Hours	C
Max. Day Demand (Average 2011-2019):	1,003	m ³ /day	D

Calculations

Fire Storage

$$\begin{aligned}V_{FS} &= (B \times C) \times 3.6 \\ &= 569 \quad \text{m}^3\end{aligned}$$

Equalization Storage

$$\begin{aligned}V_{EQ} &= D \times 0.25 \\ &= 251 \quad \text{m}^3\end{aligned}$$

Emergency Storage

$$\begin{aligned}V_{EM} &= (V_{FS} + V_{EQ}) \times 0.25 \\ &= 205 \quad \text{m}^3\end{aligned}$$

Total Treated Water Storage Requirement

$$\begin{aligned}V_T &= V_{FS} + V_{EQ} + V_{EM} \\ &= 1024 \quad \text{m}^3\end{aligned}$$

Treated Water Storage



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-03

Existing + Phase 1

Design Criteria			
Population:	3,597		A
Suggested Fire Flow (MOE):	119	L/s	B
Duration:	2.0	Hours	C
Max. Day Demand ¹ :	2,999	m ³ /day	D
Calculations			
Fire Storage			
	V_{FS}	$= (B \times C) \times 3.6$	
		$= 857$	m ³
Equalization Storage			
	V_{EQ}	$= D \times 0.25$	
		$= 750$	m ³
Emergency Storage			
	V_{EM}	$= (V_{FS} + V_{EQ}) \times 0.25$	
		$= 402$	m ³
Total Treated Water Storage Requirement			
	V_T	$= V_{FS} + V_{EQ} + V_{EM}$	
		$= 2008$	m ³

1. Maximum Day Demand is the average maximum day for existing conditions from actual flows (2011-2019) plus the theoretical maximum day calculated for Phase 1 development areas.

Treated Water Storage



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-03

Existing + Phase 1 + Phase 2

Design Criteria			
Population:	4,478		A
Suggested Fire Flow (MOE):	134	L/s	B
Duration:	2.0	Hours	C
Max. Day Demand ¹ :	3,792	m ³ /day	D
Calculations			
Fire Storage			
	V_{FS}	$= (B \times C) \times 3.6$	
		$= 966$	m ³
Equalization Storage			
	V_{EQ}	$= D \times 0.25$	
		$= 948$	m ³
Emergency Storage			
	V_{EM}	$= (V_{FS} + V_{EQ}) \times 0.25$	
		$= 478$	m ³
Total Treated Water Storage Requirement			
	V_T	$= V_{FS} + V_{EQ} + V_{EM}$	
		$= 2392$	m ³

1. Maximum Day Demand is the average maximum day for existing conditions from actual flows (2011-2019) plus the theoretical maximum day calculated for Phase 1+Phase 2 development areas.

Treated Water Storage



Project Name: Norwood Infrastructure

Project No: 19055

Designed By: MC

Date: 2020-06-03

Existing + Phase 1 + Phase 2 + Phase 3

Design Criteria			
Population:	7,412		A
Suggested Fire Flow (MOE):	170	L/s	B
Duration:	3.0	Hours	C
Max. Day Demand ¹ :	6,432	m ³ /day	D
Calculations			
Fire Storage			
	V_{FS}	$= (B \times C) \times 3.6$	
		$= 1836$	m ³
Equalization Storage			
	V_{EQ}	$= D \times 0.25$	
		$= 1608$	m ³
Emergency Storage			
	V_{EM}	$= (V_{FS} + V_{EQ}) \times 0.25$	
		$= 861$	m ³
Total Treated Water Storage Requirement			
	V_T	$= V_{FS} + V_{EQ} + V_{EM}$	
		$= 4305$	m ³

1. Maximum Day Demand is the average maximum day for existing conditions from actual flows (2011-2019) plus the theoretical maximum day calculated for Phase 1+Phase 2+Phase 3 development areas.

Appendix J: Water Pressure Calculations

Hazen-Williams Desired Pressure



Project Name: Norwood Infrastructure Assessment

Designed By: MC

Project No: 19055

Date: 2019-12-17

H24 - 2362 County Road 45

Design Criteria			
GPM to LPM Conversion:	3.785	L/min = 1gpm	A
Field Flow Test:	1233	gpm	B
Static Pressure at Residual Hydrant:	60	psi	C
Minimum Operating Pressure:	40	psi	D
Residual Pressure during Flow Test:	56	psi	E
Calculations			
Residual Pressure			
	$H_R = C - D$		
	= 20	psi	
Flow Pressure			
	$H_F = C - E$		
	= 4	psi	
Flow at 40psi			
	$Q_R = B \times (H_R/H_F)^{0.54}$		
	= 2940	gpm	
	= 11129	L/min	

Appendix C

Record of stakeholder and
Public Consultation

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

MEA REVIEW AGENCIES	MAILING OR EMAILING ADDRESSES	Preference Email or Mail?
PROVINCIAL AGENCIES & MINISTRIES		
CONSERVATION AUTHORITIES - OTONABEE CONSERVATION AUTHORITY	Lori Moloney lmoloney@otonabeeconservation.com	Email
MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS	eanotification.eregion@ontario.ca	Email
OFFICE OF THE FIRE MARSHALL	SEE BELOW	SEE BELOW
MINISTRY OF HEALTH AND LONG-TERM CARE	SEE BELOW	SEE BELOW
MINISTRY OF HERITAGE, SPORT, TOURISM AND CULTURAL INDUSTRIES	Karla Barboza, Team Lead(A), Heritage Heritage Planning Unit Programs and Services Branch Ministry of Heritage, Sport, Tourism and Cultural Industries 401 Bay Street, Suite 1700 Toronto ON M7A 0A7 karla.barboza@ontario.ca	Email
SPORT, RECREATION AND COMMUNITY PROGRAMS DIVISIONS	Ray Dempster, Manager and Bob Freeman, Senior Policy Advisor Sport, Recreation and Community Programs Division Policy Branch: Neil Coburn, Director(A) 777 Bay Street, 18th Floor Toronto, ON M7A 1S5 ray.dempster@ontario.ca bob.freeman@ontario.ca	Mail
MINISTRY OF INDIGENOUS AFFAIRS	CONTACT MECP	
MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING (REGIONAL OFFICE)	Michael Elms, Manager Community Planning and Development Eastern Municipal Services Office Ministry of Municipal Affairs and Housing 8 Estate Lane, Rockwood House Kingston ON K7M 9A8 michael.elms@ontario.ca	Mail
MINISTRY OF NATURAL RESOURCES AND FORESTRY	Attn: Catherine Warren, District Planner (Peterborough Area) Peterborough District Ministry of Natural Resources and Forestry South Tower, 1st Floor 300 Water St, PO Box 7000 Peterborough ON K9J 8M5 catherine.warren@ontario.ca	Email
MINISTRY OF THE SOLICITOR GENERAL	Robert Greene, Director Ministry of the Solicitor General 25 Grosvenor Street, 13th Flr Toronto ON M7A 1Y6 robert.greene@ontario.ca	Email
MINISTRY OF TRANSPORTATION (REGIONAL OFFICE)	Mark Pedlar Mark.Pedlar@ontario.ca	Email and mail
HYDRO ONE NETWORKS INC.	SecondaryLandUse@HydroOne.com	Email
FEDERAL AGENCIES		
ENVIRONMENT AND CLIMATE CHANGE CANADA	Wes Plant, Manager Environmental Assessment Section Environmental Protection Branch – Ontario Region Environment and Climate Change Canada 4905 Dufferin St. Downsview ON M3H 5T4 wesley.plant@canada.ca	Email
INDIGENOUS SERVICES CANADA AND CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA		

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

COUNTIES, DISTRICTS, MUNICIPALITIES AND PLANNING BOARDS		
County of Peterborough	Kari Stevenson kstevenson@ptbocounty.ca	Email
Township of Selwyn	Tania Goncalves tgoncalves@selwyntownship.ca	Email
Township of Douro-Dummer	Martina Chait-Hartwig martinac@dourodummer.on.ca	Email
Township of North Kawartha	Connie Parent c.parent@northkawartha.ca	Email
Township of Cavan Monaghan	Cindy Page cpage@cavanmonaghan.net	Email
Municipality of Trent Lakes	Jessie Clark jclark@trentlakes.ca	Email
Township of Havelock-Belmont-Methuen	Bianca Boyington bboyington@hbmtpw.ca	Email
Township of Otonabee-South Monaghan	Heather Scott hscott@osmtownship.ca	Email
OTHER		
LOCAL PUBLIC HEALTH UNIT/MEDICAL OFFICER (Peterborough County-City Health Unit)	Chris Eaton Public Health Inspector Small Drinking Water Systems Peterborough Public Health 185 King Street Peterborough, ON K9J 2R8 P: (705) 743-1000 EX 225 F: (705) 743-1203 Dr. Rosana Salvaterra Medical Officer of Health Peterborough County-City Health Unit Jackson Square 185 King St Peterborough, ON K9J 2R8	Mail
Township Fire Department	Darryl Payne Fire Chief Township of Asphodel-Norwood Fire Rescue & Emergency Services 4440 Highway #7, P.O. Box 29, Norwood, Ontario, K0L 2V0	Mail
FIRST NATIONS		
Alderville First Nation	Dave Simpson Consultation Coordinator Alderville First Nation 11696 Second Line Rd ALDERVILLE, ON K0K 2X0 consultation@alderville.ca	Mail
Curve Lake	Katie Haddlesey Chief Operating Officer Curve Lake First Nation 22 Winookeedaa Road Curve Lake, ON K0L 1R0	Mail
Hiawatha First Nation	Tom Cowie Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 tcowie@hiawathafn.ca	Mail
	Sean Davison Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 sdavison@hiawathafn.ca	Mail
Mississaugas of Scugog Island First Nation	Monica Sanford - Community Consultation Administrative Assistant Mississaugas of Scugog Island First Nation Administration Building 22521 Island Road Port Perry, ON L9L 1B6	Mail
	Michael Thoms - Community Consultation Specialist Mississaugas of Scugog Island First Nation Administration Building 22521 Island Road Port Perry, ON L9L 1B6	Mail
Beausoleil First Nation	Dana Monague Lands Compliance Officer Beausoleil First Nation 11 O'Gemaa Miikaan Christian Island, ON L9M 0A9	Mail
Chippewas of Georgina Island	Chief Donna Big Canoe Georgina Island Administration Office R.R.#2 Box N-13 Sutton West, Ontario L0E 1R0	Mail

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

Chippewas of Rama First Nation	Sharday James, Community Consultation Chippewas of Rama First Nation 5884 Rama Road, Suite 200 Rama ON, L3V 6H6	Mail
Mohawks of the Bay of Quinte	Charlotte Gurnsey Consultation Coordinator Mohawks of the Bay of Quinte Administration Building 24 Meadow Drive Tyendinaga Mohawk Territory, ON K0K 1X0	Mail
Kawartha Nishnawbe First Nation	Kris Nahrgang 257 Big Cedar Lake Rd. Big Cedar, Ontario K0L 2H0 705.930.1020	Mail
PROPERTY OWNERS ADJACENT TO PROJECT SITE AND DIRECTLY AFFECTED PUBLIC/LANDOWNERS	REFER TO MAILING LABELS PROVIDED BY THE TOWNSHIP	Mail
Norwood Centennial Pharmacy	-Manager Pharmacist 2375 County Road 45, Norwood, ON K0L2V0 PO BOX 309 Email: centennialpharmacy@hotmail.com	Mail

Norwood Water Storage Municipal Class Environmental Assessment

Client Consultation Meeting (Meeting No. 3) MINUTES

Attendance:	Kyle Beacock	Township of Asphodel-Norwood (Township)	kbeacock@antownship.ca
	Candice White	Township of Asphodel-Norwood (Township)	cwhite@antownship.ca
	Matthew Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Jingmiao Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Iris Yan	J.L. Richards & Associates Limited (JLR)	iyan@jlrichards.ca

The meeting commenced at 8:30 a.m. on Thursday, July 22, 2021 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

<u>ITEM</u>	<u>ACTION BY</u>	<u>DUE BY</u>
3.1 Introduction		
JLR (MM) noted the purpose of the meeting was to discuss the outcome of the water modeling and the options analysis for the future water storage facility.	INFO	
3.2 Hydraulic Grade Line		
JLR is working on the water modeling for the future flow scenarios. The preliminary results showed that, in order for Site 2 (Entrance to the Landfill Site) and Site 3 (Public Works Building) to become feasible, the existing hydraulic grade line will need to be raised. JLR also noted that the existing well pumps will need to be upgraded to support the increase in the hydraulic grade line (HGL).	INFO	
In the Phase 1 report, it was identified that an opportunity existed to improve the distribution system pressure via this project. The Township has confirmed that it is their intent to increase the HGL.		
3.3 Proposed Options		
JLR presented the following options for the elevated storage facility. The sketches presented at the meeting are attached to the meeting minutes.	INFO	
Option 1a – Existing WTP Site (decommission the existing standpipe)		
- The existing standpipe will be decommissioned. A 3,000m³ new elevated storage will be built near the existing standpipe. The circles shown on the site layout is representative of a Landmark style composite tank. The bigger circle represents the footprint of the bowl, whereas the smaller circle represents the concrete pedestal. Well pumps will need to be upgraded to support the new HGL. - The Township indicated that they have a preference of the standpipe configuration over elevated composite tank due to budget constraints. JLR will update the sketches to include the footprint of a standpipe for all the options.	JLR	

Norwood Water Storage Municipal Class Environmental Assessment

Client Consultation Meeting (Meeting No. 3) MINUTES

ITEM

ACTION BY

DUE BY

- The Township indicated that part of the existing standpipe was used to provide chlorine contact time (CT) under high flow conditions.

Option 1b – Existing WTP Site (expand the existing standpipe vertically and construct new elevated storage)

- This option is not feasible. The the wall thickness of standpipe rings is not adequate to withstand expanded volume pressures. Additionally, foundation structure was not sized to load additional water storage or wind/seismic pressures for Ontario Building Code 2020 (amended) Post-Disaster design.

Option 2 – Entrance of Landfill Site Driveway

- A new 3,000m³ elevated storage will be built at the entrance of the landfill site. Existing standpipe will be decommissioned. Additional chlorine contact time will be required at the WTP. Well pumps will need to be upgraded to support the new HGL. Watermain upsizing is required to bring water to this site.
- JLR has contacted Hydro One due to the close proximity to transmission lines and hydro towers. Hydro One has sent a correspondence discouraging this option. JLR will contact Hydro One to set up a consultation meeting.
- The site is adjacent to Ouse River. JLR has organized a pre-consultation meeting with the Otonabee Conservation Authority on August 11, 2021. We will be looking for their inputs on all the sites during this meeting.

JLR

JLR

Option 3 – Township Public Works Building

- A new 3,000m³ elevated tower will be built in the proposed location. Existing standpipe will be decommissioned. Additional chlorine contact time will be required at the WTP. Well pumps will need to be upgraded to support the new HGL. Watermain upsizing is required.
- The Township indicated that they would prefer to have the storage tank on the Esker such that the height of the tank could be reduced. JLR will revisit this option and review the construction and infrastructure requirements to bring watermain from Highway 7 to the elevated location.
- The Township asked JLR to review the feasibility of bringing the watermain from Highway 40. JLR will investigate the feasibility of installing a new watermain to the north of the landfill site.
- The Township noted that they are developing the closure plan for the landfill. The Township can send the last waste management report, as well as the well monitoring report.

JLR

JLR

Township

3.8 Next Meeting

- .1 To be confirmed.

INFO

Norwood Water Storage Municipal Class Environmental Assessment

**Client Consultation Meeting (Meeting No. 3)
MINUTES**

ITEM

ACTION BY

DUE BY

Prepared by:



Iris Yan, M.Eng., EIT.
Environmental Engineering Intern

Reviewed by:

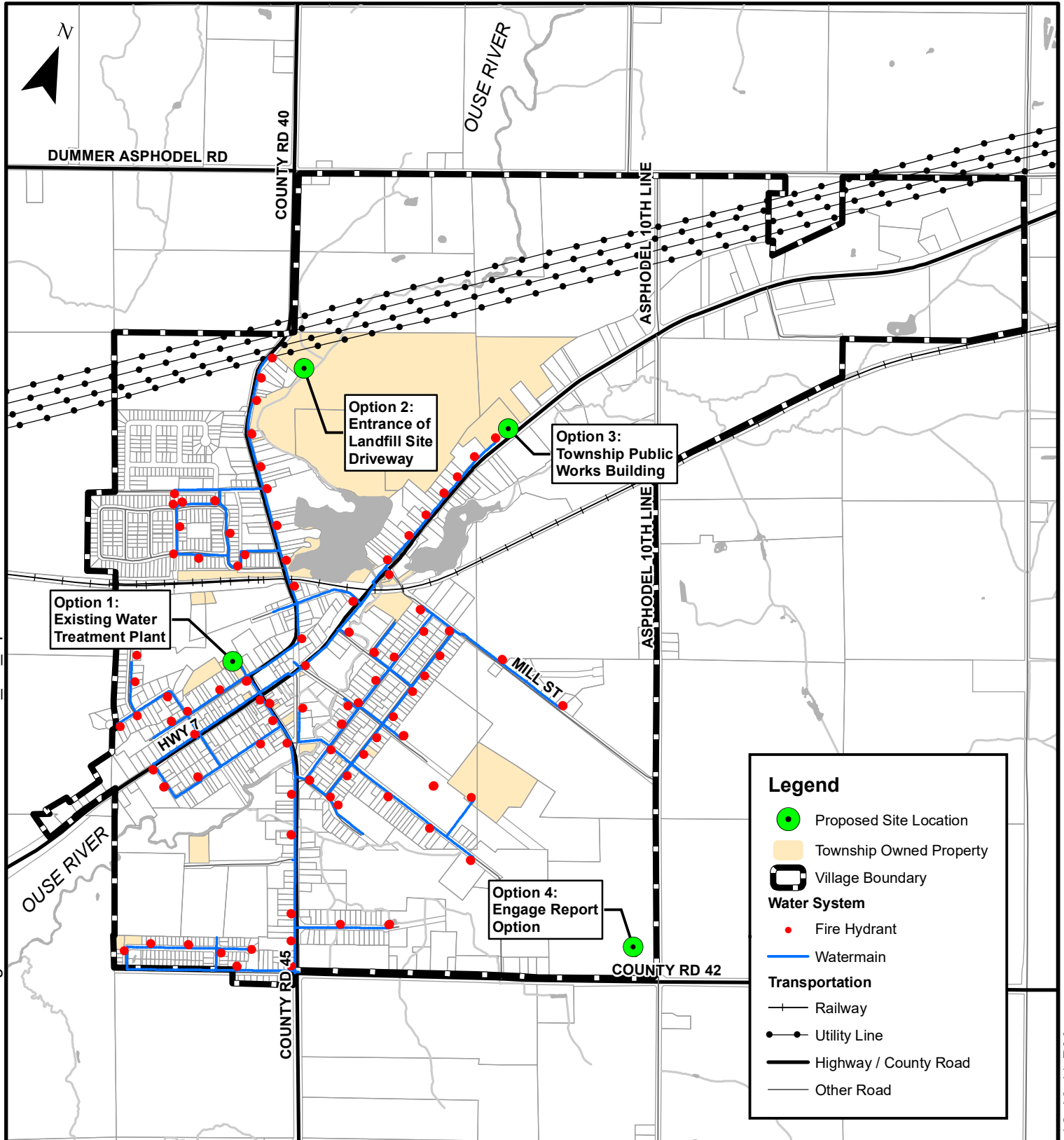


Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

Issued on: August 10, 2021

Distribution: All attendees
Attachment: Location Plan and Site Layouts

File Location: P:\29000\29837-000 - Norwood Storage EA\5-Production\7-Plan\29837_SF_Options.mxd

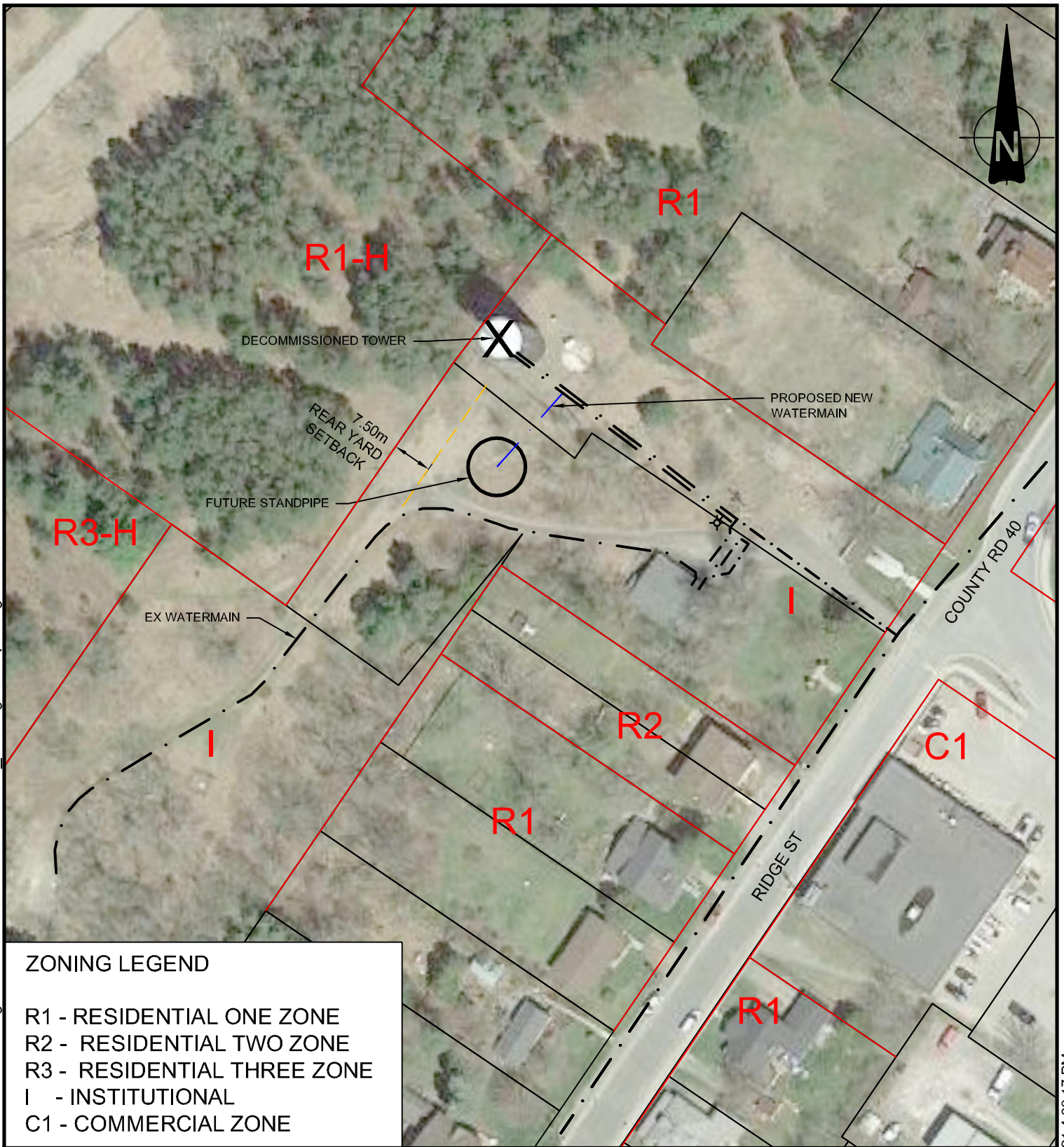


PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: LOCATION PLAN OF PROPOSED WATER STORAGE FACILITY

 J.L. Richards ENGINEERS · ARCHITECTS · PLANNERS www.jlrichards.ca	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: SJS	DRAWING #: FIGURE 2
		DRAWN: KTK	
		CHECKED: MM	
JLR #: 29837			

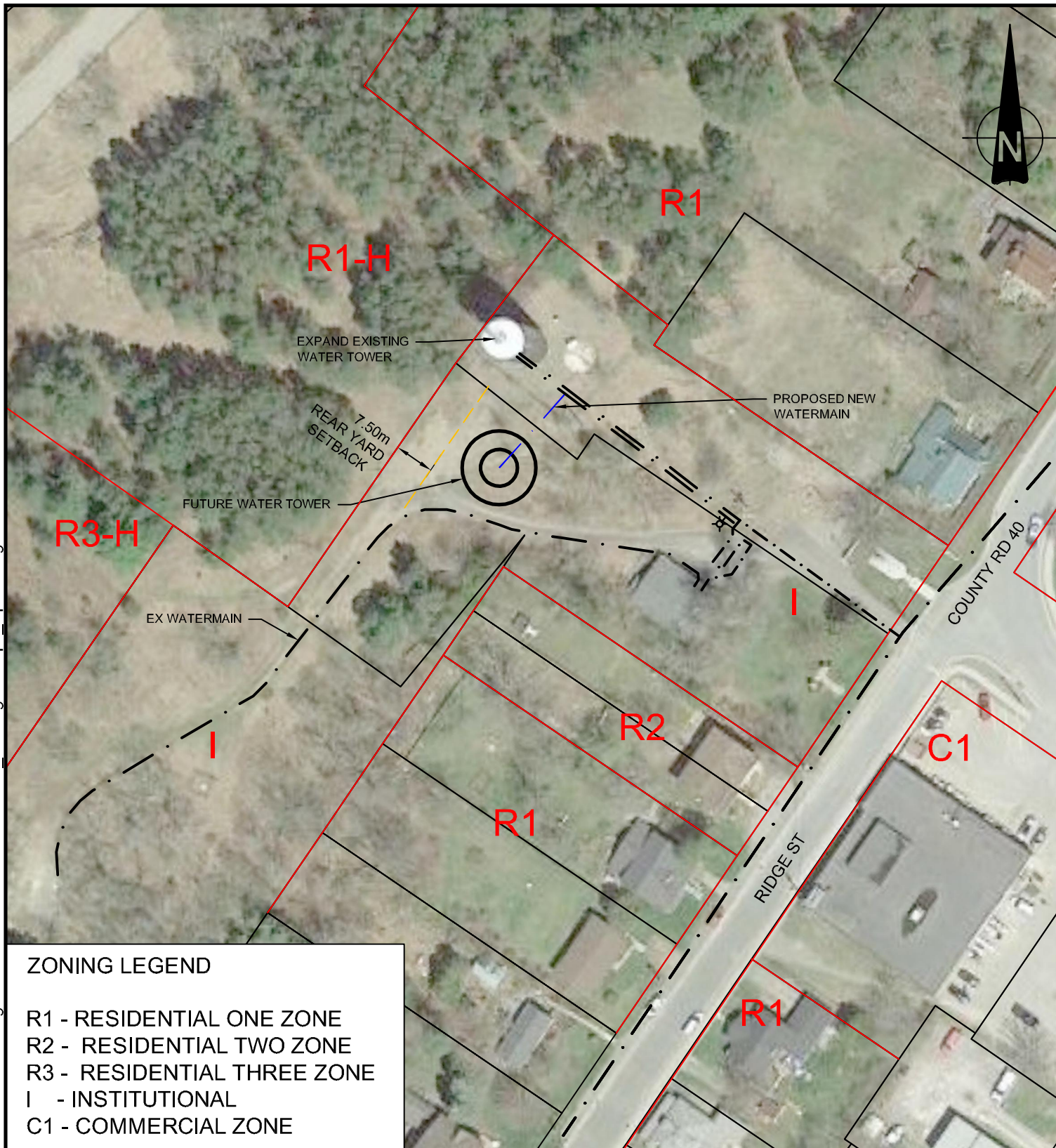
Plot Date: Friday, June 11, 2021 12:46:11 PM



PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: OPTION 1A -EXISTING WATER TREATMENT PLANT (DECOMMISSION THE EXISTING STANDPIPE)

 J.L. Richards ENGINEERS · ARCHITECTS · PLANNERS	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: IY	DRAWING #: FIGURE 1
		DRAWN: KTK	
		CHECKED: SS	
		JLR #: 29837	



ZONING LEGEND

R1 - RESIDENTIAL ONE ZONE
 R2 - RESIDENTIAL TWO ZONE
 R3 - RESIDENTIAL THREE ZONE
 I - INSTITUTIONAL
 C1 - COMMERCIAL ZONE

PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

OPTION1B - EXISTING WATER TREATMENT PLANT(EXPAND THE EXISTING STANDPIPE AND CONSTRUCT NEW ELEVATED STORAGE)



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DESIGN: IY

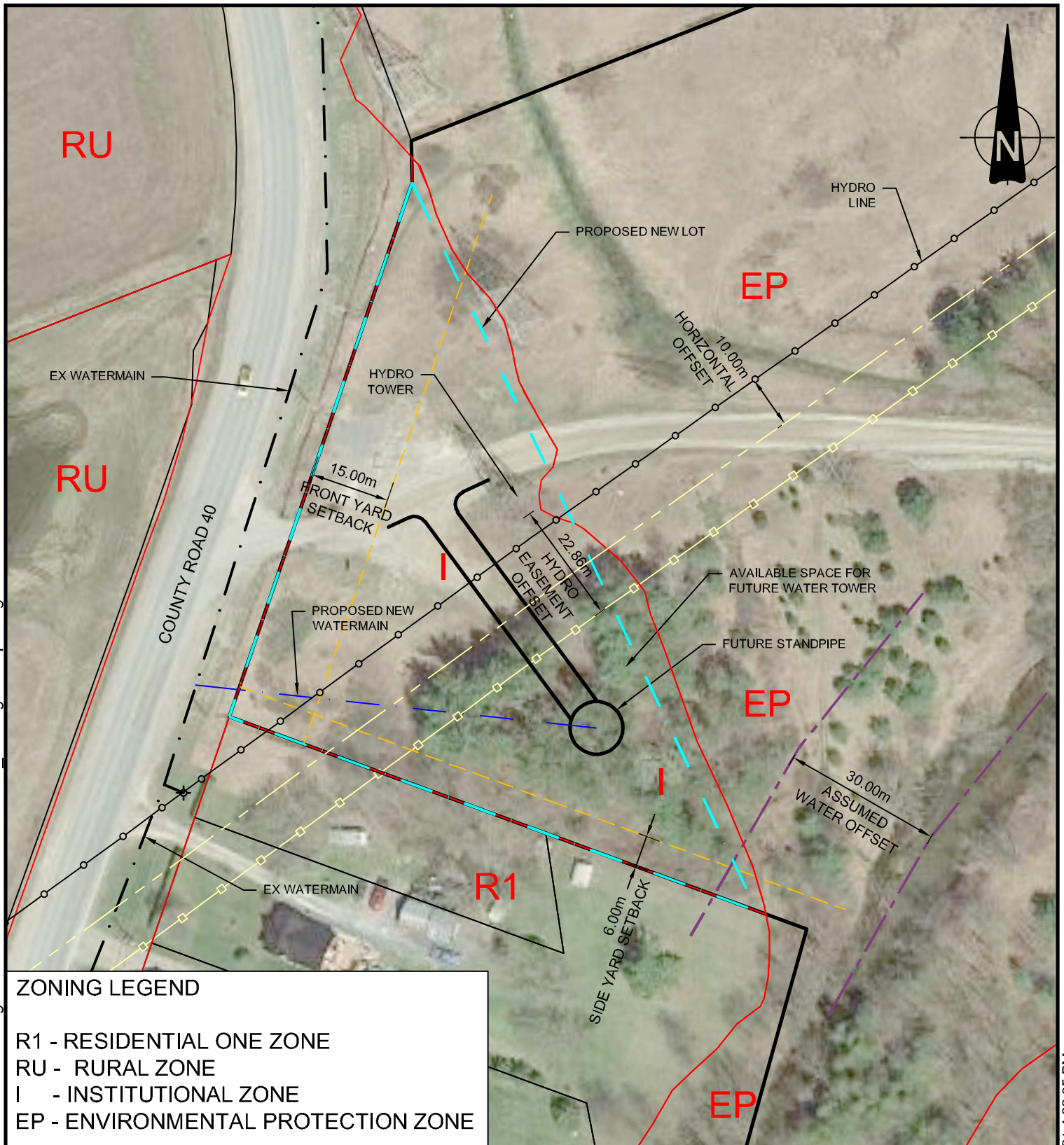
DRAWN: KTK

CHECKED: SS

JLR #: 29837

DRAWING #:

FIGURE 1

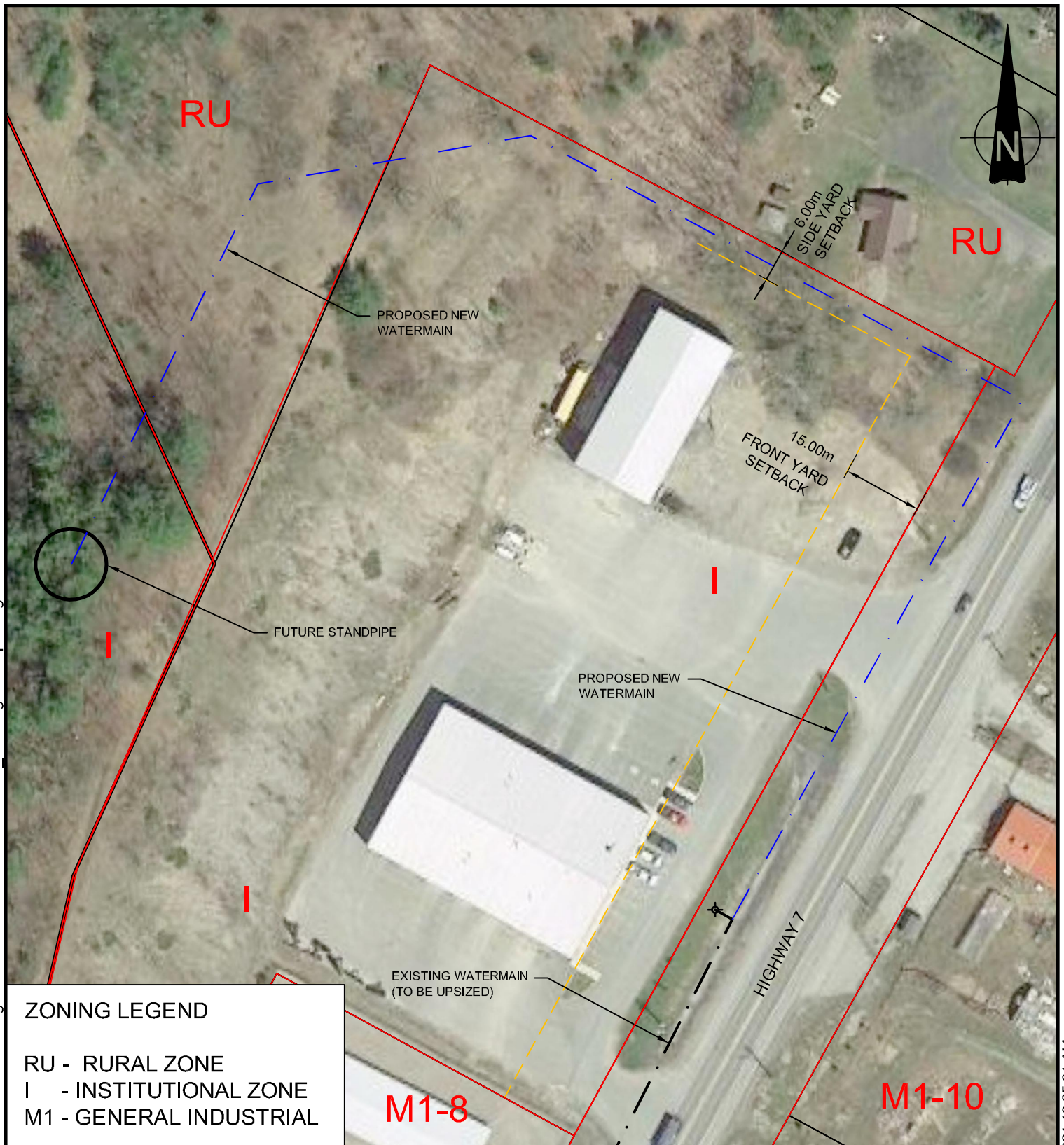


ZONING LEGEND	
R1	- RESIDENTIAL ONE ZONE
RU	- RURAL ZONE
I	- INSTITUTIONAL ZONE
EP	- ENVIRONMENTAL PROTECTION ZONE

PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: OPTION 2 - ENTRANCE OF LANDFILL SITE DRIVEWAY

 J.L. Richards ENGINEERS · ARCHITECTS · PLANNERS	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: IY	DRAWING #: FIGURE 2
		DRAWN: KTK	
		CHECKED: SS	
		JLR #: 29837	



ZONING LEGEND

RU - RURAL ZONE
I - INSTITUTIONAL ZONE
M1 - GENERAL INDUSTRIAL

PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

OPTION 3 - TOWNSHIP PUBLIC WORKS BUILDING



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DESIGN: IY

DRAWN: KTK

CHECKED: SS

JLR #: 29837

DRAWING #:

FIGURE 3

From: [Lori Moloney](#)
To: [Susan Jingmiao Shi](#)
Cc: [Iris Yan](#); [Jennifer Clinesmith](#)
Subject: RE: Request for Pre-Consultation Village of Norwood Water Storage Class EA
Date: June 24, 2021 2:04:00 PM
Attachments: [image008.png](#)
[image009.png](#)

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Hello,

Thank you for your email.

Jennifer Clinesmith, Manager of Plan Review and Permitting, will make the decision as to who will be the lead on this file at ORCA. I have copied her on this email. She is on vacation until July 5th. In the meantime, please send any documentation to me and I will get it into our database.

With many thanks,
Lori



Lori Moloney

Administrative Assistant, Plan Review & Permitting Services
Otonabee Region Conservation Authority
250 Milroy Drive, Peterborough, ON, K9H 7M9
705-760-0488
lmoloney@otonabeeconservation.com





ARE YOU PLANNING AN UPCOMING CONSTRUCTION PROJECT ON YOUR PROPERTY? Submit a [Property Inquiry Form](#) so we can help you understand how natural hazards may affect your property.

This e-mail is confidential. If you are not an addressee named above, please immediately delete and notify the sender. Thank you.

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: Thursday, June 24, 2021 11:23 AM
To: Lori Moloney <lmoloney@otonabeeconservation.com>
Cc: Iris Yan <iyan@jlrichards.ca>
Subject: Request for Pre-Consultation Village of Norwood Water Storage Class EA

Hello Lori,

J.L. Richards & Associates Limited is working with the Township of Asphodel-Norwood on a Class Environmental Assessment for the Village of Norwood's drinking water storage.

We would like to schedule a pre-consultation meeting with the Otonabee Conservation Authority to go through some of the site options we are currently considering. Can you please put me in contact with the right person?

We are going to be issuing the Notice of Project Commencement in the upcoming days – that is why the Conservation Authority hasn't seen any communications on this yet.

Thank you!
Susan

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and

communities while improving our communication technology. ***We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.*** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.

From: [Susan Jingmiao Shi](#)
To: [Lori Moloney](#)
Cc: [Iris Yan](#); [Jennifer Clinesmith](#)
Subject: RE: Request for Pre-Consultation Village of Norwood Water Storage Class EA
Date: June 30, 2021 12:57:09 PM
Attachments: [image017.png](#)
[image018.png](#)

Thanks Lori!

Jennifer – We would like to schedule a pre-consultation meeting in mid- July. Once you are back in the office, can you let us know your team's availabilities?

Thank you!

From: Lori Moloney <lmoloney@otonabeeconservation.com>
Sent: Thursday, June 24, 2021 2:04 PM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Cc: Iris Yan <iyan@jlrichards.ca>; Jennifer Clinesmith <jclinesmith@otonabeeconservation.com>
Subject: RE: Request for Pre-Consultation Village of Norwood Water Storage Class EA

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Hello,

Thank you for your email.

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With many thanks,

Lori



Lori Moloney

Administrative Assistant, Plan Review & Permitting Services
Otonabee Region Conservation Authority
250 Milroy Drive, Peterborough, ON, K9H 7M9

705-760-0488

lmoloney@otonabeeconservation.com



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This e-mail is confidential. If you are not an addressee named above, please immediately delete and notify the sender. Thank you.

From: Susan Jingmiao Shi <sshi@jlrichards.ca>

Sent: Thursday, June 24, 2021 11:23 AM

To: Lori Moloney <lmoloney@otonabeeconservation.com>

Cc: Iris Yan <iyan@jlrichards.ca>

Subject: Request for Pre-Consultation Village of Norwood Water Storage Class EA

Hello Lori,

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We are going to be issuing the Notice of Project Commencement in the upcoming days – that is why the Conservation Authority hasn't seen any communications on this yet.

Thank you!
Susan

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited

203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



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From: [Matthew Morkem](#)
To: [Susan Jingmiao Shi](#); [Iris Yan](#)
Subject: FW: Schedule B Municipal Class Environmental Assessment – Potable Water Storage
Date: July 16, 2021 9:28:03 AM
Attachments: [image008.png](#)

From: Jennifer Clinesmith <jclinesmith@otonabeeconservation.com>
Sent: Thursday, July 15, 2021 8:31 PM
To: Matthew Morkem <mmorkem@jlrichards.ca>
Cc: kbeacock@antownship.ca
Subject: Schedule B Municipal Class Environmental Assessment – Potable Water Storage

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Good afternoon Matthew –

We will likely have comments as the project progresses. Please keep us on your circulation list.

Best Regards,
Jennifer



Jennifer Clinesmith, MCIP, RPP

Manager, Plan Review and Permitting Services
Otonabee Region Conservation Authority
250 Milroy Drive, Peterborough, ON, K9H 7M9
705-745-5791 x215
jclinesmith@otonabeeconservation.com





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This e-mail is confidential. If you are not an addressee named above, please immediately delete and notify the sender. Thank you.

From: [Susan Jingmiao Shi](#)
To: [Warren, Catherine \(MNRF\)](#); [Matthew Morkem](#); kbeacock@antownship.ca
Cc: [Iris Yan](#)
Subject: RE: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage
Date: July 16, 2021 11:03:31 AM
Attachments: [image001.png](#)
[29837_SF_Options.pdf](#)

Hello Catherine,

For the future water storage facility, we have established 4 potential site options (see attached). Note that Option 4 is not being carried forward into the detailed evaluation.

We don't anticipate in-water works at this stage. The storage facility will likely be above-grade. Your feedback on the natural heritage features for Site Options 1 to 3 will be much appreciated!

Thank you!

From: Warren, Catherine (MNRF) <Catherine.Warren@ontario.ca>
Sent: Thursday, July 15, 2021 2:32 PM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>; Matthew Morkem <mmorkem@jlrichards.ca>; kbeacock@antownship.ca
Cc: Iris Yan <iyan@jlrichards.ca>
Subject: RE: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

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Hello,

Thanks very much for your EA notice. Will the new water storage facility be in the same place as the wells and treatment plant? If so, I can take a look at my mapping and see if there are any natural heritage features to be aware of there. Will there be any in-water works associate with the project (in a stream or lake)?

All the best,
Catherine

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: July 8, 2021 8:17 PM
To: Warren, Catherine (MNRF) <Catherine.Warren@ontario.ca>
Cc: Iris Yan <iyan@jlrichards.ca>
Subject: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Catherine,

The Township of Asphodel-Norwood (the Township) has retained J.L. Richards & Associates Limited to complete a Municipal Environmental Assessment (Class EA) to assess alternative potable water storage solutions for the Village of Norwood (Norwood) for the next 20 years.

Please see attached Notice of Project Initiation. Let the Project Team know if you have any questions and concerns.

Sincerely,

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406

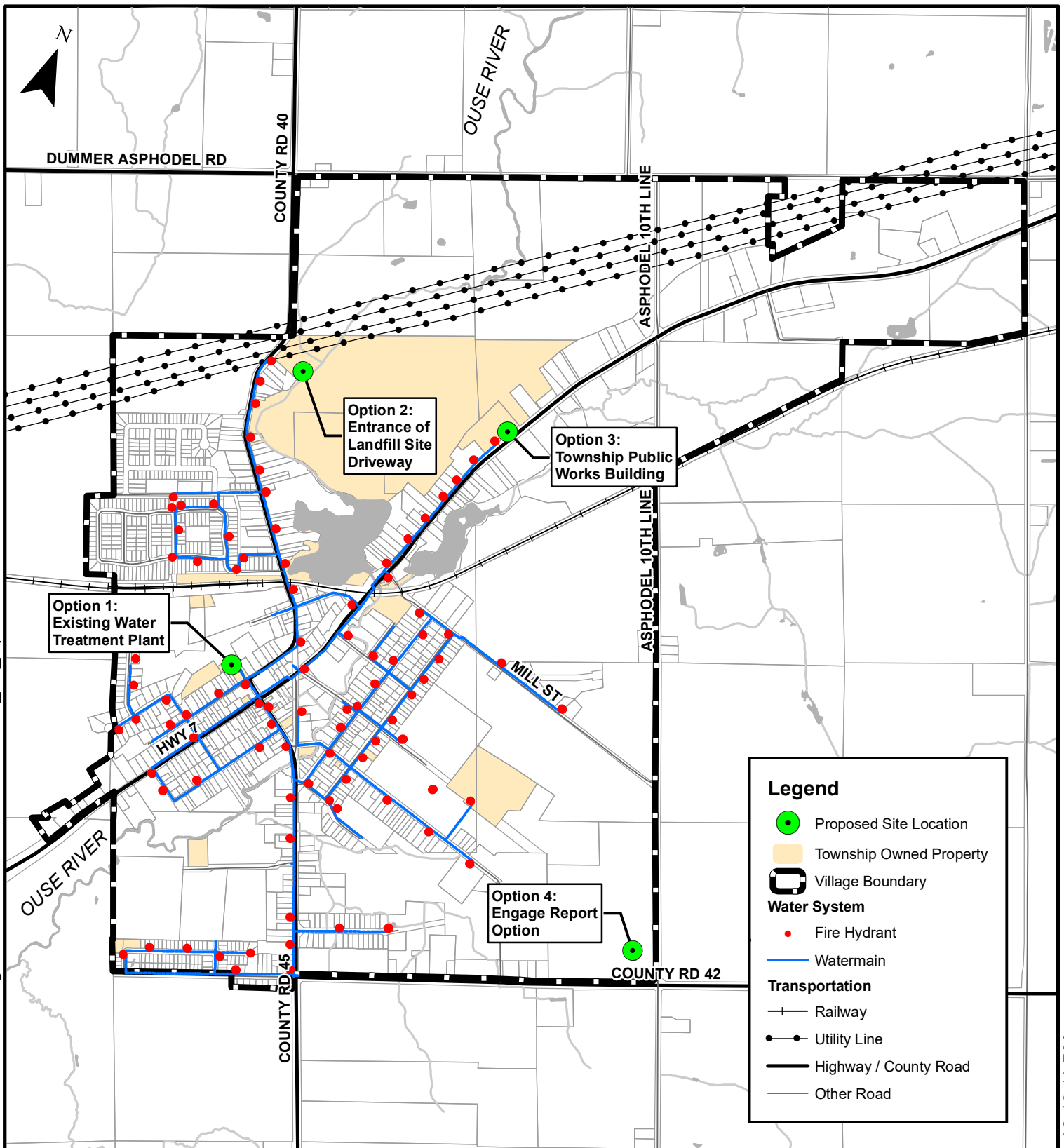


**J.L. Richards
& Associates Limited**
ENGINEERS • ARCHITECTS • PLANNERS



Platinum
member

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PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA NORWOOD, ONTARIO

DRAWING:

LOCATION PLAN OF PROPOSED WATER STORAGE FACILITY

Norwood Water Storage Municipal Class Environmental Assessment

Pre-Consultation Meeting with Otonabee Region Conservation Authority Minutes

Attendance:	Kyle Beacock	Township of Asphodel-Norwood (Township)	kbeacock@antownship.ca
	Donald Allin	Otonabee Region Conservation Authority	dallin@otonabeeconservation.com
	Neil MacFarlane	Otonabee Region Conservation Authority	nmacfarlane@otonabeeconservation.com
	Terri Cox	Otonabee Region Conservation Authority	tcx@otonabeeconservation.com
	Susan Jingmiao Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Iris Yan	J.L. Richards & Associates Limited (JLR)	iyan@jlrichards.ca
Regrets	Candice White	Township of Asphodel-Norwood (Township)	cwhite@antownship.ca
	Matthew Morkem	J.L. Richards & Associates Limited (JLR)	mmorkme@jlrichards.ca

The meeting commenced at 10:00 a.m. on Wednesday, August 11, 2021 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

<u>ITEM</u>		<u>ACTION BY</u>	<u>DUE BY</u>
1.	Introduction		
	JLR noted the purpose of the meeting was to consult with the Otonabee Region Conservation Authority (ORCA) on the potential risks and concerns constructing the future standpipe in the three (3) proposed locations.	INFO	
2.	Roles & Responsibilities		
	.1 Township:	INFO	
	Kyle Beacock, Water and Wastewater Operations Manager		
	.2 Otonabee Region Conservation Authority:		
	- Donald Allin, Acting Manager Plan Review & Permitting Services - Terri Cox, Risk Management Official - Neil MacFarlane, Engineering Services Coordinator		
	.3 JLR:		
	- Susan Shi, P.Eng., Environmental Engineer - Iris Yan, EIT, Environmental EIT		
3.	Proposed Options		
	A slideshow was presented at the meeting and is attached to the meeting minutes. The following is a summary of the key discussion points.	INFO	
	Source Water Protection		
	- Three (3) sites are all identified within wellhead protection area. - The ORCA confirmed that the prescribed Drinking Water Treats activity does not include construction of a water storage facility. - ORCA commented that the vulnerability score is not consistent throughout the wellhead protection area as shown on the slide. ORCA will send the mapping to JLR to include in the study.	ORCA	

Norwood Water Storage Municipal Class Environmental Assessment

Pre-Consultation Meeting with Otonabee Region Conservation Authority Minutes

ITEM

ACTION BY

DUE BY

Option 1a – Existing WTP Site (decommission the existing standpipe)

- ORCA confirmed that the flood plain from Ouse River would not impact the proposed area.
- ORCA confirmed that the drinking water threat is minimal based on the above-grade construction activities proposed. The only risk ORCA foresees is that the construction may disturb the transport pathway, depending on the amount of excavation. ORCA indicated that the closer the construction is to the wellheads, the greater the impact. ORCA also confirmed that there is nothing under the Clean Water Act that restricts the site development.

Option 2 – Entrance of Landfill Site Driveway

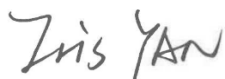
- ORCA indicated that the site is within the flood fringe overlay zone and confirmed that the most recent line mapping will be sent to JLR. JLR has also requested risk and mitigation measures be provided such that they can be included in the study.
- ORCA indicated that they have no other concerns for this site.

ORCA

Option 3 – Township Public Works Building

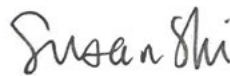
- ORCA suggested the Township conduct a slope stability study for the proposed location.
- The Township confirmed that a geotechnical study will be completed in the preliminary design.
- ORCA indicated that this site has the lowest drinking water threat vulnerability score among the three sites.

Prepared by:



Iris Yan, M.Eng., EIT.
Environmental Engineering Intern

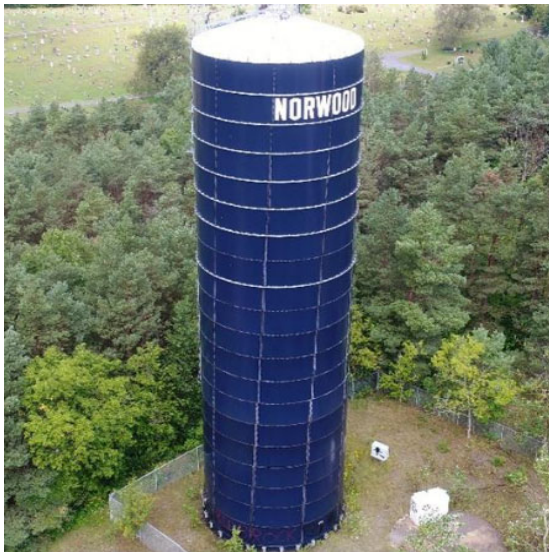
Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

Issued on: August 27, 2021

Distribution: All Listed
Attachment: PowerPoint Presentation



Pre-consultation Meeting with Otonabee Conservation

Authority

Aug 11, 2021

Township of Asphodel-Norwood Potable Water Storage

Schedule 'B' Municipal Class Environmental Assessment

Agenda

- Introduction
- Overview of the Existing Norwood Water System
- Phase 1 - Problem/Opportunity Statement
- Phase 2 - Evaluation of Alternative Solutions and Identification of Recommended Solutions
- Source Water Protection
- Q/A

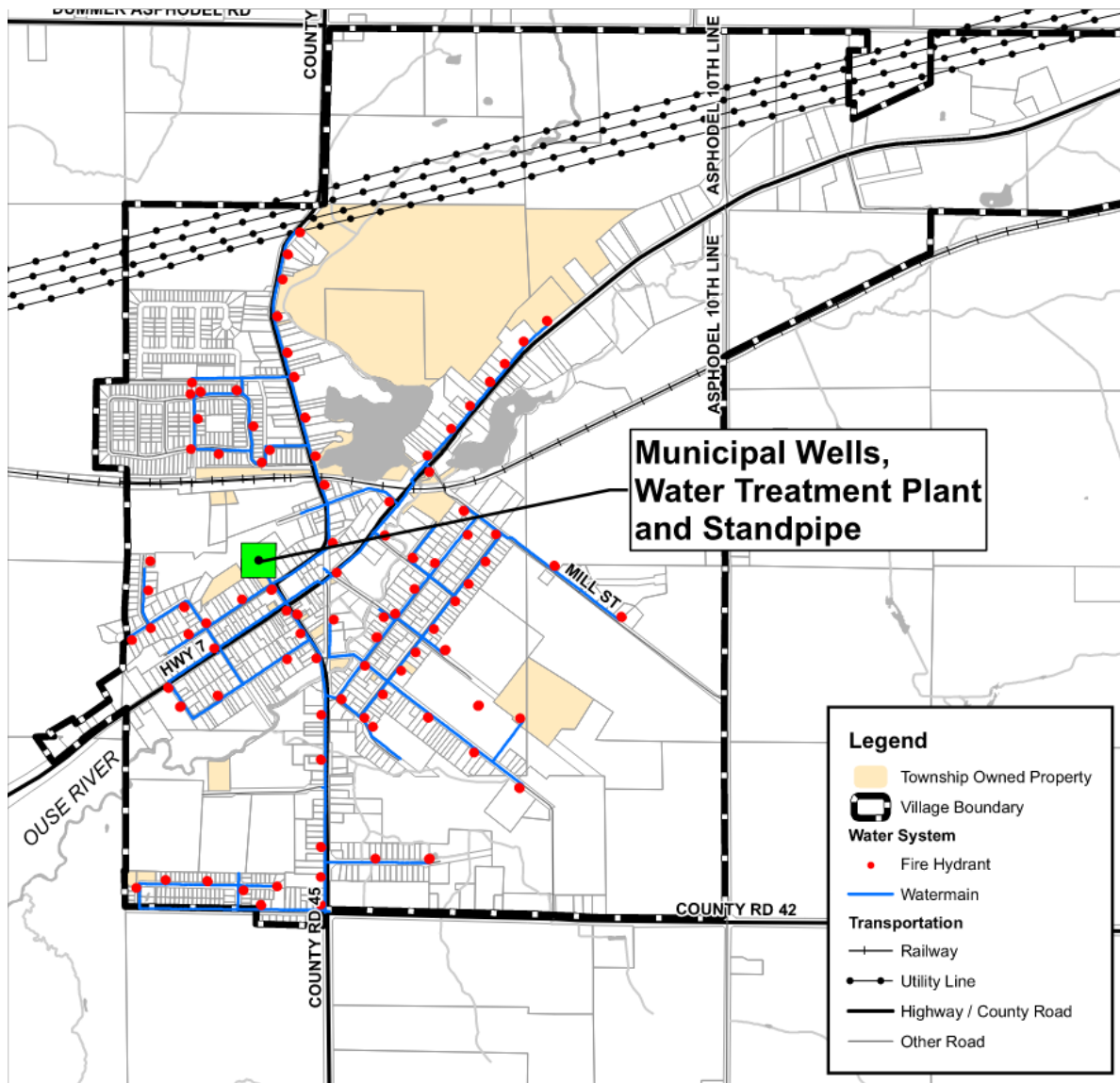
Introduction

- In 2020, an Infrastructure Assessment Report completed by Engage Engineering identified significant growth potential in the Village of Norwood over the next 10-20 years.
- In December 2020, the Township of Asphodel-Norwood initiated a Municipal Schedule 'B' Class Environmental Assessment (Class EA) to assess the alternate potable water storage solutions for the Village of Norwood for the next 20 years and more.
- J.L. Richards & Associates Limited, in association with Cambium Inc., has been retained to undertake the Class EA work.

Overview of the Schedule 'B' Class EA Process



Existing Village of Norwood Water System



- The existing water supply system consists of four groundwater wells, a chlorine disinfection treatment plant, one municipal water tower (standpipe) and a dedicated distribution system.
- Existing water system services approximately 2,100 people in the Village.
- The existing standpipe provides a usable storage of 885 m³.

Future Servicing Requirements

- The existing water storage capacity is insufficient to support growth for the next 10-20 years.

Parameter	2020	2030	2040
A – Fire Storage (m ³)	563	992	1,096
B – Equalization Storage (m ³)	278	998	1,196
C – Emergency Storage (m ³)	210	497	573
Total Storage Recommended (m³)	1,051	2,486	2,865
Existing Storage (m³)	885	885	885
Deficit (m³)	166	1,061	1,980

- A hydraulic water model was completed to assess the existing conditions. Overall, the existing water pressure and fire flow appears to be generally consistent with guidelines. There is an opportunity to consider ideal locations for new storage that may improve the overall level of service in the system.

Phase 1 Problem/Opportunity Statement

“The Village of Norwood is facing considerable growth over the next 10-20 year timeframe, and therefore the Township is in need of a solution that will address water storage constraints in the communal potable water supply system now and for the next 20 years and beyond.

There is also the opportunity to potentially improve system pressures and fire flows within the system.”

Phase 2 - Identification and Screening of Alternative Solutions

Approach

Do Nothing



Maintain
Existing Tower +
Construct New
Storage

Decommission
Existing Tower +
Construct New
Storage



Location

At Existing
Water
Treatment
Plant



At the
Entrance of
Landfill Site



At Public
Works
Building



At Engage
Report
Proposed Site

Configuration

Below Grade
Reservoir and
Pumping
Station

At Grade
Reservoir and
Pumping
Station

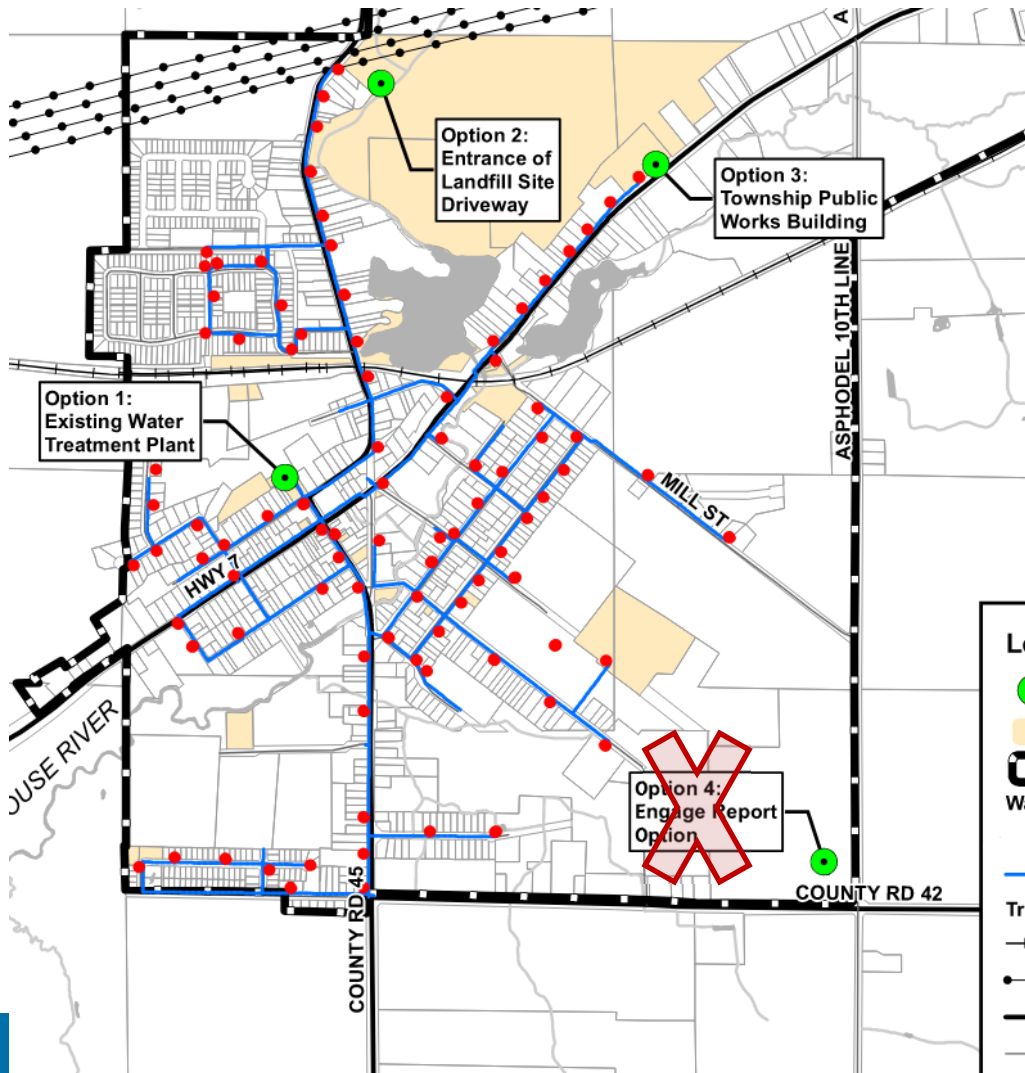
Elevated
Storage Tank

Standpipe



Carried Forward ✓

Potential Locations for Future Storage



- Initial Screening Requirements:
 - Township-owned land
 - Proximity to trunk water main
- Option 4 has been eliminated during the initial screening.

Source Water Protection

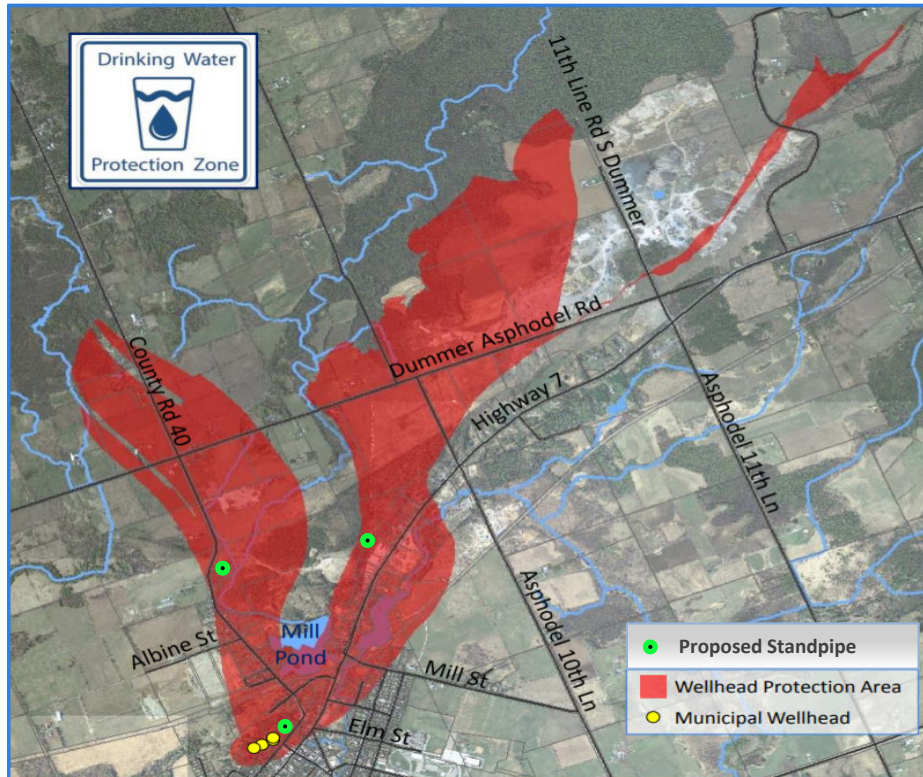


Table 4.4: Meanings of Policy Applicability Map Colours by Type of Vulnerable Area

Type of Vulnerable Area	Map Colours and Vulnerability Scores		
Wellhead Protection Area	10	8	WHPA-C (2,4,6)
Intake Protection Zone	10	9	8

Sample Policy Header

groundwater

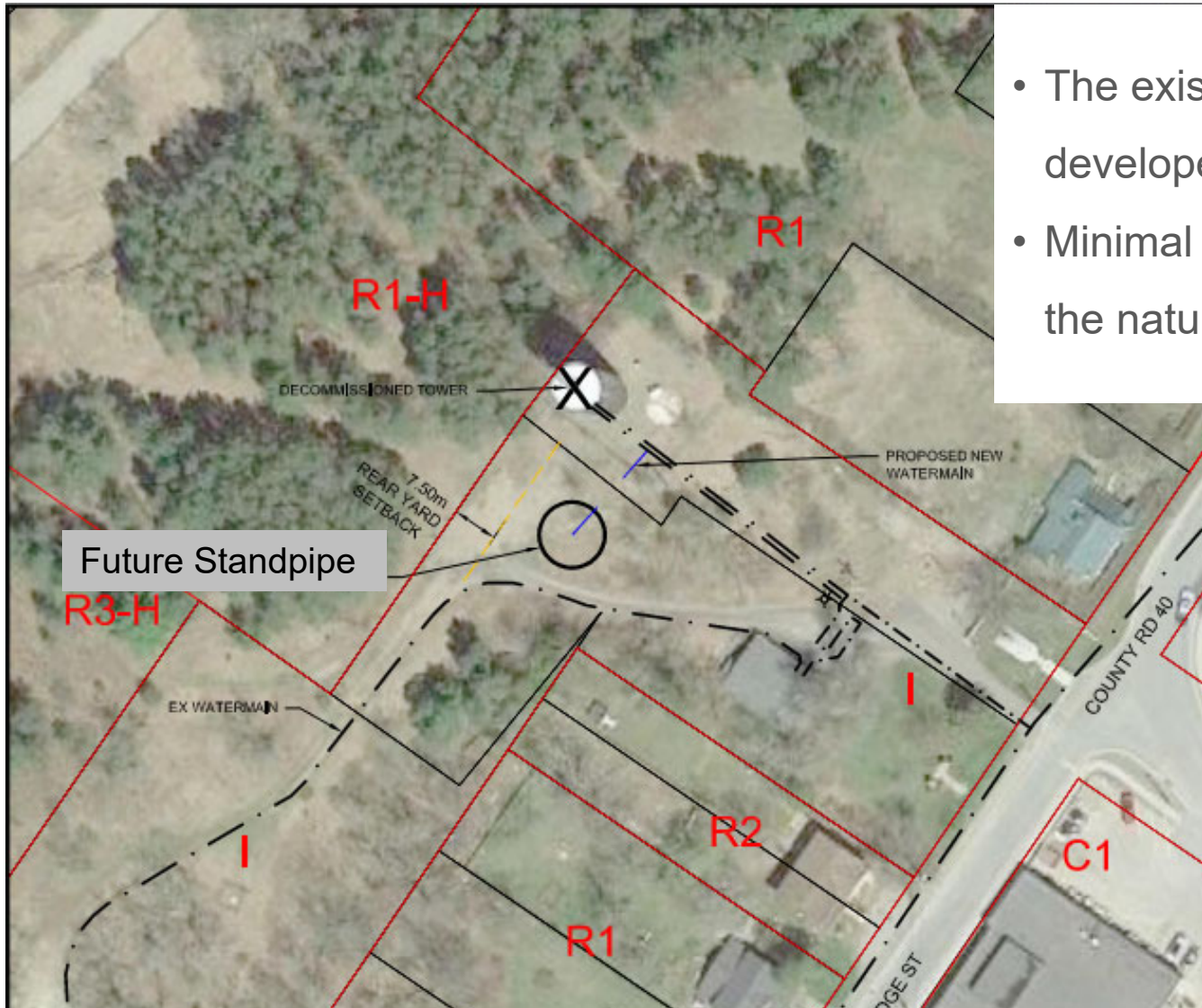


surface water



- It has been identified that the proposed sites are within Wellhead Protection Area with a Vulnerability Score 10.
- The prescribed Drinking Water Threats activities do not include construction of a water storage facility.
- As such, the impact is considered no/minimal to the Wellhead Protection Area.

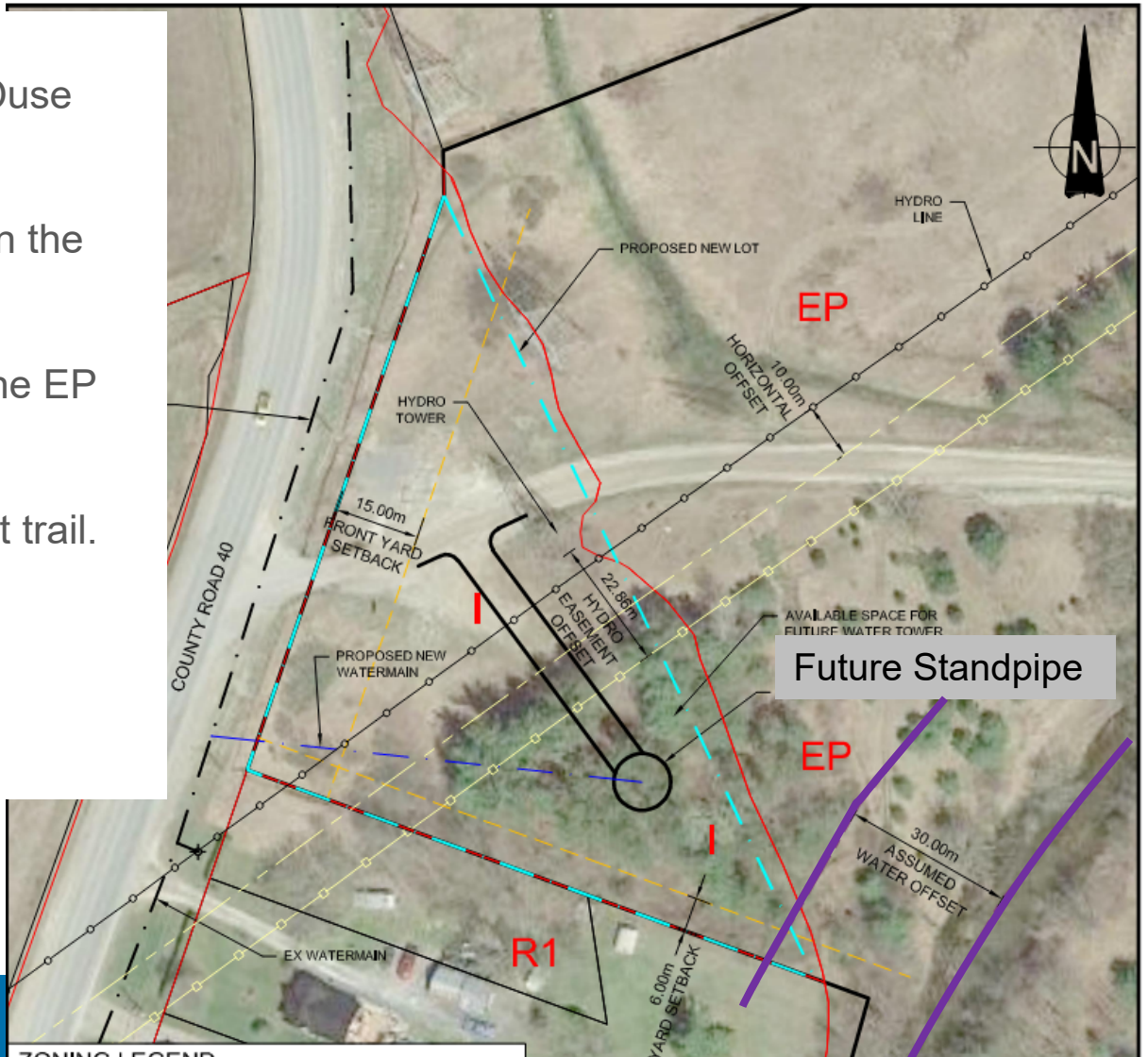
Option 1 – Existing Water Treatment Plant Site



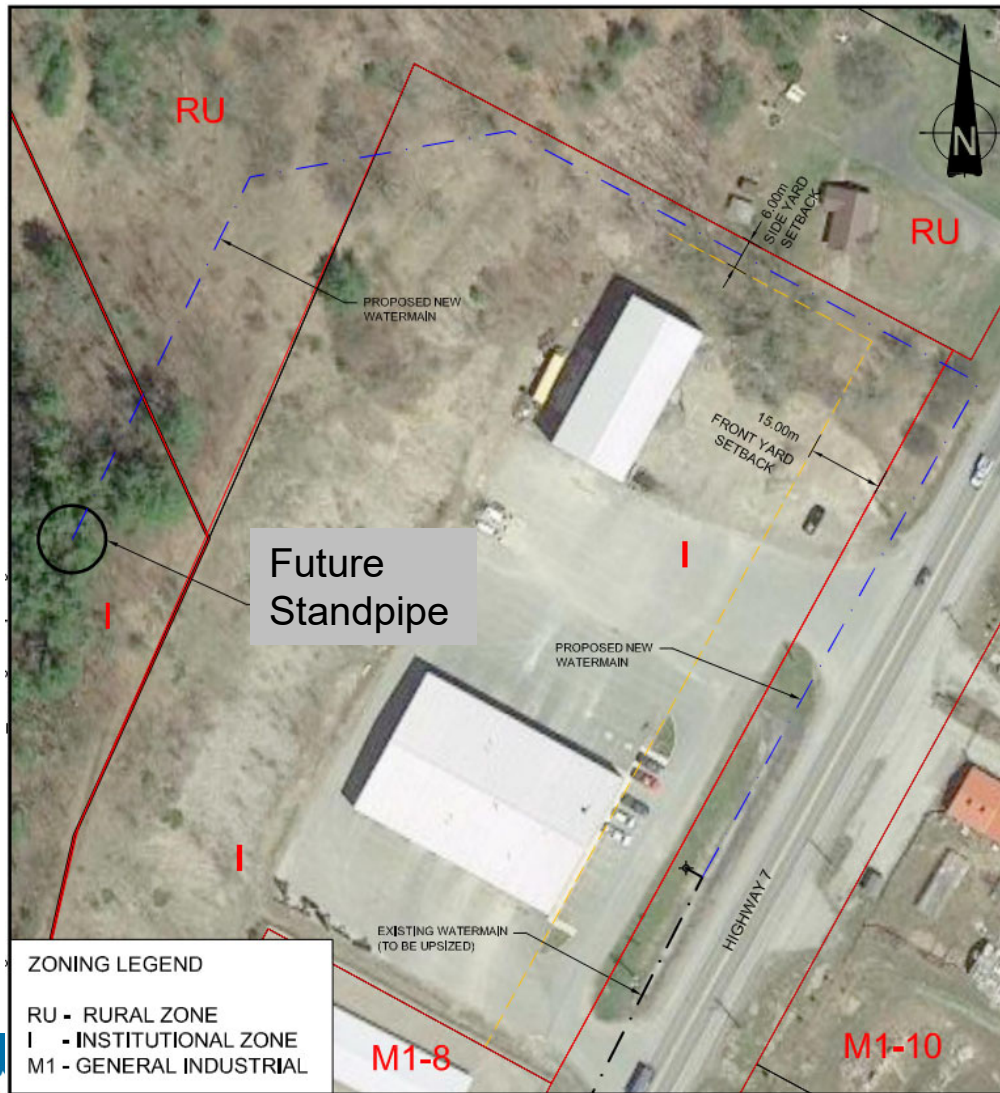
- The existing site is already developed.
- Minimal impact is anticipated to the natural environment.

Option 2: Entrance of Landfill Site

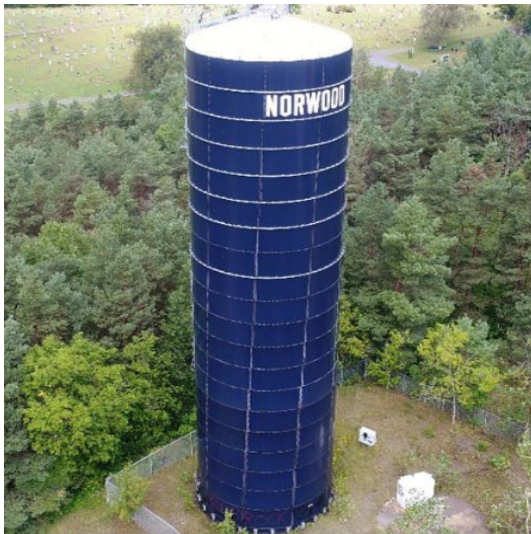
- The site is located adjacent to Ouse River.
- The site appears to be located in the flood fringe overlay zone.
- The site is located adjacent to the EP Zone.
- Visible from the Mill Pond Forest trail.
- New storage tank is adjacent to residential neighbors.



Option 3 – Public Works Building Site



- New storage tank is located on the Esker.
- New watermain construction around existing site.



THANK YOU!

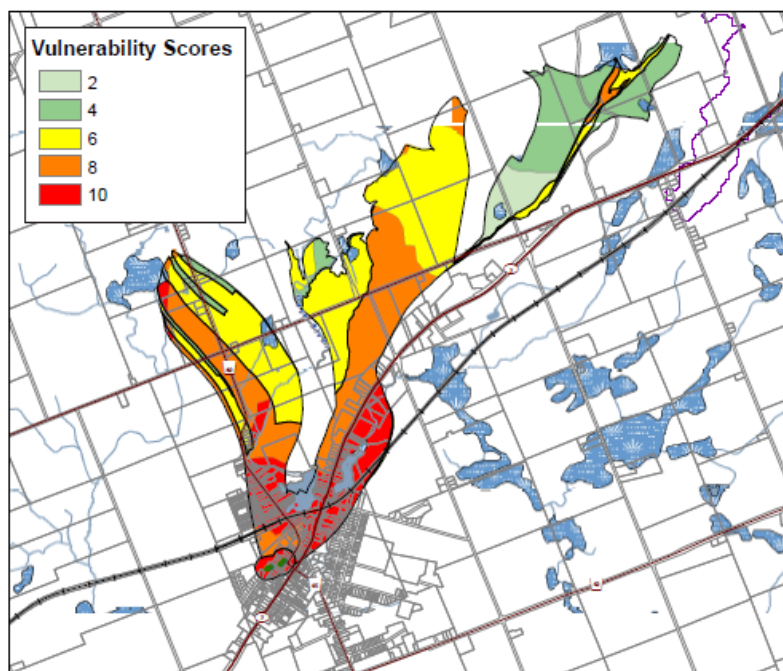
From: [Terri Cox](#)
To: [Susan Jingmiao Shi](#); [Iris Yan](#); [Matthew Morkem](#)
Cc: [Donald Allin](#); [Neil MacFarlane](#)
Subject: Pre-consultation Village of Norwood Water Storage Class EA: Clean Water Act considerations
Date: August 12, 2021 2:41:22 PM
Attachments: [image008.png](#)
[image009.png](#)
[Trent AR Report Maps Chapter 5 17a-23c 2019.pdf](#)

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Hi Susan,

The following reflect the comments offered in the meeting yesterday and include additional information and resources for your reference.

1. All proposed locations are within the [Wellhead Protection Area for the Norwood Municipal Well Supply](#).
2. Vulnerability Scores are assigned throughout the Wellhead Protection Area and are based on a comparative scale that quantifies susceptibility to contamination within vulnerable areas (see map below which is one of three included in Trent Assessment Report Map 5-23a (attached)). A higher score = a higher susceptibility to contamination. Options 1 and 2 have the highest vulnerability score of 10 (out of 10); Option 3 has a vulnerability score of 8 (out of 10).



3. Policies in the Trent Source Protection Plan apply to existing and future activities that that are being undertaken in the Wellhead Protection Area and that pose a significant drinking water

[threat](#). There do not appear to be any significant drinking water threats associated with the proposed water tower.

4. Consider if a Transport Pathway may be created. Transport pathways are anthropogenic features on the landscape that can redirect the natural flow of water to surface water sources or disturb the surface above an aquifer which increases the rate or quantity of flow to a groundwater source. In either case, a drinking water source may be impacted. Examples of Transport Pathways include boreholes, unused or abandoned wells, pits, quarries, construction activities involving deep excavations, and underground storm, sanitary or water distribution system infrastructure. Section 27 of Ontario Regulation 287/07 requires municipalities to notify the Source Protection Authority Chairperson, Source Protection Committee Chairperson, and the applicant if they become aware of a proposal that will create or modify a Transport Pathway in a Vulnerable Area.



Terri Cox

Pronouns: she/her

Risk Management Official / Risk Management Inspector

Otonabee Region Conservation Authority

250 Milroy Drive, Peterborough, ON, K9H 7M9

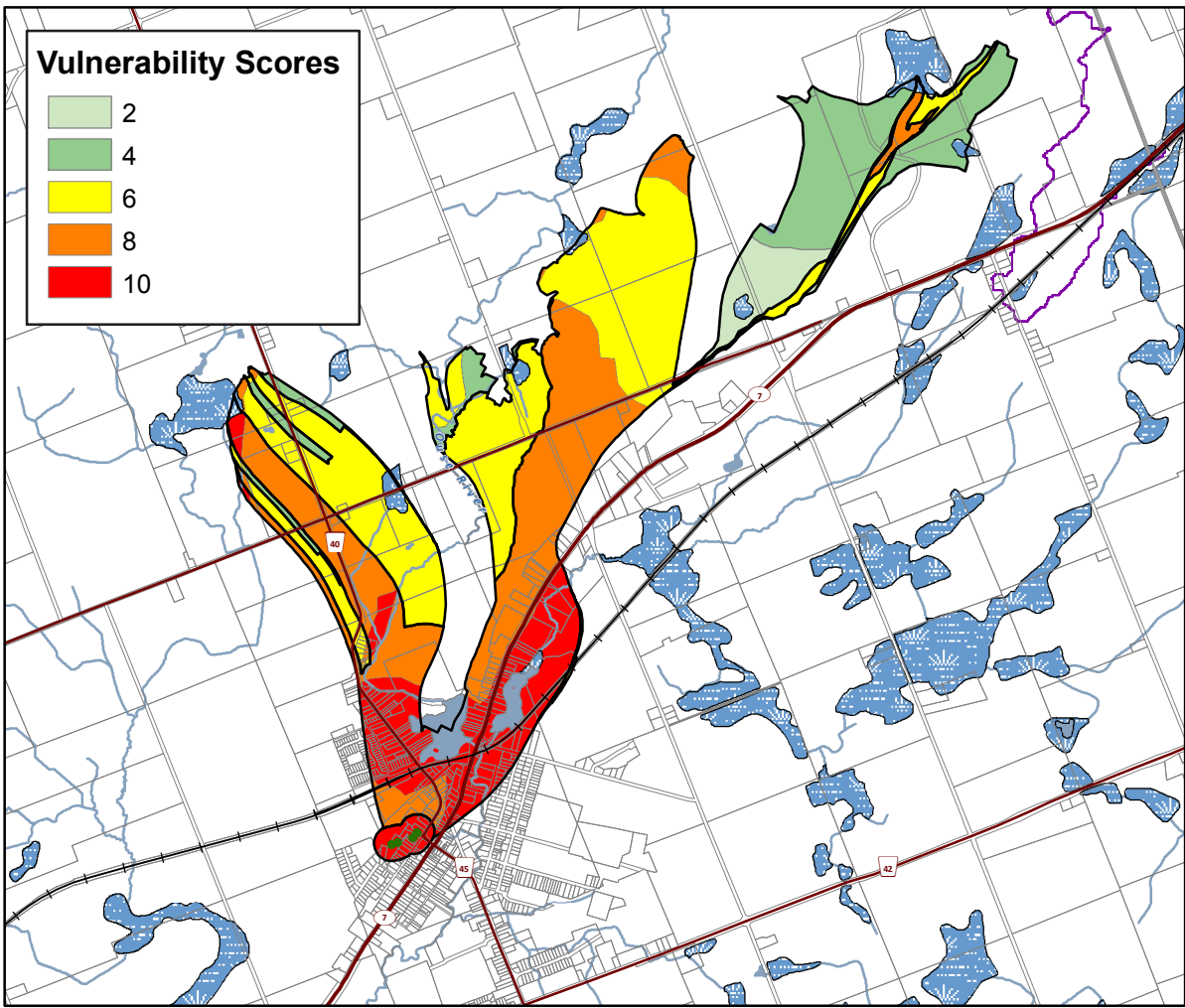
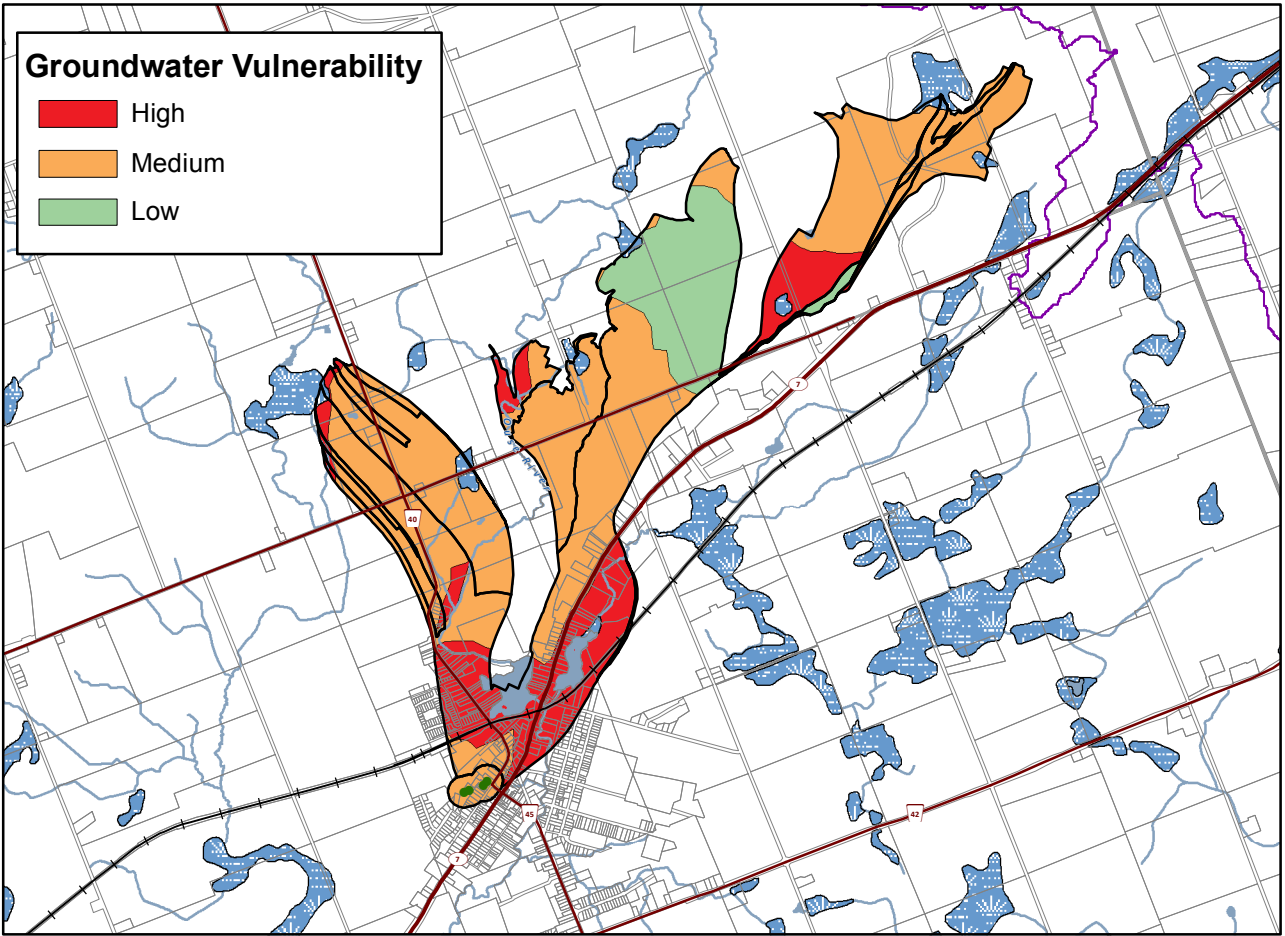
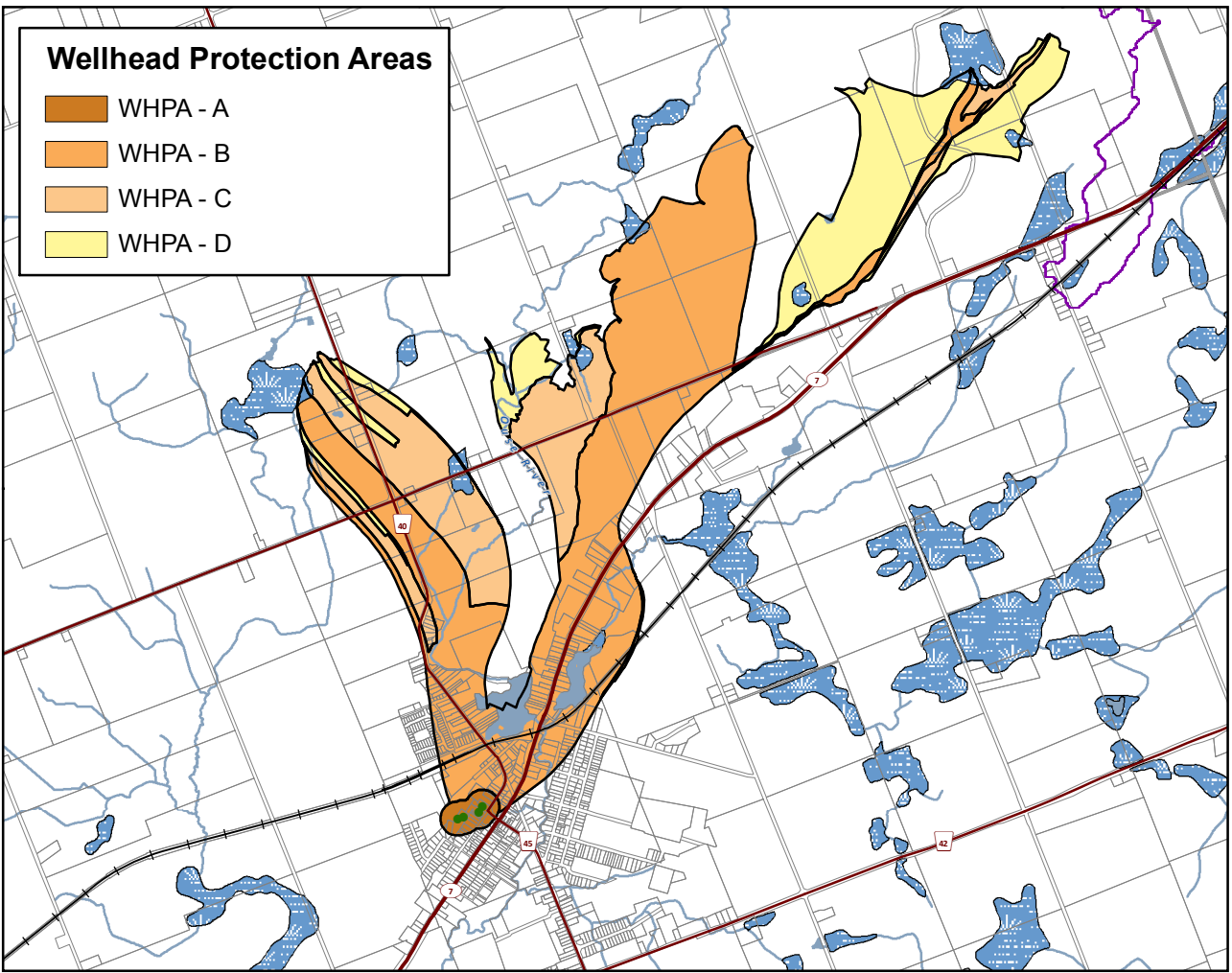
705-745-5791 x219

tcx@otonabeeconservation.com



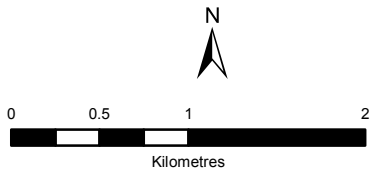
WOULD YOU LIKE TO KNOW MORE ABOUT HOW MUNICIPAL DRINKING WATER SOURCES ARE PROTECTED? Learn more about your local [Drinking Water Source Protection](#) program including the Otonabee-Peterborough Source Protection Area, the Trent Source Protection Plan, and the Clean Water Act.

This e-mail is confidential. If you are not an addressee named above, please immediately delete and notify the sender. Thank you.



Norwood Municipal Well System Otonabee-Peterborough Source Protection Area Wellhead Protection Areas & Vulnerability

- Legend**
- Municipal Wells
 - +— Railway
 - Watercourse
 - Main Road
 - Highway
 - Multi Lane Highway
 - Property Boundary
 - Source Protection Region
 - Source Protection Area
 - Lower and Single Tier Municipality
 - Upper Tier Municipality
 - Wellhead Protection Areas
 - Waterbody
 - Wetland



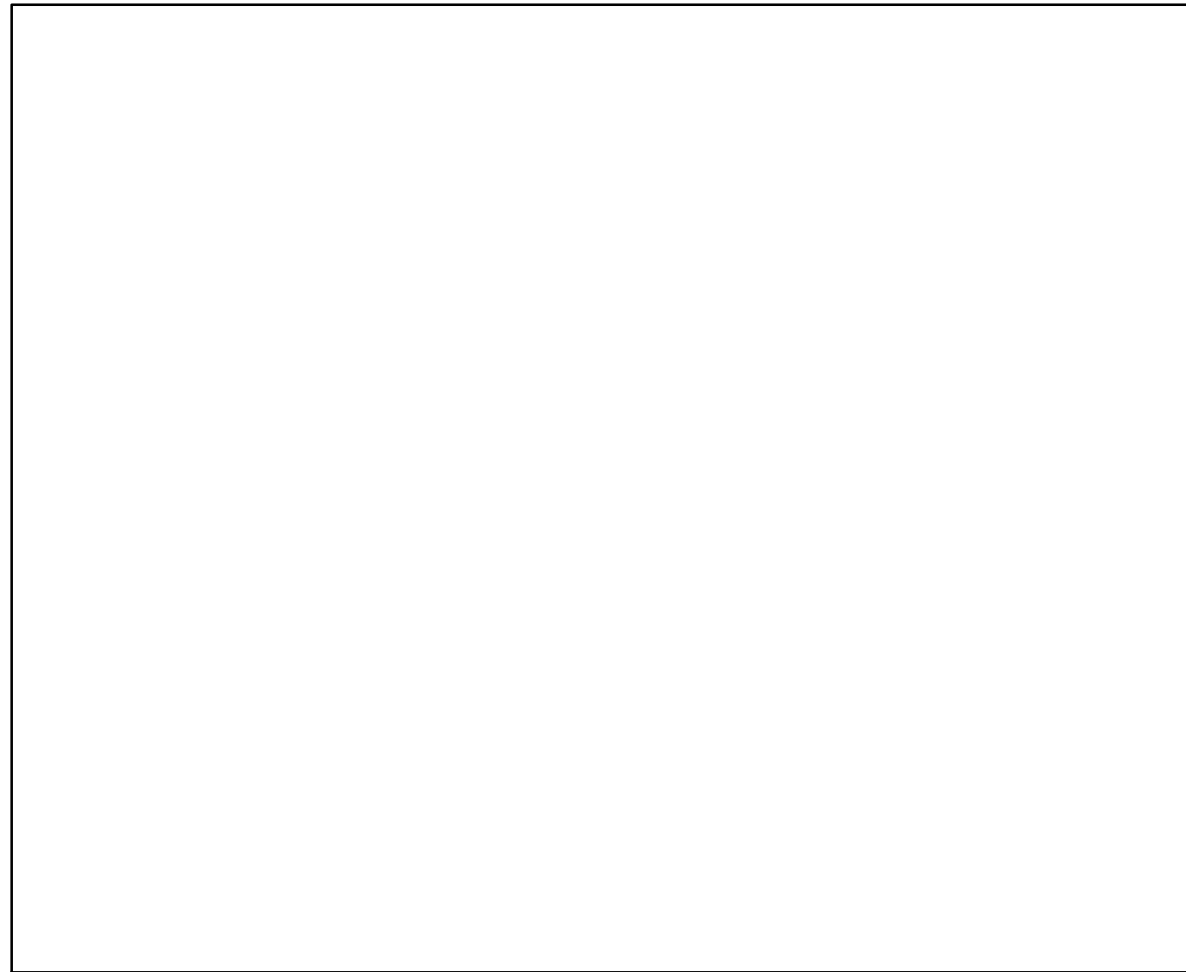
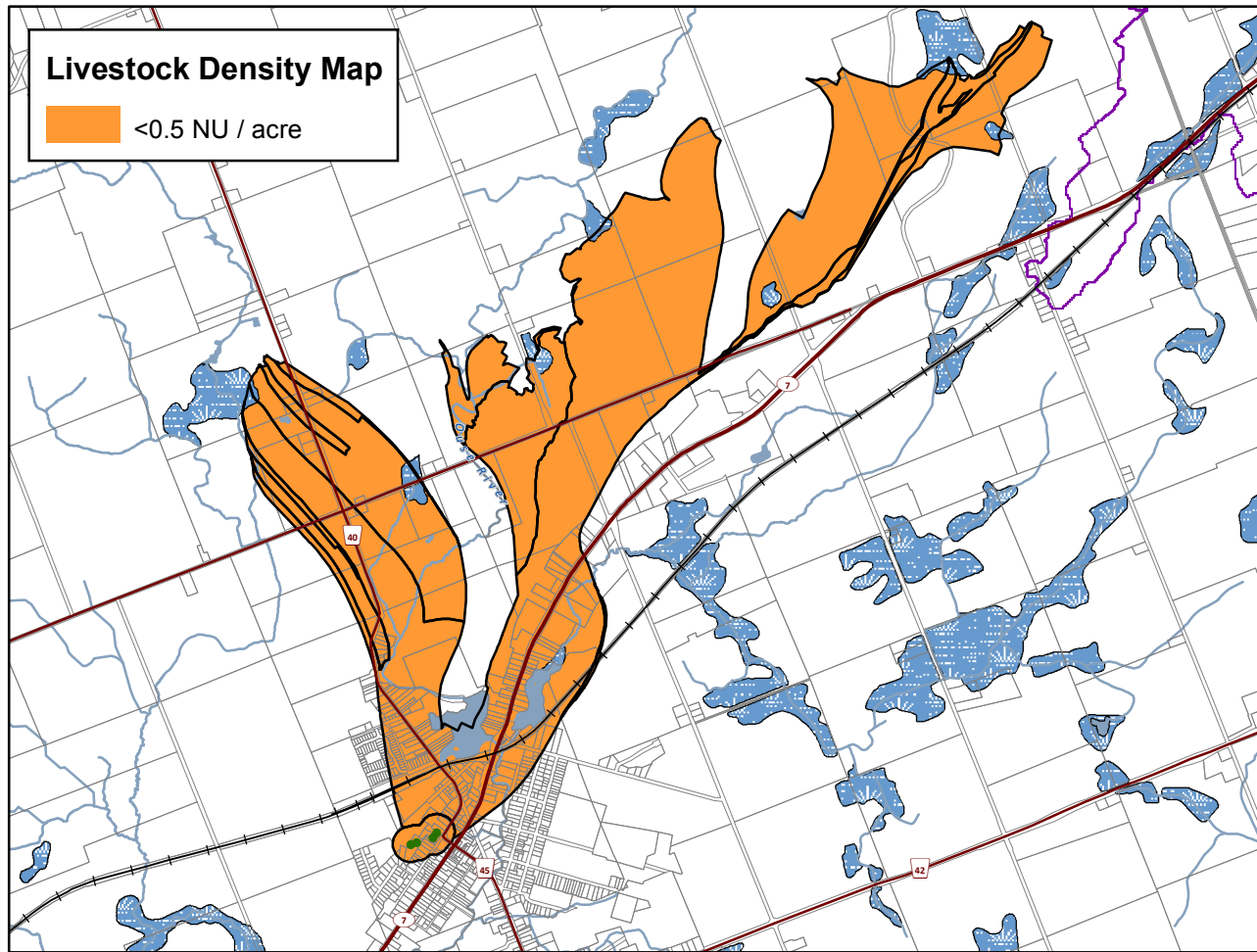
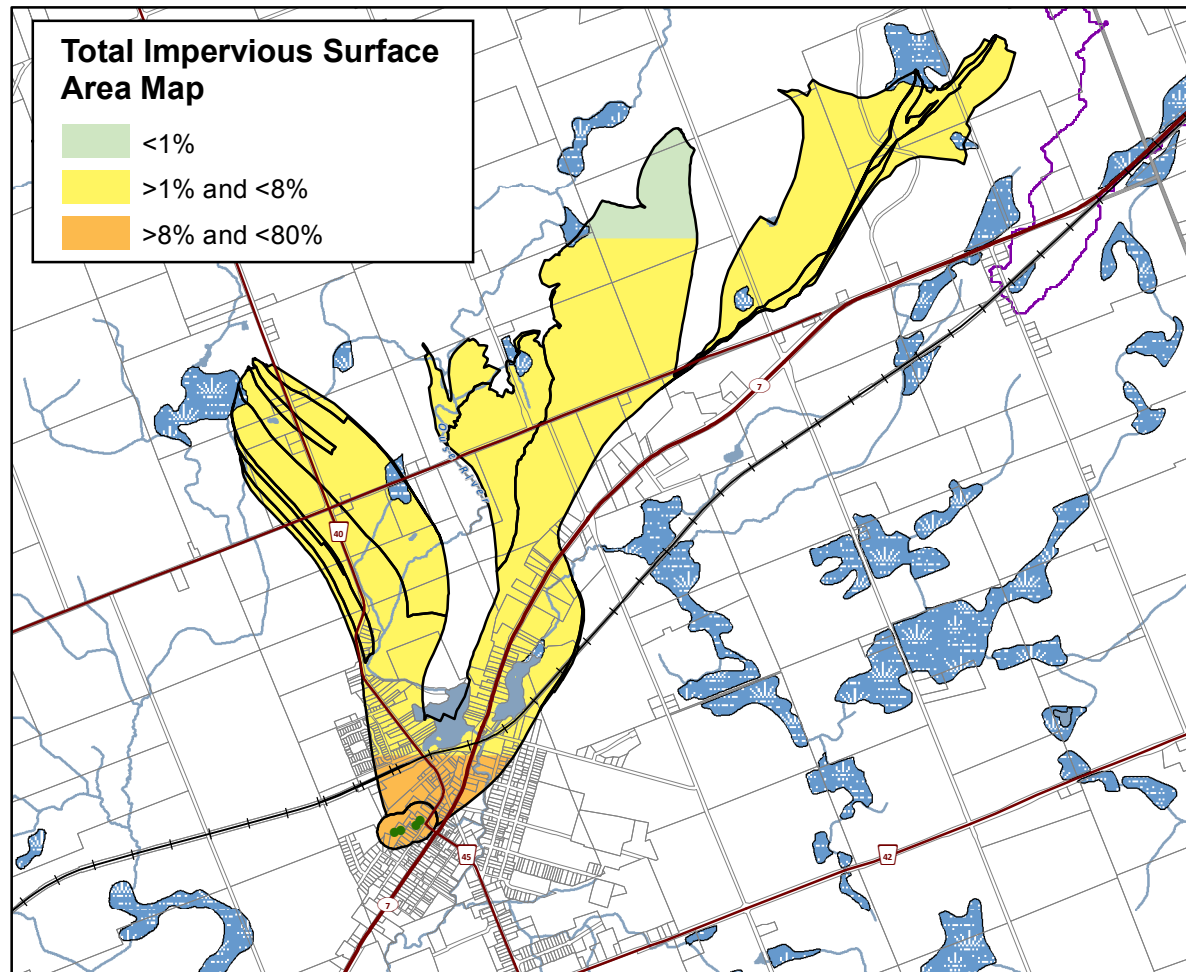
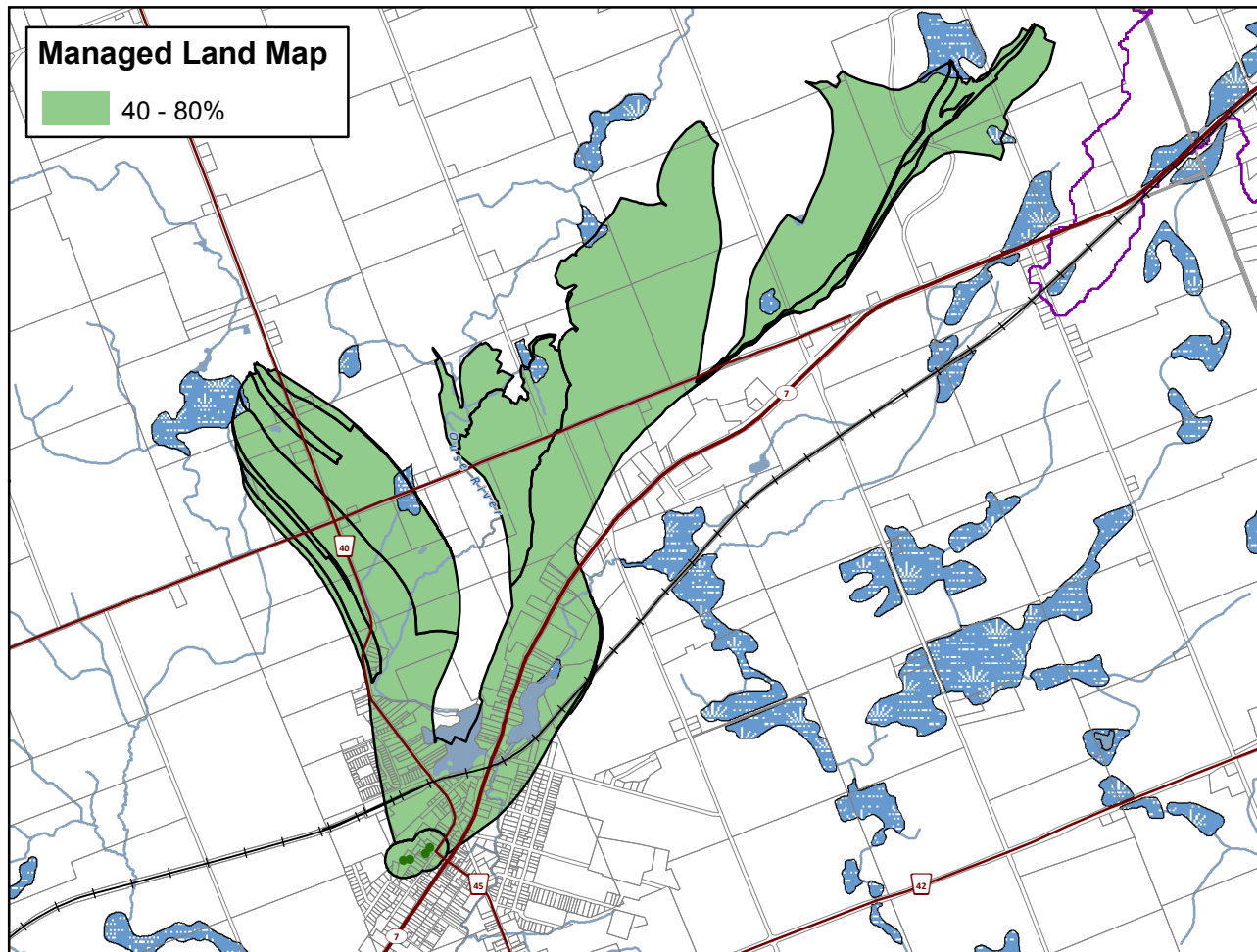
**Trent Conservation Coalition
Source Protection Region**
www.trentsourceprotection.on.ca

This map has been prepared for the purpose of meeting the provincial requirements under the Clean Water Act, 2006. If it is proposed to use it for another purpose, it would be advisable to first consult with the responsible conservation authority.

PRODUCED BY Lower Trent Conservation on behalf of the Trent Conservation Coalition Source Protection Committee, March 2011.
(Updated August 20, 2019), with data supplied under licence by members of the Ontario Geospatial Data Exchange.

NOTE: Waterbodies and watercourses located within the extent of a wellhead protection area are included in that area.

Ontario
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Norwood Municipal Well System

Otonabee-Peterborough Source Protection Area

Managed Land, Livestock Density & Total Impervious Surface Area

Legend

- Municipal Wells
- Railway
- Watercourse
- Main Road
- Highway
- Multi Lane Highway
- Property Boundary
- Source Protection Region
- Source Protection Area
- Lower and Single Tier Municipality
- Upper Tier Municipality
- Wellhead Protection Areas
- Waterbody
- Wetland

0 0.5 1 2
Kilometers

Trent Conservation Coalition Source Protection Region

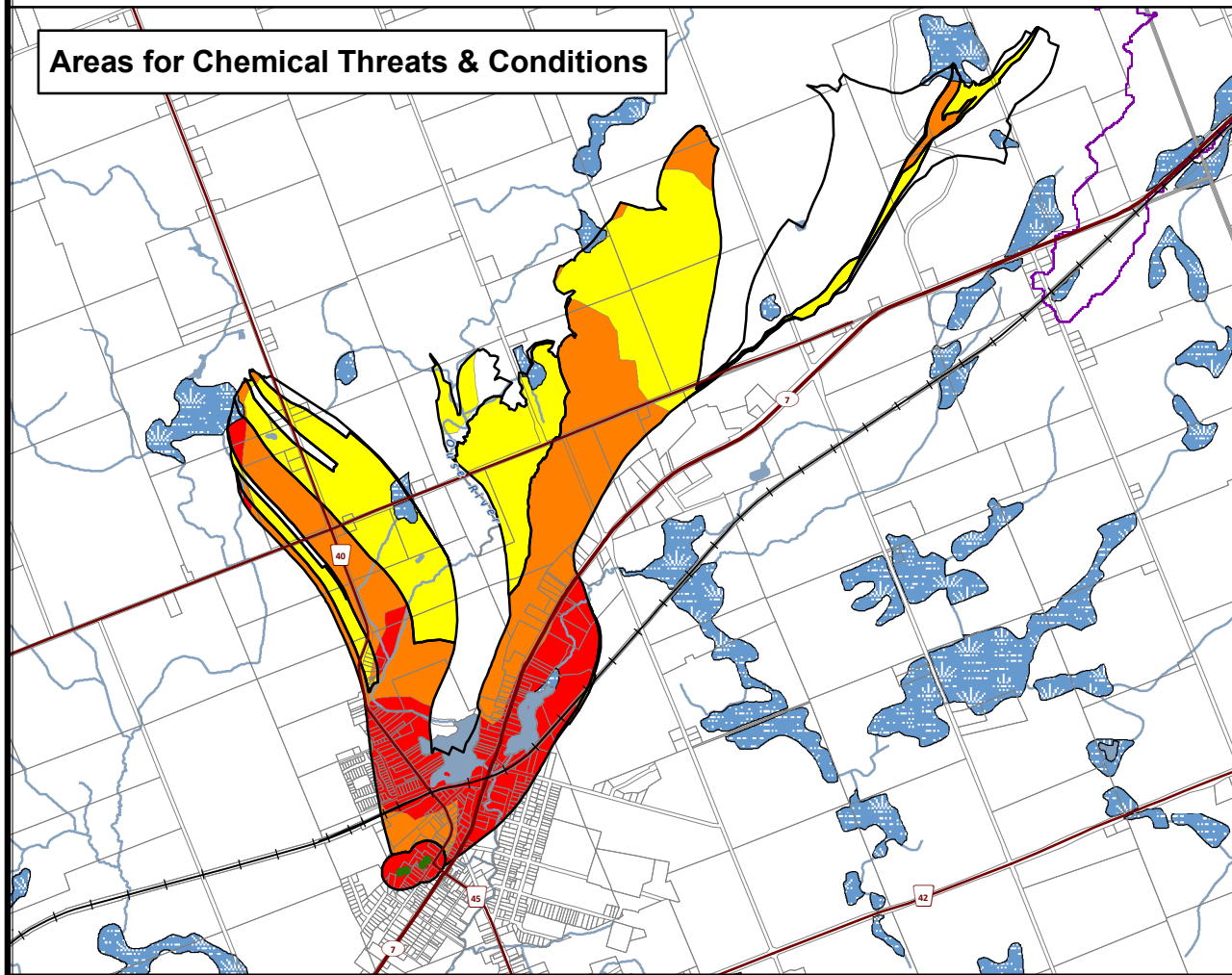
www.trentsourceprotection.on.ca

This map has been prepared for the purpose of meeting the provincial requirements under the Clean Water Act, 2006. If it is proposed to use it for another purpose, it would be advisable to first consult with the responsible conservation authority.

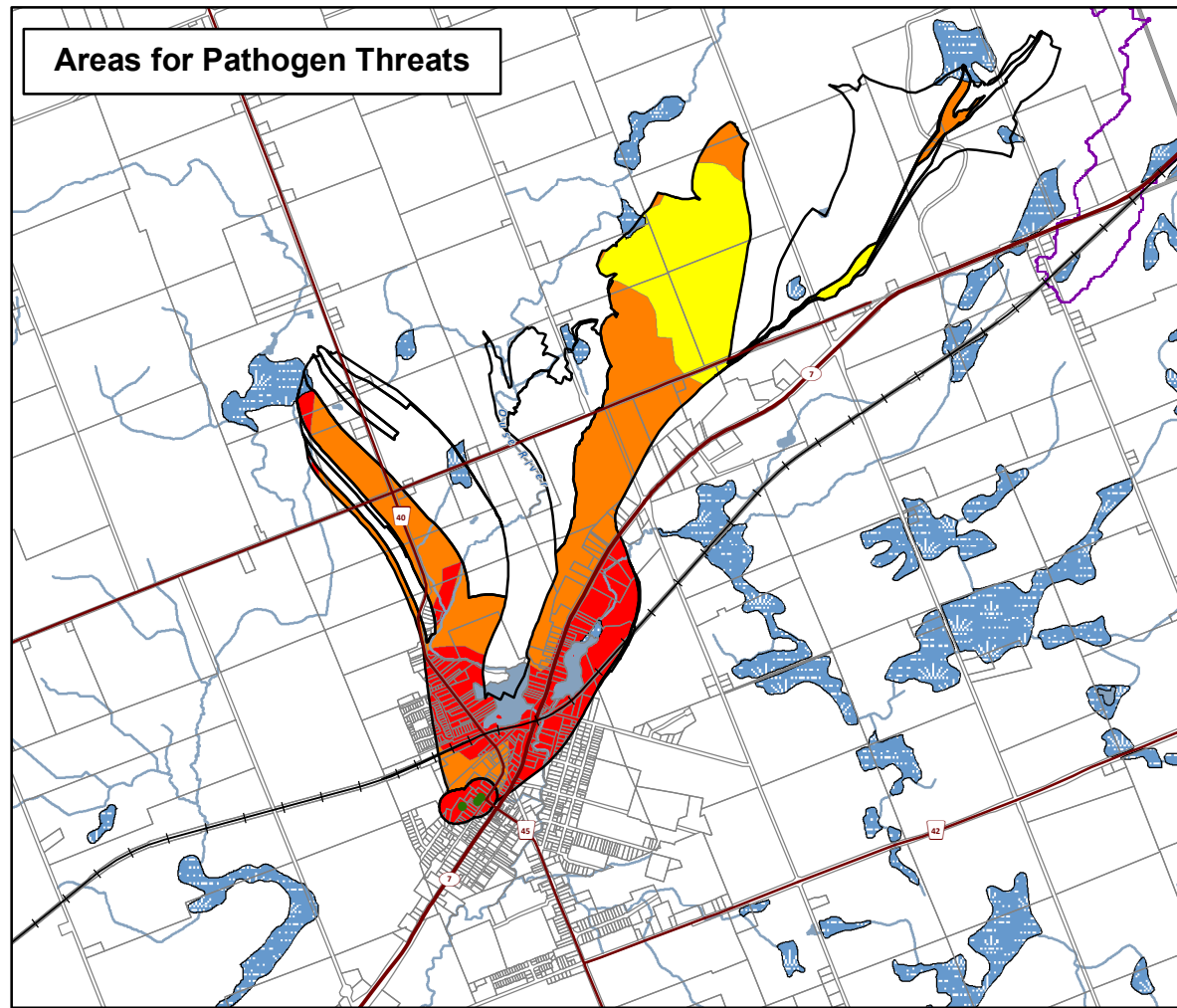
PRODUCED BY Lower Trent Conservation on behalf of the Trent Conservation Coalition Source Protection Committee, March 2011
(Updated August 20, 2019), with data supplied under licence by members of the Ontario Geospatial Data Exchange.

Ontario
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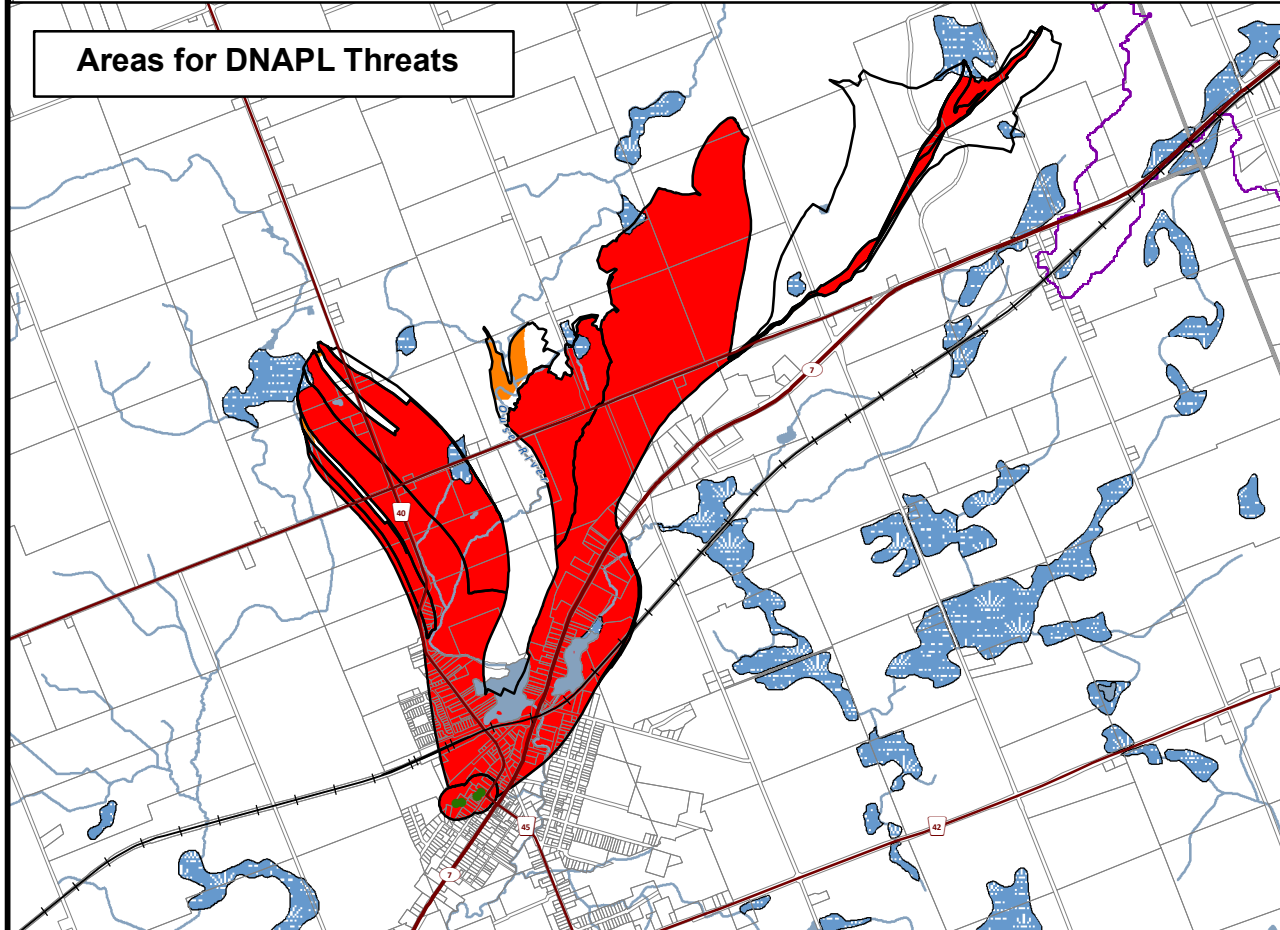
Areas for Chemical Threats & Conditions



Areas for Pathogen Threats



Areas for DNAPL Threats



CHEMICAL THREATS			
Area	Provincial Table of Circumstances		
	Significant	Moderate	Low
	Table 01 (CW10S)	Table 03 (CW10M)	Table 06 (CW10L)
	Table 02 (CW8S)	Table 04 (CW8M)	Table 07 (CW8L)
	-	Table 05 (CW6M)	Table 08 (CW6L)

PATHOGEN THREATS			
Area	Provincial Table of Circumstances		
	Significant	Moderate	Low
	Table 12 (PW10S)	Table 13 (PW10M)	-
	-	Table 14 (PW8M)	Table 15 (PW8L)
	-	-	Table 16 (PW6L)

DNAPL THREATS			
Area	Provincial Table of Circumstances		
	Significant	Moderate	Low
	Table 9 (DWAS)	-	-
	-	Table 10 (DW6M)	Table 11 (DW6L)

These tables indicate where chemical, pathogen, and DNAPL (dense non-aqueous phase liquid) threats are (or would be for future activities) significant, moderate, or low in the Wellhead Protection Area. The table numbers and codes refer to the Provincial Table of Circumstances that lists the circumstances under which these threats can be significant, moderate, or low. The Provincial Tables of Circumstances can be accessed from: the source protection homepage of ontario.ca or the reports and legislation page of <http://trentsourceprotection.on.ca>

DRINKING WATER

SOURCE PROTECTION

ACT FOR CLEAN WATER

Norwood

Municipal Well System

Otonabee-Peterborough

Source Protection Area

Areas for Significant, Moderate, & Low Drinking Water Threats (Chemical, Pathogen & DNAPL Threats)

Legend

Municipal Wells

Railway

Watercourse

Main Road

Highway

Multi Lane Highway

Property Boundary

Source Protection Region

Source Protection Areas

Lower and Single Tier Municipality

Upper Tier Municipality

Wellhead Protection Areas

Waterbody

Wetland

0

0.5

1

2

Kilometers

Trent Conservation Coalition

Source Protection Region

www.trentsourceprotection.on.ca

This map has been prepared for the purpose of meeting the provincial requirements under the Clean Water Act, 2006. If it is proposed to use it for another purpose, it would be advisable to first consult with the responsible conservation authority.

PRODUCED BY Lower Trent Conservation on behalf of the Trent Conservation Coalition Source Protection Committee, March 2011. (Updated August 20, 2019), with data supplied under licence by members of the Ontario Geospatial Data Exchange.

Ontario

Made possible through the support of the Government of Ontario

Trent Assessment Report Map 5-23c

From: [Donald Allin](#)
To: [Susan Jingmiao Shi](#); [Kyle Beacock](#); [Iris Yan](#); [Matthew Morkem](#); [Terri Cox](#); [Neil MacFarlane](#); [Candice White](#)
Subject: RE: ORCA Pre-consultation Village of Norwood Water Storage Class EA Meeting Minutes
Date: September 15, 2021 3:24:55 PM
Attachments: [image001.png](#)
[Ouse Main-West Trib Summary Results.txt](#)
[20210908_Timmins WSEL - PG.shx](#)
[20210908_Timmins WSEL - PG.shp.style](#)
[20210908_Timmins WSEL - PG.shp](#)
[20210908_Timmins WSEL - PG.prj](#)
[20210908_Timmins WSEL - PG.dbf](#)
[XS_HECRAS.zip](#)

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Susan,

Find the requested information as it relates to the floodplain project for the Norwood Ouse River update and the ongoing EA for the water storage proposal. Of key importance is that the option 2 location appears to be within the floodplain and upstream of where the Two-Zone Special Policy Area begins. A one-zone approach will apply and the entire floodplain is considered a 'floodway'. Current ORCA policies for new development in a floodway are quite prohibitive. I will reference Policy 2.4(1) and 2.4.1(1) of our Planning and Regulation Policy Manual and provide a link to this document below. These policies are prohibitive of new institutional development and any development that may be considered an essential service. In addition, ORCA regulation applies to this area and ORCA permit policies are also generally prohibitive to new development of an essential service – see 3.2(5) – Prohibited uses. If said infrastructure can be interpreted as meeting the definition of an essential service or essential emergency service (i.e given the reliance of the system to provide water for fire fighting) then this location may be problematic. Let me know what questions you may have at this point and if you would like to setup another meeting to discuss once you have had a chance to go through the provided documentation.

<https://www.otonabeeconservation.com/wp-content/uploads/2017/03/ORCA-Watershed-Planning-Regulation-Policy-Manual.pdf>

Norwood Two-Zone mapping is available on p193.

Don Allin

Acting Manager, Plan Review & Permitting Services
Otonabee Region Conservation Authority
705-745-5791 x225

This e-mail is confidential. If you are not an addressee named above, please immediately delete and notify the sender. Thank you.

From: Susan Jingmiao Shi <sshi@jlrichards.ca>

Sent: August 27, 2021 8:25 AM

To: Donald Allin <dallin@otonabeeconservation.com>; Kyle Beacock <kbeacock@antownship.ca>; Iris Yan <iyan@jlrichards.ca>; Matthew Morkem <mmorkem@jlrichards.ca>; Terri Cox <tc Cox@otonabeeconservation.com>; Neil MacFarlane <nmacFarlane@otonabeeconservation.com>; Candice White <cwhite@antownship.ca>

Subject: ORCA Pre-consultation Village of Norwood Water Storage Class EA Meeting Minutes

This message's attachments contains at least one web link. This is often used for phishing attempts. Please only interact with this attachment if you know its source and that the content is safe. If in doubt, confirm the legitimacy with the sender by phone.

Hello all,

In the attached, you can find the minutes from our Aug 11 pre-consultation meeting on the Norwood Water Storage Class EA.

Don and Neil, whenever you have a chance, please send us the updated flood plain mapping with the risks/mitigation measures, particularly for Option 2 – Landfill Entrance. The information will then be incorporated into our Schedule B report.

Thank you!
Susan

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. **We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

From: [Susan Jingmiao Shi](#)
To: [Iris Yan](#)
Subject: Fw: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage
Date: July 9, 2021 2:03:37 PM
Attachments: [0.png](#)
[image001.png](#)
[29837-000.1 Project Initiation Letter- Peter Makula.pdf](#)

For file. Update the stakeholder tracking sheet to include the additional contact person.
Thanks!
Susan

From: Tolles, Cheryl (MTO) <Cheryl.Tolles@ontario.ca>
Sent: 09 July 2021 1:34 PM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>; mmorkem@jlricksards.ca <mmorkem@jlricksards.ca>
Cc: Kyle Beacock <kbeacock@antownship.ca>; Pedlar, Mark (MTO) <Mark.Pedlar@ontario.ca>; Green, Kate (MTO) <Kate.Green1@ontario.ca>
Subject: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

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Susan/Matt, MTO is in receipt of the project initiation letter for the potable water storage project in Norwood. As you know, Highway 7 is under the jurisdiction of the MTO and permits are required for any works proposed within the highway corridor as well as within the permit control area which extends to 396 metres around each intersection. The site location falls within the MTO permit control area.

MTO has no concerns with the project in principle but we are interested in the technical aspects such as site plan for the location depicted and any implications to existing or proposed watermain infrastructure in the Highway 7 right of way. Typically these notifications go to several MTO offices. From this point forward, you can remove the other MTO offices and the MTO Corridor Management Section in Kingston will be your one window contact.

I have also included Mark Pedlar on this email. Please copy both Mark and I as your MTO contacts. I will be on vacation starting next Friday for one month but Mark is available.

Thanks for looping us in at the initial stages.

Cheryl

Cheryl Tolles

Senior Project Manager
Corridor Management Section
Ministry of Transportation
1355 John Counter Blvd.
Kingston, ON K7L 5A3

Email: Cheryl.Tolles@ontario.ca
Telephone: 613-449-0313 (cell)



From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: July 9, 2021 8:37 AM
To: Makula, Peter (MTO) <Peter.Makula@ontario.ca>
Cc: Iris Yan <iyan@jlrichards.ca>
Subject: FW: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Peter,

The Township of Asphodel-Norwood has retained J.L. Richards & Associates Limited to complete a Municipal Environmental Assessment to assess alternative potable water storage solutions for the Village of Norwood for the next 20 years.

Please see attached Notice of Project Initiation. Let the Project Team know if you have any questions and concerns.

Sincerely,

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and

communities while improving our communication technology. ***We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.*** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.

From: [Susan Jingmiao Shi](#)
To: [Iris Yan](#)
Subject: Fw: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage
Date: July 9, 2021 2:58:19 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[29837-000.1 Project Initiation Letter - Martina Chait-Hartwig - DD.pdf](#)

For file and updates.

From: Nicole Zenner <NicoleZ@dourodummer.on.ca>
Sent: 09 July 2021 2:10 PM
To: Matthew Morkem <mmorkem@jlrichards.ca>
Cc: Martina Chait <MartinaC@dourodummer.on.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: RE: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

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Hello Matthew,

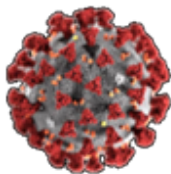
Please find the attached agency/stakeholder response form on behalf of Martina Chait-Hartwig.

Thank you,
Nicole

..
Nicole Zenner,
Administrative Assistant

T: 705 652 8392 x 224 F: 705 652 5044

Township of
Douro-Dummer
www.dourodummer.on.ca



Due to COVID-19 staff are working remotely and can be reached via email or by phone during regular business hours.

Updates including facility closures and meetings can be found on our website at www.dourodummer.on.ca/news

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: Thursday, July 8, 2021 8:09 PM
To: Martina Chait <MartinaC@dourodummer.on.ca>

Cc: Iris Yan <iyan@jlrichards.ca>

Subject: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class
EA Potable Water Storage

Hello Martina,

The Township of Asphodel-Norwood has retained J.L. Richards & Associates Limited to complete a Municipal Environmental Assessment to assess alternative potable water storage solutions for the Village of Norwood for the next 20 years.

Please see attached Notice of Project Initiation. Let the Project Team know if you have any questions and concerns.

Sincerely,

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. **We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

**Township of Asphodel-Norwood
Schedule 'B' Municipal Class Environmental Assessment
Potable Water Storage (Village of Norwood)**

AGENCY / STAKEHOLDER RESPONSE FORM

DATE: July 9, 2021

Name (please print): Martina Chait-Hartwig

Agency: Township of Douro-Dummer

1) Is your agency interested in being involved in this project? (Circle One) YES NO

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title: Martina Chait-Hartwig, Deputy Clerk

Address: 894 South Street, PO Box 92, Warsaw ON

Postal Code: K0L 3A0

Telephone: (705) 652-8392 ext 210 Fax: (705) 652-5044

E-mail: martinac@dourodummer.on.ca

3) If you presently have any comments or questions about this project please outline them below or attach on a separate sheet of paper.

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

Please submit to:

Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Telephone: 343-302-5425
Electronic-mail: mmorkem@jlrichards.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

From: [Matthew Morkem](#)
To: [Susan Jingmiao Shi](#); [Iris Yan](#)
Subject: Fw: agency/stakeholder response form for Norwood
Date: July 23, 2021 8:18:55 AM
Attachments: [doc09245320210722101047.pdf](#)

From: Chris Eaton <ceaton@peterboroughpublichealth.ca>
Sent: July 23, 2021 8:14 AM
To: Matthew Morkem <mmorkem@jlrichards.ca>
Subject: agency/stakeholder response form for Norwood

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Hello,

Please find the agency/stakeholder response form for Norwood attached.

Thanks,

Chris Eaton
Public Health Inspector
Small Drinking Water Systems
Peterborough Public Health
185 King Street
Peterborough, ON K9J 2R8
P: (705) 743-1000 EX 225
F: (705) 743-1203

-----Original Message-----

From: helpdesk
Sent: Thursday, July 22, 2021 11:11 AM
To: Chris Eaton <ceaton@peterboroughpublichealth.ca>
Subject:

TASKalfa 6002i
[00:17:c8:28:a0:2e]

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Facebook<<https://www.facebook.com/Ptbohealth>>

Peterborough Public Health serves the residents of Curve Lake and Hiawatha First Nations, and the County and City of Peterborough.

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**Township of Asphodel-Norwood
Schedule 'B' Municipal Class Environmental Assessment
Potable Water Storage (Village of Norwood)**

AGENCY / STAKEHOLDER RESPONSE FORM

DATE: JULY 19, 2021

Name (please print): CHRIS EATON

Agency: PETERBOROUGH PUBLIC HEALTH

1) Is your agency interested in being involved in this project? (Circle One) YES NO

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title: CHRIS EATON, PUBLIC HEALTH INSPECTOR

Address: 185 KING STREET

PETERBOROUGH

Postal Code: K9J 2R8

Telephone: (705) 743-1000 ^{EX} 225 Fax: (705) 743-1203

E-mail: ceaton@peterboroughpublichealth.ca

3) If you presently have any comments or questions about this project please outline them below or attach on a separate sheet of paper.

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

Please submit to:

Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Telephone: 343-302-5425
Electronic-mail: mmorkem@jlrichards.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.



Hydro One Networks Inc
483 Bay St
Toronto, ON

July 21, 2021

Re: Township of Asphodel-Norwood Municipal Class EA Potable Water Storage

Attention:
Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited

Thank you for sending us notification regarding (Township of Asphodel-Norwood Municipal Class EA Potable Water Storage). The Secondary Land Use group is aware of this project. Please discourage option 2 from Hydro One Transmission perspective. Please inform us if the scope of the project changes so that we may assess the impact to our assets. Note that this response does not constitute approval for your plans and is being sent to you as a courtesy to inform you that we must continue to be consulted on your project. Please ensure that all future communications about this and future project(s) are sent to us electronically to secondarylanduse@hydroone.com

Sent on behalf of,

***Secondary Land Use
Asset Optimization
Strategy & Integrated Planning
Hydro One Networks Inc.***

Norwood Water Storage Municipal Class Environmental Assessment

Pre-Consultation Meeting with Hydro One Minutes

Attendance:	Kyle Beacock	Township of Asphodel-Norwood (Township)	kbeacock@antownship.ca
	Candice White	Township of Asphodel-Norwood (Township)	cwhite@antownship.ca
	Matey Matev	Hydro One Networks Inc.	Matey.MATEV@HydroOne.com
	Arnold Vidad	Hydro One Networks Inc.	Arnold.Vidad@HydroOne.com
	Matthew Morkem	J.L. Richards & Associates Limited (JLR)	mmorkem@jlrichards.ca
	Susan Jingmiao Shi	J.L. Richards & Associates Limited (JLR)	sshi@jlrichards.ca
	Iris Yan	J.L. Richards & Associates Limited (JLR)	iyan@jlrichards.ca

The meeting commenced at 1:00 p.m. on Wednesday, August 25, 2021 via Microsoft Teams.

The following summary of the discussions of this meeting has been prepared to record decisions reached and actions required for the project. Please advise the undersigned of any errors or omissions within the next three business days.

ITEM

ACTION BY DUE BY

1. Introduction

A Project Initiation Notice was sent to Hydro One in early July due to the close proximity of the proposed new standpipe location along County Road 40 to the Hydro One transmission lines and towers. A response letter was issued to the Township and JLR, stating that the standpipe location is discouraged. JLR subsequently requested a pre-consultation meeting.

INFO

JLR noted the purpose of the meeting is to consult with Hydro One on the potential risks and mitigation measures for constructing the future standpipe at this location.

2. Roles & Responsibilities

.1 Township:

- Kyle Beacock, Water and Wastewater Operations Manager
- Candice White, CAO /Clerk /Treasurer

INFO

.2 Otonabee Region Conservation Authority:

- Matey Matev, Senior Network Management Officer
- Arnold Vidad, Network Management Officer

.3 JLR:

- Susan Shi, P.Eng., Environmental Engineer
- Matthew Morkem, P.Eng., Senior Civil Engineer, Project Manager
- Iris Yan, EIT, Environmental EIT

3. Mitigation Measures for Standpipe Location Option 2 – Entrance to Landfill

A sketch for the proposed standpipe location was presented at the meeting and is attached to the meeting minutes. The Township indicated that this site location is one of the preferable options from their perspective and the project team is looking for input from Hydro One (i.e., identification of risks, mitigation measures) to make this site feasible. The following is a summary of the key discussions.

INFO

Norwood Water Storage Municipal Class Environmental Assessment

Pre-Consultation Meeting with Hydro One Minutes

ITEM

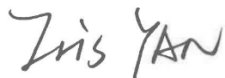
ACTION BY

DUE BY

- JLR has included a 10-meter horizontal setback and 23-meter (75 ft) easement as shown on the sketch.
- Hydro One asked if the standpipe can be relocated to the east of the Ouse River. The Township/JLR confirmed the standpipe cannot be pushed further to the east due to technical challenges.
- Hydro One commented that a 15-meter radius around each leg of the hydro tower needs to be considered to allow the maintenance vehicle to access the hydro tower. The proposed roadway into the standpipe site needs to be relocated.
- Hydro One indicated that there is a concern of the standpipe falling and impacting the transmission line. Hydro One indicated that a distance equal to the height of the standpipe needs to be set as the setback distance.
- JLR will update the sketch, to incorporate Hydro One's comments.
- Hydro One will have a discussion with its Engineering Team after receiving the updated sketch to check the compatibility and reply to JLR.

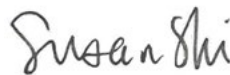
JLR
Hydro One

Prepared by:



Iris Yan, M.Eng., EIT.
Environmental Engineering Intern

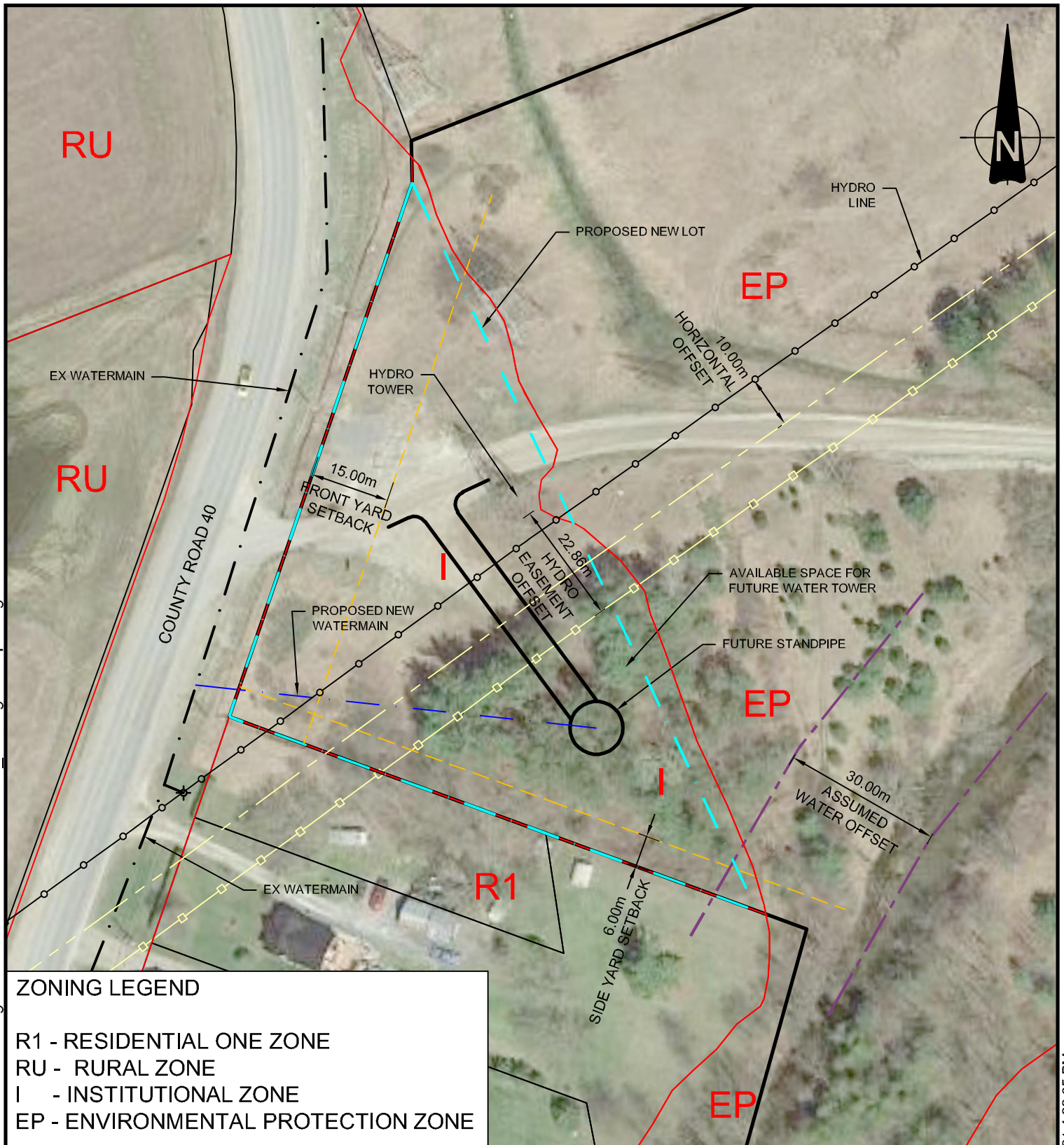
Reviewed by:



Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

Issued on: August 31, 2021

Distribution: All attendees
Attachment: Option 2 Sketches



ZONING LEGEND	
R1	- RESIDENTIAL ONE ZONE
RU	- RURAL ZONE
I	- INSTITUTIONAL ZONE
EP	- ENVIRONMENTAL PROTECTION ZONE

PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: OPTION 2 - ENTRANCE OF LANDFILL SITE DRIVEWAY

 J.L. Richards ENGINEERS - ARCHITECTS - PLANNERS	This drawing is copyright protected and may not be reproduced or used for purposes other than execution of the described work without the express written consent of J.L. Richards & Associates Limited.	DESIGN: IY	DRAWING #: FIGURE 2
		DRAWN: KTK	
		CHECKED: SS	
		JLR #: 29837	

From: Matey.MATEV@HydroOne.com
To: [Susan Jingmiao Shi](#)
Cc: Arnold.Vidad@HydroOne.com; kbeacock@antownship.ca; cwhite@antownship.ca; [Matthew Morkem](#); [Iris Yan](#); Department.SecondaryLandUse@hydroone.com
Subject: RE: Meeting Minutes - Township of Asphodel-Norwood Municipal Class EA Potable Water Storage Hydro One Pre-Consultation Meeting
Date: September 21, 2021 2:51:32 PM
Attachments: [image001.png](#)

Hi Susan

Thank you for sharing the updated site layout

I have gathered preliminary feedback from our team which is included below for your consideration.

Generally there were no concerns with the revised location of the water tower. We have the following specific comments:

- Please install helicopter hazard marking signage to warn of the obstruction (water tower)
- The close proximity of our ROW may present construction and maintenance challenges for the township (i.e. a tag line blowing towards/into the power lines)
- There may be some level of induction from the transmission lines onto your equipment based on the crane/equipment set up
- Please note that any damage to the power system associated with the construction and/or operation of the water tower will be billed back to the township

Please let us know if anything else is needed to finalize your EA.

Thanks

Matey

From: Susan Jingmiao Shi <sshi@jlrichards.ca>
Sent: Tuesday, August 31, 2021 11:32 AM
To: MATEV Matey <Matey.MATEV@HydroOne.com>; VIDAD Arnold <Arnold.Vidad@HydroOne.com>; Kyle Beacock <kbeacock@antownship.ca>; 'Candice White' <cwhite@antownship.ca>; Matthew Morkem <mmorkem@jlrichards.ca>; Iris Yan <iyan@jlrichards.ca>
Subject: Meeting Minutes - Township of Asphodel-Norwood Municipal Class EA Potable Water Storage Hydro One Pre-Consultation Meeting

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Hello,

The attached is the meeting minutes from our last week's meeting. Please review and let us know if you have any questions.

Matey and Arnold, as discussed at the meeting, we have revised the site layout to incorporate the 15m radius around each hydro tower leg, and a 47m setback (same height as the standpipe) from the closest transmission line. See attached updated sketch.

We look forward to hearing back from you on the feasibility of the proposed site layout.

Thank you!
Susan

-----Original Appointment-----

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



**J.L. Richards
& Associates Limited**
ENGINEERS • ARCHITECTS • PLANNERS



Platinum
member

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From: Susan Jingmiao Shi

Sent: Friday, August 20, 2021 10:45 AM

To: Susan Jingmiao Shi; Matey.MATEV@HydroOne.com; Arnold.Vidad@HydroOne.com; Kyle Beacock; 'Candice White'; Matthew Morkem; Iris Yan

Subject: Hydro One Response: 20210721-NoticeOfCommence-Township of Asphodel-Norwood Municipal Class EA Potable Water Storage

When: Wednesday, August 25, 2021 1:00 PM-1:30 PM (UTC-05:00) Eastern Time (US & Canada).

Where: Microsoft Teams Meeting

Hello Matey,

This is the meeting invite for a consultation meeting for the Village of Norwood Water Storage Class EA.

The attached is a conceptual level site layout that has been developed for the site of interest.

We are looking for Hydro One's feedback on how to mitigate the risks to the transmission lines/towers for this particular site. Your feedback will be incorporated in the evaluation.

Thank you!
Susan

Microsoft Teams meeting

Join on your computer or mobile app
[Click here to join the meeting](#)

Or call in (audio only)

[+1 437-703-4646,,304214330#](#) Canada, Toronto

Phone Conference ID: 304 214 330#

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

From: Matey.MATEV@HydroOne.com <Matey.MATEV@HydroOne.com>

Sent: Wednesday, August 18, 2021 2:58 PM

To: Susan Jingmiao Shi <sshi@jlrichards.ca>

Cc: Department.SecondaryLandUse@hydroone.com; Arnold.Vidad@HydroOne.com

Subject: RE: Hydro One Response: 20210721-NoticeOfCommence-Township of Asphodel-Norwood
Municipal Class EA Potable Water Storage

Good afternoon Susan,
I apologize for the delay in responding to your email.
We are quite flexible with our availability next week as outlined below:

August 23 and 24 - any time

August 25 - 9-11am or 1-3pm

August 26 - anytime in the morning

August 27 - any time

Please let me know which time is suitable for your team.

Thanks

Matey Matev

-----Original Message-----

From: Susan Jingmiao Shi <sshi@jlrichards.ca>

Sent: Tuesday, August 17, 2021 7:53 PM

To: SECONDARY LAND USE Department <Department.SecondaryLandUse@hydroone.com>
Subject: RE: Hydro One Response: 20210721-NoticeOfCommence-Township of Asphodel-Norwood
Municipal Class EA Potable Water Storage

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Hello there,

I'm following up on the pre-consultation request I previously sent on July 26. Has there been an advancement on this request?

Thank you!

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406
www.jlrichards.ca

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-----Original Message-----

From: Susan Jingmiao Shi
Sent: Monday, July 26, 2021 9:00 AM
To: SecondaryLandUse@HydroOne.com
Cc: Matthew Morkem <mmorkem@jlrichards.ca>; Iris Yan <iyan@jlrichards.ca>; Kyle Beacock <kbeacock@antownship.ca>
Subject: FW: Hydro One Response: 20210721-NoticeOfCommence-Township of Asphodel-Norwood
Municipal Class EA Potable Water Storage

Hello,

We are in receipt of the letter attached.

We understand that from Hydro One's perspective, Option 2 is discouraged.

We would like to schedule a consultation meeting with Hydro One to discuss your concerns with our proposed site location, and any mitigation measures that can be adopted to mitigate the risk to Hydro One infrastructure.

Based on our project schedule, we would like to request our meeting to be scheduled in August if possible.

Let us know.

Thank you!

-----Original Message-----

From: Susan.SUN@HydroOne.com <Susan.SUN@HydroOne.com>

Sent: Wednesday, July 21, 2021 1:46 PM

To: Matthew Morkem <mmorkem@jlrichards.ca>

Cc: SecondaryLandUse@HydroOne.com

Subject: Hydro One Response: 20210721-NoticeOfCommence-Township of Asphodel-Norwood
Municipal Class EA Potable Water Storage

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Please see the attached for Hydro One's Response.

Hydro One Networks Inc

SecondaryLandUse@HydroOne.com

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<p></p>

From: [MATEV Matey](#)
To: [Iris Yan](#); [VIDAD Arnold](#)
Cc: [Susan Jingmiao Shi](#)
Subject: RE: Revised Notice of Public Information Centre Township of Asphodel-Norwood Village of Norwood Potable Water Storage Schedule 'B' Class EA
Date: October 5, 2021 11:47:27 AM
Attachments: [image001.png](#)

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Hi Iris

Thank you for your note.

We have reviewed and provided feedback to Susan directly.
At this point, we don't have any further comment.

We would like to receive an update when the township decides which option will be going forward.

Thanks
Matey

From: Iris Yan <iyan@jlrichards.ca>
Sent: Tuesday, October 5, 2021 11:38 AM
To: VIDAD Arnold <Arnold.Vidad@HydroOne.com>; MATEV Matey <Matey.MATEV@HydroOne.com>
Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: Revised Notice of Public Information Centre Township of Asphodel-Norwood Village of Norwood Potable Water Storage Schedule 'B' Class EA

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Hi Matey and Arnold,

The Township of Asphodel-Norwood (the Township) is completing a Schedule B Class Environmental Assessment to assess the alternative potable water storage solutions in the Village of Norwood for the next 20 years.

A Public Information Centre will be held virtually on **October 18th**, 2021 at 5:00 p.m. to present the

work complete to date.

Please see attached Revised Notice of Public Information Center and new date. We are interested in hearing any comments or concerns that you may have about this project.

Sincerely,

Iris Yan, EIT, M.Eng.
Environmental Engineering Intern

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5419



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**Ministry of Heritage, Sport,
Tourism and Culture Industries**

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7
Tel: 437.239.3404

**Ministère des Industries du Patrimoine,
du Sport, du Tourisme et de la Culture**

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto, ON M7A 0A7
Tél: 437.239.3404



July 28, 2021

EMAIL ONLY

Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
mmorkem@jlrichards.ca

MHSTCI File : 0014611
Proponent : Township of Asphodel-Norwood
Subject : Notice of Project Initiation – Schedule B MCEA
Project : Potable Water Storage
Location : Township of Asphodel-Norwood

Dear Matthew Morkem:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Commencement for the above-referenced project. MHSTCI's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources.

Project Summary

The Township of Asphodel-Norwood (the Township) has initiated a planning process to assess alternative potable water storage solutions for the Village of Norwood (Village). The project has recently been initiated and is being carried out within the requirements for a Schedule 'B' project under the Terms of the Municipal Class EA process, which is approved under the Environmental Assessment Act.

Identifying Cultural Heritage Resources

While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Cultural heritage resources are often of critical importance to Indigenous communities. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to them.

Archaeological Resources

This EA project may impact archaeological resources and should be screened using the MHSTCI [Criteria for Evaluating Archaeological Potential](#) to determine if an archaeological assessment is needed. MHSTCI archaeological sites data are available at archaeology@ontario.ca. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licenced under the OHA, who is responsible for submitting the report directly to MHSTCI for review.

Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment will be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. MHSTCI has developed screening criteria that may assist with this exercise: [Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes](#).
2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.
3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

Given that this project covers a large study area, MHSTCI recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected.

Environmental Assessment Reporting

All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MHSTCI whether any technical cultural heritage studies will be completed for this EA project, and provide them to MHSTCI before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MHSTCI on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, do not hesitate to contact Laura Hatcher.

Sincerely,

Joseph Harvey

On behalf of

Laura Hatcher

Heritage Planner

Heritage Planning Unit

laura.e.hatcher@ontario.ca

Copied to: Susan Jingmiao Shi, Environmental Engineer, J.L. Richards & Associates Limited
Kyle Beacock, Water and Wastewater Operations Manager, Township of Asphodel-Norwood

It is the sole responsibility of proponents to ensure that any information and documentation submitted as part of their EA report or file is accurate. MHSTCI makes no representation or warranty as to the completeness, accuracy or quality of the any checklists, reports or supporting documentation submitted as part of the EA process, and in no way shall MHSTCI be liable for any harm, damages, costs, expenses, losses, claims or actions that may result if any checklists, reports or supporting documents are discovered to be inaccurate, incomplete, misleading or fraudulent.

Please notify MHSTCI if archaeological resources are impacted by EA project work. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to carry out an archaeological assessment in accordance with the *Ontario Heritage Act* and the *Standards and Guidelines for Consultant Archaeologists*.

If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer Services (416-326-8800) must be contacted. In situations where human remains are associated with archaeological resources, MHSTCI should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*.

From: [Susan Jingmiao Shi](#)
To: [Iris Yan](#)
Subject: Fw: File 0014611: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage
Date: July 28, 2021 1:39:18 PM
Attachments: [We found suspicious links.msg](#)

For file.

Please complete the preliminary archeology screening using the link in the letter.

Thanks!

Susan

From: Harvey, Joseph (MHSTCI) <Joseph.Harvey@ontario.ca>
Sent: 28 July 2021 12:44 PM
To: Matthew Morkem <mmorkem@jlrichards.ca>
Cc: Hatcher, Laura (MHSTCI) <Laura.E.Hatcher@ontario.ca>; Barboza, Karla (MHSTCI) <Karla.Barboza@ontario.ca>; Susan Jingmiao Shi <sshi@jlrichards.ca>; kbeacock@antownship.ca <kbeacock@antownship.ca>
Subject: File 0014611: Notice of Project Initiation - Township of Asphodel-Norwood Schedule 'B' Municipal Class EA Potable Water Storage

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Matthew Morkem,

Please find attached MHSTCI's comments on the above referenced undertaking.
Contact Laura Hatcher with any further questions or concerns.

Regards,

Joseph Harvey

On behalf of

Laura Hatcher
Heritage Planner
Heritage Planning Unit
laura.e.hatcher@ontario.ca

From: [Susan Jingmiao Shi](#)
To: [Iris Yan](#)
Subject: FW: Township of Norwood Asphodel Water Storage EA Archaeological Site Assessment
Date: September 13, 2021 2:09:19 PM
Attachments: [image004.png](#)

From: von Bitter, Robert (MHSTCI) <Robert.vonBitter@ontario.ca>
Sent: Tuesday, August 3, 2021 1:27 PM
To: Susan Jingmiao Shi <sshi@jlrichards.ca>
Subject: RE: Township of Norwood Asphodel Water Storage EA Archaeological Site Assessment

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Susan,

At the present time no reported archaeological sites are mapping within 300 m of those 3 locations in Norwood, Ontario.

While the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries attempts to maintain a current and reliable database covering all archaeological sites reported by licensed archaeologists in Ontario, we waive responsibility for the quality, accuracy and completeness of this information and any damages, which may be incurred through its use.

Regards,

Robert von Bitter

Robert von Bitter
Archaeological Data Co-Ordinator
Archaeology Program Unit
Heritage, Tourism and Culture Division
Ministry of Heritage, Sport, Tourism and Culture Industries
401 Bay Street Suite 1700
Toronto, Ontario M7A 0A7
437-339-9176
Robert.vonBitter@ontario.ca

From: Archaeology (MHSTCI) <archaeology@ontario.ca>
Sent: July-30-21 11:20 AM
To: von Bitter, Robert (MHSTCI) <Robert.vonBitter@ontario.ca>
Subject: FW: Township of Norwood Asphodel Water Storage EA Archaeological Site Assessment

From: Susan Jingmiao Shi <sshi@jlrichards.ca>

Sent: July 30, 2021 10:44 AM

To: Archaeology (MHSTCI) <archaeology@ontario.ca>

Cc: Iris Yan <iyan@jlrichards.ca>; Matthew Morkem <mmorkem@jlrichards.ca>

Subject: Township of Norwood Asphodel Water Storage EA Archaeological Site Assessment

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Hello,

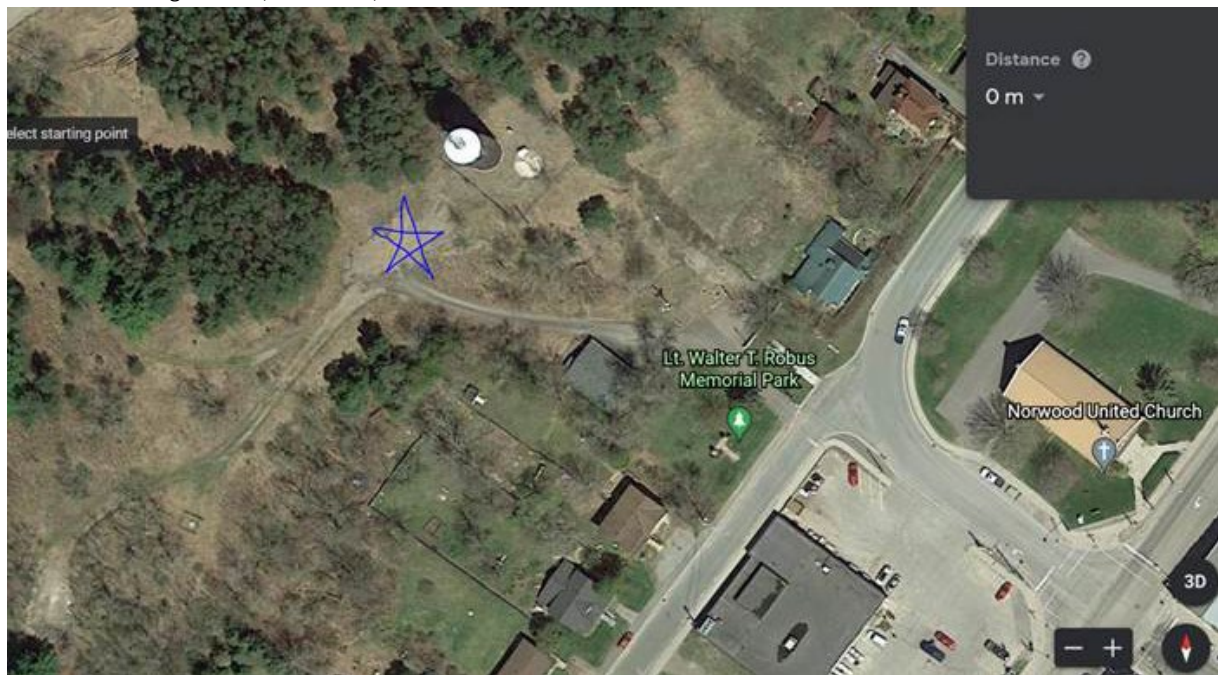
The Township of Asphodel-Norwood (the Township) has retained J.L. Richards & Associates Limited to complete a Municipal Environmental Assessment (Class EA) to assess alternative potable water storage solutions for the Village of Norwood (Norwood) for the next 20 years.

Under the EA process, the proponent is required to determine a project's potential impact on archaeological and cultural heritage resources.

Upon the information we were given in the email by MHSTCI, it mentioned MHSTCI archaeological sites data are available at archaeology@ontario.ca. We kindly request the archaeological information within 300 meter from the following sites, such that we can complete the preliminary archaeological screening form. The sites currently under review are as follows. The blue stars represent future water storage facility location on each site.

Site 1: The existing water treatment plant site

Address: 42 Ridge Street, Norwood, ON



Site 2 – Entrance of Landfill Site Driveway

Address: 187 County Road 40, Norwood, ON



Site 3 – Township Public Works Building

Address: 4439 Hwy 7, Norwood, ON



Thank you for your effort and please let us know if there is any Archaeological Site found.

Best,

Susan Jingmiao Shi, P.Eng., M.Eng.
Environmental Engineer

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5406



*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. **We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

From: [Matthew Morkem](#)
To: [Susan Jingmiao Shi](#); [Iris Yan](#)
Subject: FW: Municipal Class EA - Norwood Potable Water Storage
Date: September 6, 2021 10:01:56 PM
Attachments: [MEA - NOC Response Twp.Asphodel-Norwood Potable Water Storage.pdf](#)

From: Orpana, Jon (MECP) <Jon.Orpana@ontario.ca>
Sent: Friday, September 3, 2021 5:11 PM
To: kbeacock@antownship.ca; Matthew Morkem <mmorkem@jlrichards.ca>
Cc: Fuller, Jacqueline (MECP) <Jacqueline.Fuller@ontario.ca>
Subject: Municipal Class EA - Norwood Potable Water Storage

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Hello Mr. Beacock,

Please find MECP's preliminary comments on the above mentioned project.

Regards,

Jon

Jon K. Orpana
Regional Environmental Planner
Environmental Assessment Branch
Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5
Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

**Ministry of the Environment,
Conservation and Parks**

**Ministère de l'Environnement,
de la Protection de la nature
et des Parcs**

Environmental Assessment
Branch

Direction des évaluations
environnementales

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax.: 416 314-8452

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél. : 416 314-8001
Téléc. : 416 314-8452

By email only

September 3, 2021

Township of Asphodel-Norwood

Attention: Mr. Kyle Beacock, Water and Wastewater Operations Manager
Township of Asphodel-Norwood
kbeacock@antownship.ca

Dear Mr. Beacock,

Re: Notice of Project Initiation – Village of Norwood Schedule 'B' Municipal Class
Environmental Assessment Potable Water Storage

Thank you for providing the Notice of Study Commencement for your project by email on July 8, 2021 and the Project Information Form.

The Class EA study is being conducted according to the requirements of a Schedule 'B' project under the Municipal Class Environmental Assessment document (October 2000, amended in 2007, 2011 & 2015).

The Township of Asphodel-Norwood (the Township) has initiated a planning process to assess alternative potable water storage solutions for the Village of Norwood (Village). Currently, the Village's potable water system provides water to a population of approximately 2,100 people. A 2020 Infrastructure Assessment Report by Engage Engineering identified significant growth potential in the Village over the next 10-20

years and beyond. As such, the Township is considering infrastructure upgrades to ensure sufficient and reliable service for the community as it grows.

The Village's existing drinking water supply system consists of four groundwater wells, a recently upgraded chlorine disinfection water treatment plant, one municipal water tower (standpipe) and a dedicated distribution system.

As the Environmental Resource Planner & EA Coordinator for this region, I will be coordinating the technical review for the Ministry of the Environment, Conservation and Parks.

Please see the following instructions regarding the Class EA process and our preliminary comments.

Class Environmental Assessment Process

- Please provide copies of all notices by email (pdf) to the eastern region email address - eanotification.eregion@ontario.ca. Notices of Completion must be sent to the ministry in accordance with section 15.1 (1) of the amended *Environmental Assessment Act*.
- Please provide scanned copies of the notices as they appear in newspapers and confirm the dates of publication.

Consultation with Review Agencies

In addition to public consultation, consultation with review agencies is an important component of the Class EA process.

Other ministries and agencies that may have an interest in the project are listed in section A.3.6 and Appendices 3 and 7 of the Municipal Class Environmental Assessment. If applicable please ensure that you contact non-MECP review agencies directly to determine their interest in the project at the Notice of Commencement stage.

The final report should include information on correspondence with review agencies, issues raised by reviewers, and how these issues will be addressed, including: commitments to undertake technical studies or further consultation, as well as commitments to provide additional information or studies to obtain specific approvals or permits.

Schedule B Process

Your notice indicates that the proponent will be following the Schedule B process for the project. In accordance with the Municipal Class EA, Schedule B projects require that a

Project File be prepared. The Project File shall be organized in such a way as to clearly demonstrate that the appropriate steps in Phases 1 and 2 have been followed and explain the following:

- background to the project and earlier studies;
- the nature and extent of the problem or opportunity, to explain the source of the concern or issue;
- description/inventory of the environment;
- the alternative solutions considered and the evaluation process followed to select the preferred solution;
- follow-up commitments, including any monitoring necessary; and,
- the public consultation program employed and how concerns raised have been addressed.

The Project File must contain a complete record of all activities associated with the planning of the Project and shall include:

- correspondence;
- copies of notices, letters, bulletins relating to public consultation;
- memoranda to file explaining the proponent's rationale in developing stages of the project; and,
- copies of reports prepared by consultants and others.

The project documentation must be maintained in such a way that it is suitable for easy review by the public at any time.

Notice of Completion

Once the Project File is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the Proponent.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Section 16 Order requests on those matters should be addressed in writing to:

Minister
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3

minister.mecp@ontario.ca

and

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Please note the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion.

Further, the proponent may not proceed after this time if:

- a Section 16 Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director will issue a Notice of Proposed Order to the Proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent.

Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

The following link has more details regarding the Section 16 Order requests.

<https://www.ontario.ca/page/class-environmental-assessments-section-16-order>

MECP Technical Review

This Ministry's interest in water projects includes:

- problems identified during MECP inspections of existing facilities,
- raw water quality of the drinking water source,
- source protection of drinking water supplies,
- impacts to / interference with area wells during operation of new communal water supply,
- impacts to groundwater and surface water due to construction (i.e. dewatering of trenches during installation of watermains, control of erosion and sedimentation, construction and/or dredging at water crossings, spill control),
- proposed water service area compared to sewage service area,
- potential for encountering waste disposal sites, contaminated soil, contaminated sediment or groundwater,
- management of excess materials, waste, contaminated soil and groundwater,
- Species at Risk
- Climate Change

These environmental issues, and appropriate mitigation measures, should be addressed during the Class EA process.

We recommend that you contact this office as soon as possible during the environmental assessment process if you become aware of:

- contaminated sites in the study area or influence area of the project,
- a source water protection vulnerable area in the vicinity of the project, or
- issues that are contentious to the general public, aboriginal communities or review agencies.

Water Resources

For a new or expanded groundwater supply, this office is interested in reviewing the hydrogeological assessment as part of the Class EA process rather than at the Permit To Take Water stage. The hydrogeological assessment provides important information to the proponent, MECP reviewers, and other interested parties on potential environmental impacts, and it is necessary to evaluate this information as part of the Class EA process.

Source Protection

Proponents undertaking a Municipal Class EA project must identify early in the process whether a project is occurring within a source water protection vulnerable area, or changes vulnerable areas or creates new vulnerable areas. This must be clearly documented in a Master Plan, Project File report or Environmental Study Report. Specifically, the report should discuss whether or not the project changes or creates new vulnerable areas, and provide applicable details about the area. This section should then be used to inform and should be reflected in other sections of the report, such as the identification of net positive or negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

In cases that result in delineation of new vulnerable areas (WHPA/IPZ) or amendment of existing vulnerable areas, completion of other technical work to assess source water vulnerability scores within the new or expanded vulnerable areas may be necessary, and may result in the development or extension of source protection policies to areas where they previously did not apply. If creating or changing a vulnerable area, proponents should document whether any existing uses or activities may potentially be affected by the implementation of source protection policies.

The proponent should contact and consult with the appropriate Conservation Authority/Source Protection Authority (CA/SPA) to discuss these issues early in the process.

Ontario Regulation 205/18 applies to source protection areas and ensures that municipal residential drinking water sources are protected *before* drinking water can be provided to the public. Where owners of municipal residential drinking water systems are applying for a drinking water works permit for a change that results in new or expanded vulnerable areas, the regulation requires:

- identification of vulnerable areas and vulnerability scoring,
- written confirmation from the Source Protection Authority (SPA) that
 - the SPA is satisfied that the vulnerability area mapping and scoring is complete,
 - identifies amendments necessary to the source protection plan (SPP),
 - indicates when the source protection authority will be able to propose amendments to the SPP, and
 - identifies if any of the amendments have already been made,
- a condition in the drinking water works permit or license that prevents the supply of drinking water to users of the new or expanding system until any necessary amendments to the SPP have been approved.

In summary, we recommend that early in the Class EA process the proponent contact the local SPA to discuss source protection implications. We recommend that during the Class EA process, delineation of new or expanded vulnerable areas and vulnerability

scoring be completed, and businesses and landowners be consulted about source protection implications resulting from the new or expanded water supply.

Planning for Sewage and Water Servicing

As discussed in section 1.6.6 of the 2014 Provincial Policy Statement (PPS) under the Planning Act, municipal sewage and water services are the preferred form of servicing for settlement areas. Where municipal services are not provided, municipalities may allow the use of private communal sewage and water services. Partial services shall only be permitted to address failed individual on-site services in an existing development, or to allow infilling and minor rounding out of existing development on partial services, provided that site conditions are suitable for the long-term provision of such services with no negative impacts.

The Project File or Environmental Study Report should include a discussion of these servicing options, and a rationale for proceeding with one of the less preferred types of servicing, and the environmental implications of the servicing. For example, in cases where private communal water and septic systems are proposed, the report should discuss why municipal servicing is not feasible, why full services are not feasible, and whether any impacts to the environment (for example, impacts to the effectiveness of individual septic systems) could result.

As discussed in PPS section 1.1.3.8, settlement areas can only be identified or expanded during a comprehensive review of the Official Plan. We recommend that the local Ministry of Municipal Affairs Municipal Services Office be circulated on notices and reports and consulted on issues related to new or expanded settlement areas.

Contaminated Sites and Waste Management

The proponent should consider the potential that the project may be constructed in an area of contamination. If an area of contamination is present, the EA should determine the appropriate management of contaminated soil, sediment and groundwater as well as consider health and safety measures.

Waste, including contaminated soil, must be managed in accordance with MECP standards. The *Environmental Protection Act* (EPA) and Regulation 347 require waste to be classified and disposed of appropriately. When determining the waste category, the proponent must ensure compliance with Schedule 4 of Regulation 347.

Species at Risk

The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. For any questions related to consideration of species at risk or subsequent permit requirements, please contact SAROntario@ontario.ca

Climate Change

Climate change should be considered as part of the study as well and there are resources appended to the end of this letter to help address this topic and others.

Consultation with First Nation and Métis Communities

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before you can proceed with this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the process.

Your proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to your proposed project, **the MECP is delegating the procedural aspects of rights-based consultation to you through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information you have provided to date and the Crown's preliminary assessment you are required to consult with the following Aboriginal communities who have been identified as potentially affected by your proposed project:

- **Kawartha Nishnawbe First Nation**
- **Alderville First Nation**
- **Curve Lake First Nation**
- **Hiawatha First Nation**
- **Mississaugas of Scugog Island First Nation**

For the above Williams Treaties communities, please cc Karry Sandy McKenzie, William Treaties First Nations Process Co-ordinator, inquiries@williamstreatiesfirstnations.ca

Steps that you may need to take in relation to Aboriginal consultation for your proposed project are outlined in the “Code of Practice for Consultation in Ontario’s Environmental Assessment Process” which can be found at the following link:

<https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process>

Additional information related to Ontario’s Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments

You must contact the Director of Environmental Assessment Branch under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right
- Consultation with Indigenous communities or other stakeholders has reached an impasse
- A Part II Order request is expected on the basis of impacts to Aboriginal or treaty rights

The ministry will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

Thank you for your notification regarding this project and your ongoing care of the environment.

If you have any questions or comments, please do not hesitate to contact me at my coordinates below.

Regards,



Jon K. Orpana
Environmental Planner & Environmental Assessment Coordinator

Ministry of the Environment, Conservation and Parks
Kingston Regional Office
PO Box 22032, 1259 Gardiners Road
Kingston, Ontario
K7M 8S5

Phone: (613) 548-6918
Fax: (613) 548-6908
Email: jon.orpana@ontario.ca

EC.

Courtney Redmond, Compliance Supervisor
Peterborough District Office, Ministry of the Environment, Conservation and Parks
Courtney.redmond@ontario.ca

J.L. Richards and Associates Limited
MMorkem@jlrichards.ca

Guidance:

Climate Change

Ontario is leading the fight against climate change through the Climate Change Action Plan (<https://www.ontario.ca/page/climate-change-action-plan>). Recently released, the plan lays out the specific actions Ontario will take in the next five years to meet its 2020 greenhouse gas reduction targets and establishes the framework necessary to meet its long-term targets. As a commitment of the action plan, **the province has now finalized a guide, "Considering Climate Change in the Environmental Assessment Process" (Guide)** (<https://www.ontario.ca/page/considering-climate-change-environmental-assessment-process>)

The Guide is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA.

Proponents should review this Guide in detail.

- The MECP expects proponents to:

Consider during the assessment of alternative solutions and alternative designs, the following:

- a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and

b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).

2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" (https://ero.ontario.ca/notice/013-2083?_ga=2.113331267.532557834.1525694946-2101883328.1501507205) document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase set to come into effect on January 1, 2021. Please visit <https://www.ontario.ca/page/handling-excess-soil>.
- Activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) (<https://www.ontario.ca/page/management-excess-soil-guide-best-management-practices>).

All waste generated during construction must be disposed of in accordance with ministry requirements

Species at Risk

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. For any questions related to consideration of SAR and subsequent permit requirements, please contact SAROntario@ontario.ca.

From: [Tolles, Cheryl \(MTO\)](#)
To: [Iris Yan](#); [Pedlar, Mark \(MTO\)](#)
Cc: [Susan Jingmiao Shi](#); [Shane Smith](#)
Subject: Revised Notice of Public Information Centre Township of Asphodel-Norwood Village of Norwood Potable Water Storage Schedule 'B' Class EA
Date: October 5, 2021 12:13:40 PM
Attachments: [image001.png](#)
[image002.png](#)

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Thanks for sending this along.....MTO does not typically attend the PICs and with COVID restrictions, that complicates travel even further. In principle, of course, MTO has no concerns with the proposal for potable water solutions for Norwood. As the site is within MTO permit control, please ensure that you are circulating Mark on all drawings, reports, etc. and he will provide comments throughout the process so that when you get the preferred alternative, you already have most of your MTO review in place.

Permits will be required and MTO clearances. Mark can walk you through any requirements/process as the project moves forward.

I will be retiring in a few weeks and you can remove me from your mailing list for this project. All of my files are being transitioned over to Mark and he will be your MTO contact.

Cheryl

Cheryl Tolles
Senior Project Manager
Corridor Management Section
Ministry of Transportation
1355 John Counter Blvd.
Kingston, ON K7L 5A3

Email: Cheryl.Tolles@ontario.ca
Telephone: 613-449-0313 (cell)



From: Iris Yan <iyan@jlrichards.ca>

Sent: Tuesday, October 5, 2021 12:00 PM

To: Pedlar, Mark (MTO) <Mark.Pedlar@ontario.ca>; Tolles, Cheryl (MTO) <Cheryl.Tolles@ontario.ca>

Cc: Susan Jingmiao Shi <sshi@jlrichards.ca>

Subject: Revised Notice of Public Information Centre Township of Asphodel-Norwood Village of Norwood Potable Water Storage Schedule 'B' Class EA

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Hi Cheryl & Mark ,

The Township of Asphodel-Norwood (the Township) is completing a Schedule B Class Environmental Assessment to assess the alternative potable water storage solutions in the Village of Norwood for the next 20 years.

A Public Information Centre will be held virtually on **October 18th**, 2021 at 5:00 p.m. to present the work complete to date.

Please see attached Revised Notice of Public Information Center and new date. We are interested in hearing any comments or concerns that you may have about this project.

Sincerely,

Iris Yan, EIT, M.Eng.
Environmental Engineering Intern

J.L. Richards & Associates Limited
203 - 863 Princess Street, Kingston, ON K7L 5N4
Direct: 343-302-5419



*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. **We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

RETURN TO SENDER RENOI A L'EXPEDITEUR
☐ Unclaimed Non réclamé
☒ No such address Adresse inexistante
☐ Address incomplete Adresse incomplète
☐ Moved / Unknown Déménagé / Inconnu
☐ No such Post Office Bureau inexistant
☐ Refused by addressee Refusé par le destinataire

Daniel & Terri-Lynn Pammett
175 County Rd 45
Norwood, ON K0L 2V0

RE: Township
Notice of

NO SUCH ADDRESS // ADRESSE INEXISTANTE RETURN TO SENDER RENOI A L'EXPEDITEUR K1Z 5M2



2109180724

3808 M4L

RETURN TO SENDER RENOI A L'EXPEDITEUR
☐ Unclaimed Non réclamé
☐ No such address Adresse inexistante
☐ Address incomplete Adresse incomplète
☒ Moved / Unknown Déménagé / Inconnu
☐ No such Post Office Bureau inexistant
☐ Refused by addressee Refusé par le destinataire

Donald Hannon
187 County Rd 40

MOVED / UNKNOWN // DEMENAGE OU INCONNU RETURN TO SENDER RENOI A L'EXPEDITEUR K1Z 5M2



2109180820

3808 M4L

Township of Asphodel-Norwood
Schedule 'B' Municipal Class Environmental Assessment
Potable Water Storage (Village of Norwood)

AGENCY / STAKEHOLDER RESPONSE FORM

DATE: July 26-21

Name (please print): [redacted] and [redacted]

Agency: Norwood Centennial Pharmacy

1) Is your agency interested in being involved in this project? (Circle One) YES NO

2) If you are interested in being involved in this project, please identify a contact person:

Name and Title: [redacted]

Address: 2375 County Rd 45 Norwood ON K6L 2L6
- Box 309 To: [redacted]

Telephone: () For: (F) [redacted]

E-mail: centennialpharmacy@hotmail.com

3) If you presently have any comments or questions about the project please outline them below or attach on a separate sheet of paper.

4) Do you have any information regarding the Study Area that will assist us in our planning process? If so, please outline below or attach on a separate sheet of paper.

Please submit to:

Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Telephone: 343-302-5425
Electronic-mail: mmorkem@jlr.ca

Note: If you wish to respond via email, please write directly on the form and scan a copy before emailing it to the address above. Comments and information regarding this Study are being collected to assist the Ministry in meeting the requirements of the EA Act. This material will be maintained on file for use during the Study and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Iris Yan

From: Matthew Morkem
Sent: November 30, 2021 11:14 AM
To: Iris Yan; Susan Jingmiao Shi
Subject: FW: Village of Norwood - Potable water Storage

-----Original Message-----

From: Matthew Morkem
Sent: Monday, October 4, 2021 10:12 AM
To: dougpearcy <dpearcy@accel.net>
Subject: RE: Village of Norwood - Potable water Storage

Hello Mr Pearcy

Thanks you for the questions. We will review these items in relation to the presentation.

Just to note that we have rescheduled the PIC. A notification will be sent out today.

Again, thanks for you engagement on this project.

Thanks

Matt

-----Original Message-----

From: dougpearcy <dpearcy@accel.net>
Sent: Monday, October 4, 2021 9:47 AM
To: Matthew Morkem <mmorkem@jlrichards.ca>
Subject: Village of Norwood - Potable water Storage

Caution: This email originated from outside JLR. Do not click links or open attachments unless you recognize the sender and know the content is safe. If in doubt, please forward suspicious emails to Helpdesk.

Questions that might be asked at meeting today at 5:00 p.m.

1. There is a lot of talk as to the amount of water which is actually available in the ground to warrant growth of the system?
2. Is the present standpipe in poor repair - does it need to be replaced or is the need only driven by the desire to grow the system and the number of users?
3. What will be the cost of this type of project?
4. Who is going to pay - federal and provincial programs - development charges - developers - or will all this fall back on the users of the system in monthly rate increases?

I realize that you as the consultant may not be able to answer these questions but they will be asked.

Doug Pearcy
30 King Street
Norwood, Ont.
K0L 2V0

TOWNSHIP OF ASPHODEL-NORWOOD

NOTICE OF STUDY COMPLETION

VILLAGE OF NORWOOD

Schedule 'B' Municipal Class Environmental Assessment

POTABLE WATER STORAGE

The Township of Asphodel-Norwood has completed a Class Environmental Assessment Study to assess alternative potable water storage solutions for the Village of Norwood. Currently, the Village's single standpipe does not have adequate capacity to service the current population. The study was undertaken in accordance with the planning and design process for Schedule 'B' projects of the *Municipal Class Environmental Assessment* (MCEA). The Schedule 'B' Class EA is recommending the construction of a new standpipe at the existing Water Treatment Plant.

The completed Schedule 'B' Class EA reports document the planning process of the study. By this notice, the Report is being placed on public record for a 30-day review period in accordance with the requirements of the Municipal Class EA. The documents can be accessed at the Township's website.

<https://www.antownship.ca/en/township-services/water-and-wastewater.aspx>

Interested persons may provide written comments to our project team by **FEBRUARY 19, 2022**. All comments and concerns should be sent directly to:

Matthew Morkem, P.Eng.
Project Manager
J.L. Richards & Associates Limited
mmorkem@jlrichards.ca

Kyle Beacock
Water and Wastewater Operations Manager
Township of Asphodel-Norwood
kbeacock@antownship.ca

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g., require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name. Requests should specify what kind of order is being requested (request for conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy potential adverse impacts on Aboriginal and treaty rights, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request. The request should be sent in writing or by email to:

Minister of the Environment,
Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to the Township of Asphodel-Norwood by mail or by e-mail. Please visit the ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at <https://www.ontario.ca/page/class-environmental-assessments-part-ii-order>. All personal information included in your request – such as name, address, telephone number and property location – is collected, under the authority of section 30 of the Environmental Assessment Act and is collected and maintained for the purpose of creating a record that is available to the general public. As this information is collected for the purpose of a public record, the protection of personal information provided in the Freedom of Information and Protection of Privacy Act (FIPPA) does not apply (s.37). Personal information you submit will become part of a public record that is available to the general public unless you request that your personal information remain confidential.

If there is no request received by **FEBRUARY 19, 2022**, the Schedule B Class EA is deemed complete and valid for a 10-year period. The Township could then proceed with implementing the preferred alternative anytime within this 10-year window, as presented in the planning documentation.

Issued: January 20, 2022

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

MEA REVIEW AGENCIES	MAILING OR EMAILING ADDRESSES	Preference Email or Mail?
PROVINCIAL AGENCIES & MINISTRIES		
CONSERVATION AUTHORITIES - OTONABEE CONSERVATION AUTHORITY	Lori Moloney lmoloney@otonabeeconservation.com	Email
MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS	eanotification.eregion@ontario.ca	Email
OFFICE OF THE FIRE MARSHALL	SEE BELOW	SEE BELOW
MINISTRY OF HEALTH AND LONG-TERM CARE	SEE BELOW	SEE BELOW
MINISTRY OF HERITAGE, SPORT, TOURISM AND CULTURAL INDUSTRIES	Karla Barboza, Team Lead(A), Heritage Heritage Planning Unit Programs and Services Branch Ministry of Heritage, Sport, Tourism and Cultural Industries 401 Bay Street, Suite 1700 Toronto ON M7A 0A7 karla.barboza@ontario.ca	Email
SPORT, RECREATION AND COMMUNITY PROGRAMS DIVISIONS	Ray Dempster, Manager and Bob Freeman, Senior Policy Advisor Sport, Recreation and Community Programs Division Policy Branch: Neil Coburn, Director(A) 777 Bay Street, 18th Floor Toronto, ON M7A 1S5 ray.dempster@ontario.ca bob.freeman@ontario.ca	Mail
MINISTRY OF INDIGENOUS AFFAIRS	CONTACT MECP	
MINISTRY OF MUNICIPAL AFFAIRS AND HOUSING (REGIONAL OFFICE)	Michael Elms, Manager Community Planning and Development Eastern Municipal Services Office Ministry of Municipal Affairs and Housing 8 Estate Lane, Rockwood House Kingston ON K7M 9A8 michael.elms@ontario.ca	Mail
MINISTRY OF NATURAL RESOURCES AND FORESTRY	Attn: Catherine Warren, District Planner (Peterborough Area) Peterborough District Ministry of Natural Resources and Forestry South Tower, 1st Floor 300 Water St, PO Box 7000 Peterborough ON K9J 8M5 catherine.warren@ontario.ca	Email
MINISTRY OF THE SOLICITOR GENERAL	Robert Greene, Director Ministry of the Solicitor General 25 Grosvenor Street, 13th Flr Toronto ON M7A 1Y6 robert.greene@ontario.ca	Email
MINISTRY OF TRANSPORTATION (REGIONAL OFFICE)	Mark Pedlar Mark.Pedlar@ontario.ca	Email and mail
HYDRO ONE NETWORKS INC.	SecondaryLandUse@HydroOne.com	Email
FEDERAL AGENCIES		
ENVIRONMENT AND CLIMATE CHANGE CANADA	Wes Plant, Manager Environmental Assessment Section Environmental Protection Branch – Ontario Region Environment and Climate Change Canada 4905 Dufferin St. Downsview ON M3H 5T4 wesley.plant@canada.ca	Email
INDIGENOUS SERVICES CANADA AND CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA		

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

COUNTIES, DISTRICTS, MUNICIPALITIES AND PLANNING BOARDS		
County of Peterborough	Kari Stevenson kstevenson@ptbocounty.ca	Email
Township of Selwyn	Tania Goncalves tgoncalves@selwyntownship.ca	Email
Township of Douro-Dummer	Martina Chait-Hartwig martinac@dourodummer.on.ca	Email
Township of North Kawartha	Connie Parent c.parent@northkawartha.ca	Email
Township of Cavan Monaghan	Cindy Page cpage@cavanmonaghan.net	Email
Municipality of Trent Lakes	Jessie Clark jclark@trentlakes.ca	Email
Township of Havelock-Belmont-Methuen	Bianca Boyington bboyington@hbmtpw.ca	Email
Township of Otonabee-South Monaghan	Heather Scott hscott@osmtownship.ca	Email
OTHER		
LOCAL PUBLIC HEALTH UNIT/MEDICAL OFFICER (Peterborough County-City Health Unit)	Chris Eaton Public Health Inspector Small Drinking Water Systems Peterborough Public Health 185 King Street Peterborough, ON K9J 2R8 P: (705) 743-1000 EX 225 F: (705) 743-1203 Dr. Rosana Salvaterra Medical Officer of Health Peterborough County-City Health Unit Jackson Square 185 King St Peterborough, ON K9J 2R8	Mail
Township Fire Department	Darryl Payne Fire Chief Township of Asphodel-Norwood Fire Rescue & Emergency Services 4440 Highway #7, P.O. Box 29, Norwood, Ontario, K0L 2V0	Mail
FIRST NATIONS		
Alderville First Nation	Dave Simpson Consultation Coordinator Alderville First Nation 11696 Second Line Rd ALDERVILLE, ON K0K 2X0 consultation@alderville.ca	Mail
Curve Lake	Katie Haddlesey Chief Operating Officer Curve Lake First Nation 22 Winookeedaa Road Curve Lake, ON K0L 1R0	Mail
Hiawatha First Nation	Tom Cowie Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 tcowie@hiawathafn.ca	Mail
	Sean Davison Lands/Resource Consultation Satellite Office Hiawatha First Nation 197 Sopers Lane Hiawatha, ON. K9J 0E6 sdavison@hiawathafn.ca	Mail
Mississaugas of Scugog Island First Nation	Monica Sanford - Community Consultation Administrative Assistant Mississaugas of Scugog Island First Nation Administration Building 22521 Island Road Port Perry, ON L9L 1B6	Mail
	Michael Thoms - Community Consultation Specialist Mississaugas of Scugog Island First Nation Administration Building 22521 Island Road Port Perry, ON L9L 1B6	Mail
Beausoleil First Nation	Dana Monague Lands Compliance Officer Beausoleil First Nation 11 O'Gemaa Miikaan Christian Island, ON L9M 0A9	Mail
Chippewas of Georgina Island	Chief Donna Big Canoe Georgina Island Administration Office R.R.#2 Box N-13 Sutton West, Ontario L0E 1R0	Mail

PRELIMINARY LIST OF POTENTIAL STAKEHOLDERS
Township of Asphodel-Norwood



Schedule B Municipal Class EA for Potable Water Storage in the Village of Norwood

Chippewas of Rama First Nation	Sharday James, Community Consultation Chippewas of Rama First Nation 5884 Rama Road, Suite 200 Rama ON, L3V 6H6	Mail
Mohawks of the Bay of Quinte	Charlotte Gurnsey Consultation Coordinator Mohawks of the Bay of Quinte Administration Building 24 Meadow Drive Tyendinaga Mohawk Territory, ON K0K 1X0	Mail
Kawartha Nishnawbe First Nation	Kris Nahrgang 257 Big Cedar Lake Rd. Big Cedar, Ontario K0L 2H0 705.930.1020	Mail
PROPERTY OWNERS ADJACENT TO PROJECT SITE AND DIRECTLY AFFECTED PUBLIC/LANDOWNERS	REFER TO MAILING LABELS PROVIDED BY THE TOWNSHIP	Mail
Norwood Centennial Pharmacy	██████████ Manager ██████████ Pharmacist ██████████ Norwood, ON ██████████ ██████████ ██████████ Fax: ██████████ Email: ██████████	Mail

Appendix D

Natural Heritage Report by
Cambium Inc



Environmental

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Facsimile

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Website

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Locations

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Barrie
Oshawa
Calgary

Laboratory

Peterborough



September 30, 2021

J.L. Richards & Associates Ltd.
203-863 Princess Street
Kingston, ON K7L 5N4

Attn: Matthew Morkem, P.Eng.

Re: Natural Heritage Impact Assessment - Municipal Class Environmental Assessment, Treated Water Storage Facility, Township of Asphodel-Norwood, ON

Cambium Reference # 11913-001

Dear Mr. Morkem,

Cambium Inc. (Cambium) was retained by J.L. Richards & Associates Ltd. (the Client) to conduct a Natural Heritage Impact Assessment (NHIA) in the village of Norwood, Township of Asphodel-Norwood, County of Peterborough (the Study Area). We understand that the NHIA is required to support a Schedule B Municipal Class Environmental Assessment (MCEA) and Preliminary Engineering Design for a new treated water storage facility. This NHIA was completed for three (3) potential water storage facility locations to identify reasonably anticipated impacts, provide mitigation measures and demonstrate compliance with provincial legislation.

PROPOSED WATER STORAGE FACILITY LOCATIONS

Cambium completed an initial feasibility screening of natural heritage constraints for the proposed water storage facility locations within the village of Norwood. The three (3) potential locations for a water storage facility addressed in this NHIA report include:

- Option 1A: Existing water treatment plant (decommission the existing standpipe):
- Option 2: Entrance of the landfill site driveway (located east of County Road 40), and



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- Option 3: Township public works building (located along the Highway 7 corridor).

These locations, including a preliminary delineation of the anticipated route of servicing for each site, are illustrated on appended Figures 1, 2, and 3, respectively.

BACKGROUND INFORMATION REVIEW

As part of a comprehensive desktop exercise, existing background information pertaining to the Study Area and surrounding landscape was compiled and reviewed to better understand local biophysical conditions. In southern Ontario, readily available data includes aerial orthophotography, topographic base mapping, and geological records. Natural area records and species occurrences were obtained from digital resources and reference materials. The comprehensive desktop review for the Study Area included the following resources:

- Natural Heritage Areas: Make-a-map (Ministry of Natural Resources and Forestry, 2018); Accessed February 25, 2021
- Aquatic Species at Risk Maps - Ontario (Fisheries and Oceans Canada, 2018); Accessed February 25, 2021
- Aquatic Resource Area Summary Data (Government of Ontario, 2015); Accessed February 25, 2021
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2018); Accessed February 25, 2021
- Ontario Breeding Birds Atlas (OBBA) (2001-2005) (Bird Studies Canada, 2005); Accessed February 25, 2021

HABITAT-BASED SPECIES AT RISK SCREENING

Species listed as endangered or threatened on the Species at Risk in Ontario (SARO) list are protected under the provincial *Endangered Species Act*, 2007 (ESA) (Government of Ontario, 2007). Section 9(1) of the ESA prohibits a person



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from killing, harming, harassing, capturing or taking a member of a species listed as endangered, threatened, or extirpated. Section 10(1) of the ESA prohibits the damage or destruction of habitat of species listed as endangered or threatened.

The federal *Species at Risk Act* (SARA) was adopted in 2002 to prevent endangered or threatened species from becoming extinct or extirpated, to help in the recovery of endangered, threatened and extirpated species, and to manage species of special concern to help prevent them from becoming endangered or threatened. Habitat, which is deemed necessary for the survival/recovery of a listed wildlife species, referred to as Critical Habitat, is protected under Section 56 of the SARA. The SARA applies to all federal lands in Canada; however, at-risk aquatic and migratory bird species located on private property in Ontario also receive protection under SARA.

Cambium employed a habitat-based screening to identify species at risk (SAR) and their habitats on, or adjacent to, each of the three (3) facility options. A list of SAR with the potential to occur in the general vicinity of the Study Area has been compiled based on known species' ranges and habitat requirements and review of background information sources.

Based on our screening, the Study Area and adjacent lands have the potential to provide habitat for the following species:

Special Concern Species (not afforded habitat protection under the ESA, but habitat may be protected under provincial natural heritage policy)

- Snapping Turtle (*Chelydra serpentina*)
- Canada Warbler (*Cardellina canadensis*)
- Common Nighthawk (*Chordeiles minor*)
- Grasshopper Sparrow (*Ammodramus savannarum*)
- Northern Map Turtle (*Graptemys geographica*)

Threatened and Endangered Species (habitat protected under the ESA)

- Barn Swallow (*Hirundo rustica*; threatened)
- Bank Swallow (*Riparia riparia*; threatened)
- Bobolink (*Dolichonyx oryzivorus*; threatened)



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- Cerulean Warbler (*Dendroica cerulea*; threatened)
- Chimney Swift (*Chaetura pelagica*; threatened)
- Eastern Meadowlark (*Sturnella magna*; threatened)
- Eastern Wood-pewee (*Contopus virens*; special concern)
- Wood Thrush (*Hylocichla mustelina*; special concern)
- Blanding's Turtle (*Emydoidea blandingii*; threatened)
- Little Brown Myotis (*Myotis lucifugus*; endangered)
- Northern Myotis (*Myotis septentrionalis*; endangered)
- Eastern Small-footed Myotis (*Myotis leibii*; endangered)
- Tri-coloured Bat (*Perimyotis subflavus*; endangered)
- Butternut (*Juglans cinerea*; endangered)

Also, three (3) federally listed species were documented within the Study Area:

- Midland Painted Turtle (*Chrysemys picta marginata*)
- Western Chorus Frog (*Pseudacris maculata pop. 1*)
- Eastern Milksnake (*Lampropeltis Triangulum*)

Impacts to these three (3) species and their habitats will not be discussed as the lands are not federally owned, and these species are not considered to be aquatic or migratory birds; therefore, the SARA does not apply.

The Ouse River and its tributaries traverse the Study Area. No Critical Habitat for aquatic SAR is documented by Fisheries and Oceans Canada (DFO) for this watercourse network, within or adjacent to the Study Area.





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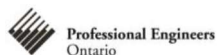
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TECHNICAL APPROACH AND DATA COLLECTION METHODS

Information gathered through the background information review was used to guide the development of the fieldwork program. Each of the three (3) potential facility locations was visited to verify information acquired through existing documentation and to gather additional site-specific information. A summary of field investigations is included in Table 1, and the following sections detail the methodologies that were applied.

Table 1: Summary of Field Investigations

Date	Time On Site	Weather	Observer	Activities
2021-05-25	0600 - 0800	Clear; Low 16- High 22;	K. McKitterick	Ecological Land Classification, Breeding Bird Survey and Wildlife Observations
2021-06-04	0600-0800	Clear; Low 18- High 24	K. McKitterick	Ecological Land Classification, Breeding Bird Survey and Wildlife Observations
2021-07-21	0600-0800	Clear; Low 17- High 25	K. McKitterick	Ecological Land Classification, Breeding Bird Survey and Wildlife Observations

VEGETATION CLASSIFICATION

The Ecological Land Classification (ELC) System for Southern Ontario (Lee, et al., 1998) was used to classify vegetation communities at each location.

Definitions of vegetation types are derived from the ELC for Southern Ontario First Approximation Field Guide (Lee, et al., 1998) and the revised 2008 tables. ELC units were initially delineated and classified by orthoimagery interpretation. Field investigations confirmed vegetation communities' type and extent through vegetation inventory and soil assessment with a hand auger. Where vegetation communities extend outside of accessible areas, classification is done through observation from property boundaries and publicly accessible lands.



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WILDLIFE ASSESSMENT

Given the small footprint required to facilitate the proposed undertaking, a habitat-based approach was used to assess potential impacts to wildlife, consistent with standard practice. General habitat information gathered through the field investigations was used to assess the connectivity of each location with the surrounding landscape, and to evaluate the ecological significance of the local area. Cambium staff actively searched for features that may provide specialized habitat for wildlife. These searches included inspecting tree cavities, overturning logs, rocks and debris, and scanning for scat, browse, sheds, and fur. Any evidence of breeding, forage, shelter, or nesting was noted. Species and habitat observations were documented.

Two (2) breeding bird surveys were conducted 7-10 days apart during the peak breeding season for birds, between May 24 and July 10. Point counts were completed using components of the Ontario Breeding Bird Atlas (OBBA) Guide for Participants (Ontario Breeding Bird Atlas, 2001) and the Forest Bird Monitoring Program (Cadman, Dewar, & Welsh, 1998) based on habitat characteristics. As outlined in the OBBA protocol, point counts are to be done between dawn and five (5) hours after dawn, when wind speed is low (<19 km/h) and in the absence of rain or thick fog. All species observations (visual and auditory) were recorded during a five (5) minute period. Each species observed was classified and assigned a code based on the highest level of breeding evidence, as defined by the protocol: Confirmed, Probable, Possible or Observed.

CHARACTERIZATION OF NATURAL FEATURES AND FUNCTIONS

Based on the information gathered, an assessment of significance has been completed to identify protected natural heritage features on, and adjacent to each potential facility location, as detailed below.



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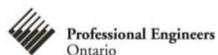
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Option 1A: Existing water treatment plant (decommission the existing standpipe)

Option 1A is located at the existing water treatment plant, adjacent to the current water storage tower (standpipe). Adjacent lands along County Road 40 (Ridge Street) consist of residential properties with maintained lawns. No wetlands or watercourses are present on the site or adjacent lands (i.e., within 120 m).

The vegetation community is described as a Cultural Meadow (CUM-1) and contains common and weedy herbaceous plants and some shrubs. The forest at the rear of the lot is a Cultural Red Pine plantation (CUP-1). No rare or at-risk vascular plants were observed at this location.

Breeding bird surveys indicated Probable or Confirmed breeding evidence for the following species: American Robin, Baltimore Oriole, Black-throated Blue Warbler, Blue Jay, Brown Thrasher, Clay-colored Sparrow, Common Yellowthroat, House Wren, Mourning Dove, and Northern Cardinal. The migratory bird species observed are considered common in Ontario. No SAR or rare birds were observed on or adjacent to this location. No rare or at-risk wildlife was documented at this location.

Option 2: Entrance of the landfill site driveway (located east of County Road 40)

Option 2 is located adjacent to an existing hydro corridor and associated hydro towers, and an access road leading to a conservation area and closed landfill (active waste transfer station). A new lot is proposed to be created to accommodate Option 2. Adjacent lands to the south along County Road 40 consist of residential properties with maintained lawns. A tributary of the Ouse River is located toward the east, greater than 30 m from the proposed standpipe and new watermain location. This location is within the development control area (DCA) of the Otonabee Region Conservation Authority (ORCA). No wetlands are present on or adjacent to the Option 2 location.

The vegetation communities present at Option 2 include a Cultural Thicket (CUT) beneath the hydro corridor, and a Cultural Red Pine plantation (CUP1-1) in the



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southern portion of the proposed new lot, which overlaps the proposed water storage facility footprint. East of the new lot, on adjacent lands, is another Cultural Thicket (CUT) which contains some planted White Pine trees. A Mixed Forest community (FOM) borders the tributary of the Ouse River, located approximately 60 m to the east. No rare or at-risk vascular plants were observed at this location.

Breeding bird surveys completed at this location indicated Probable or Confirmed breeding evidence for the following species: American Robin, Baltimore Oriole, Chipping Sparrow, and Pine Warbler. These bird species are common in Ontario. No SAR or rare birds were observed on or adjacent to the Site. No rare or at-risk wildlife was documented at this location.

Option 3: Township public works building (located along the Highway 7 corridor)

Option 3 is located at the Township's public works property on the northwest side of Highway 7. Residential and mixed commercial uses occupy adjacent lands to the south and north. These lands are occupied by an existing parking lot and associated public works buildings. The lot backs onto a closed municipal landfill (active waste transfer station) immediately to the west of the proposed water storage facility footprint. Several unevaluated wetlands are located in the surrounding landscape, but all are greater than 30 m from the potential works. A tributary to the Ouse River is located approximately 170 m from the property boundary, on the opposite side of Highway 7.

The Norwood Esker Complex, a regionally significant Area of Natural and Scientific Interest (ANSI), is located approximately 10 m east of the property boundary. The proposed new watermain is located within the 50 m setback to the ANSI.

The vegetation communities present at Option 3 are classified as a Cultural Thicket (CUT) and Coniferous Forest (FOC). West of the existing developed area, near the potential water storage facility footprint, is a steep slope that rises to the west. The plant community on this slope is an open Cultural Thicket (CUT) dominated by White Ash and Trembling Aspen. Other species observed include



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Manitoba Maple, Hawthorn (species), Common Buckthorn, Staghorn Sumac, and White Cedar. The Coniferous Forest (FOC) community dominates the top of the slope area. No rare or at-risk vascular plants were observed at this location.

Breeding bird surveys completed at this location indicated Probable or Confirmed breeding evidence for the following species: American Robin, American Crow, Eastern Phoebe, European Starling, and Red-eyed Vireo. No SAR or rare birds were observed on or adjacent to the Site. No rare or at-risk wildlife was documented at this location.





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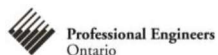
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IMPACT ASSESSMENT AND MITIGATION MEASURES

The following section addresses potential impacts to natural heritage features, functions, and species identified on and adjacent to the three (3) options that may result from the proposed development and site alteration. An interpretation of sensitivity to development is presented, and potential impacts are discussed for each location. Mitigation measures are recommended for all locations, with specific measures identified as needed on a site-by-site basis.

On all sites, ground disturbance associated with the water storage facility and water main construction has the potential to impact vegetation communities, wildlife and their habitats. There is potential for wildlife to be impacted by development activities (i.e., due to vegetation clearing, an increase in vehicular traffic, and the presence of work crews on the site). Specifically, vegetation clearing has a high potential to negatively impact migratory birds if undertaken during breeding bird season, which extends from April 15 to August 15 in the local area.

BASE MITIGATION MEASURES APPLIED TO ALL LOCATIONS

Mitigation measures to eliminate or minimize impacts of the proposed work that should be implemented at all locations include:

- Minimize the area of vegetation removal, site grading, and construction activities.
- Vegetation clearing should occur outside the breeding bird season (from April 15 to August 15 in the local area, as per Environment and Climate Change Canada Guidelines). Therefore, vegetation clearing should only be conducted from August 16, through to April 14.
- An erosion and sediment control plan should be prepared to prevent erosion of materials and transport of sediment and impacts beyond the work area. Disturbed areas should be seeded as soon as possible to allow vegetation to establish and stabilize soils.



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- If observed, allow wildlife to safely leave the work area before commencing activities.
- If turtles or snakes are observed on or adjacent to the work area, a qualified biologist should be contacted to thoroughly inspect the area for SAR before commencing or proceeding with any works.
- Equipment and vehicles coming into the work area should be free of soil and seeds that could introduce non-native and invasive species following the *Clean Equipment Protocol for Industry: Inspecting and Cleaning Equipment for the Purposes of Invasive Species Prevention* (J. Halloran, 2013).

LOCATION-SPECIFIC IMPACT ASSESSMENT AND MITIGATION MEASURES

Option 1A: Existing water treatment plant (decommission the existing standpipe)

The construction of a new standpipe and water main at Option 1A can be accomplished within an existing disturbed area. The Cultural Meadow (CUM1-1) vegetation community present at the existing water treatment plant contains common and weedy herbaceous plants and some shrubs. This vegetation type is common and has arisen due to historical site disturbance. As such, limited disturbance within this area will not influence this community's overall form or function.

At this location, minor vegetation clearing would be required for construction, increasing the potential for introducing invasive plant species. Due to the open nature of this location, invasive species would colonize rapidly. Mitigation measures should be strictly followed to limit these introductions.

Provided that the overall mitigation measures presented above are adhered to, impacts to natural heritage at this location are determined to be minimal, and no further mitigations are required.



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Option 2: Entrance of the landfill site driveway (located east of County Road 40)

The construction of a new standpipe and water main at Option 2 is within a Cultural Red Pine plantation. Red Pine plantations are common in the landscape and are not considered a sensitive habitat type. The area to be cleared is approximately 0.15 ha and is not anticipated to result in lasting adverse impacts to the larger landscape. A vegetated buffer of greater than 30 m would remain between the developed area and the watercourse.

Woody vegetation clearing would be required to construct the standpipe and watermain and must be completed following the overall mitigation measures detailed above to protect breeding birds and their breeding habitat.

Vegetation clearing on a previously undisturbed site leads to an increase in erosion potential due to exposed soils. Sediment from the work area could be transported to the tributary of the Ouse River and result in harm to fish and fish habitat. Due to the location of this site near the Ouse River, exposed soils should be carefully managed.

Equipment required for construction and vegetation clearing can result in spills that could result in deleterious substances entering the watercourse and impact fish habitat. Due to the vegetated buffer that will remain between the work area and the watercourse, these impacts are interpreted to be minimal, provided that mitigation measures are implemented.

Location-specific mitigation measures to minimize the potential for impacts to the site and surrounding landscape, including the Ouse River and associated habitats, include:

- Stockpiled materials should be located outside the DCA, using appropriate ESC measures around stockpiles.
- Sediment fence should be installed around the work area and stockpiled materials to prevent soil migration. These measures will also prevent turtles from accessing and nesting within the work area.



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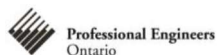
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- The contractor should take the following steps to prevent the release of a deleterious substance into the watercourse:
 - Develop a Spill Response Plan to be implemented in the event of a spill of a deleterious substance.
 - Keep an emergency spill kit on-site.
 - If a spill of deleterious substance occurs, immediately stop work and contain the spill to prevent dispersal.
 - Reporting any spills of oil, fuel, poured concrete, concrete wastewater, or other deleterious material, whether near or directly into a water body, to the Ontario Spills Action Centre (1-866-663-8477 or online at <https://www.ontario.ca/page/report-pollution-and-spills>).
 - Clean up and appropriately dispose of the deleterious substances following appropriate regulations and guidance.
 - Maintain all machinery on-site in a clean condition and free of fluid leaks to prevent any deleterious substances from entering the water.
 - Washing, refuelling and servicing machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

Provided that the overall mitigation measures and additional site-specific mitigations presented above are adhered to, reasonably anticipated impacts to natural heritage at this location are determined to be minimal.

Option 3: Township public works building (located along the Highway 7 corridor)

At Option 3, constructing a new standpipe would be within a Coniferous Forest (FOC) at the top of the slope, and the water main would primarily pass through a Cultural Thicket (CUT). Both of these communities are common in the landscape, and no rare or at-risk species were documented. Minor clearing of woody and herbaceous vegetation would be required. The area to be cleared is approximately 0.15 ha and is not anticipated to result in lasting adverse impacts to the larger landscape.

No site alteration or development is proposed within the ANSI. The construction of the watermain at the township public works property is located within the 50 m



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development setback of the ANSI (i.e., on adjacent lands). The Norwood Esker Complex is an Earth Science ANSI. Earth Science ANSIs are geological in nature and represent some of the most significant examples of bedrock, fossil and landforms in Ontario. These sites are not sensitive to small-scale developments, particularly when the development does not include significant substrate removal/relocation. The construction of the watermain will result in temporary and localized disturbance to the soils to create a trench to lay the watermain. It is anticipated that the ground surface would be reinstated to the same grade as pre-construction, and thus, the watermain will not result in changes to the esker landform or its topography. Highway 7 and more than a dozen homes are located within the ANSI, and the construction of the water storage facility in this location would be consistent with surrounding land uses. The construction of the watermain within the 50 m setback to the ANSI will not negatively impact the Norwood Esker Complex.

Provided that the overall mitigation measures presented above are adhered to, impacts to natural heritage at this location are determined to be minimal, and no further mitigations are required.





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CLOSING

This memo provides a NHIA and mitigation measures for three (3) potential water storage facility locations. Option 1A provides the optimal location as it is within a developed area and requires the least vegetation removal. Option 2 requires the most vegetation clearing and is the least preferred option. Option 3 accommodates most of the impacts within a disturbed cultural vegetation community and would require minor tree removals and is considered the alternative preferred option.

Provided the mitigation measures presented in this report are followed, it is anticipated that the construction of the water storage facility and watermain will have minimal impacts on natural heritage features at each location and will comply with applicable provincial and federal policies related to natural heritage and SAR.

Best regards,

Cambium Inc.

Matthew Wheeler, B.A. Hons.
Project Manager / Ecologist

MW/azc

Encl. *Figures 1 Option 1A-Existing Water Treatment Plant (Decommission the Existing Standpipe)*
 Figure 2 Option 2- Entrance of Landfill Site Driveway
 Figure 3 Option 3-Township Public Works Building

\\camfile\Projects\11900 to 11999\11913-001 J.L. Richards & Associates Limited - NHIA - Treated Water Storage Facility MCEA, Norwood\Deliverables\2. REPORT - Natural Heritage Impact Assessment\Final\2021-09-30 LTR - Natural Heritage Impact Assessment.docx





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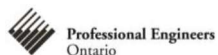
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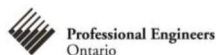
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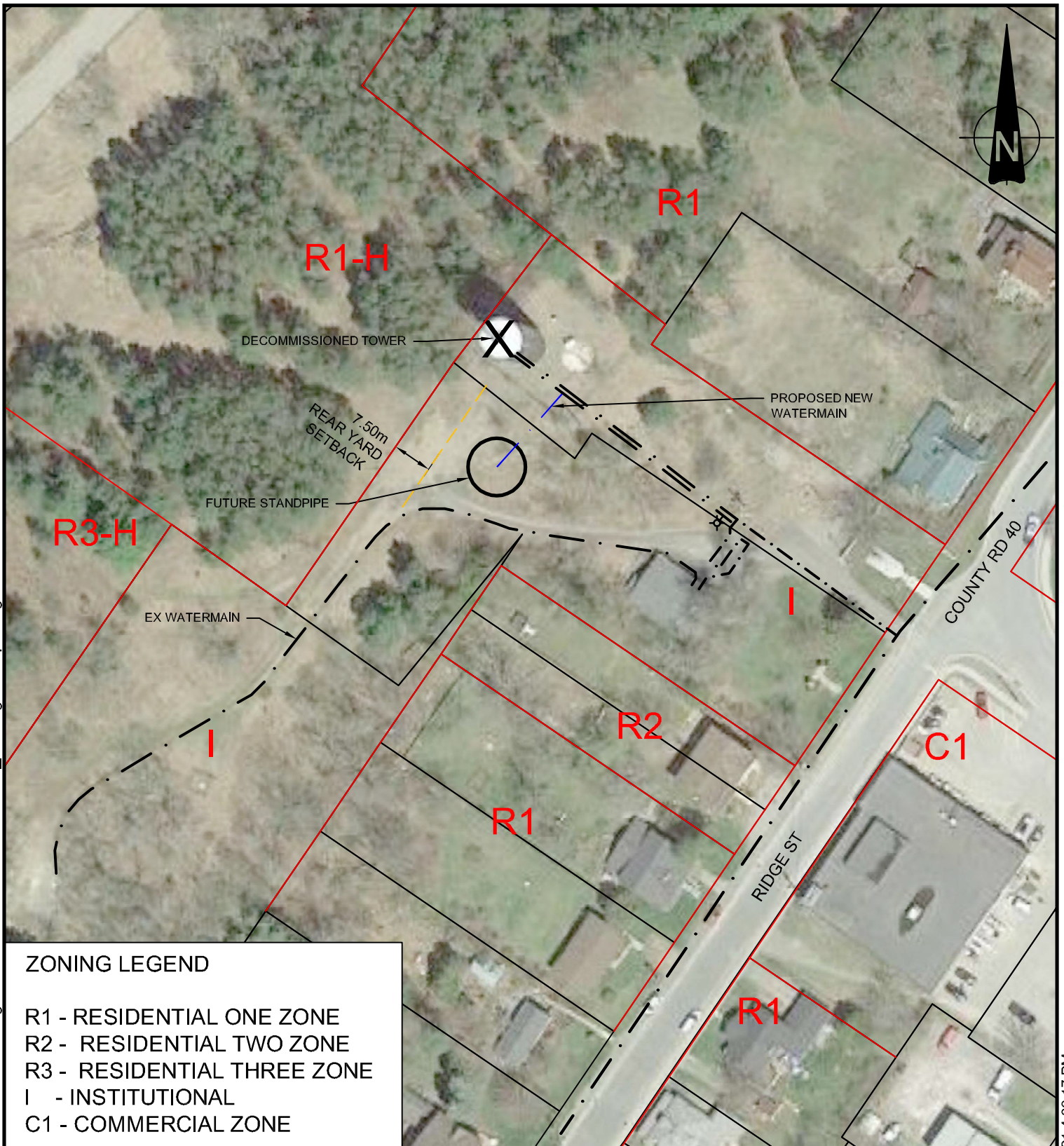
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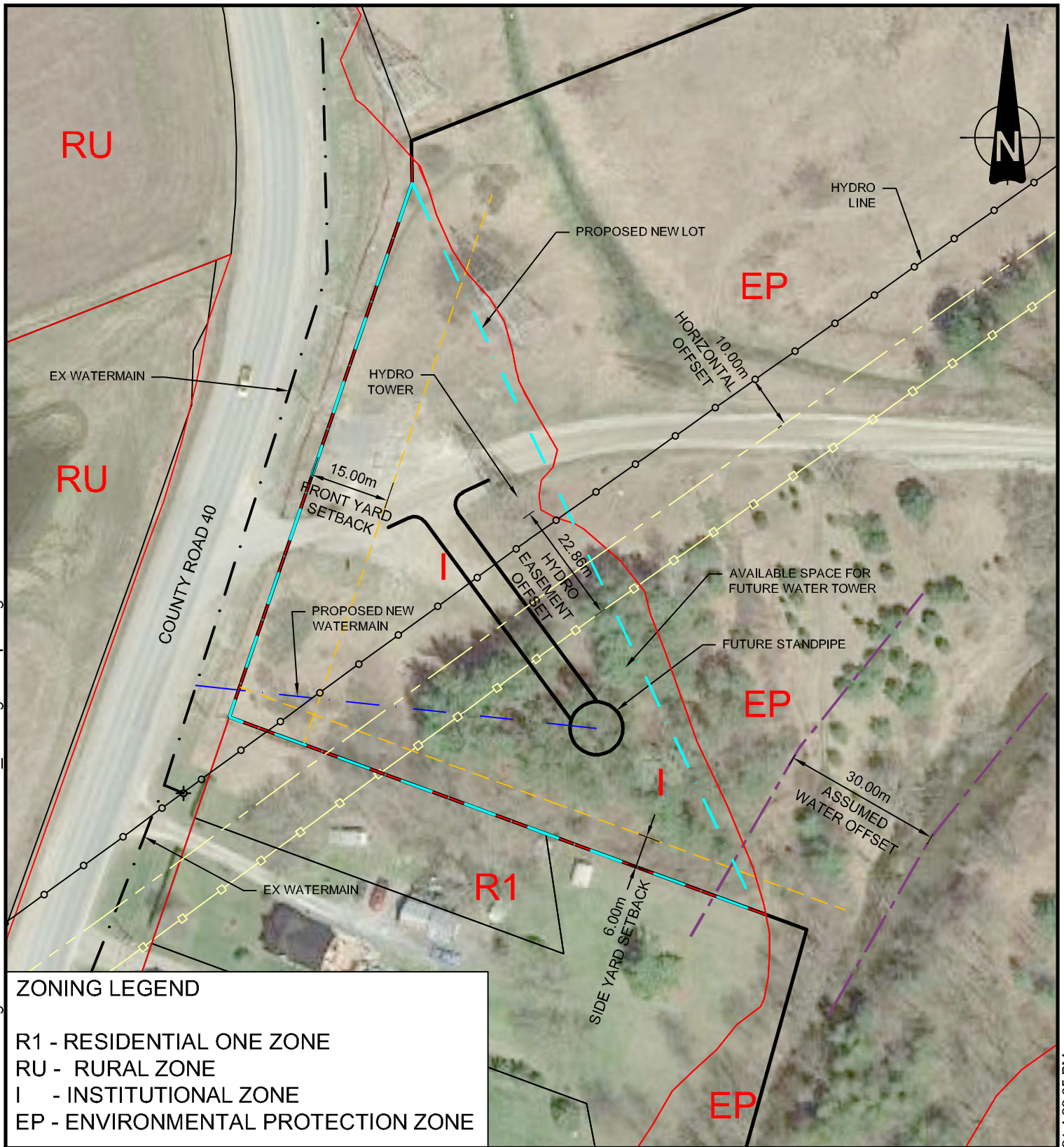




PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: OPTION 1A -EXISTING WATER TREATMENT PLANT (DECOMMISSION THE EXISTING STANDPIPE)

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		CHECKED: SS	
		JLR #: 29837	

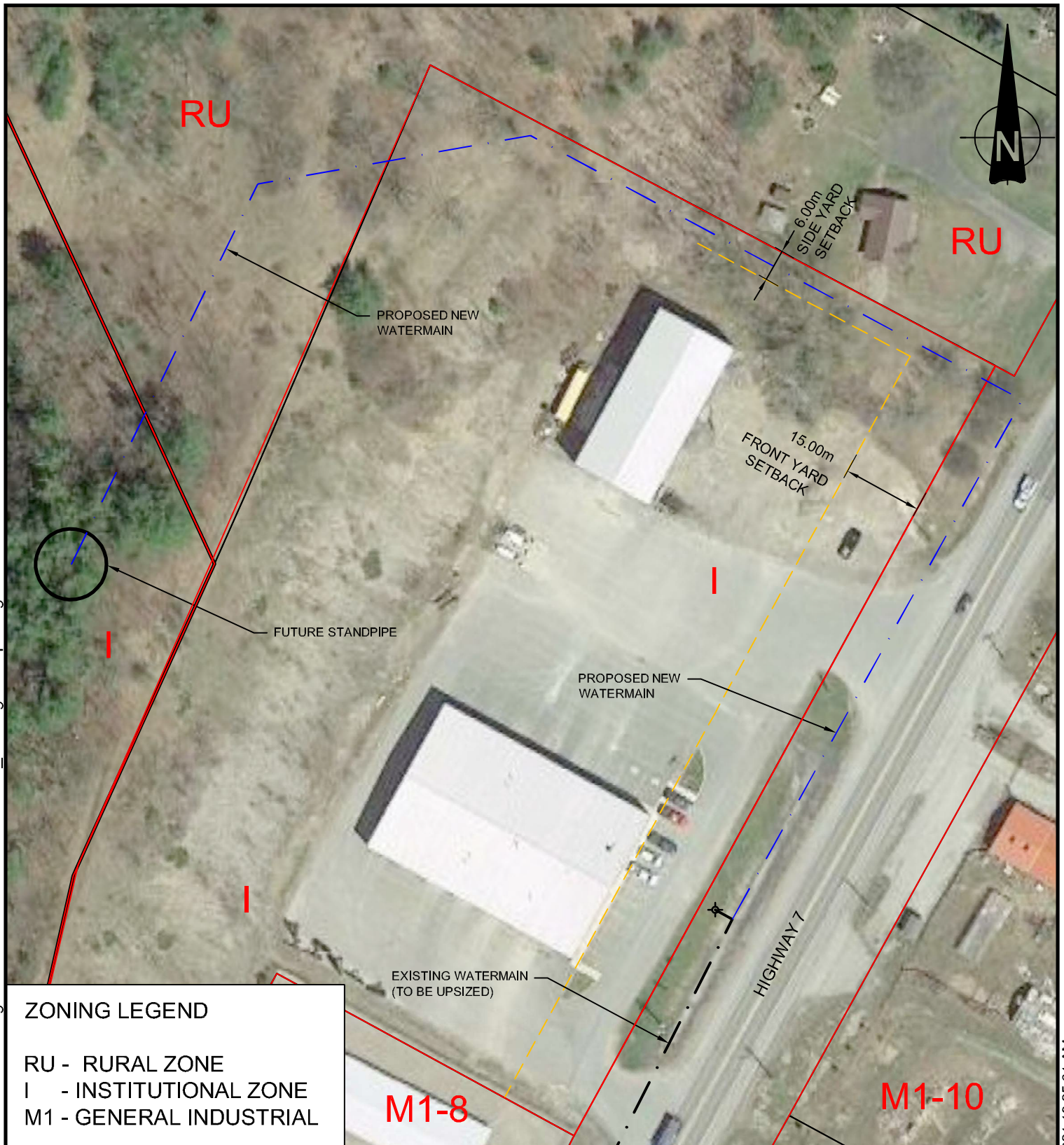


ZONING LEGEND	
R1	- RESIDENTIAL ONE ZONE
RU	- RURAL ZONE
I	- INSTITUTIONAL ZONE
EP	- ENVIRONMENTAL PROTECTION ZONE

PROJECT: TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING: OPTION 2 - ENTRANCE OF LANDFILL SITE DRIVEWAY

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		DRAWN: KTK	
		CHECKED: SS	
		JLR #: 29837	



ZONING LEGEND

RU - RURAL ZONE
I - INSTITUTIONAL ZONE
M1 - GENERAL INDUSTRIAL

PROJECT:

TOWNSHIP OF ASPHODEL-NORWOOD WATER STORAGE CLASS EA
NORWOOD, ONTARIO

DRAWING:

OPTION 3 - TOWNSHIP PUBLIC WORKS BUILDING



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FIGURE 3

Appendix E

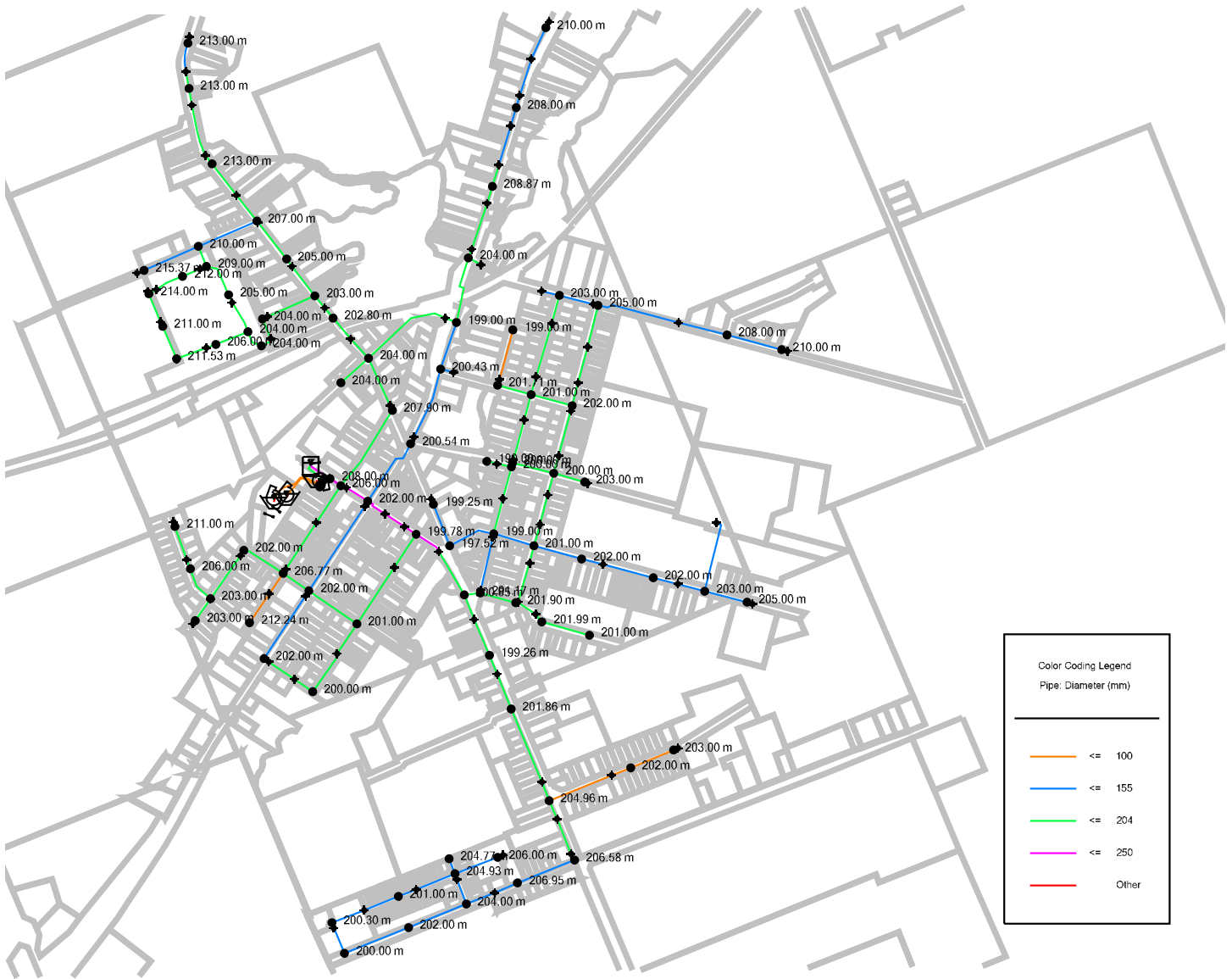
Water Model Results

Norwood Water Model (JLR 29837)

Junctions



Norwood Water Model (JLR 29837)



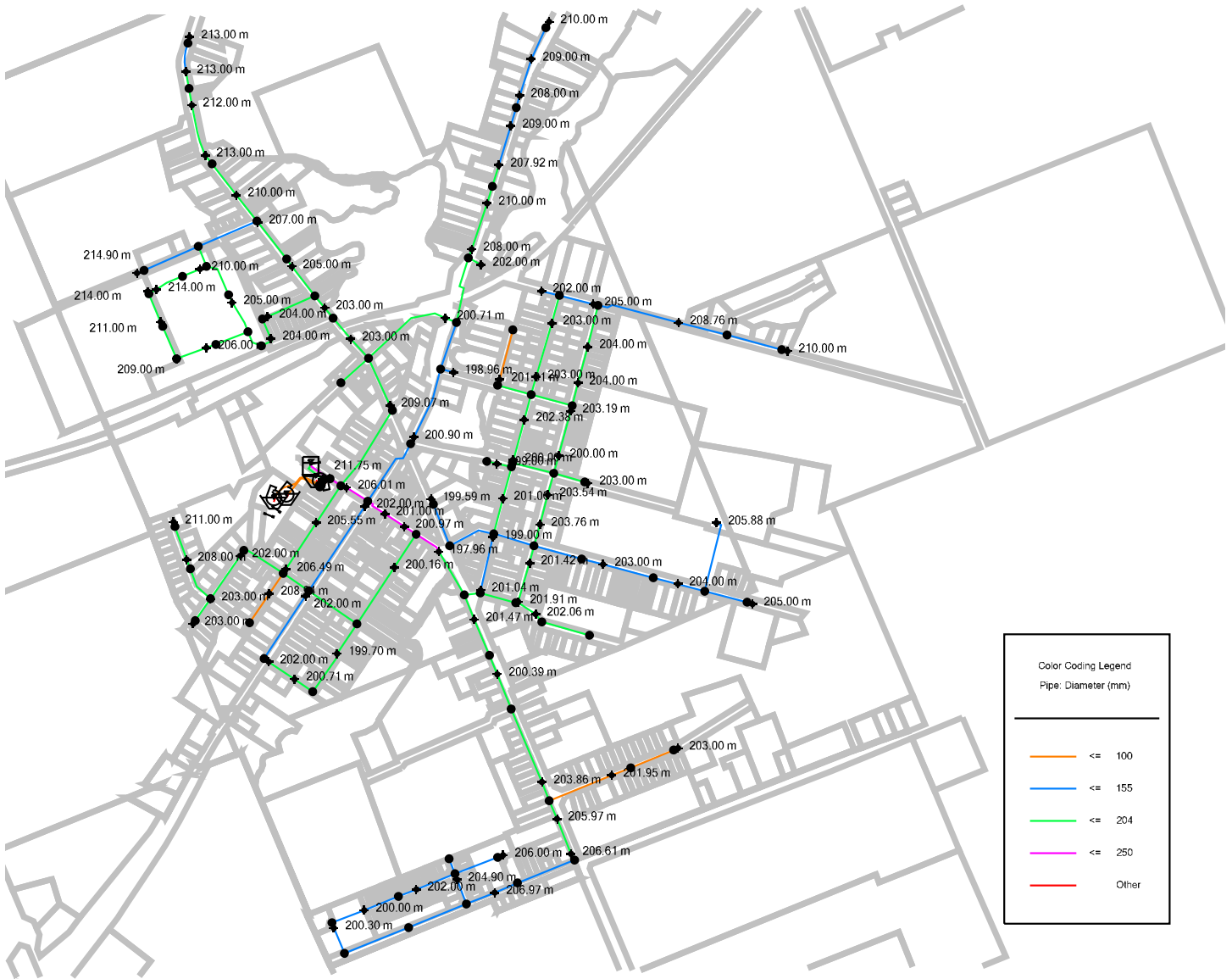
Norwood Water Model (JLR 29837)

Hydrants

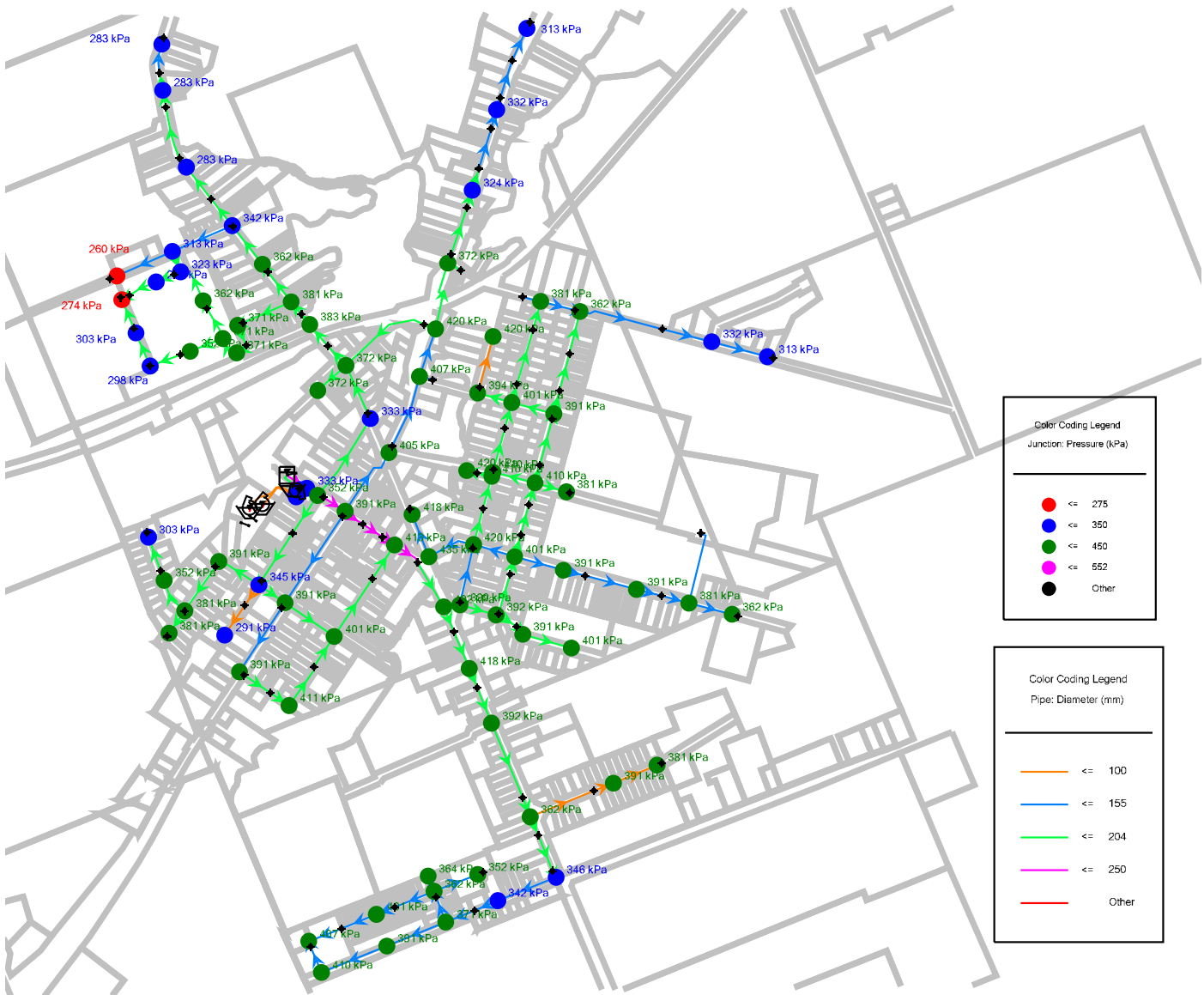


Norwood Water Model (JLR 29837)

Hydrant Elevations



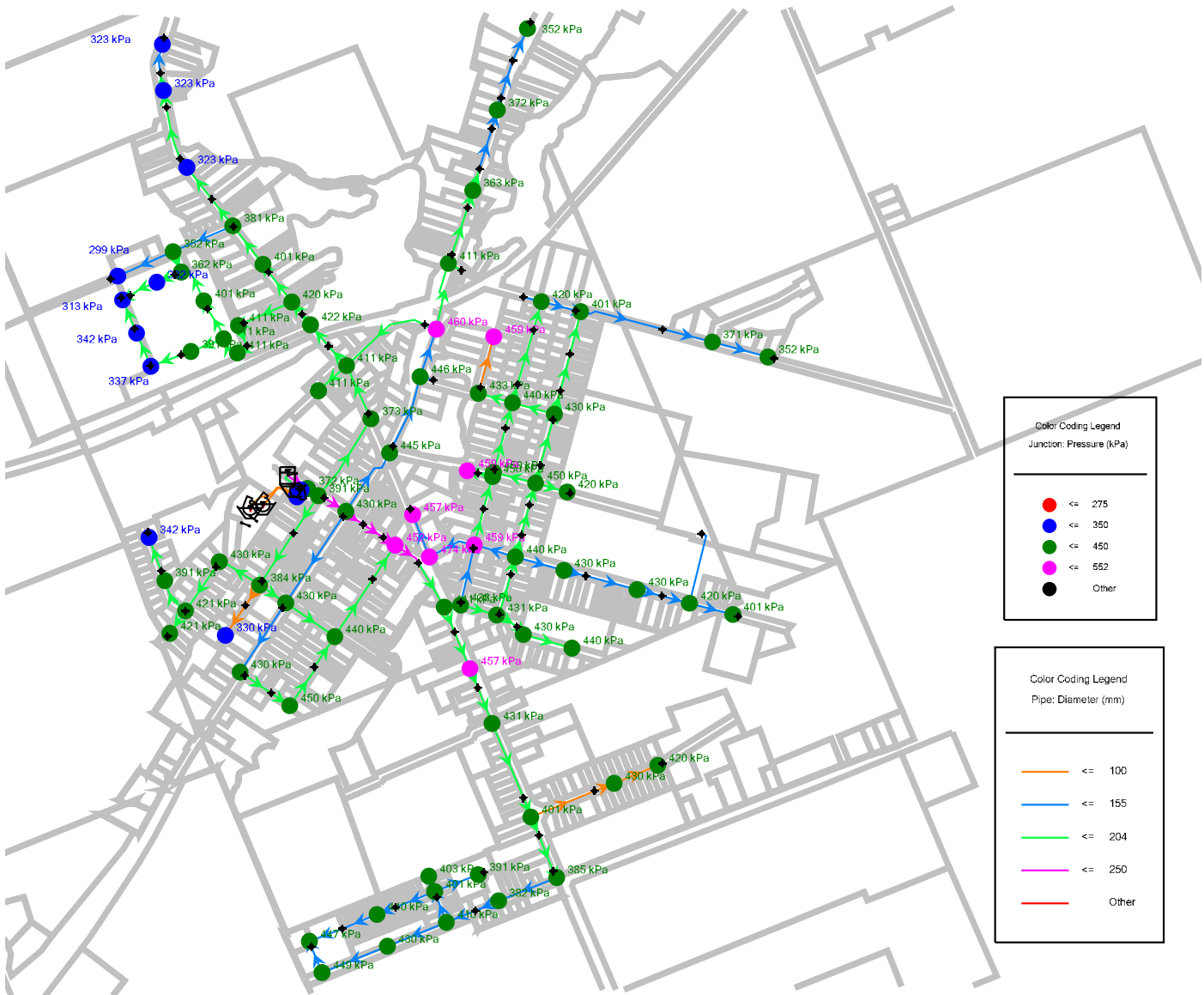
Norwood Water Model (JLR 29837) **Average Day Demand - Pressures** **Existing Conditions - HGL 242.00 m**



Norwood Water Model (JLR 29837)

Average Day Demand - Pressures

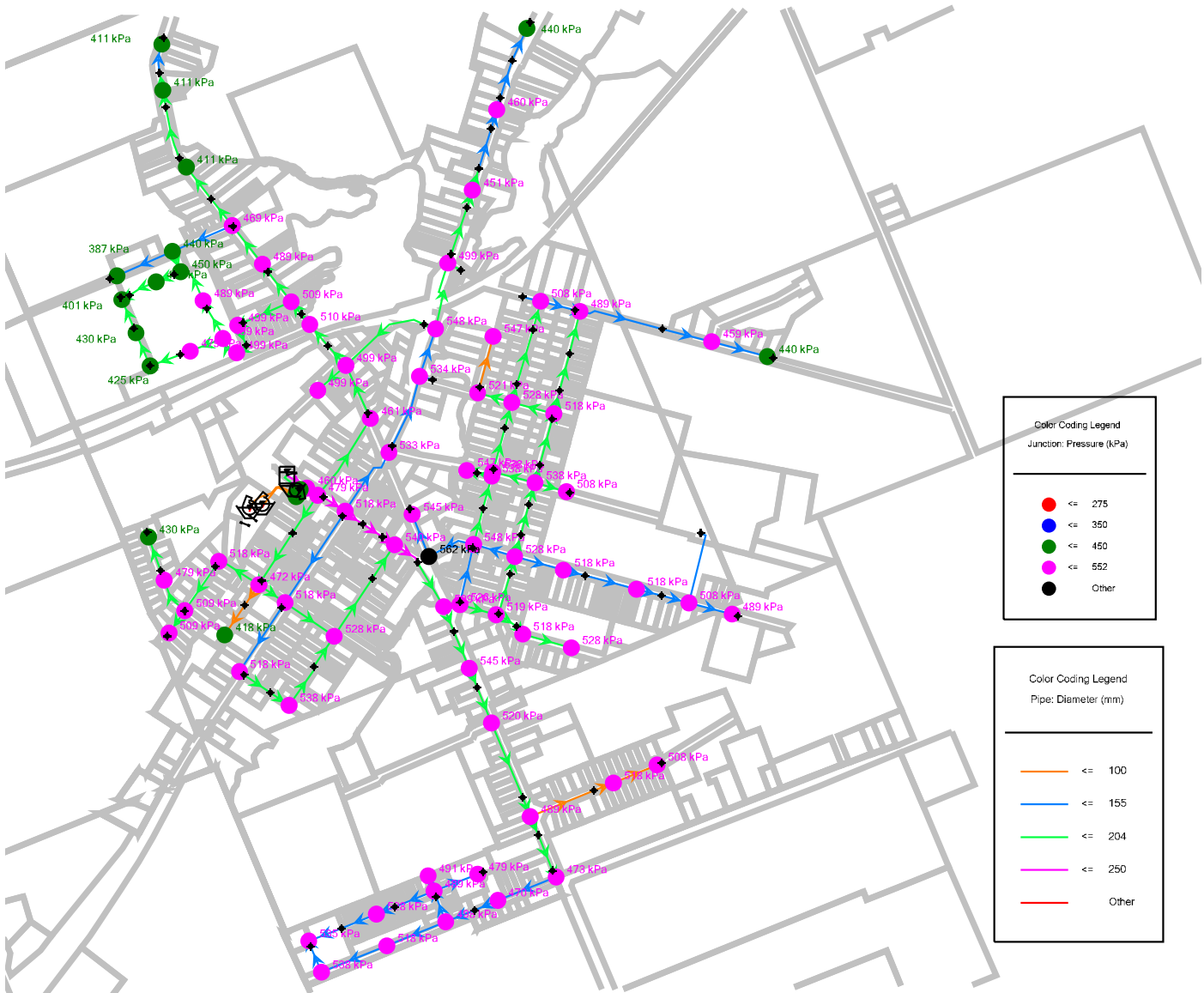
Location 1 - HGL 246.00 m



Norwood Water Model (JLR 29837)

Average Day Demand - Pressures

Location 1 - HGL 255.00 m



Norwood - Location 1 - Average Day Demand

LOCATION 1 (HGL 242)		
ID	Label	Pressure
198	J79	260
193	J74	274
203	J84	283
202	J83	283
201	J82	283
128	J9	291
194	J75	293
191	J72	298
192	J73	303
126	J7	303
204	J85	313
197	J78	313
182	J63	313
195	J76	323
180	J61	324
159	J40	332
181	J62	332
120	J1	333
176	J57	333
200	J81	342
166	J47	342
122	J3	345
165	J46	346
174	J55	352
190	J71	352
125	J6	352
121	J2	352
144	J25	362
158	J39	362
196	J77	362
199	J80	362
162	J43	362
172	J53	362
173	J54	364
167	J48	371
189	J70	371
188	J69	371
187	J68	371
179	J60	372
183	J64	372
184	J65	372
164	J45	381
143	J24	381
157	J38	381
152	J33	381
186	J67	381
127	J8	381

LOCATION 1 (HGL 246 LWL)		
ID	Label	Pressure
198	J79	299
193	J74	313
203	J84	323
202	J83	323
201	J82	323
128	J9	330
194	J75	332
191	J72	337
192	J73	342
126	J7	342
204	J85	352
197	J78	352
182	J63	352
195	J76	362
180	J61	363
159	J40	371
181	J62	372
120	J1	372
176	J57	373
200	J81	381
166	J47	382
122	J3	384
165	J46	385
174	J55	391
190	J71	391
125	J6	391
121	J2	391
144	J25	401
158	J39	401
196	J77	401
199	J80	401
162	J43	401
172	J53	401
173	J54	403
167	J48	410
189	J70	411
188	J69	411
187	J68	411
179	J60	411
183	J64	411
184	J65	411
164	J45	420
143	J24	420
157	J38	420
152	J33	420
186	J67	420
127	J8	421

LOCATION 1 (HGL 255 HWL)		
ID	Label	Pressure
198	J79	387
193	J74	401
203	J84	411
202	J83	411
201	J82	411
128	J9	418
194	J75	420
191	J72	425
192	J73	430
126	J7	430
204	J85	440
197	J78	440
182	J63	440
195	J76	450
180	J61	451
159	J40	459
181	J62	460
120	J1	460
176	J57	461
200	J81	469
166	J47	470
122	J3	472
165	J46	473
174	J55	479
190	J71	479
125	J6	479
121	J2	479
144	J25	489
158	J39	489
196	J77	489
199	J80	489
162	J43	489
172	J53	489
173	J54	491
167	J48	498
189	J70	499
188	J69	499
187	J68	499
179	J60	499
183	J64	499
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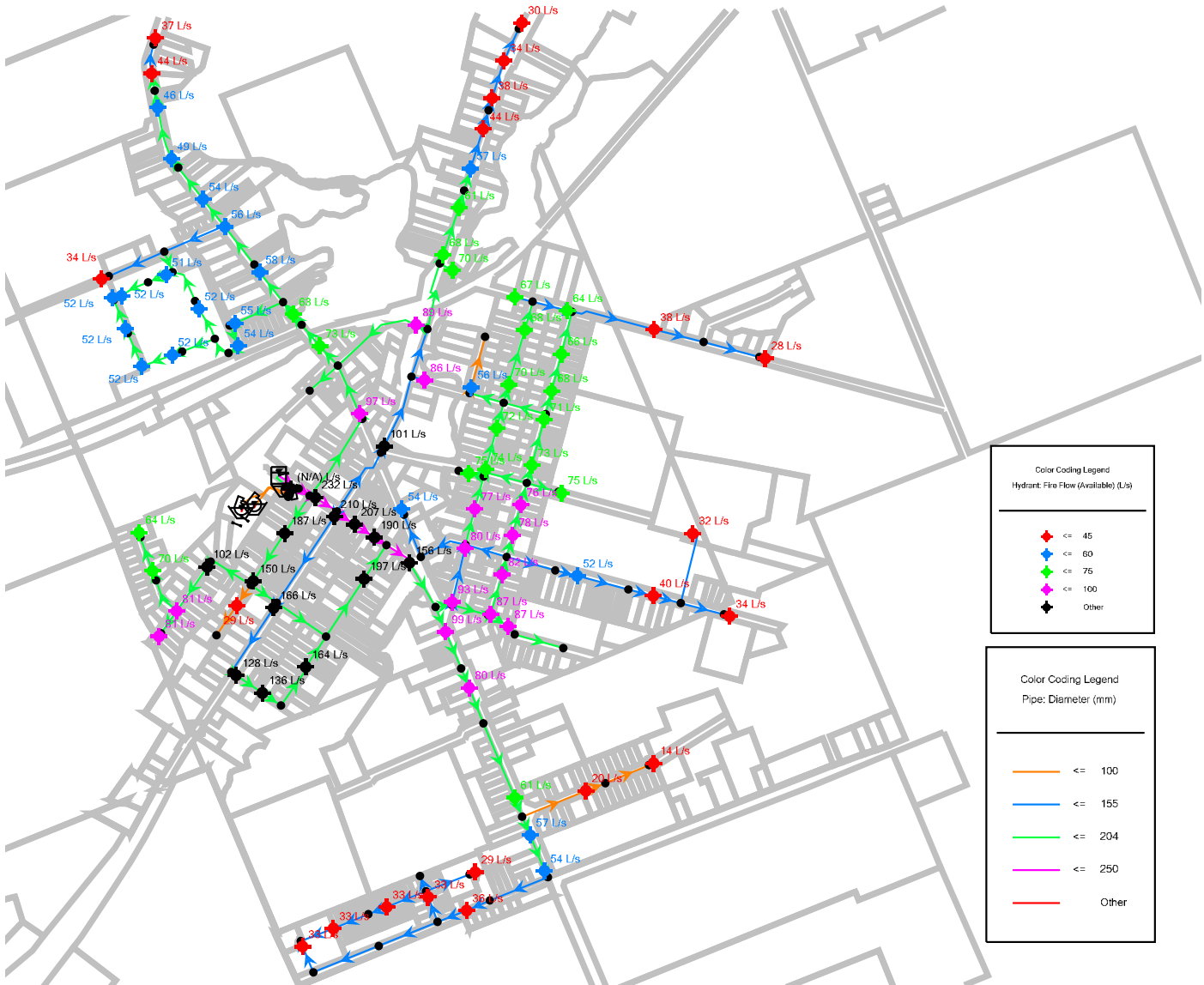
Norwood - Location 1 - Average Day Demand

LOCATION 1 (HGL 242)		
ID	Label	Pressure
124	J5	381
185	J66	383
168	J49	391
163	J44	391
142	J23	391
153	J34	391
141	J22	391
138	J19	391
130	J11	391
129	J10	391
123	J4	391
133	J14	391
137	J18	392
161	J42	392
155	J36	394
136	J17	399
171	J52	401
154	J35	401
140	J21	401
139	J20	401
132	J13	401
135	J16	402
175	J56	405
177	J58	407
170	J51	407
169	J50	410
150	J31	410
151	J32	410
149	J30	410
131	J12	411
134	J15	413
160	J41	418
147	J28	418
156	J37	420
148	J29	420
145	J26	420
178	J59	420
146	J27	435

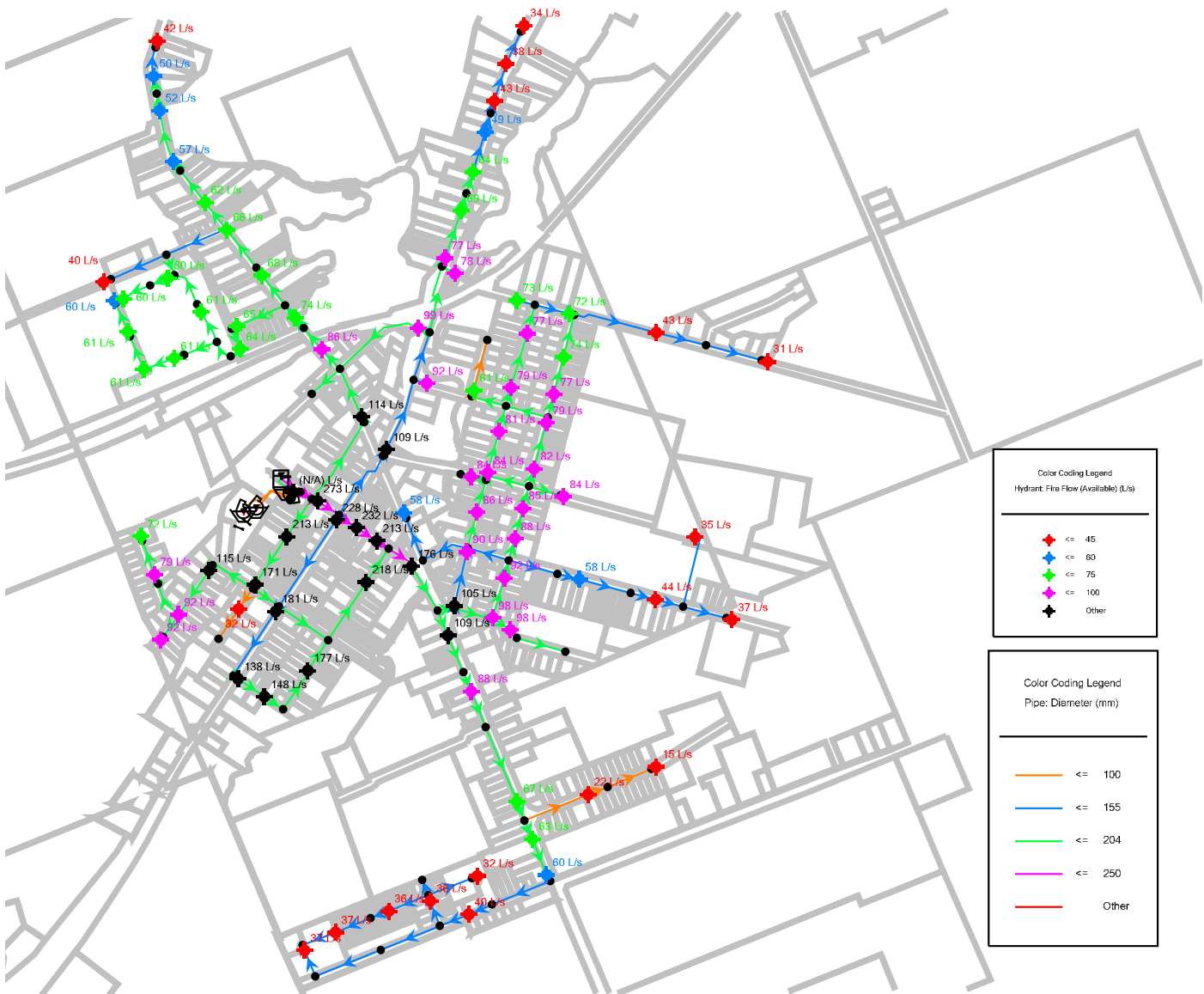
LOCATION 1 (HGL 246 LWL)		
ID	Label	Pressure
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185	J66	422
168	J49	430
163	J44	430
142	J23	430
153	J34	430
141	J22	430
138	J19	430
130	J11	430
129	J10	430
123	J4	430
133	J14	430
137	J18	431
161	J42	431
155	J36	433
136	J17	438
171	J52	440
154	J35	440
140	J21	440
139	J20	440
132	J13	440
135	J16	441
175	J56	445
177	J58	446
170	J51	447
169	J50	449
150	J31	450
151	J32	450
149	J30	450
131	J12	450
134	J15	452
160	J41	457
147	J28	457
156	J37	459
148	J29	459
145	J26	459
178	J59	460
146	J27	474

LOCATION 1 (HGL 255 HWL)		
ID	Label	Pressure
124	J5	509
185	J66	510
168	J49	518
163	J44	518
142	J23	518
153	J34	518
141	J22	518
138	J19	518
130	J11	518
129	J10	518
123	J4	518
133	J14	518
137	J18	519
161	J42	520
155	J36	521
136	J17	526
171	J52	528
154	J35	528
140	J21	528
139	J20	528
132	J13	528
135	J16	529
175	J56	533
177	J58	534
170	J51	535
169	J50	538
150	J31	538
151	J32	538
149	J30	538
131	J12	538
134	J15	540
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156	J37	547
148	J29	547
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178	J59	548
146	J27	562

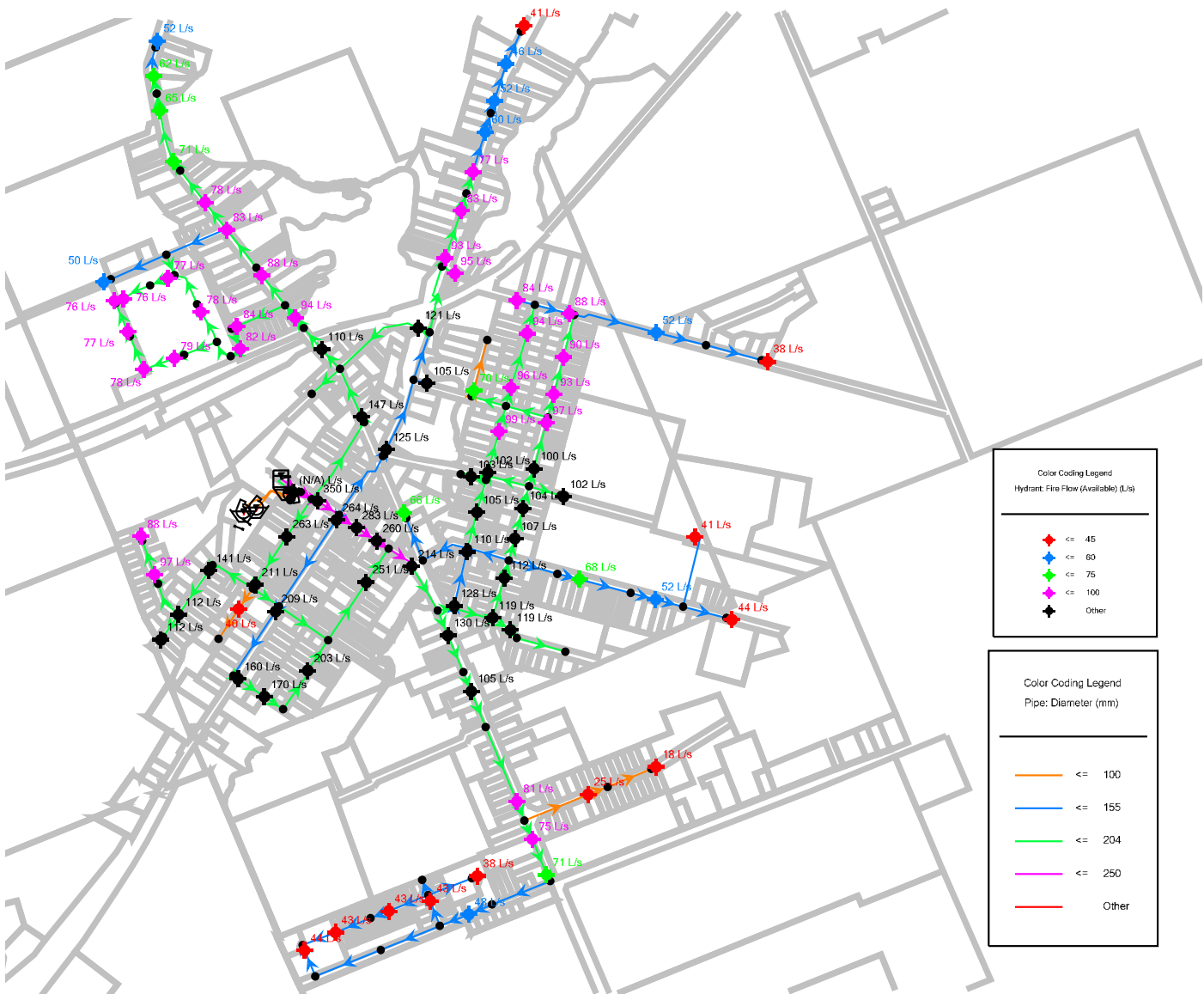
Norwood Water Model (JLR 29837) **Maximum Day Demand - Fire Flows** **Existing Conditions - HGL 242.00 m**



Norwood Water Model (JLR 29837) **Maximum Day Demand - Fire Flows** **Location 1 - HGL 246.00 m**



Norwood Water Model (JLR 29837) **Maximum Day Demand - Fire Flows** **Location 1 - HGL 255.00 m**



Norwood - Location 1 - Maximum Day Demand + Fire Flow

LOCATION 1 (HGL 242)		
ID	Label	Fire Flow
54	H36	14
53	H35	20
86	H56	28
47	H15	29
119	H101	29
98	H74	30
67	H60	32
56	H32	33
57	H33	33
58	H34	33
118	H100	33
97	H69	34
66	H59	34
117	H102	34
55	H31	36
108	H10	37
85	H55	38
96	H68	38
65	H58	40
107	H11	44
95	H67	44
106	H12	46
105	H87	49
115	H105	51
114	H106	52
113	H107	52
112	H108	52
116	H104	52
111	H109	52
110	H110	52
64	H57	52
77	H39	54
52	H30	54
109	H103	54
104	H86	54
101	H83	55
78	H45	56
103	H85	56
94	H66	57
51	H29	57
102	H84	58
50	H28	61
93	H65	61
100	H82	63
45	H90	64

LOCATION 1 (HGL 246 LWL)		
ID	Label	Fire Flow
54	H36	15
53	H35	22
86	H56	31
119	H101	32
47	H15	32
98	H74	34
67	H60	35
56	H32	36
57	H33	36
58	H34	37
118	H100	37
66	H59	37
97	H69	38
117	H102	40
55	H31	40
108	H10	42
85	H55	43
96	H68	43
65	H58	44
95	H67	49
107	H11	50
106	H12	52
105	H87	57
64	H57	58
77	H39	58
52	H30	60
113	H107	60
115	H105	60
114	H106	60
78	H45	61
112	H108	61
116	H104	61
111	H109	61
110	H110	61
104	H86	62
51	H29	63
109	H103	64
94	H66	64
101	H83	65
103	H85	66
50	H28	67
102	H84	68
93	H65	69
45	H90	72
82	H53	72

LOCATION 1 (HGL 255 HWL)		
ID	Label	Fire Flow
54	H36	18
53	H35	25
86	H56	38
119	H101	38
47	H15	40
98	H74	41
67	H60	41
56	H32	43
57	H33	43
58	H34	43
118	H100	44
66	H59	44
97	H69	46
55	H31	48
117	H102	50
65	H58	52
108	H10	52
96	H68	52
85	H55	52
95	H67	60
107	H11	62
106	H12	65
77	H39	66
64	H57	68
78	H45	70
105	H87	71
52	H30	71
51	H29	75
113	H107	76
114	H106	76
112	H108	77
115	H105	77
94	H66	77
104	H86	78
111	H109	78
116	H104	78
110	H110	79
50	H28	81
109	H103	82
93	H65	83
103	H85	83
101	H83	84
81	H54	84
45	H90	88
102	H84	88

Norwood - Location 1 - Maximum Day Demand + Fire Flow

LOCATION 1 (HGL 242)		
ID	Label	Fire Flow
82	H53	64
84	H78	66
81	H54	67
83	H77	68
92	H64	68
80	H48	68
91	H63	70
79	H47	70
44	H89	70
72	H76	71
73	H44	72
99	H81	73
71	H75	73
74	H43	74
70	H50	75
75	H42	75
69	H73	76
76	H40	77
68	H72	78
49	H27	80
63	H38	80
43	H17	81
42	H88	81
62	H71	82
89	H46	86
60	H70	87
61	H49	87
90	H62	89
59	H37	93
88	H80	97
48	H26	99
87	H41	101
46	H16	102
41	H18	128
40	H52	136
37	H14	150
34	H25	156
39	H19	164
38	H20	166
36	H13	187
33	H24	190
35	H21	197
32	H23	207
31	H22	210
30	H79	232

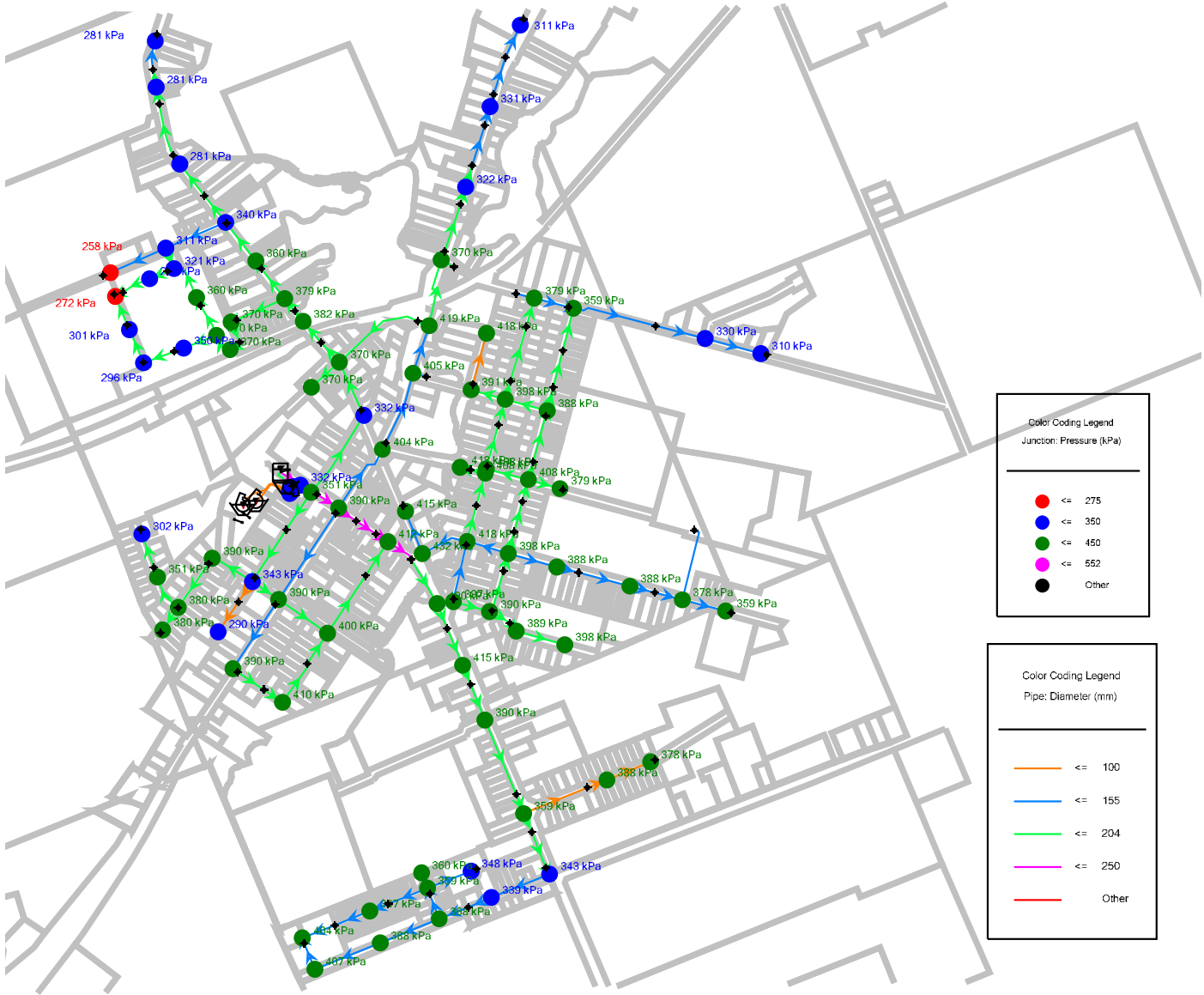
LOCATION 1 (HGL 246 LWL)		
ID	Label	Fire Flow
81	H54	73
100	H82	74
84	H78	74
92	H64	77
83	H77	77
80	H48	77
91	H63	78
79	H47	79
44	H89	79
72	H76	79
73	H44	81
71	H75	82
74	H43	84
70	H50	84
75	H42	84
69	H73	85
99	H81	86
76	H40	86
68	H72	88
49	H27	88
63	H38	90
43	H17	92
42	H88	92
62	H71	92
89	H46	92
60	H70	98
61	H49	98
90	H62	99
59	H37	105
87	H41	109
48	H26	109
88	H80	114
46	H16	115
41	H18	138
40	H52	148
37	H14	171
34	H25	176
39	H19	177
38	H20	181
36	H13	213
33	H24	213
35	H21	218
31	H22	228
32	H23	232
30	H79	273

LOCATION 1 (HGL 255 HWL)		
ID	Label	Fire Flow
82	H53	88
84	H78	90
92	H64	93
83	H77	93
80	H48	94
100	H82	94
91	H63	95
79	H47	96
44	H89	97
72	H76	97
73	H44	99
71	H75	100
74	H43	102
70	H50	102
75	H42	103
69	H73	104
49	H27	105
89	H46	105
76	H40	105
68	H72	107
63	H38	110
99	H81	110
43	H17	112
42	H88	112
62	H71	112
60	H70	119
61	H49	119
90	H62	121
87	H41	125
59	H37	128
48	H26	130
46	H16	141
88	H80	147
41	H18	160
40	H52	170
39	H19	203
38	H20	209
37	H14	211
34	H25	214
35	H21	251
33	H24	260
36	H13	263
31	H22	264
32	H23	283
30	H79	350

Norwood Water Model (JLR 29837)

Peak Hour Demand - Pressures

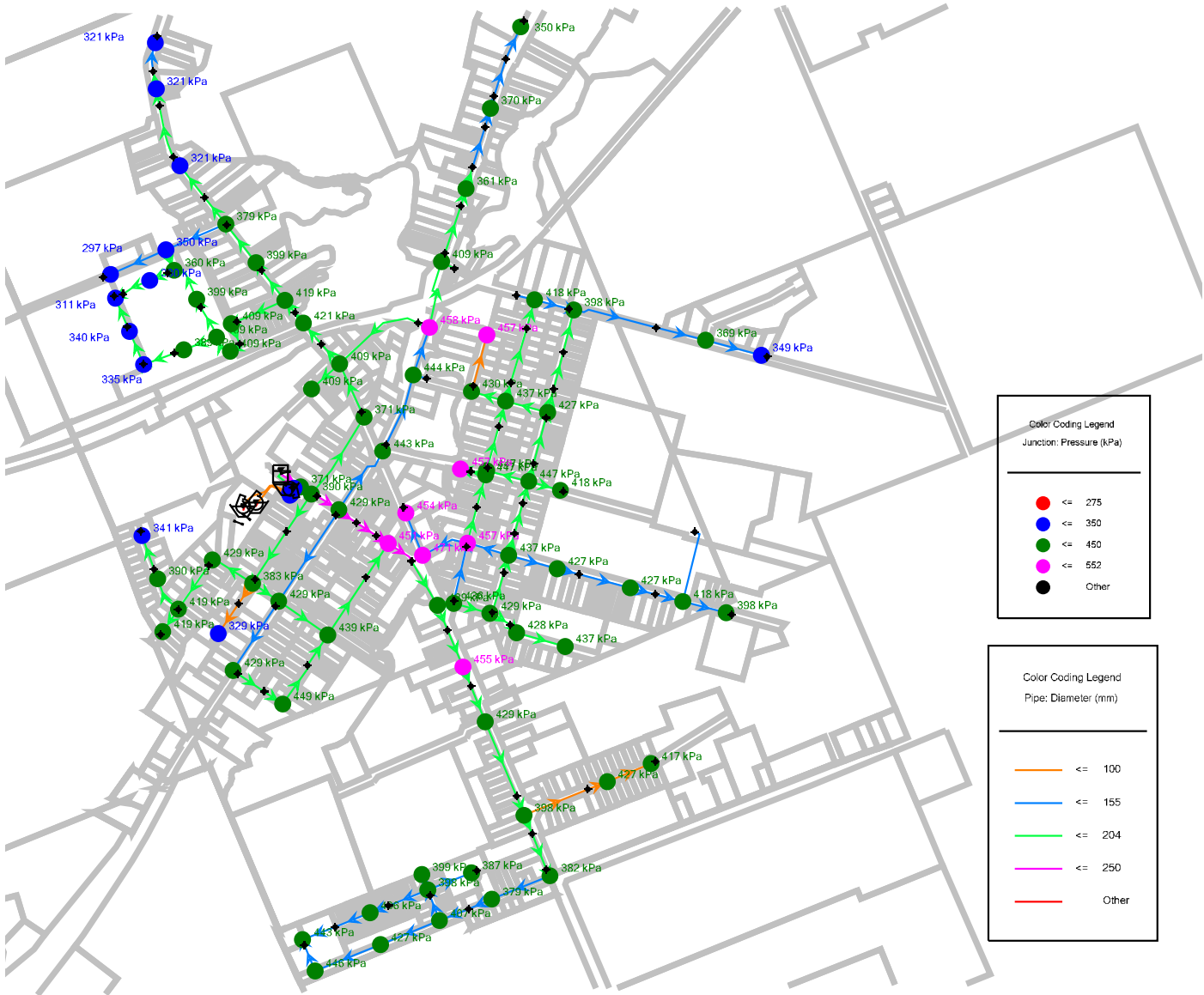
Existing Conditions - HGL 242.00 m



Norwood Water Model (JLR 29837)

Peak Hour Demand - Pressures

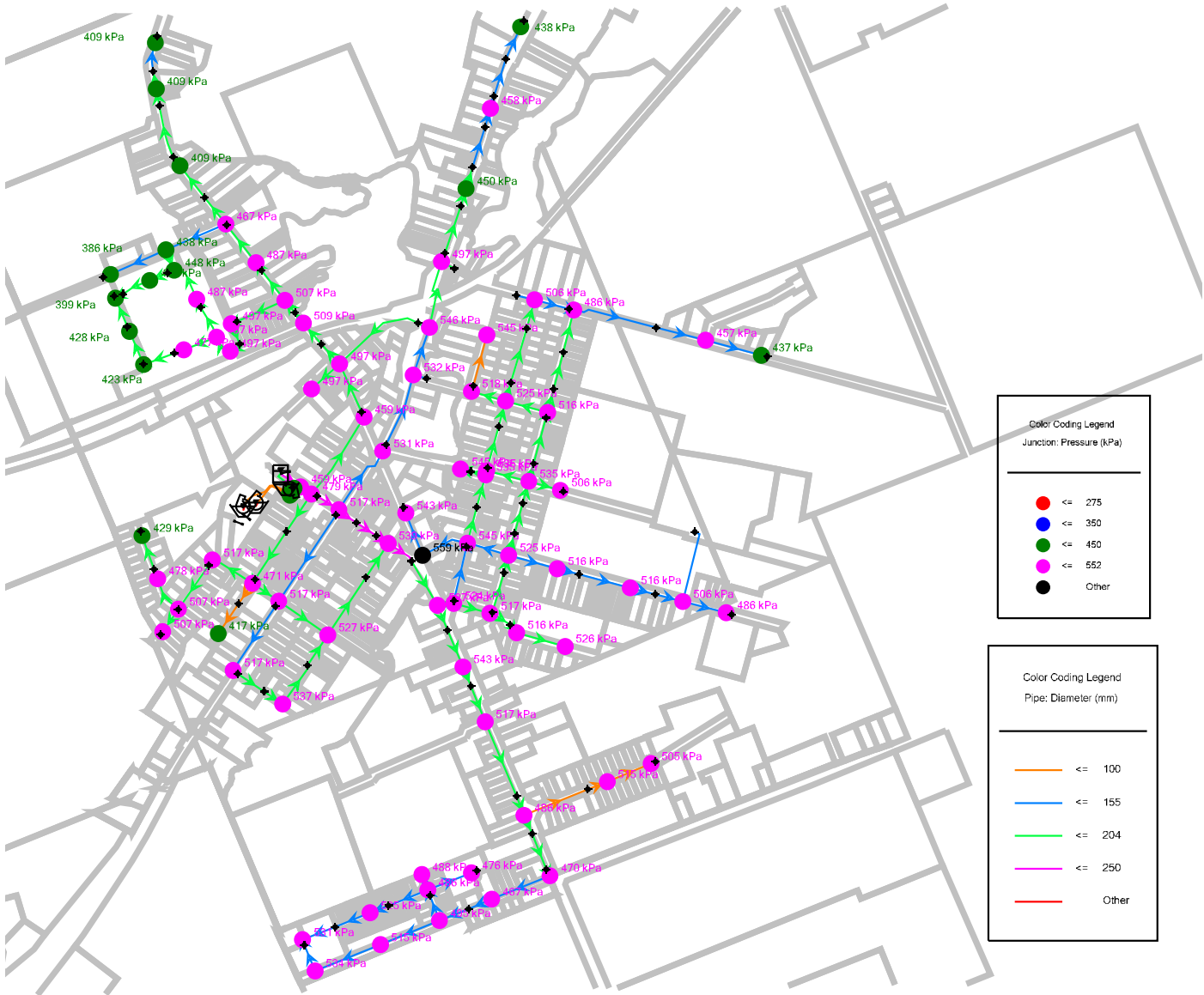
Location 1 - HGL 246.00 m



Norwood Water Model (JLR 29837)

Peak Hour Demand - Pressures

Location 1 - HGL 255.00 m



Norwood - Location 1 - Peak Hour Demand

LOCATION 1 (HGL 242)		
ID	Label	Pressure
198	J79	258
193	J74	272
203	J84	281
202	J83	281
201	J82	281
128	J9	290
194	J75	291
191	J72	296
192	J73	301
126	J7	302
204	J85	310
197	J78	311
182	J63	311
195	J76	321
180	J61	322
159	J40	330
181	J62	331
120	J1	332
176	J57	332
166	J47	339
200	J81	340
165	J46	343
122	J3	343
174	J55	348
190	J71	350
125	J6	351
121	J2	351
172	J53	359
144	J25	359
158	J39	359
162	J43	359
196	J77	360
199	J80	360
173	J54	360
167	J48	368
189	J70	370
188	J69	370
187	J68	370
179	J60	370
184	J65	370
183	J64	370
164	J45	378
143	J24	378
157	J38	379
152	J33	379
186	J67	379
127	J8	380

LOCATION 1 (HGL 246 LWL)		
ID	Label	Pressure
198	J79	297
193	J74	311
203	J84	321
202	J83	321
201	J82	321
128	J9	329
194	J75	330
191	J72	335
192	J73	340
126	J7	341
204	J85	349
197	J78	350
182	J63	350
195	J76	360
180	J61	361
159	J40	369
181	J62	370
120	J1	371
176	J57	371
166	J47	379
200	J81	379
165	J46	382
122	J3	383
174	J55	387
190	J71	389
125	J6	390
121	J2	390
172	J53	398
144	J25	398
158	J39	398
162	J43	398
196	J77	399
199	J80	399
173	J54	399
167	J48	407
189	J70	409
188	J69	409
187	J68	409
179	J60	409
184	J65	409
183	J64	409
164	J45	417
143	J24	418
157	J38	418
152	J33	418
186	J67	419
127	J8	419

LOCATION 1 (HGL 255 HWL)		
ID	Label	Pressure
198	J79	386
193	J74	399
203	J84	409
202	J83	409
201	J82	409
128	J9	417
194	J75	418
191	J72	423
192	J73	428
126	J7	429
204	J85	437
197	J78	438
182	J63	438
195	J76	448
180	J61	450
159	J40	457
181	J62	458
120	J1	459
176	J57	459
166	J47	467
200	J81	467
165	J46	470
122	J3	471
174	J55	476
190	J71	477
125	J6	478
121	J2	479
172	J53	486
144	J25	486
158	J39	486
162	J43	486
196	J77	487
199	J80	487
173	J54	488
167	J48	495
189	J70	497
188	J69	497
187	J68	497
179	J60	497
184	J65	497
183	J64	497
164	J45	505
143	J24	506
157	J38	506
152	J33	506
186	J67	507
127	J8	507

Norwood - Location 1 - Peak Hour Demand

LOCATION 1 (HGL 242)		
ID	Label	Pressure
124	J5	380
185	J66	382
168	J49	388
163	J44	388
142	J23	388
153	J34	388
141	J22	388
138	J19	389
137	J18	390
161	J42	390
130	J11	390
129	J10	390
123	J4	390
133	J14	390
155	J36	391
136	J17	397
171	J52	397
154	J35	398
140	J21	398
139	J20	398
132	J13	400
135	J16	400
170	J51	404
175	J56	404
177	J58	405
169	J50	407
150	J31	408
151	J32	408
149	J30	408
131	J12	410
134	J15	412
147	J28	415
160	J41	415
156	J37	418
148	J29	418
145	J26	418
178	J59	419
146	J27	432

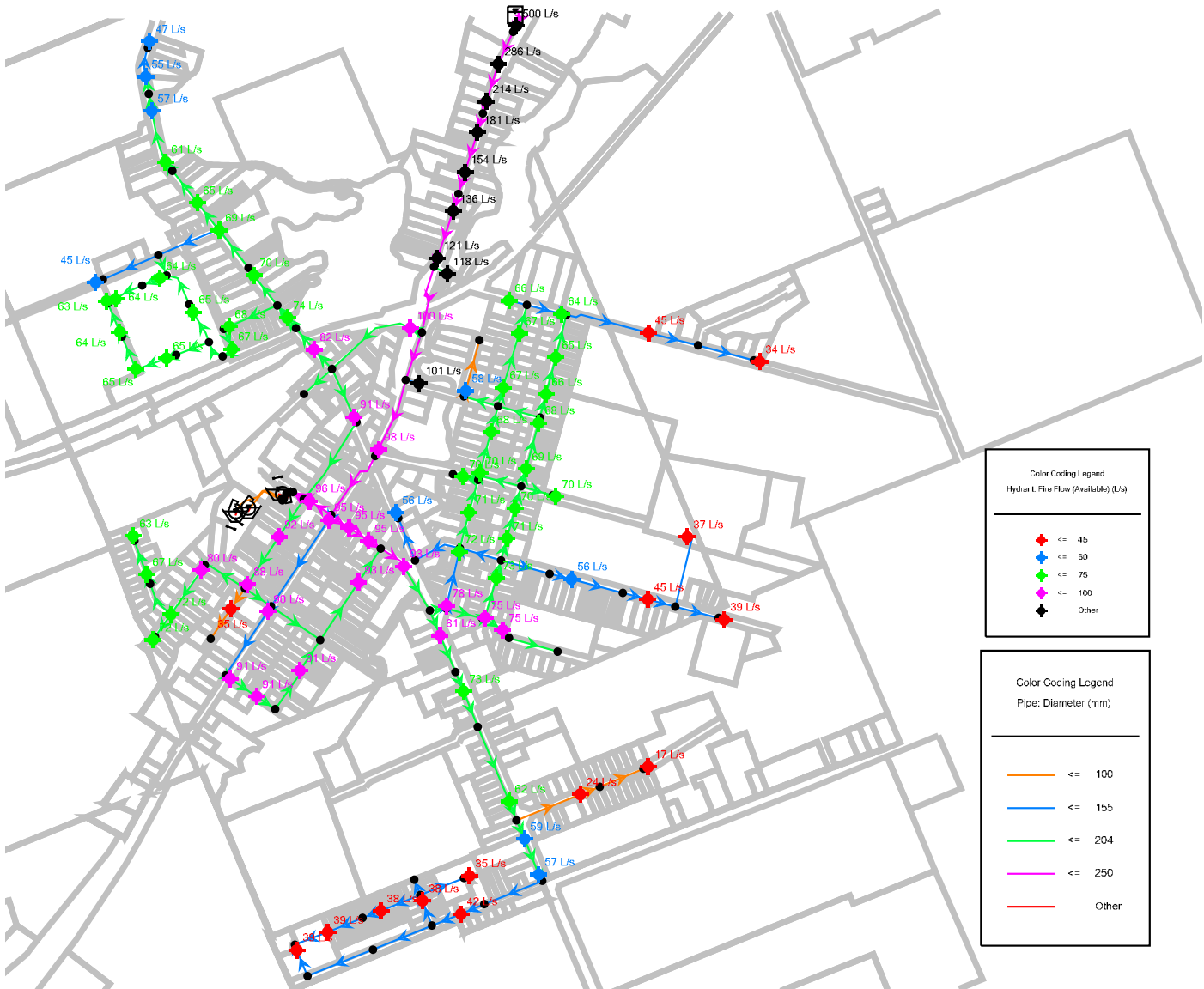
LOCATION 1 (HGL 246 LWL)		
ID	Label	Pressure
124	J5	419
185	J66	421
168	J49	427
163	J44	427
142	J23	427
153	J34	427
141	J22	427
138	J19	428
137	J18	429
161	J42	429
130	J11	429
129	J10	429
123	J4	429
133	J14	429
155	J36	430
136	J17	436
171	J52	436
154	J35	437
140	J21	437
139	J20	437
132	J13	439
135	J16	439
170	J51	443
175	J56	443
177	J58	444
169	J50	446
150	J31	447
151	J32	447
149	J30	447
131	J12	449
134	J15	451
147	J28	454
160	J41	455
156	J37	457
148	J29	457
145	J26	457
178	J59	458
146	J27	471

LOCATION 1 (HGL 255 HWL)		
ID	Label	Pressure
124	J5	507
185	J66	509
168	J49	515
163	J44	515
142	J23	516
153	J34	516
141	J22	516
138	J19	516
137	J18	517
161	J42	517
130	J11	517
129	J10	517
123	J4	517
133	J14	517
155	J36	518
136	J17	524
171	J52	525
154	J35	525
140	J21	525
139	J20	526
132	J13	527
135	J16	527
170	J51	531
175	J56	531
177	J58	532
169	J50	534
150	J31	535
151	J32	535
149	J30	535
131	J12	537
134	J15	539
147	J28	543
160	J41	543
156	J37	545
148	J29	545
145	J26	545
178	J59	546
146	J27	559

Norwood Water Model (JLR 29837)

Maximum Day Demand - Fire Flows

Option 3 with Watermain Upgrades - HGL 255.00 m



Norwood - Location 3 - Maximum Day Demand + Fire Flow

LOCATION 1 (HGL 242)		
ID	Label	Fire Flow
54	H36	14
53	H35	20
86	H56	28
47	H15	29
119	H101	29
98	H74	30
67	H60	32
56	H32	33
57	H33	33
58	H34	33
118	H100	33
97	H69	34
66	H59	34
117	H102	34
55	H31	36
108	H10	37
85	H55	38
96	H68	38
65	H58	40
107	H11	44
95	H67	44
106	H12	46
105	H87	49
115	H105	51
114	H106	52
113	H107	52
112	H108	52
116	H104	52
111	H109	52
110	H110	52
64	H57	52
77	H39	54
52	H30	54
109	H103	54
104	H86	54
101	H83	55
78	H45	56
103	H85	56
94	H66	57
51	H29	57
102	H84	58
50	H28	61
93	H65	61
100	H82	63
45	H90	64

LOCATION 3 (HGL 255 HWL)		
ID	Label	Fire Flow
54	H36	17
53	H35	24
86	H56	34
119	H101	35
47	H15	35
67	H60	37
56	H32	38
57	H33	38
58	H34	39
118	H100	39
66	H59	39
55	H31	42
85	H55	45
65	H58	45
117	H102	45
108	H10	47
107	H11	55
64	H57	56
77	H39	56
106	H12	57
52	H30	57
78	H45	58
51	H29	59
105	H87	61
50	H28	62
45	H90	63
113	H107	63
114	H106	64
115	H105	64
82	H53	64
112	H108	64
116	H104	65
111	H109	65
110	H110	65
84	H78	65
104	H86	65
81	H54	66
83	H77	66
109	H103	67
80	H48	67
44	H89	67
79	H47	67
72	H76	68
101	H83	68
73	H44	68

Norwood - Location 3 - Maximum Day Demand + Fire Flow

LOCATION 1 (HGL 242)		
ID	Label	Fire Flow
82	H53	64
84	H78	66
81	H54	67
83	H77	68
92	H64	68
80	H48	68
91	H63	70
79	H47	70
44	H89	70
72	H76	71
73	H44	72
99	H81	73
71	H75	73
74	H43	74
70	H50	75
75	H42	75
69	H73	76
76	H40	77
68	H72	78
49	H27	80
63	H38	80
43	H17	81
42	H88	81
62	H71	82
89	H46	86
60	H70	87
61	H49	87
90	H62	89
59	H37	93
88	H80	97
48	H26	99
87	H41	101
46	H16	102
41	H18	128
40	H52	136
37	H14	150
34	H25	156
39	H19	164
38	H20	166
36	H13	187
33	H24	190
35	H21	197
32	H23	207
31	H22	210
30	H79	232

LOCATION 3 (HGL 255 HWL)		
ID	Label	Fire Flow
103	H85	69
71	H75	69
74	H43	70
70	H50	70
75	H42	70
102	H84	70
69	H73	70
76	H40	71
68	H72	71
43	H17	72
42	H88	72
63	H38	72
49	H27	73
62	H71	73
100	H82	74
60	H70	75
61	H49	75
59	H37	78
46	H16	80
48	H26	81
99	H81	82
37	H14	88
38	H20	90
41	H18	91
40	H52	91
88	H80	91
39	H19	91
36	H13	92
34	H25	93
35	H21	93
33	H24	95
32	H23	95
31	H22	95
30	H79	96
87	H41	98
90	H62	100
89	H46	101
91	H63	118
92	H64	121
93	H65	136
94	H66	154
95	H67	181
96	H68	214
97	H69	286
98	H74	500

Appendix F

2018 Hydrogeology Review
Municipal Groundwater
Supply, Norwood, Ontario by
D.M. Wills Associates
Limited

Hydrogeology Review Municipal Groundwater Supply Norwood, Ontario

FINAL REPORT

Prepared for:

D. M. Wills Associates Limited
150 Jameson Drive
Peterborough, ON K9J 0B9

10 August 2018

Report 18-8.1

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Michael J. Lord
 Manager, Environmental Engineering
 D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, ON K9J 0B9

10 August 2018

**Re: Hydrogeological Review
 Municipal Groundwater Supply, Norwood, Ontario**

Dear Mike:

We are pleased to submit our final report of the hydrogeological review of the municipal groundwater supply at Norwood. The purpose of the review was to analyse recent step test data in new and existing municipal wells, and to assess the application of the test results to the evaluation of the long-term pumping capacity of the well field.

The review concludes that the two new wells, Well 4 and Well 1B, combined with existing Wells 2 and 3, are expected to provide sufficient capacity to meet the current drinking water permit maximum design flow of 1,965 m³/d. However, this should be confirmed by long-duration pumping tests in the new and existing wells to assess the long-term well performance, aquifer hydraulic parameters, and possible hydraulic boundaries. In advance of the long-term testing, it is recommended that a groundwater monitoring program be initiated to establish a baseline database.

We trust you will find this report adequate for your needs. If you have any questions, please call.

Yours truly,



Ted Rannie, MSc PGeo

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1.0 INTRODUCTION

1.1 Background

At the request of D. M. Wills Associates Limited (D. M. Wills), we have conducted analyses of hydraulic tests in municipal wells in Norwood, Ontario, which lies about 30 km east of Peterborough in the Township of Asphodel-Norwood (Figure 1). Figure 2 shows the location of the municipal well field in Norwood. A site sketch map is shown in Figure 3.

The Norwood Drinking Water System currently consists of Wells 1, 2 and 3. Well 1 and Well 3 are used as duty wells. Well 2 is a backup well, used only when demand exceeds the capacity of Well 1 and Well 3. Well 1 and Well 3 are typically pumped for 3.5 hours, four times per day, at a flow rate of about 7.6 L/s. The average combined flow rate during the summer months is about 310 m³/d.

In December 2017, two test wells were drilled on the site, referred to in the driller's well records as TW17-01 and TW07-02 (Appendix A-1). For clarity and consistency, these test wells have been designated by the Town as Well 4 and Well 1B, respectively; these are the well names used henceforth in this report.

The Township of Asphodel-Norwood would like to obtain approvals from Otonabee Region Conservation Authority (ORCA), Trent Conservation Coalition (TCC) and Ministry of Environment, Conservation and Parks (MECP), to connect two new wells (Well 4, Well 1B) to the existing drinking water distribution system with existing wells, Well 2 and Well 3. Well 4 would be connected to the water system as a second backup well. Well 1B would replace existing Well 1, which would be decommissioned. The new wells would be connected at the pump house at Well 2 (Figure 3), where the water is treated and monitored before distribution to the Town.

The drinking water system, with the two existing Well 2 and Well 3, combined with new Well 1B and Well 4 is expected to have a firm capacity of 1,965 m³/d, which is the maximum allowed under the current permit. All existing and new wells would each have a 7.5 hp pump rated at 7.6 L/s (655 m³/d).

The municipal well field is located on an esker ridge (see Section 2.0), which stands about 10-15 m above the surrounding terrain. The wells are about 20-30 m deep, and are screened in sandy gravel at the base of the esker, or in the underlying limestone bedrock. Details of the wells are summarized in Table 1, and the driller's geological logs are in Appendix A-1. Well 1B was drilled on the eastern flank of the esker, close to Well 1. Well 4 was drilled on higher ground near the crest of the esker ridge.

Soon after completion of drilling in December 2017, step pumping tests were completed in Well 4 and Well 1B. In February 2018, step tests were also done in Well 2 and Well 3. All step tests were done by G. Hart & Sons Well Drilling Inc., under supervision by D.M. Wills. Each test consisted of pumping the well at several different flow rates for 15-20 minutes each. Field data for the step tests are in Appendix B-5.

1.2 Objectives

The objectives of this review are as follows:

- Analyse data of recent step tests in Well 4, Well 3, Well 2 and Well 1B.
- Interpret the test results in the context of the hydrogeology on the site.
- Assess the application of the test results to the evaluation of the long-term pumping capacity of Well 4 and Well 1B.

2.0 HYDROGEOLOGY

2.1 Geological Setting

The regional geology consists of Paleozoic argillaceous limestone bedrock overlain by Quaternary glacial overburden sediments.

The surficial Quaternary geology around Norwood was mapped by Leyland and Mihychuk (1984). The oldest (lowest) overburden unit is regional till, or ground moraine (Units 3, 4 in Figure 4). The till plain is covered by coarse ice-contact sand/gravel (Unit 5), or outwash sand (Unit 6). Sand and gravel is extracted from a pit on the west side of Norwood (Figure 5).

The main topographic feature at the site is an esker ridge, known as the Norwood Esker (Dixon, 1978), that trends NE-SW through the centre of Norwood. An esker is a well-defined linear ridge of glaciofluvial gravel and sand, deposited by flowing glacial meltwater, possibly within a tunnel or channel at the base of the glacier. Dixon studied the sedimentary structure of the Norwood Esker, and reported that, “because of its overall size, both in height and length, it ranks as one of the largest eskers in Southern Ontario.”

The municipal well field site is entirely enclosed within the esker (Figure 5), which is about 200 m wide at the site, and stands about 10-15 m above the surrounding terrain. Well 3 and Well 4 are located at the crest of the esker ridge; Well 2, Well 1 and Well 1B lie on the east side of the esker (Figure 5).

Cross-Section A-A' (Figure 6) shows the stratigraphy of the well field in profile, and the relative positions of the well intakes at the base of the esker and upper bedrock.

Figure 2 shows MOE well records of 17 historical private wells in Norwood, provided by D. M. Wills (Appendix A-2). The wells are not active, because Norwood residents are provided water from the municipal well field. These wells were not used during this review, but may provide useful information regarding the local hydrogeology.

2.2 Hydraulic Conductivity of Esker Sediments

The Norwood Esker sediments show a wide range in grain size, from boulders and cobbles, to fine sand and silt (Dixon, 1978). Although the stratigraphy of the esker is complex, the coarser gravel and sand were likely laid down during initial deposition under high-flow conditions, generally at the base of the esker, and in a “core” in the centre of the esker. The finer sediments were deposited under low-flow conditions on the flanks of the esker.

In this review, the in-situ K values from the step tests were augmented by K values estimated from grain-size analyses of basal sand-gravel sediments in Well 4 and Well 1B. Grain-size analyses of these overburden samples are in Appendix A-3, and are summarized in Table 2.

These grain-size analyses provided estimates of hydraulic conductivity (K) of the basal gravel sediments using the Hazen correlation (Freeze and Cherry, 1979). Table 2 shows K values of eight samples from Well 4 had a geometric mean of 3×10^{-3} m/s. Seven samples from Well 1B showed a mean K of 2×10^{-4} m/s, or one order of magnitude lower than at Well 4.

2.3 Groundwater Flow

Interpretation of the groundwater flow pattern at the site is limited by a lack of water level data. Available groundwater levels measured in municipal wells (Table 3) allowed a plot of the piezometric surface at the base of the esker and upper limestone in Cross-Section A-A' (Figure 6). A conceptual (unmeasured) water table is also shown, at an unknown elevation above the base of the esker.

3.0 ANALYSIS OF STEP PUMPING TESTS

3.1 Constant-Head Analytical Method

The step pumping test data in Well 4, Well 3, Well 2 and Well 1B, were analysed for in-situ hydraulic conductivity (K), using the constant-head method of Hvorslev (1951). The analysis uses a linear plot of flow rate vs steady-state drawdown. A ‘best-fit’ line is interpolated through the test data; an arbitrary point on this line is chosen as the input value to the analytical equation to solve for K.

3.2 Hydraulic Conductivity (K) Results

In this discussion, please refer to the analytical plots of the step test data in Appendix B, and the K results summary in Table 4. In-situ K values from the step tests ranged over two orders of magnitude, from 3×10^{-2} m/s in Well 4, to 3×10^{-4} m/s in Well 1B. The K values for Well 3 and Well 2 are similar (4×10^{-3} m/s and 1×10^{-3} m/s, respectively).

For comparison purposes, the field Q/s data (pumping rate/drawdown) for the four tested wells are plotted at the same scale in Figure 7. The plot shows different slopes for the four wells, which are in proportion to the K at each well. The Q/s data for Well 4 show the steepest slope, and the highest K (3×10^{-2} m/s). Well 4 was pumped at the highest flow rate at 1251 L/min (20.9 L/s), with a relatively small drawdown (0.28 m).

In contrast, field data for bedrock well TW17-02 show the shallowest Q/s slope, and the lowest K value (3×10^{-4} m/s). Well 1B was pumped at 1024 L/min (17.1 L/s), almost as high as Well 4, but had a comparatively large drawdown of 7.09 m. Each well has a design flow rate of 7.6 L/s.

The step tests in individual wells provided “point” values of hydraulic conductivity (K) that were mapped across the site in Figure 8. The K value of the basal gravel sediments appears to decrease by two orders of magnitude from the centre of the esker at Well 4 (3×10^{-2} m/s), to the eastern flank at Well 1B (3×10^{-4} m/s). This is consistent with a finer grain size of the sediment at Well 1B compared to Well 4. Dixon (1978) also reported that the esker sediments are generally coarser at the centre, and finer on the flanks. This may explain why Well 1, adjacent to Well 1B, has historically shown performance issues, such as screen-clogging problems and relatively low pumping rates.

The analytical plot for Well 1B also shows that the Q/s slope flattens at about 500 L/min (8.3 L/s). This flatter slope likely represents increased well losses, and lower well efficiency, at higher flow rates due to turbulence at the well screen. Similar slope changes also occurred in the plots for other wells, but were not as pronounced as at Well 1B.

4.0 ASSESSMENT OF WELL CAPACITY

4.1 Suitability of Well 4 and Well 1B as Production Wells

Well 4 would be an excellent additional production well, due to its high permeability and high efficiency. Well 4 has a K value one order of magnitude higher than Well 3, and seems capable of being pumped at higher flow rates, with lower drawdowns than Well 3. In addition, Well 4 appears to be screened in the permeable core of the esker, which could have high transmissivity, storativity, and lateral continuity along the NE-SW trend of the esker.

Well 1B is similar to Well 1 in its well performance. Well 1B is a bedrock well; the break in the Q/s plot and the flatter slope at rates >500 L/min (Figure 7) may represent non-laminar (turbulent) flow into the well bore at higher flow rates, or possibly closure of fractures in the limestone at distance from the well bore. At longer pumping times, and greater distance from the well bore, the well efficiency may decrease further than was observed during the step test.

The finer esker sediments on the east flank of the esker may explain why Well 1 has a relatively low permeability and possible screen problems. Future wells would be better placed in the centre of the esker, to the NE or SW of Well 4. Well 1B should perhaps be used as a backup well, rather than as a duty well.

4.2 Assessment of Well Capacity using the Step Test K Results

The step pumping tests provided in-situ K values that are reasonable, and consistent with the on-site geology. However, the results should not be used to estimate sustainable well capacity, because the pumping times of the step tests were not long enough to intersect possible hydraulic boundaries and barriers at distance from the pumped well.

Longer-term pumping tests should be completed to estimate sustainable well capacity. Each well should be pumped individually for 24 hours or more, dependent on the observed response, to determine its long-term response to pumping.

In advance of possible long-term testing in the future, it is recommended that a network of monitoring wells be installed, and that a groundwater monitoring program be initiated, to establish a baseline database.

5.0 SUMMARY AND CONCLUSIONS

The following summary and conclusions are based on the preceding analysis and discussion:

- The Norwood municipal well field is located on an esker ridge, which stands about 10-15 m above the surrounding terrain. This esker is known as the Norwood Esker, and is one of the largest eskers in Southern Ontario.
- There are five wells on the site: Well 1, Well 1B, Well 2, Well 3 and Well 4. Four wells are screened in sandy gravel at the base of the esker; Well 1B has its intake in the underlying limestone bedrock.
- Well 3 and Well 4 are located at or near the crest of the esker ridge. Well 2, Well 1 and Well 4 lie on the east flank of the esker.
- New wells Well 4 and Well 1B were drilled in December 2017. Well 4 was drilled on the crest of the esker ridge, as an additional production well for Norwood. Well 1B was drilled on the eastern flank of the esker, to replace Well 1 as the new duty well.
- Step pumping tests were done in test wells Well 4 and Well 1B, soon after completion of drilling, in December 2017. In February 2018, step tests were also done in existing Well 2 and Well 3. Each step test consisted of pumping the well at several different flow rates for 15-20 minutes each.
- K values of the basal gravel sediments appear to decrease by 1-2 orders of magnitude from the centre of the esker at Well 4, to the eastern flank at Well 1B, possibly because the esker sediments are generally coarser in the centre, and finer on the flanks. The finer sediments on the east flank may explain why Well 1 has historically a relatively low permeability and possibly screen problems.
- Well 4 would be an excellent production well, due to its high permeability and high efficiency. Well 4 has a K value one order of magnitude higher than Well 3, and seems capable of being pumped at higher flow rates, with lower drawdowns than Well 3. Well 4 also appears to be screened in the permeable core of the esker, which could have high transmissivity, storativity, and lateral continuity along the NE-SW trend of the esker.
- Well 1B is a bedrock well, has a relatively low K value, and its response to step test pumping suggests that its well efficiency may decrease over longer pumping times, and/or greater distances from the well bore. The long-term performance of Well 1B is expected to have similar performance issues to those observed in existing Well 1.

- Future wells would be better placed in the centre of the esker, along the crestline of the ridge to the NE or SW of Well 4.
- The two new wells, Well 4 and Well 1B, combined with existing Wells 2 and 3, are expected to provide sufficient capacity to meet the current drinking water permit maximum design flow of 1,965 m³/d.
- The step pumping test results should not be used to assess sustainable, long-term well capacity, because the step test pumping times were not long enough to intersect possible hydraulic boundaries at distance from the pumped well.
- New long-duration pumping tests are recommended in the future to assess the long-term well performance, aquifer parameters transmissivity and storativity, and also possible boundary effects that can only be assessed under long-term pumping conditions. In these long-term tests, the new and existing wells should be pumped separately for 24 hours or longer, depending on the observed responses.
- In advance of possible long-term testing in the future, it is recommended that a network of monitoring wells be installed, and that a groundwater monitoring program be initiated, to establish a baseline database.

Respectfully submitted,

Ted Rannie, M.Sc., P.Geo.
Hydrogeologist



6.0 REFERENCES

Dixon, John Arthur, 1978. Morphology and Anatomy of the Norwood Esker, Ontario. M.A. thesis, Wilfrid Laurier University, 1978. 98 p.

Hvorslev, 1951. Time Lag and Soil Permeability in Groundwater Observations. U.S. Army Corps Engers Waterway Exp. Sta. Bull. 36, Vicksburg, Miss.

Ian D. Wilson Associates Limited, Consulting Hydrogeologists, 1993. Well Evaluation, Wells 3 and 4, Village of Norwood, County of Peterborough. Project 92-09. July 19, 1993.

Ian D. Wilson Associates Limited, Consulting Hydrogeologists, 1994. Well Evaluation, Combined Test, Wells 1, 2 and 3, Village of Norwood. Project 92-09. May 3, 1994.

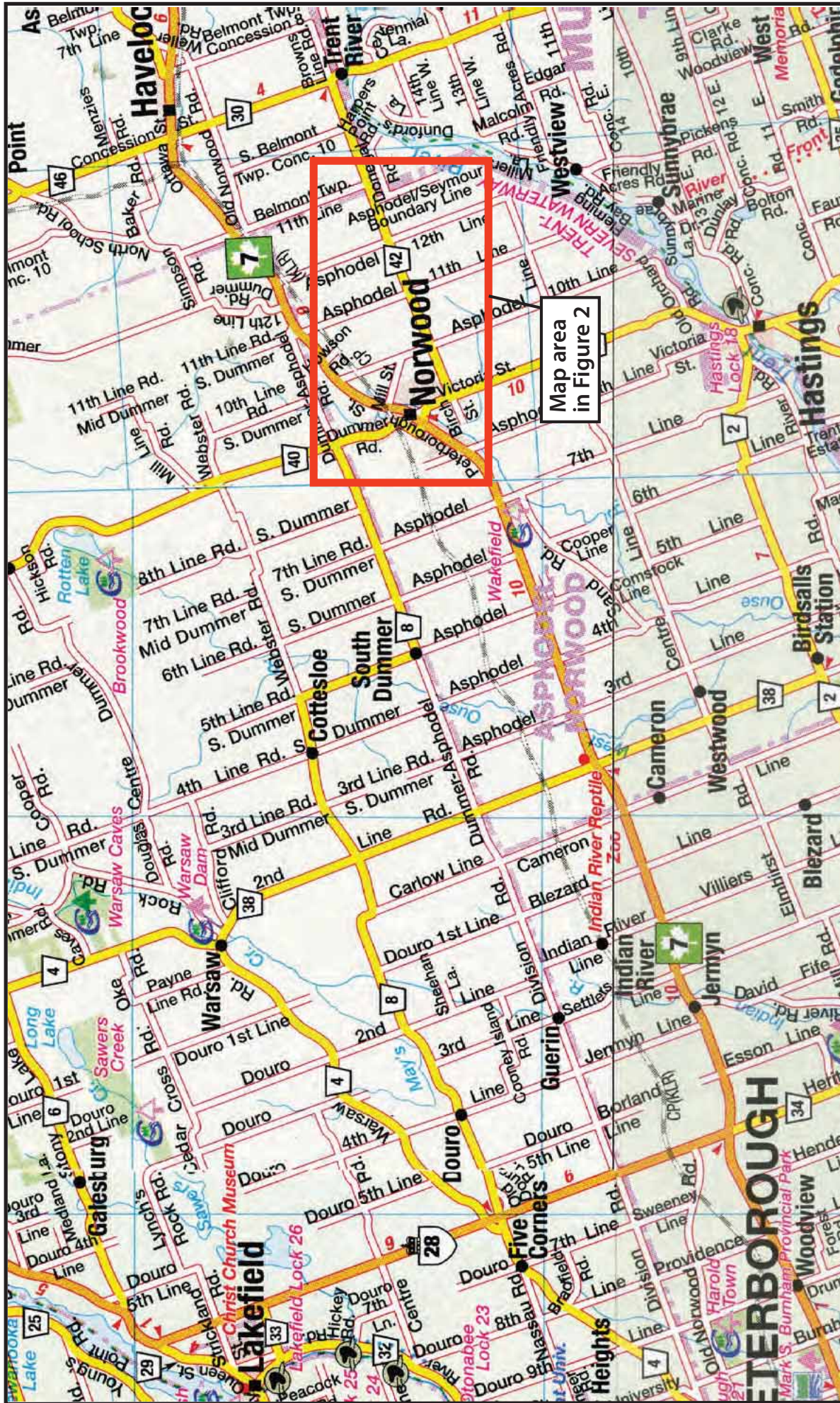
Leyland, J. G. and Mihychuk, M., 1984. Quaternary Geology of the Campbellford Area, Southern Ontario. Ontario Geological Survey, Map P.2532. Geological Series - Preliminary Map. Scale 1:50 000. Geology 1980.

Ontario Ministry of the Environment. Water Well Records,

XCG Consultants Ltd., 2006. Technical Memorandum, Wellhead Protection Study for Norwood Municipal Drinking water System. XCG Fil 01-1751-04-01.

FIGURES

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Notes:

Base map from MapArt, 2012

tedrannie

MSC PGeo 647.528.5511

hydrogeologist

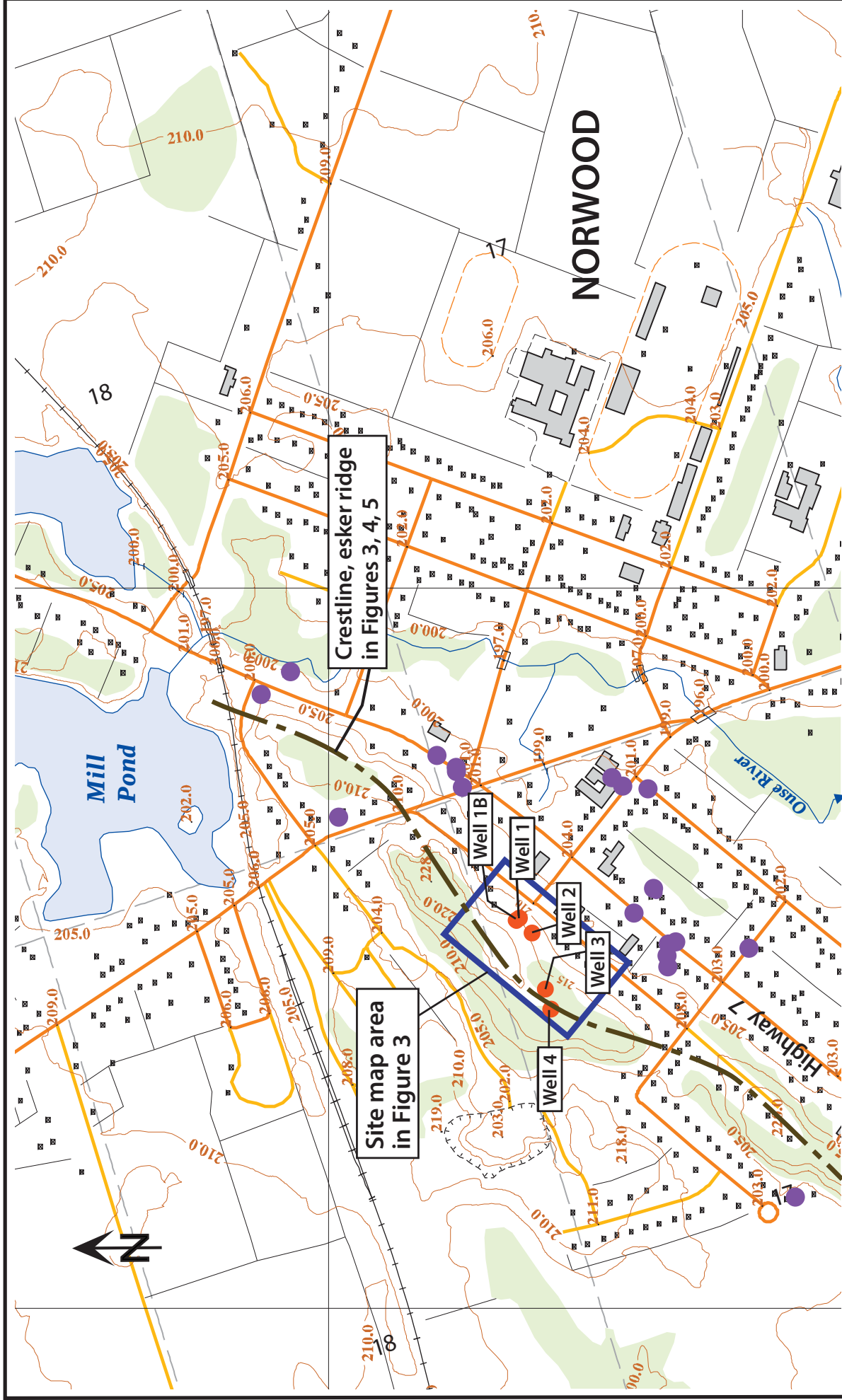
ted@knowyourground.com

HYDROGEOLOGY REVIEW
MUNICIPAL GROUNDWATER SUPPLY
NORWOOD, ONTARIO

Location of Site

FIGURE

1



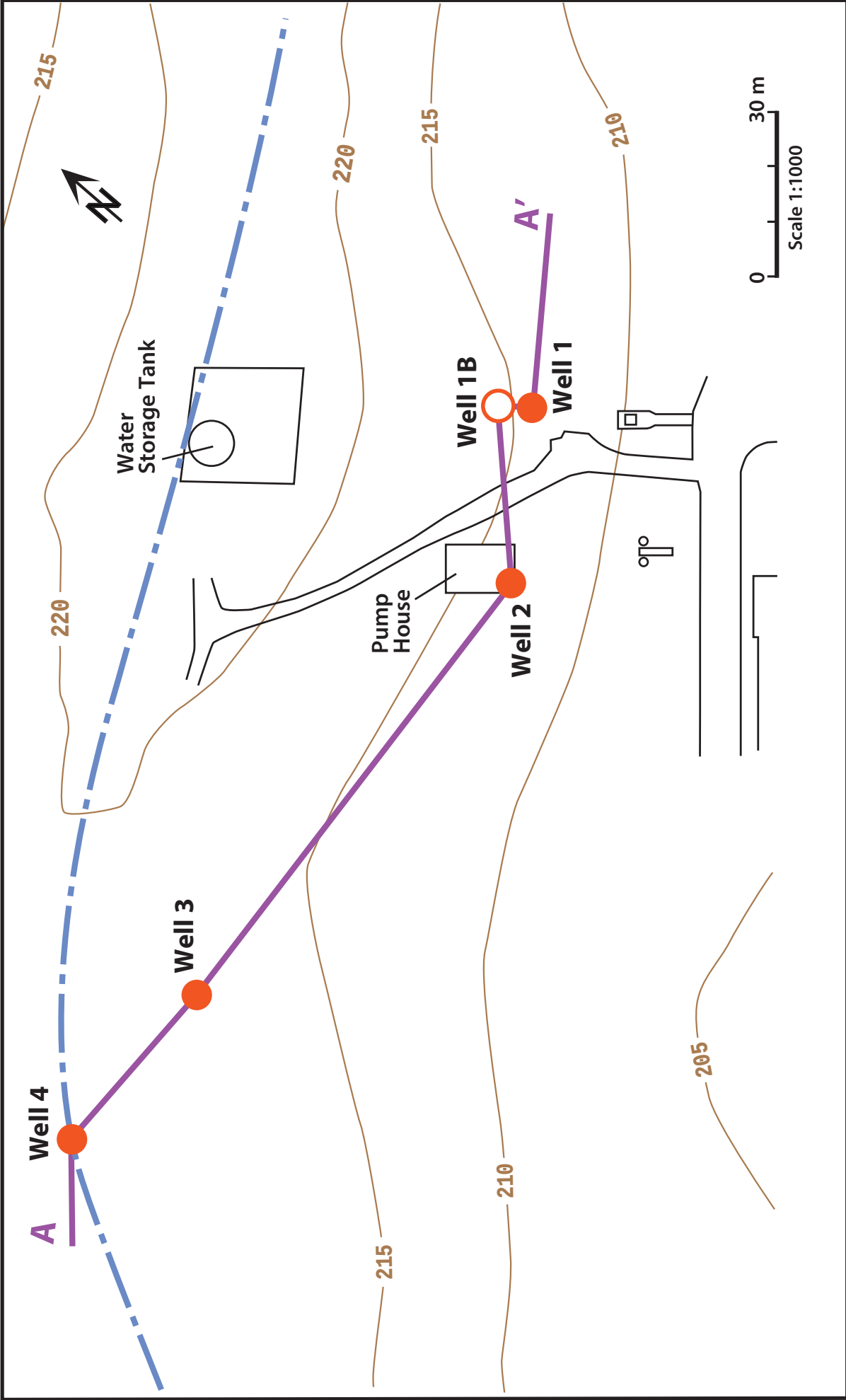
● Municipal well

● Historical well in Norwood
with MOE well record (Appendix A-2)

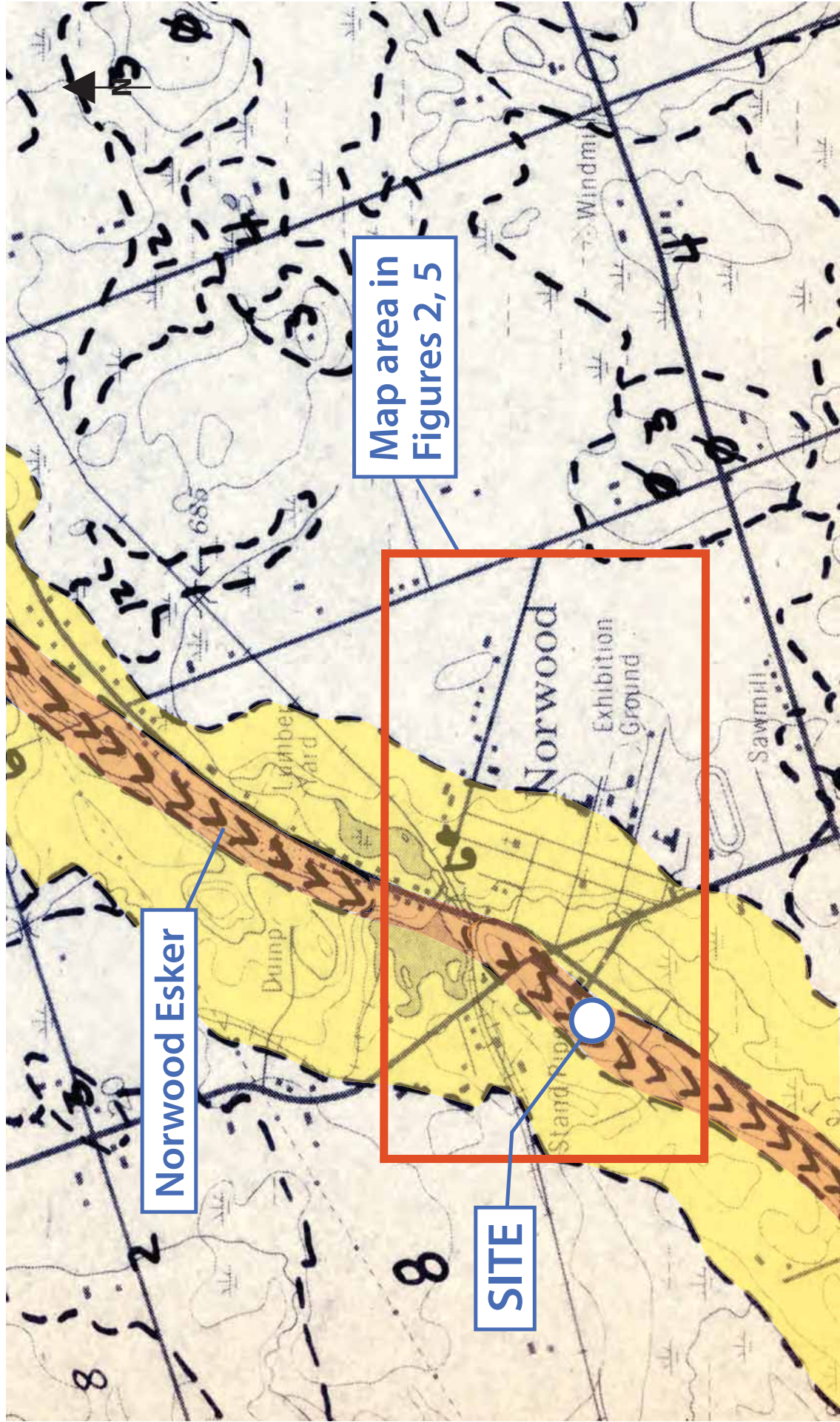
0 300 m
Scale 1:7750

Notes:

Ontario Base Map (OBM) from Ministry of Natural Resources.
MOE well records provided by D. M. Wills Associates Limited (Appendix A-2).

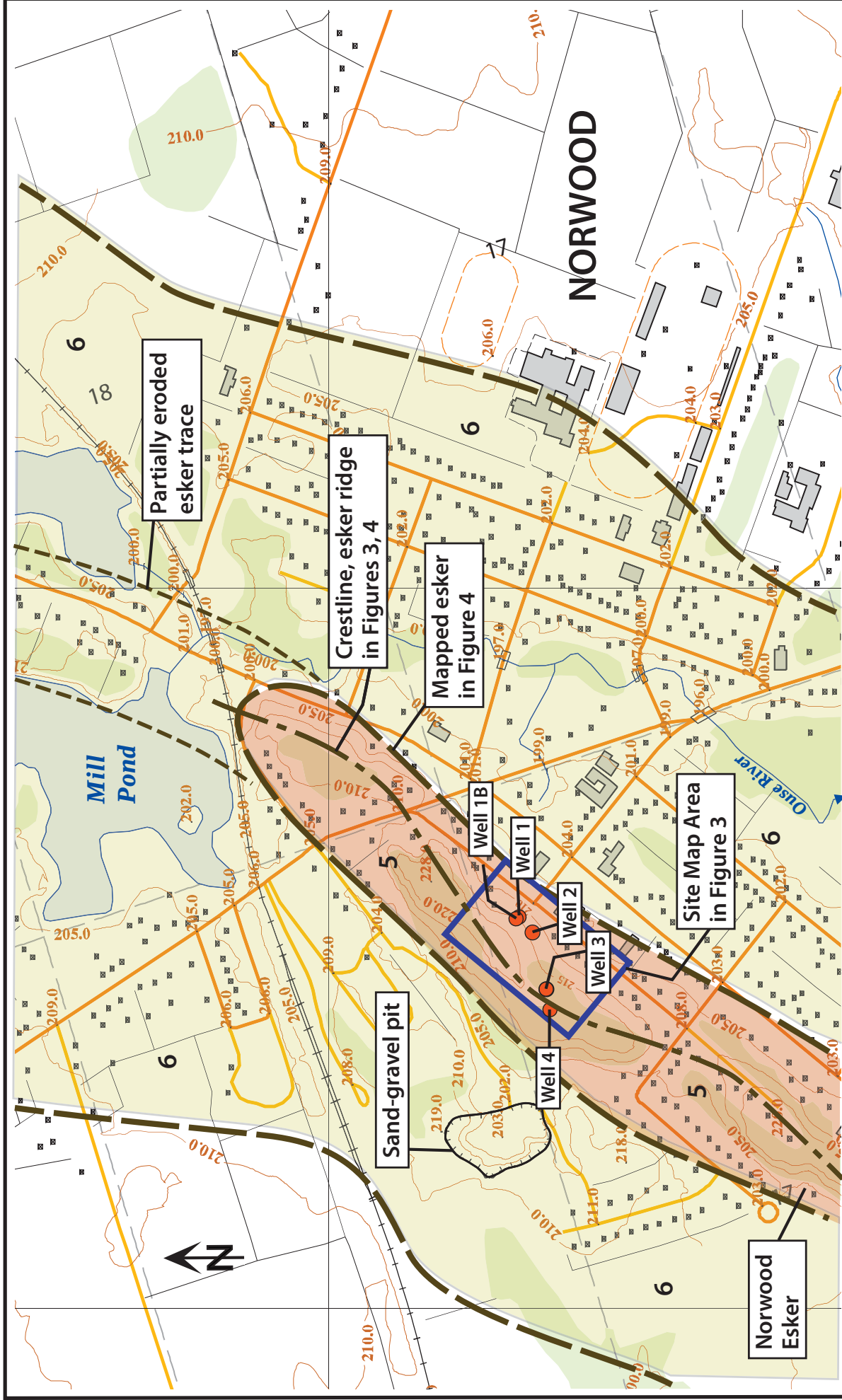


A — 215 — Cross-section line (see Figure 6) Crestline of esker ridge (see Figure 5) Topographic contour (masl) ● Overburden well ○ Bedrock well Notes: Well records are in Appendix A-1. Well details are summarized in Table 1. Map details from D. M. Wills Associates Limited. Topographic contours are approximate, traced from OBM in Figure 2.		tedrannie hydrogeologist MSc PGeo 647.528.5511 ted@knowyourground.com HYDROGEOLOGY REVIEW MUNICIPAL GROUNDWATER SUPPLY NORWOOD, ONTARIO	Sketch Map of Site FIGURE 3
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- 
 - Glaciofluvial esker deposit: gravel, sand
 - Glaciofluvial outwash deposit: sand, gravel
- 8 Glaciolacustrine sand, silt
 - 3, 4 Till

Geology from Leyland and Mihychuk, 1984.

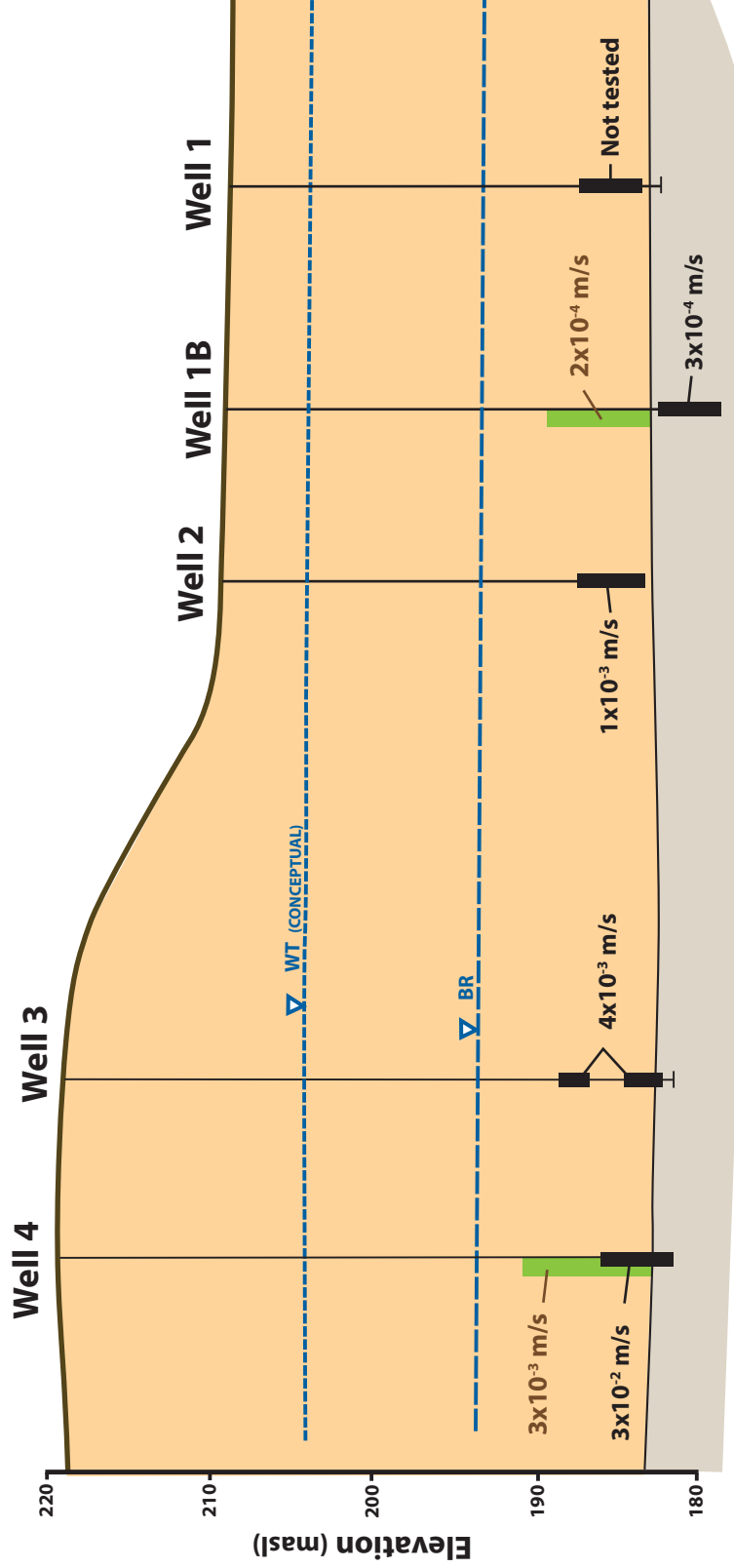


Geology from Leyland and Mihychuk, 1984 (Figure 4).

A
Southwest

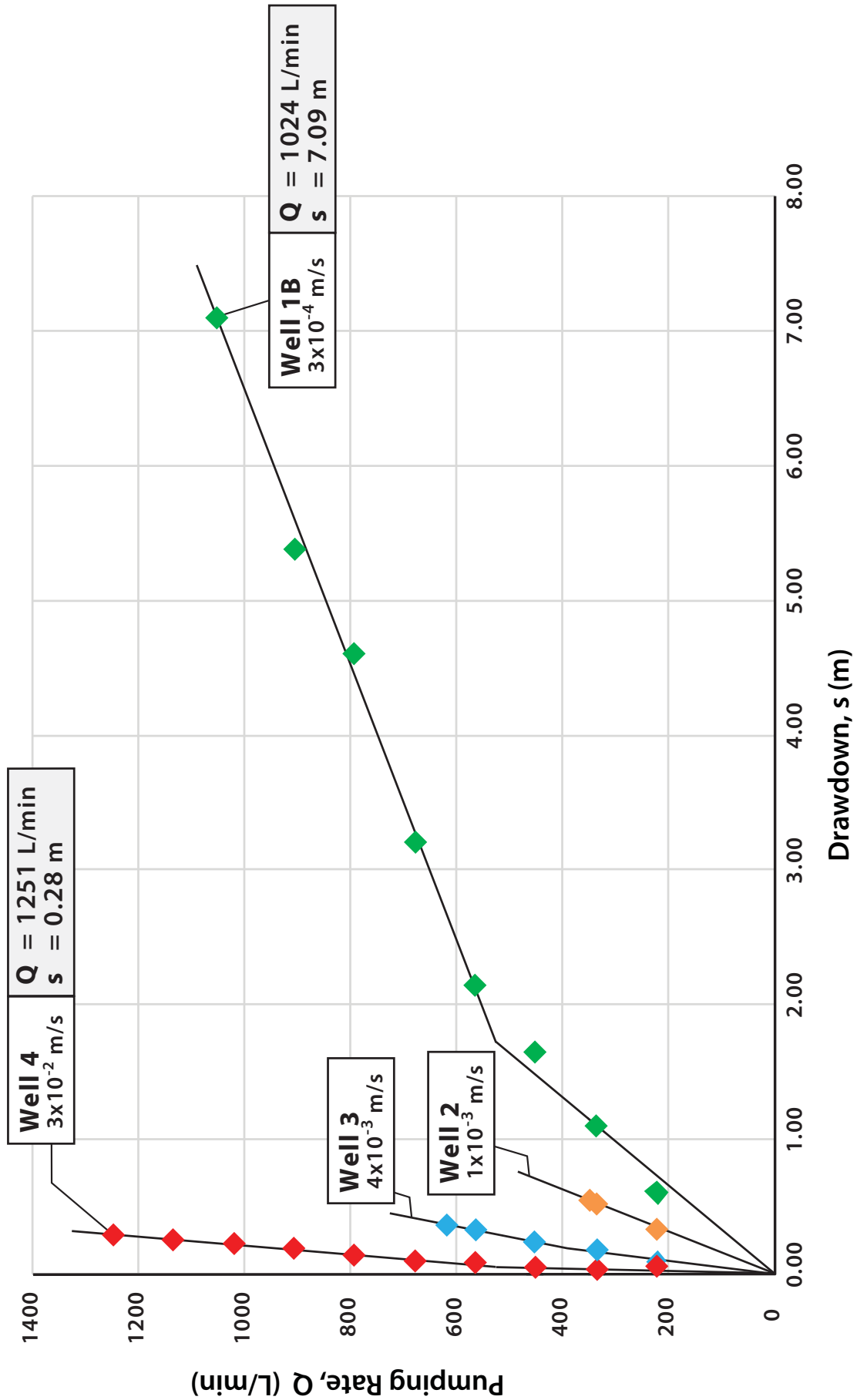
A'
Northeast

Approximate crestline of esker ridge



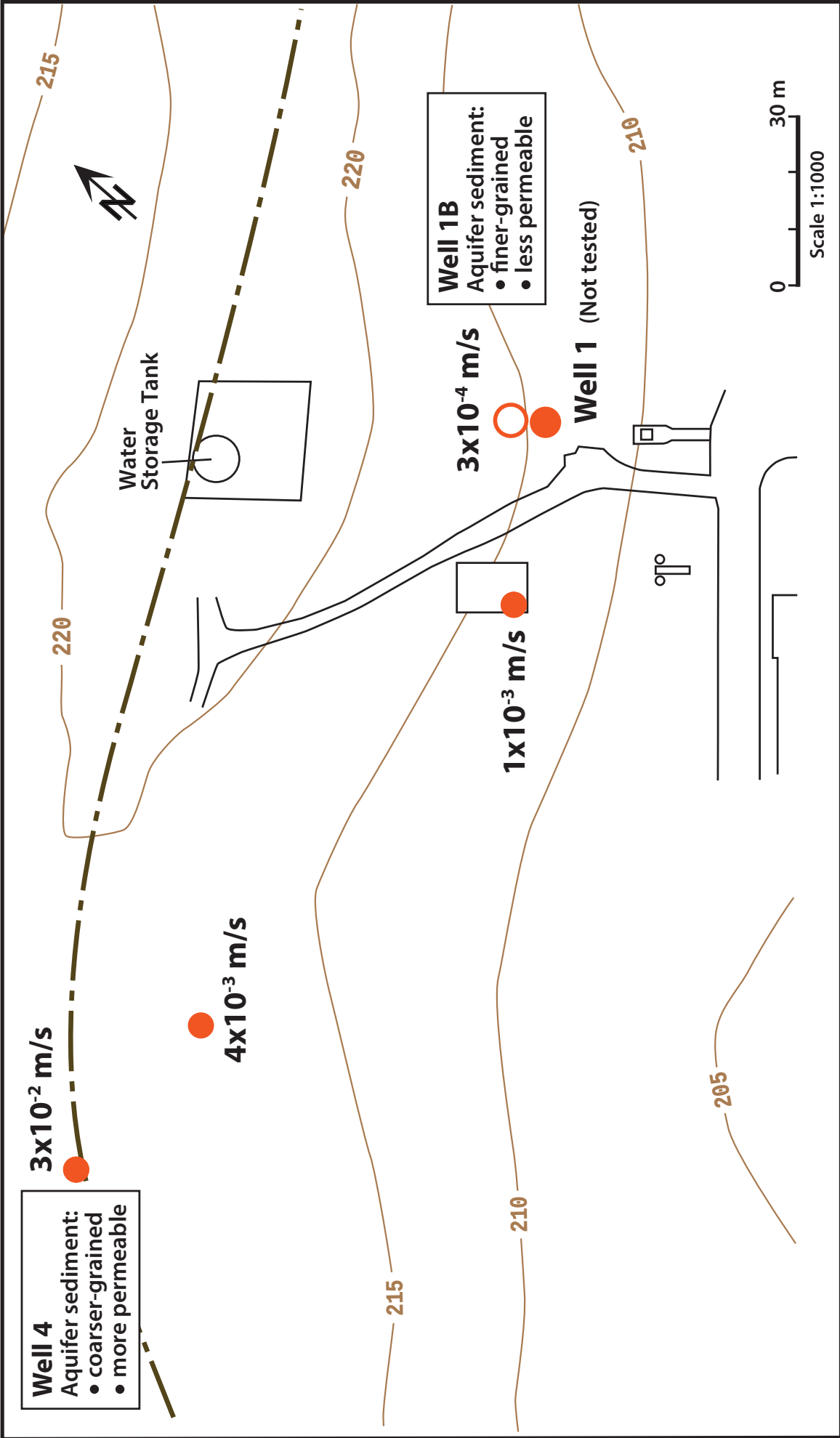
- Esker sediments: gravel, sand
- Bedrock: limestone
- Sampled sediment interval
- 4×10^{-3} m/s In-situ K, step test
- 3×10^{-3} m/s Lab K, grain-size analysis
- Well with intake interval
- Water table (conceptual)
- Piezometric surface, bedrock

Notes:
Cross-section line shown in Figure 3.
Section based on regional mapping and on-site drilling data.
Piezometric surface in basal gravel/upper bedrock based on manual water levels (Table 3).
No water levels measured at water table.
Grain-size data of sampled interval are in Table 2.



◆ Field data point

Notes:
 Test dates: December 2017 and February 2018.
 Analytical plots of individual wells are in Appendix B.



Overburden well Bedrock well 3x10⁻² m/s K value from step pumping test	Notes: Grain-size analyses and data are in Appendix A-3 and Table 2. K values from step tests are summarized in Table 4.	HYDROGEOLOGY REVIEW MUNICIPAL GROUNDWATER SUPPLY NORWOOD, ONTARIO	FIGURE 8
tedrannie hydrogeologist	MSc PGeo 647.528.5511 ted@knowyourground.com	Step Test K Values and Basal Gravel Grain Size Data	

TABLES

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Well	Date Drilled	UTM Coordinates		Well Type	Elevation (masl)		Casing Stickup (m)	Well Depth (mbgs)	Top of Bedrock		Casing Depth (mbgs)	Well Intake			
		Easting	Northing		Ground	TOC			Depth (mbgs)	Elevation (masl)		Depth (mbgs)	Top	Bottom	Length L (m)
Well 4	22-Dec-17	262383	4918678	OB	218.5	219.34	0.84	30.5	29.3	189.2	26.8	30.5	191.7	188.0	3.7
Well 1B	21-Dec-17	262535	4918737	BR	210.5	211.52	1.02	25.0	21.2	189.3	21.6	25.0	188.9	185.5	3.4
Well 3	3-May-93	262418	4918684	OB	218.5	218.00	NA	30.5	29.6	188.9	24.7	30.5	193.8	188.0	3.4*
Well 2	Apr-72	262509	4918709	OB	210.7	211.51	0.81	22.3	-	-	18.0	21.3	192.7	189.4	3.3
Well 1	Apr-72	262536	4918730	OB	210.2	211.00	0.80	20.9	-	-	17.7	20.7	192.5	189.5	3.0

Notes:

Ground elevations estimated from site and grading plan

UTM coordinates are NAD83

* Intake consists of 2 screens with total length of 3.4 m. See Figure 6.

BR = Bedrock
OB = Overburden
TOC = Top of casing
mbgs = metres below ground surface
mbtoc = metres below top of casing

Well	Sample No.	Sampled Interval				Hydraulic Conductivity K (m/s)		
		Depth (ft)		Depth (m)		Geological Material	d10 (mm)	Geo mean K
		Top	Bottom	Top	Bottom			
Well 4	1	75	79	22.9	24.1	Gravelly sand	0.58	3.E-03
	2	79	84	24.1	25.6	Gravelly sand	0.45	2.E-03
	3	84	86	25.6	26.2	Gravelly sand	0.60	4.E-03
	4	86	89	26.2	27.1	Sand and gravel	0.45	2.E-03
	5	89	92	27.1	28.0	Sand and gravel	0.40	2.E-03
	6	92	95	28.0	29.0	Sand and gravel	0.42	2.E-03
	7	95	95.5	29.0	29.1	Sand and gravel	1.50	2.E-02
	8	95.5	98	29.1	29.9	Gravelly sand	0.36	1.E-03
Sampled interval: depth 22.9 - 29.9 m, thickness 7.0 m								

Well	Sample No.	Sampled Interval				Hydraulic Conductivity K (m/s)		
		Depth (ft)		Depth (m)		Geological Material	d10 (mm)	Geo mean K
		Top	Bottom	Top	Bottom			
Well 1B	1	53	58	16.2	17.7	Sand, trace gravel, trace silt	0.14	2.E-04
	2	58	61	17.7	18.6	Sand, trace gravel, trace silt	0.14	2.E-04
	3	61	63	18.6	19.2	Gravelly sand, trace silt	0.12	1.E-04
	4	63	66	19.2	20.1	Gravelly sand, trace silt	0.15	2.E-04
	5	66	67.5	20.1	20.6	Gravelly sand, trace silt	0.14	2.E-04
	6	67.5	69	20.6	21.0	Gravelly sand, trace silt	0.12	1.E-04
	7	69	70	21.0	21.3	Sand, trace gravel, trace silt	0.10	1.E-04
Sampled interval: depth 16.2 - 21.3 m, thickness 5.1 m								

Notes:

Samples collected during drilling by G. Hart & Sons Well Drilling Ltd.

Grain-size curves provided by D. M. Wills Associates Limited (Appendix A-3).

K = Hydraulic conductivity (m/s)

* = K estimated using the Hazen correlation

Geo mean = Geometric mean

Well	Well Type	Elevation (masl)		Well Depth (mbgs)	Static Water Level				Available Drawdown (m)
		Ground	TOC		Depth (mbtoc)		Elevation (masl)		
					Testing	21-Jun-18	Testing	21-Jun-18	
Well 4	OB-BR	218.5	219.34	30.5	21.49	21.50	197.85	197.84	9.0
Well 1B	BR	210.5	211.52	25.0	14.60	14.22	196.92	197.30	10.4
Well 3	OB	218.5	218.00	30.5	21.12	8.29	196.88	209.71	9.4
Well 2	OB	210.7	211.51	22.3	14.33	14.32	197.18	197.19	8.0
Well 1	OB	210.2	211.00	20.9	-	9.84	-	201.16	11.1

Notes:

Water level data provided by D. M. Wills Associates Limited
Testing = Water levels measured during step tests

OB = Overburden
BR = Bedrock
masl = metres above sea level
mbgs = metres below ground surface
mbtoc = metres below top of casing

Appendix	Well	Test Date	Well Depth (mbgs)	Intake Length L (m)	Borehole Radius R _w (m)	Field Test Data				Hydraulic Conductivity K (m/s)	Screened Geological Material
						SWL (mbtoc)	Flow Rate Q (L/min)	Water Level (mbtoc)	Drawdown s (m)		
B-1	Well 4	22-Dec-17	30.5	3.7	0.10	21.49	228	21.54	0.05	3.E-02	Limestone / Sandy gravel
							341	21.52	0.03		
							455	21.53	0.04		
							569	21.56	0.07		
							683	21.58	0.09		
B-2	Well 3	7-Feb-18	21.6	3.4	0.10	21.12	796	21.62	0.13	4.E-03	Sandy gravel
							910	21.67	0.18		
							1024	21.70	0.21		
							1138	21.73	0.24		
							1251	21.77	0.28		
B-3	Well 2	7-Feb-18	21.2	3.3	0.10	14.33	228	14.64	0.31	1.E-03	Sandy gravel
							341	14.83	0.50		
							354	14.86	0.53		
							228	15.19	0.59		
							341	16.24	1.64		
B-4	Well 1B	22-Dec-17	25.0	3.4	0.10	14.60	455	17.79	3.19	3.E-04	Limestone
							569	19.97	5.37		
							683	15.69	1.09		
							796	16.73	2.13		
							910	19.19	4.59		
							1024	21.69	7.09		

Notes:

SWL = Static water level
masl = metres above sea level
mbgs = metres below ground surface
mbtoc = metres below top of casing

Data analysed using method of Hvorslev (1951).
Analytical plots and original data are in Appendix B-5.

APPENDIX A:

GEOLOGICAL DATA
(D.M. Wills Associates Limited)

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APPENDIX A-1:

Driller's Records of Municipal Wells

(D. M. Wills Associates Limited)

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hydrogeologist	ted@knowyourground.com	

Well Records: Well 1 and Well 2
(Wilson, 1994)

2.0 WELL CONSTRUCTION

[illegible]

2.1 Well 1:

Color	wt.	100 g of	Color	wt.	100 g of
Black	0	0.3	Black	0	0.3
Dark grey	0.3	4.5	Dark grey	0.3	4.5
Grey	4.5	15.2	Grey	4.5	15.2
Light grey	15.2	16.5	Light grey	15.2	16.5
White	16.5	17.1	White	16.5	17.1
Yellow	17.1	17.4	Yellow	17.1	17.4
Orange	17.4	18.0	Orange	17.4	18.0
Red	18.0	20.7	Red	18.0	20.7
Pink	20.7	21.3	Pink	20.7	21.3
Light blue	21.3	21.9	Light blue	21.3	21.9
Dark blue	21.9	22.9	Dark blue	21.9	22.9

Casting Director:

項目	金額	金額	金額
一、營業收入	100,000,000	100,000,000	100,000,000
二、營業成本	80,000,000	80,000,000	80,000,000
三、營業利潤	20,000,000	20,000,000	20,000,000
四、營業外收入	10,000,000	10,000,000	10,000,000
五、營業外支出	5,000,000	5,000,000	5,000,000
六、營業外淨收入	5,000,000	5,000,000	5,000,000
七、營業利潤	25,000,000	25,000,000	25,000,000
八、營業外收入	10,000,000	10,000,000	10,000,000
九、營業外支出	5,000,000	5,000,000	5,000,000
十、營業外淨收入	5,000,000	5,000,000	5,000,000
十一、營業利潤	30,000,000	30,000,000	30,000,000
十二、營業外收入	10,000,000	10,000,000	10,000,000
十三、營業外支出	5,000,000	5,000,000	5,000,000
十四、營業外淨收入	5,000,000	5,000,000	5,000,000
十五、營業利潤	35,000,000	35,000,000	35,000,000
十六、營業外收入	10,000,000	10,000,000	10,000,000
十七、營業外支出	5,000,000	5,000,000	5,000,000
十八、營業外淨收入	5,000,000	5,000,000	5,000,000
十九、營業利潤	40,000,000	40,000,000	40,000,000
二十、營業外收入	10,000,000	10,000,000	10,000,000
二十一、營業外支出	5,000,000	5,000,000	5,000,000
二十二、營業外淨收入	5,000,000	5,000,000	5,000,000
二十三、營業利潤	45,000,000	45,000,000	45,000,000
二十四、營業外收入	10,000,000	10,000,000	10,000,000
二十五、營業外支出	5,000,000	5,000,000	5,000,000
二十六、營業外淨收入	5,000,000	5,000,000	5,000,000
二十七、營業利潤	50,000,000	50,000,000	50,000,000
二十八、營業外收入	10,000,000	10,000,000	10,000,000
二十九、營業外支出	5,000,000	5,000,000	5,000,000
三十、營業外淨收入	5,000,000	5,000,000	5,000,000
三十一、營業利潤	55,000,000	55,000,000	55,000,000
三十二、營業外收入	10,000,000	10,000,000	10,000,000
三十三、營業外支出	5,000,000	5,000,000	5,000,000
三十四、營業外淨收入	5,000,000	5,000,000	5,000,000
三十五、營業利潤	60,000,000	60,000,000	60,000,000
三十六、營業外收入	10,000,000	10,000,000	10,000,000
三十七、營業外支出	5,000,000	5,000,000	5,000,000
三十八、營業外淨收入	5,000,000	5,000,000	5,000,000
三十九、營業利潤	65,000,000	65,000,000	65,000,000
四十、營業外收入	10,000,000	10,000,000	10,000,000
四十一、營業外支出	5,000,000	5,000,000	5,000,000
四十二、營業外淨收入	5,000,000	5,000,000	5,000,000
四十三、營業利潤	70,000,000	70,000,000	70,000,000
四十四、營業外收入	10,000,000	10,000,000	10,000,000
四十五、營業外支出	5,000,000	5,000,000	5,000,000
四十六、營業外淨收入	5,000,000	5,000,000	5,000,000
四十七、營業利潤	75,000,000	75,000,000	75,000,000
四十八、營業外收入	10,000,000	10,000,000	10,000,000
四十九、營業外支出	5,000,000	5,000,000	5,000,000
五十、營業外淨收入	5,000,000	5,000,000	5,000,000
五十一、營業利潤	80,000,000	80,000,000	80,000,000
五十二、營業外收入	10,000,000	10,000,000	10,000,000
五十三、營業外支出	5,000,000	5,000,000	5,000,000
五十四、營業外淨收入	5,000,000	5,000,000	5,000,000
五十五、營業利潤	85,000,000	85,000,000	85,000,000
五十六、營業外收入	10,000,000	10,000,000	10,000,000
五十七、營業外支出	5,000,000	5,000,000	5,000,000
五十八、營業外淨收入	5,000,000	5,000,000	5,000,000
五十九、營業利潤	90,000,000	90,000,000	90,000,000
六十、營業外收入	10,000,000	10,000,000	10,000,000
六十一、營業外支出	5,000,000	5,000,000	5,000,000
六十二、營業外淨收入	5,000,000	5,000,000	5,000,000
六十三、營業利潤			

Well Screen Record:

Year	Production	Consumption	Stock
1950	100	100	0
1951	100	100	0
1952	100	100	0
1953	100	100	0
1954	100	100	0
1955	100	100	0
1956	100	100	0
1957	100	100	0
1958	100	100	0
1959	100	100	0
1960	100	100	0
1961	100	100	0
1962	100	100	0
1963	100	100	0
1964	100	100	0
1965	100	100	0
1966	100	100	0
1967	100	100	0
1968	100	100	0
1969	100	100	0
1970	100	100	0
1971	100	100	0
1972	100	100	0
1973	100	100	0
1974	100	100	0
1975	100	100	0
1976	100	100	0
1977	100	100	0
1978	100	100	0
1979	100	100	0
1980	100	100	0
1981	100	100	0
1982	100	100	0
1983	100	100	0
1984	100	100	0
1985	100	100	0
1986	100	100	0
1987	100	100	0
1988	100	100	0
1989	100	100	0
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1991	100	100	0
1992	100	100	0
1993	100	100	0
1994	100	100	0
1995	100	100	0
1996	100	100	0
1997	100	100	0
1998	100	100	0
1999	100	100	0
2000	100	100	0
2001	100	100	0
2002	100	100	0
2003	100	100	0
2004	100	100	0
2005	100	100	0
2006	100	100	0
2007	100	100	0
2008	100	100	0
2009	100	100	0
2010	100	100	0
2011	100	100	0
2012	100	100	0
2013	100	100	0
2014	100	100	0
2015	100	100	0
2016	100	100	0
2017	100	100	0
2018	100	100	0
2019	100	100	0
2020	100	100	0
2021	100	100	0
2022	100	100	0
2023	100	100	0
2024	100	100	0
2025	100	100	0
2026	100	100	0
2027	100	100	0
2028	100	100	0
2029	100	100	0
2030	100	100	0
2031	100	100	0
2032	100	100	0
2033	100	100	0
2034	100	100	0
2035	100	100	0
2036	100	100	0
2037	100	100	0
2038	100	100	0
2039	100	100	0
2040	100	100	0
2041	100	100	0
2042	100	100	0
2043	100	100	0
2044	100	100	0
2045	100	100	0
2046	100	100	0
2047	100	100	0
2048	100	100	0
2049	100	100	0
2050	100	100	0
2051	100	100	0
2052	100	100	0
2053	100	100	0
2054	100	100	0
2055	100	100	0
2056	100	100	0
2057	100	100	0
2058	100	100	0
2059	100	100	0
2060	100	100	0
2061	100	100	0
2062	100	100	0
2063	100	100	0
2064	100	100	0
2065	100	100	0
2066	100	100	0
2067	100	100	0
2068	100	100	0
2069	100	100	0
2070	100	100	0
2071	100	100	0
2072	100	100	0
2073	100	100	0
2074	100	100	0
2075	100	100	0
2076	100	100	0
2077	100	100	0
2078	100	100	0
2079	100	100	0
2080	100	100	0
2081	100	100	0
2082	100	100	0
2083	100	100	0
2084	100	100	0
2085	100	100	0
2086	100	100	0
2087	100	100	0
2088	100	100	0
2089	100	100	0
2090	100	100	0
2091	100	100	0
2092	100	100	0
2093	100	100	0
2094	100	100	0
2095	100	100	0
2096	100	100	0
2097	100	100	0
2098	100	100	0
2099	100	100	0
2100	100	100	0

2-2 Well 2 - Test Well:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

11	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

[illegible]

5

[illegible]

Casing Record:

[illegible]

Well Screen Records:

[illegible]

2.3 Well 3:

[illegible]

Using Reel:

Depth:	2.10 cm D.D., 20.6 cm I.D.
Height:	0.46 m
Length:	24.65 m
Setting:	ground level to 24.65 m below ground level
Material:	steel

Well Screen Record:

[illegible]

3.0 WELL TESTING

[illegible]

COUNTY OR DISTRICT	TOWNSHIP, BUROUGH, CITY, TOWN, VILLAGE	LDN. BLOCK (incl. JURISD. ETC.)	LOT
Peterborough	ASPHODEL (Town of Norwood)	Conc. 88 08	17/18
OWNER (SURNAME FIRST)	ADDRESS	DATE FILED	
Village of Norwood; PUC	78 Colborne Street, Norwood, Ontario K0L 2V0	REV. 03 NO. 05 93	

WELL 3

PUMPING TEST	PUMPING TEST METHOD		PUMPING RATE		DURATION OF PUMPING	
	☒ PUMP	☐ SILEX	100 gpm		24	00
	STATIC LEVEL	WATER LEVEL CASE OR PUMPING	WATER LEVEL DURING		☒ PUMPING	☐ RECOVERY
			15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
	69' 5"	70' 0"	69' 11"	69' 11"	70' 0"	70' 9"
IF FLOODING, GPM RATE		PUMP INTAKE SET AT		WATER AT END OF TEST		
		92		☒ CLEAR ☐ CLOUDY		
RECOMMENDED PUMP TYPE		RECOMMENDED PUMP SETTING		FLOW/DESIGNED PUMPING RATE		
☐ SHALLOW ☒ DEEP		92		100 gpm		

FINAL STATUS OF WELL	☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL	☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED POOR QUALITY ☐ UNFINISHED ☐ DRAINAGING
WATER USE	☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER _____	☐ COMMERCIAL ☒ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED
METHOD OF CONSTRUCTION	☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PENNUSION	☐ WORMS ☐ DIAMOND ☐ JETTING ☐ OVERSIL ☐ DIGGING ☐ OTHER _____

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCE OF WELL FROM ROAD AND LOT LINE

INDICATE NORTH BY ARROW

NEW WELL

PUMP HOUSE

WATER TOWER

TOWN OF NORWOOD

PT 80

134169

CONTRACTOR	NAME OF WELL CONTRACTOR		WELL CONTRACTOR'S LICENSE NUMBER	
	FAULKNER WELL DRILLING CO. LTD.		2104	
	ADDRESS			
	789 Erskine Avenue, Peterborough		K9J 5V1	
	NAME OF WELL TECHNICIAN		WELL TECHNICIAN'S LICENSE NUMBER	
	Don Miller		T-014	
	SIGNATURE OF CONTRACTOR/CONTRACTOR		EXPIRATION DATE	
	<i>Don Miller</i>		31 05 93	

[illegible]

CONTRACTOR'S COPY Village - Roy Millett

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address		☐ Well Constructed by Well Owner	
	TWP of Asphodel-Norwood				
Mailing Address (Street Number/Name)		Municipality	Province	Postal Code	Telephone No. (inc. area code)
2357 County Rd. 45, Box 29		Norwood	ON	K0L 2V0	

Well Location

Address of Well Location (Street Number/Name) Ridge St./County Rd.40				Township Asphodel/Norwood		Lot 17		Concession 8	
County/District/Municipality Peterborough				City/Town/Village Norwood		Province Ontario		Postal Code K9L 2Y0	
UTM Coordinates: Zone		Easting		Northing		Municipal Plan and Sublot Number		Other TW17-01	
NAD 83 18		26 2 38 3		491 8 67 8				(Well)	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth From	To
Gray	Gravel		fill	0	1
Black	Topsoil			1	2
Brown	Silty sand & gravel	some cobbles		2	11
Gray	Gravel	some sand, cobbles	& boulders waterbearing at 75 ft.	11	96
Gray	Limestone			96	101
		* Finished Depth	100 ft.		

* Finished Depth 100 ft.

Annular Space

Depth Set at From	To	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
0	1.5	Bentonite chips	
1.5	21	Neat Cement	

Method of Construction

☐ Cable Tool	☐ Diamond	☒ Public	☐ Commercial	☐ Not used
☐ Rotary (Conventional)	☐ Jelling	☒ Domestic	☐ Municipal	☐ Dewatering
☐ Rotary (Reverse)	☐ Drilling	☐ Unservice	☐ Test Hole	☐ Monitoring
☐ Boring	☐ Digging	☐ Irrigation	☐ Cooling & Air Conditioning	
☐ Air percussion		☐ Industrial		
☒ Other, specify <i>dual Rotary</i>		☐ Other, specify		

Construction Record - Casing

Inside Diameter <i>(inches)</i>	Open Hole OR Material (Galvanized, Fiberglass, Concrete, Plastic, Steel)	Well Thickness <i>(inches)</i>	Depth		
			From	To	
8"	Steel	0.322	+3	88	

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Reconnaissance Well
☐ Deviating Well
☐ Observation and/or Monitoring Hole
☐ Abandonment (Construction)
☐ Abandoned

Construction Record - Screen

Outside Diameter (mm)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (mm)	
			From	To
8"	S. Steel	zero	85	88
8"	S. Steel	50	88	100

Water Details

Water found at Depth 75-96 ft	Kind of Water: ☒ Fresh ☒ Untested ☐ Gas ☐ Other, specify	Depth From	To	Diameter (inches)
Water found at Depth 97 ft	Kind of Water: ☒ Fresh ☒ Untested ☐ Gas ☐ Other, specify	0	21	13"
Water found at Depth 98 ft	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	21	101	8"

Well Contractor and Well Technician Information

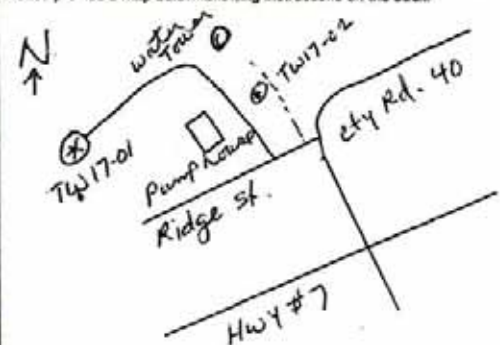
Business Name of Well Contractor		Well Contractor's Licence No.	
G.Hart & Sons Well Drilling Ltd.		2662	
Business Address (Street Number/Name)		Municipality	
Box 850 142 County Rd 8		Fenelon Falls	
Province	Postal Code	Business E-mail Address	
ON	K0M 1N0	ghart@ghart.ca	
Bus. Telephone No. (inc. area code)		Name of Well Technician (Last Name, First Name)	
705 887-3331		Watson Bryan	
Well Technician's Licence No.		Signature of Technician and/or Contractor Date Submitted	
T-2441		 _____	

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify _____	Draw Down		Recovery	
	Time (min)	Water Level (mft)	Time (min)	Water Level (mft)
If pumping discontinued, give reason:	Static Level			
	1	XX	1	
Pump intake set at (mft)	2	Refer to	2	
Pumping rate (l/min / GPM)	3	Attached	3	
	4		4	
Duration of pumping hrs + _____ min	5		5	
Final water level end of pumping (mft)	10		10	
	15		15	
If flowing give rate (l/min / GPM)	20		20	
Recommended pump depth (mft)	25		25	
Recommended pump rate (l/min / GPM)	30		30	
	40		40	
Well production (l/min / GPM)	50		50	
Disinfected? ☐ Yes ☐ No	60		60	

Map of Well Location

Please provide a map below following instructions on the back



Comments

*making approx 100gpm with rig

Well owner's information package delivered ☐ Yes ☐ No	Date Package Delivered Y Y Y Y M M D D 2017 12 22	Ministry Use Only Audit No. 277156
	Date Work Completed 2017 12 22	



Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	TWP of Asphodel-Norwood		
Mailing Address (Street Number/Name)	Municipality	Province	Postal Code
2357 County Rd. 45, Box 29	Norwood	ON	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Ridge St./County Rd. 40	Asphodel/Norwood	17	8
County/District/Municipality	City/Town/Village	Province	Postal Code
Peterborough	Norwood	Ontario	K9L 2V9
UTM Coordinates Zone Easting Northing	Municipal Plan and Sublot Number	Other	
NAD 83 18 2 62 5 35 49 1 87 37		TW17-02	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m)
Brown	Silty sand & gravel	some cobbles		0 2
Brown	Gravel & cobbles	some silty sand		2 53
Brown	Sand, gravel & cobbles			53 63
Brown	Gravel, cobbles & sand	water bearing		63 67
Gray	Cobbles & boulders	some sand & gravel	water bearing	67 69
Gray	Limestone			69 82

Water Found

cased to bedrock

Annular Space			Results of Well Yield Testing			
Depth Set at (m)	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)	After test of well yield, water was:		Draw Down	
0 8	Bentonite chips		☒ Clear and sand free	Time (min)	Water Level (m)	Recovery
8 21	Neat cement		☐ Other, specify	Static Level	Time (min)	Water Level (m)
			If pumping discontinued, give reason:	1 Refer	1 To	
			Pump intake set at (m)	2 Attached		
			Pumping rate (l/min / GPM)	3	3	
			Duration of pumping	4	4	
			Final water level end of pumping (m)	5	5	
			If flowing give rate (l/min / GPM)	10	10	
			Recommended pump depth (m)	15	15	
			Recommended pump rate (l/min / GPM)	20	20	
			Well production (l/min / GPM)	25	25	
			Disinfected?	30	30	
			☐ Yes ☐ No	40	40	
				50	50	
				60	60	

Method of Construction		Well Use	
☐ Cable Tool	☐ Diamond	☒ Public	☐ Not used
☐ Rotary (Conventional)	☐ Jetting	☐ Domestic	☐ Municipal
☐ Rotary (Reverse)	☐ Driving	☐ Livestock	☐ Test Hole
☐ Boring	☐ Digging	☐ Irrigation	☐ Cooling & Air Conditioning
☐ Air percussion		☐ Industrial	
☒ Other, specify dual rotary		☐ Other, specify	

Construction Record - Casing				Status of Well	
Inside Diameter (mm)	Open Hole OR Material (Galvanized, Fiberglass, Concrete, Plastic, Steel)	Wall Thickness (mm)	Depth (m)		
8"	Steel	0.322	+3 71	☐ Water Supply	☒ Replacement Well
8"	Openhole		71 82	☐ Test Hole	☐ Recharge Well
				☐ Dewatering Well	☐ Observation and/or Monitoring Hole
				☐ Alteration (Construction)	☐ Abandoned, Insufficient Supply
				☐ Abandoned, Poor Water Quality	☐ Abandoned, other, specify
				☐ Other, specify	

Construction Record - Screen			
Outside Diameter (mm)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m)
			From To

Water Details		Hole Diameter	
Water found at Depth (m)	Kind of Water: ☒ Fresh ☒ Untested	Depth (m)	Diameter (mm)
73 - 75	☐ Gas ☐ Other, specify	0 21	13"
76 - 77	☐ Gas ☐ Other, specify	21 82	8"
Water found at Depth (m)	Kind of Water: ☐ Fresh ☐ Untested		
	☐ Gas ☐ Other, specify		

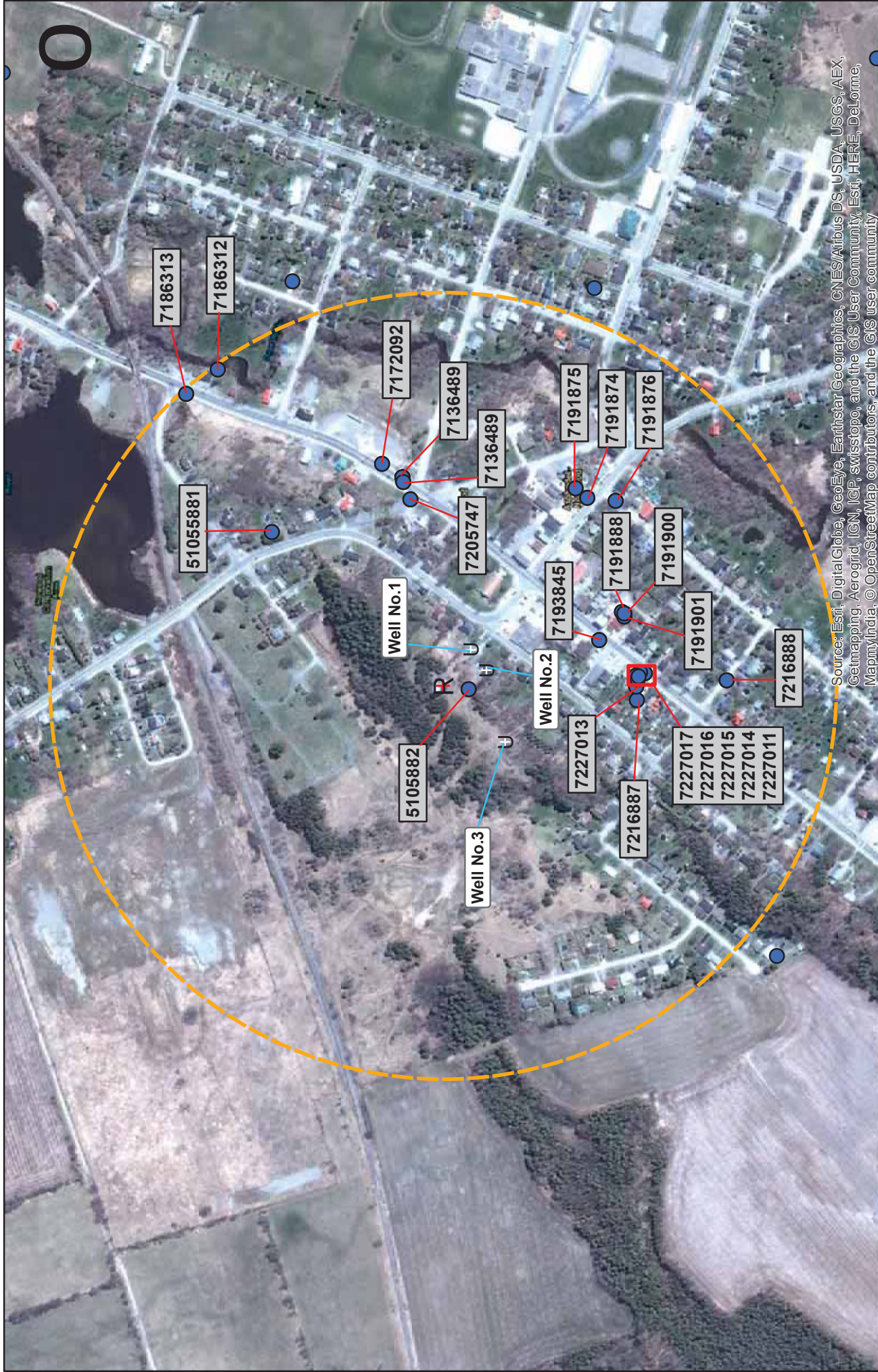
Well Contractor and Well Technician Information			
Business Name of Well Contractor		Well Contractor's Licence No.	
G.Hart & Sons Well Drilling Ltd.		2662	
Business Address (Street Number/Name)		Municipality	
Box 850, 142 County Rd 8		Fenelon Falls	
Province	Postal Code	Business E-mail Address	
ON	K0M 1N0	ghart@ghart.ca	
Bus. Telephone No. (inc. area code)		Name of Well Technician (Last Name, First Name)	
705 887-3381		Watson Bryan	
Well Technician's Licence No.		Signature of Technician and/or Contractor	
T-2441			
Date Submitted		Date Package Delivered	
		Y Y Y Y M M D D	
		Date Work Completed	
		Y Y Y Y M M D D	
		2017 12 21	
		Received	
		Ministry Use Only	
		Audit No. 277155	
		Received	

APPENDIX A-2:

MOE Well Records, Norwood

(D. M. Wills Associates Limited)

tedrannie	MSc PGeo	647.528.5511
hydrogeologist	ted@knowyourground.com	



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

MOE Well Record Plan NAD83 UTM Zone 17 North	Drawn by: K.P. Checked by:		Scale (Horz.): 1:6,500
	Engineer: P.P. Project No. 16-7128		Map Date Aug. 2016 Map File No. Figure 1
WILLS 25 YEARS STRONG			
Legend U Municipal Well Location R Norwood Standpipe ● MOE Well Record Location ○ 500m Radius from Standpipe			
D.M. Wills Associates Limited 150 Jameson Drive Peterborough, Ontario K9J 0B9 P: 705.742.2297 F: 705.741.3568 E: wills@dmwills.com			

	Status	Year	Depth	Notes
5105881	Abandoned	1972	60ft	
5105882	Test Hole	1972	70ft6"	
7136489	Monitoring	2009	8.1m	3 other MW's, nested to 3.6m, 4.2m, and 6.0m
7172092	Monitoring	2011	8.23m	3 other MW's, all to 8.23m
7186312	Monitoring/Test Hole	2012	4.57m	
7186313	Monitoring/Test Hole	2012	4.57m	
7191874	Monitoring	2012	5.2m	
7191875	Monitoring	2012	6m	
7191876	Monitoring	2012	4.5m	
7191888	Monitoring	2012	9.1m	
7191900	Monitoring	2012	15.1m	
7191901	Monitoring	2012	16.9m	
7193845	Monitoring	2012	20ft	
7205747	Monitoring	2013	4.5m	
7216887	Monitoring	2014	12ft	
7216888	Monitoring	2014	14ft	
7227011	Monitoring	2014	15ft	
7227013	Monitoring	2014	15ft	
7227014	Monitoring	2014	15ft	
7227015	Monitoring	2014	25ft	
7227016	Monitoring	2014	12ft	
7227017	Monitoring	2014	20ft	

6741 4907040

CON 13 6 51- 709041 900 11/63 2113 6 FR 145 40 130 3 4/00 D0
2338 4907007

CON 13 6 51- 709057 900 11/65 4814 6 FR 135 120 125 7 4/00 D0
2337 4907014

CON 13 6 51- 709063 900 02/62 2113 6 FR 111 60 90 5 3/00 ST D0
2370 4906447

CON 13 6 51- 709121 900 07/65 2104 6 FR 153 110 133 8 6/00 D0
2345 4907057

CON 13 8 51- 709879 915 07/60 4713 6 FR 111 80 100 7 2/00 D0
2358 4907463

CON 13 10 51- 711414 715 07/61 2113 6 FR 110 23 134 3/00 D0
2333 4907872

CON 13 11 51- 711073 830 10/61 4713 6 FR 99 32 116 3 2/00 D0
2496 4909169

NORWOOD VILLAGE

51- 10/46 2116 6 FR 51 10 20 17 3/00 D0
2506 11/46 2116 6 FR 32 10 15 17 2/00 D0
2507 07/52 3121 5 SU 88 30 D0
51- 2508 675 04/72 2801 2 FR 56 40 D0
51- 262450
5882 4918510

WELL 2
(Test Well)

51- 675 04/72 2801 DRY
5881 4918760

WELL 1

51- 660 10/49 2801 10 FR 44 46 104 MU
2505 4918350

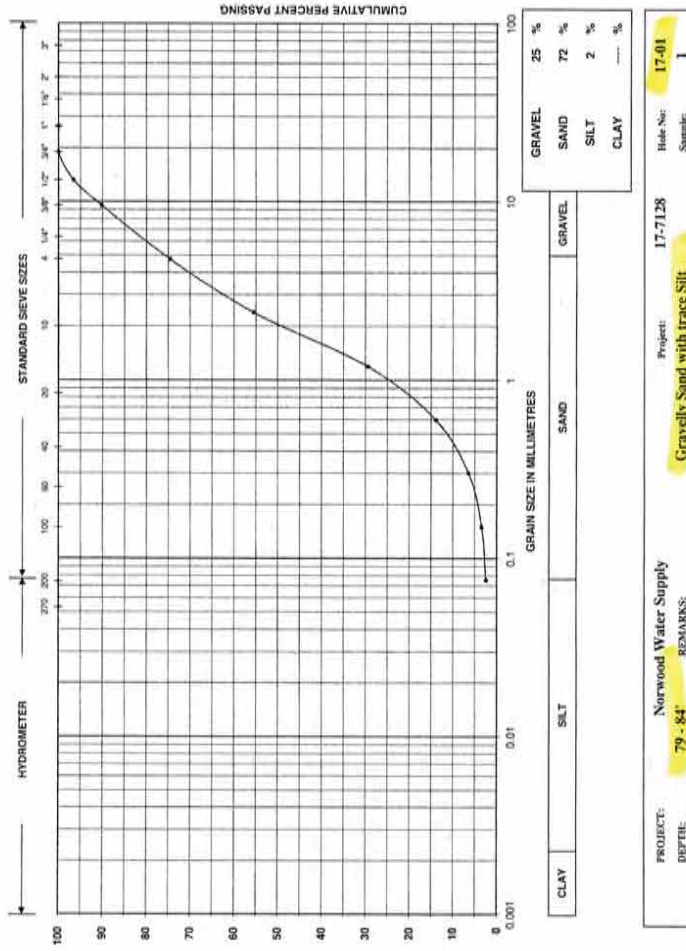
OTONABEE TOWNSHIP

51- 721906 725 11/74 5102 6 FR 80 18 80 4 1/45 D0
7223 4892935

APPENDIX A-3:

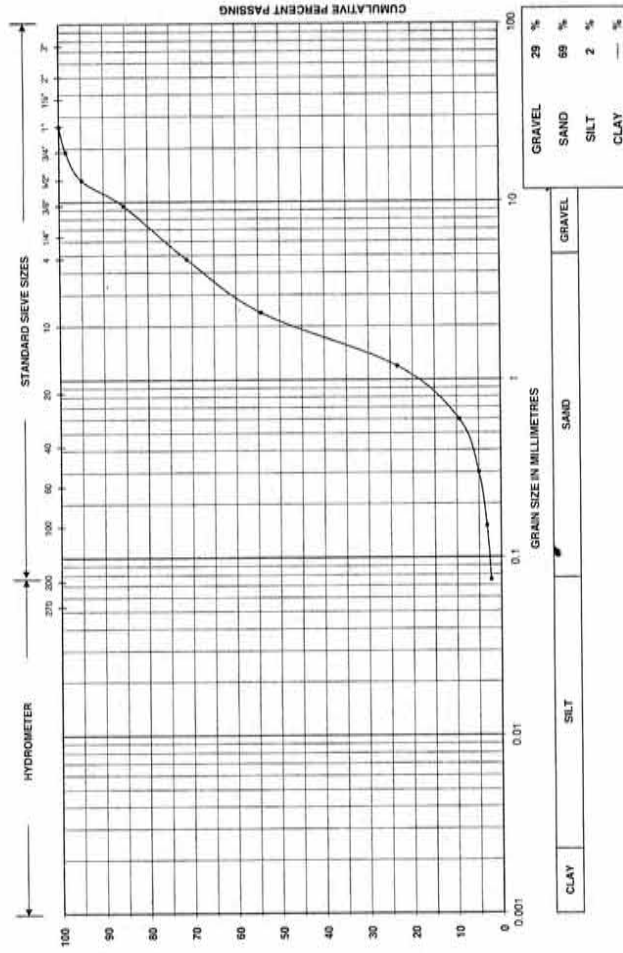
Grain-Size Analyses of Basal Gravel Sediments
Well 4 and Well 1B
(D. M. Wills Associates Limited)

PARTICLE SIZE DISTRIBUTION



APPENDIX A-3.1a: Grain-Size Analyses Well 4
Depth: 75-84 ft (22.9-25.6 m) Description: Gravelly sand

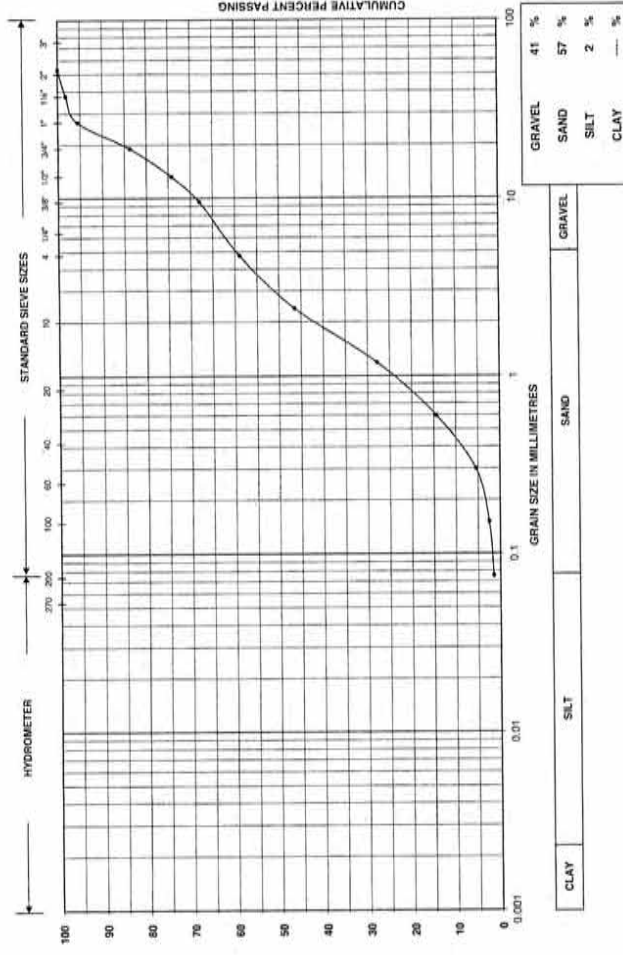
PARTICLE SIZE DISTRIBUTION



PROJECT: Norwood Water Supply
DEPTH: 84 - 86
REMARKS: Gravelly Sand with trace Silt

17-01
Hole No: 17-01
Sample: 1

PARTICLE SIZE DISTRIBUTION



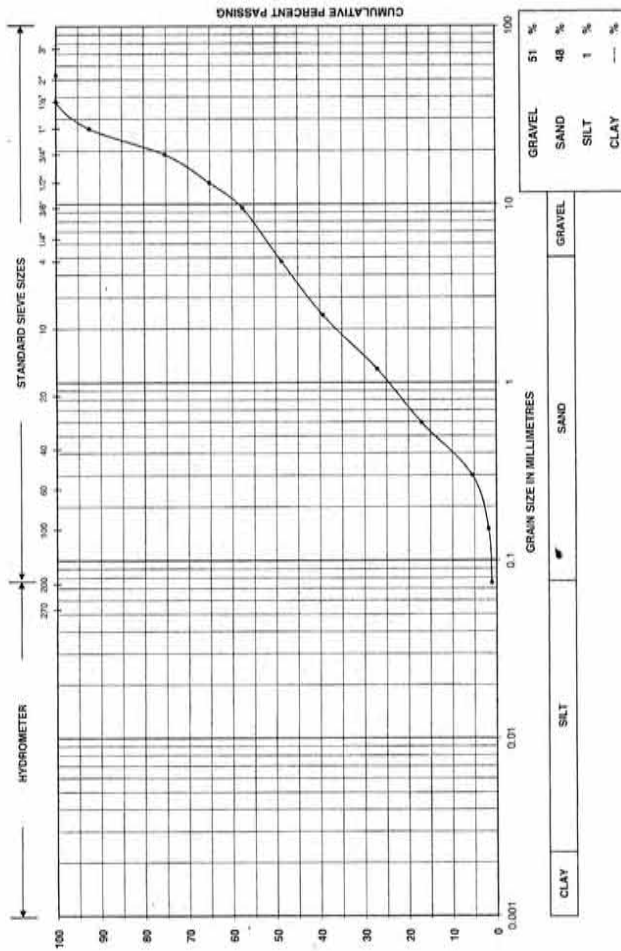
PROJECT: Norwood Water Supply
DEPTH: 86 - 89
REMARKS: Sand and Gravel with trace Silt

17-01
Hole No: 17-01
Sample: 1

APPENDIX A-3.1b: Grain-Size Analyses Well 4

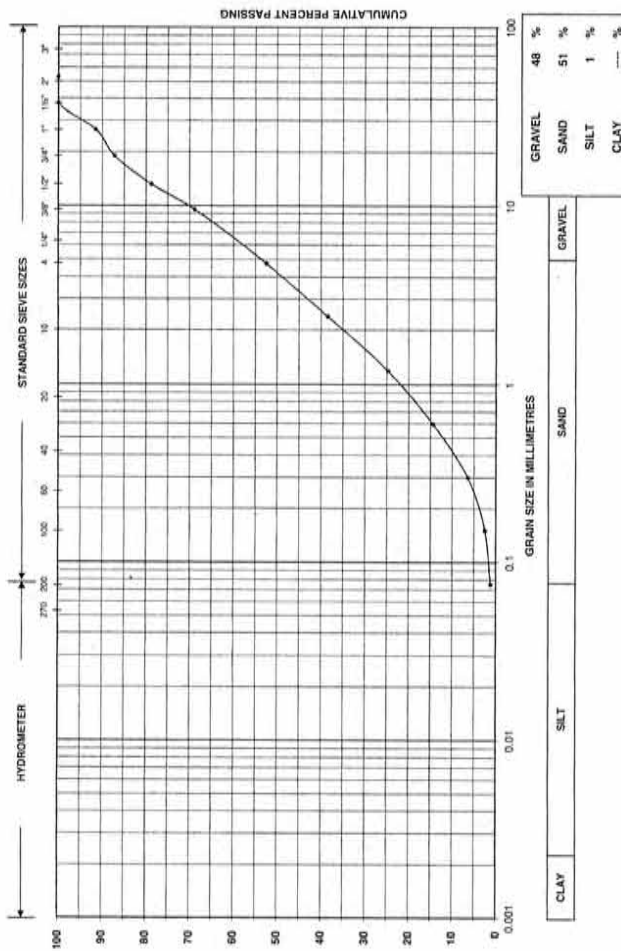
Depth: 84-89 ft (25.6-27.1 m) Description: Gravelly sand

PARTICLE SIZE DISTRIBUTION



PROJECT:	Norwood Water Supply	Project:	17-7128	Hole No:	17-01
DEPTH:	89 - 92'	REMARKS:	Sand and Gravel with trace Silt		
				Sample:	1

PARTICLE SIZE DISTRIBUTION

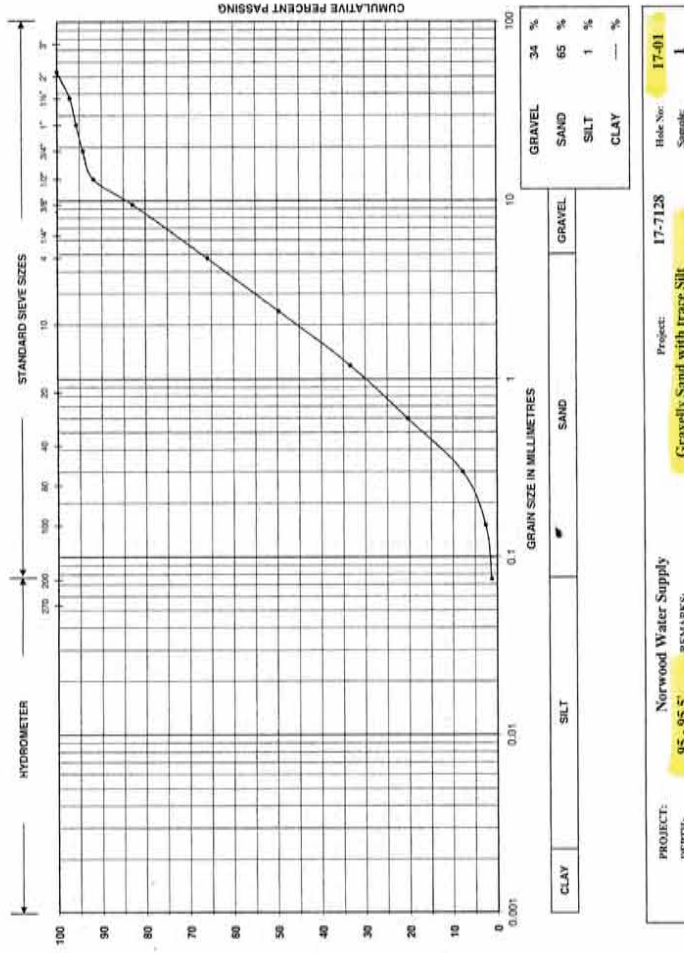


PROJECT:	Norwood Water Supply	Project:	17-7128	Hole No:	17-01
DEPTH:	92 - 95'	REMARKS:	Sand and Gravel with trace Silt		
				Sample:	1

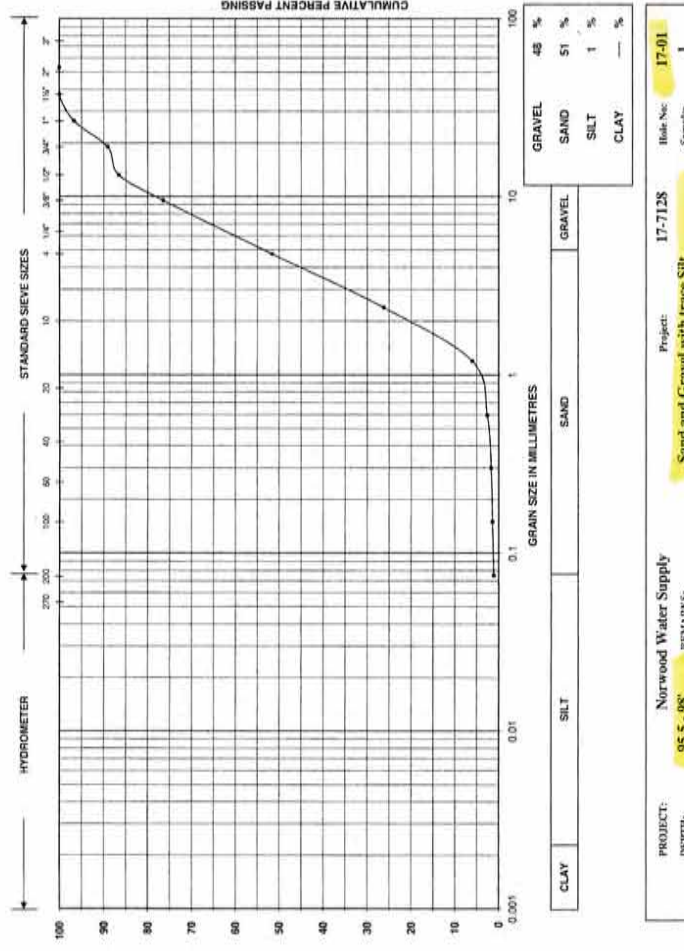
APPENDIX A-3.1c: Grain-Size Analyses Well 4

Depth: 89-95 ft (27.1-29.0 m) Description: Sand, gravel

PARTICLE SIZE DISTRIBUTION

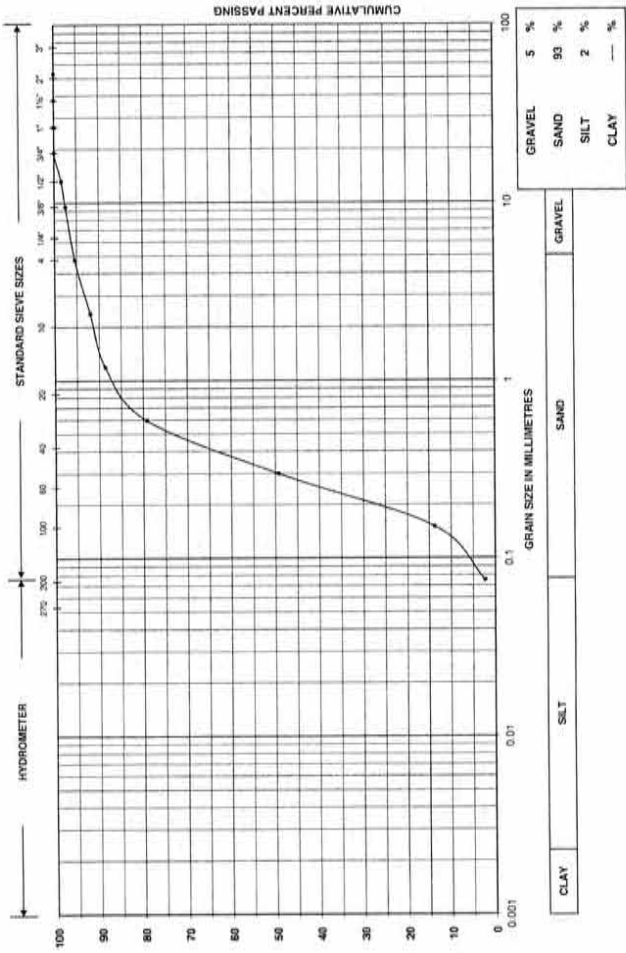


PARTICLE SIZE DISTRIBUTION



APPENDIX A-3.1d: Grain-Size Analyses Well 4 Depth: 95-98 ft (29.0-29.9 m) Description: Sand, gravel

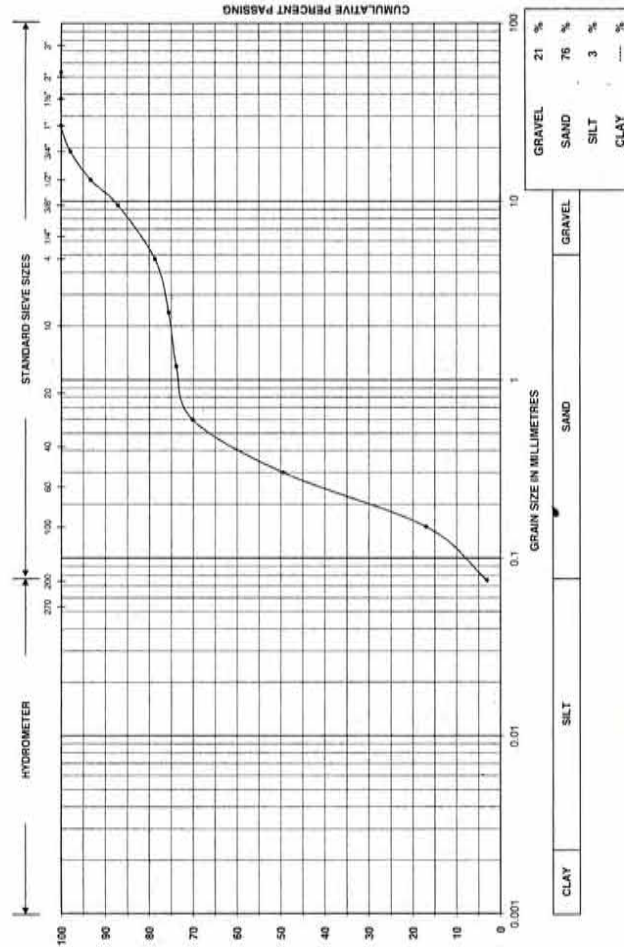
PARTICLE SIZE DISTRIBUTION



PROJECT:	Norwood Water Supply	Project:	17-7128	Hole No:	17-02
DEPTH:	58 - 61'	REMARKS:	Sand with trace Gravel and trace Silt		
				Sample:	1

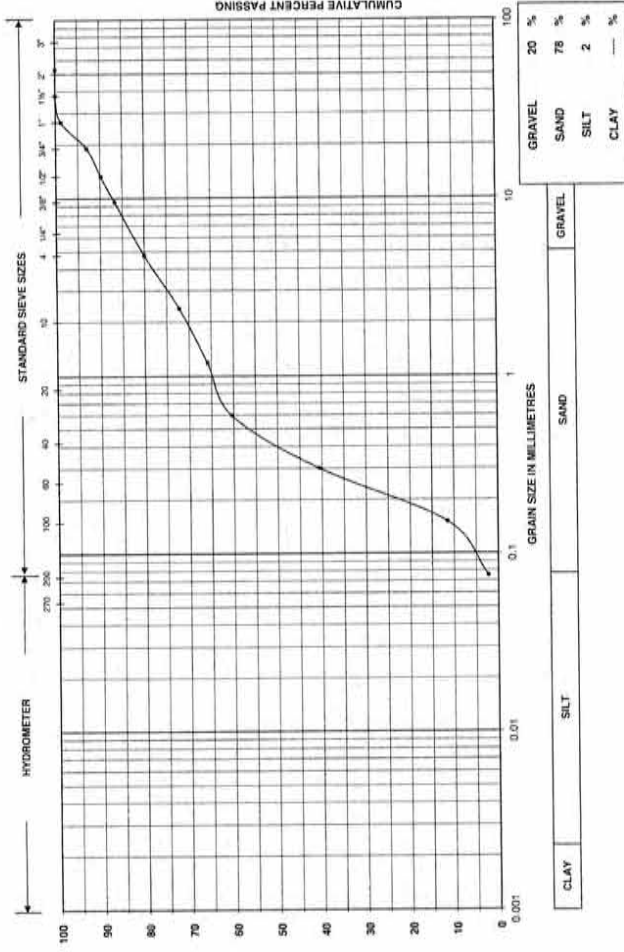
APPENDIX A-3.2a: Grain-Size Analyses Well 1B
Depth: 53-61 ft (16.2-18.6 m) Description: Sand, tr gravel

PARTICLE SIZE DISTRIBUTION



PROJECT:	Norwood Water Supply	Project:	17-7128	Hole No:	17-02
DEPTH:	61 - 63'	REMARKS:	Gravelly Sand with trace Silt	Sample:	1

PARTICLE SIZE DISTRIBUTION



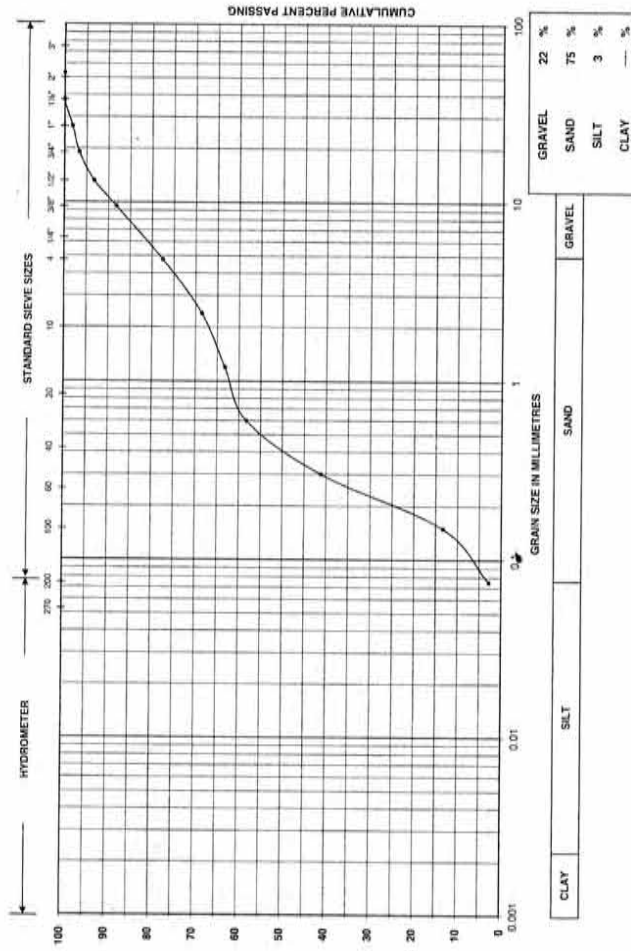
PROJECT:	Norwood Water Supply	Project:	17-7128	Hole No:	17-02
DEPTH:	63 - 66'	REMARKS:	Gravelly Sand with trace Silt	Sample:	1

APPENDIX A-3.2b: Grain-Size Analyses Well 1B

Depth: 61-66 ft (18.6-20.1 m)

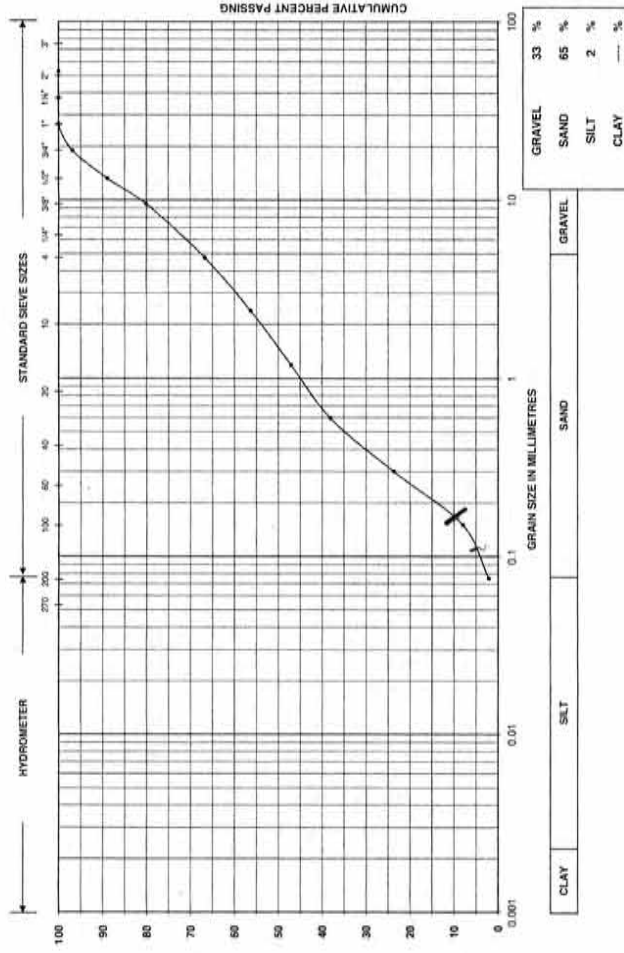
Description: Gravelly sand

PARTICLE SIZE DISTRIBUTION



PROJECT:	Norwood Water Supply	Project:	17-7128	File No:	17-02
DEPTH:	66 - 67.5'	REMARKS:	Gravelly Sand with trace Silt	Sample:	1

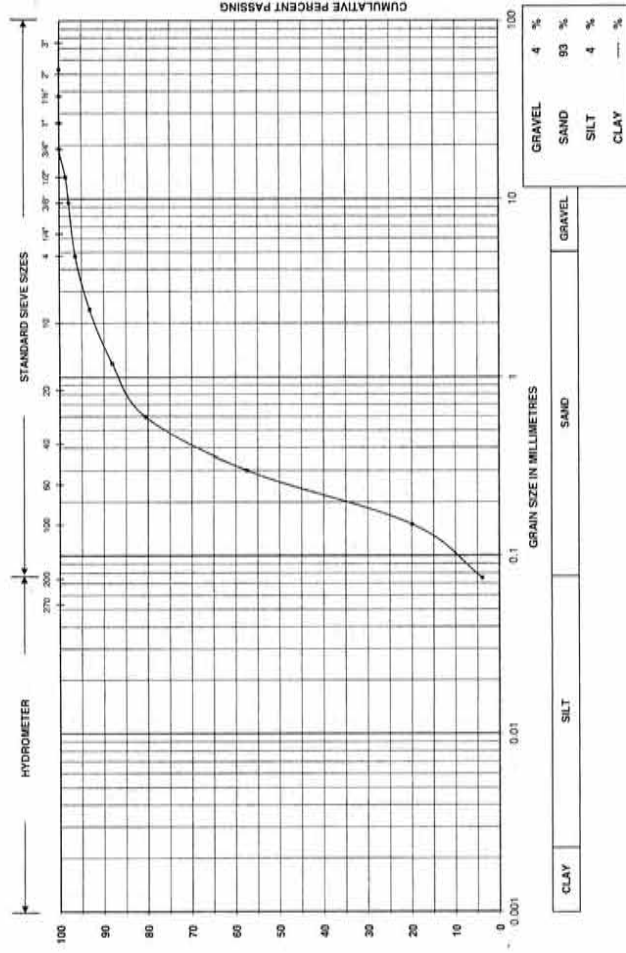
PARTICLE SIZE DISTRIBUTION



PROJECT:	Norwood Water Supply	Project:	17-7128	File No:	17-02
DEPTH:	67.5 - 69'	REMARKS:	Gravelly Sand with trace Silt	Sample:	1

APPENDIX A-3.2c: Grain-Size Analyses Well 1B
 Depth: 66-69 ft (20.1-21.0 m) Description: Gravelly sand

PARTICLE SIZE DISTRIBUTION



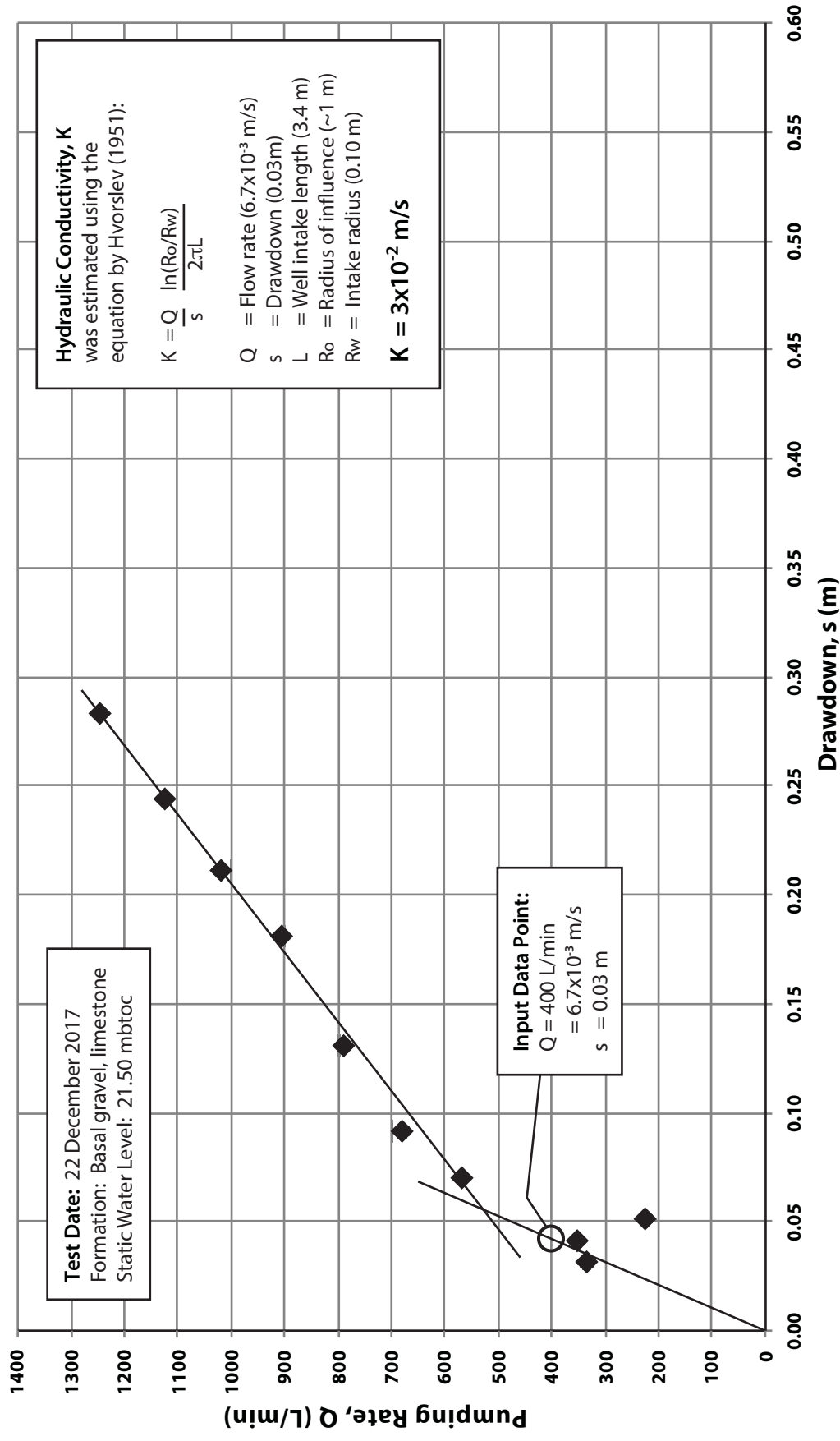
PROJECT:	Norwood Water Supply	PROJECT:	17-7128	DATE:	17-02
DEPTH:	69 - 70'	REMARKS:	Sand with trace Gravel and trace Silt		
				SAMPLE:	1

APPENDIX A-3.2d: Grain-Size Analyses Well 1B

Depth: 69-70 ft (21.0-21.3 m) Description: Sand, gravel

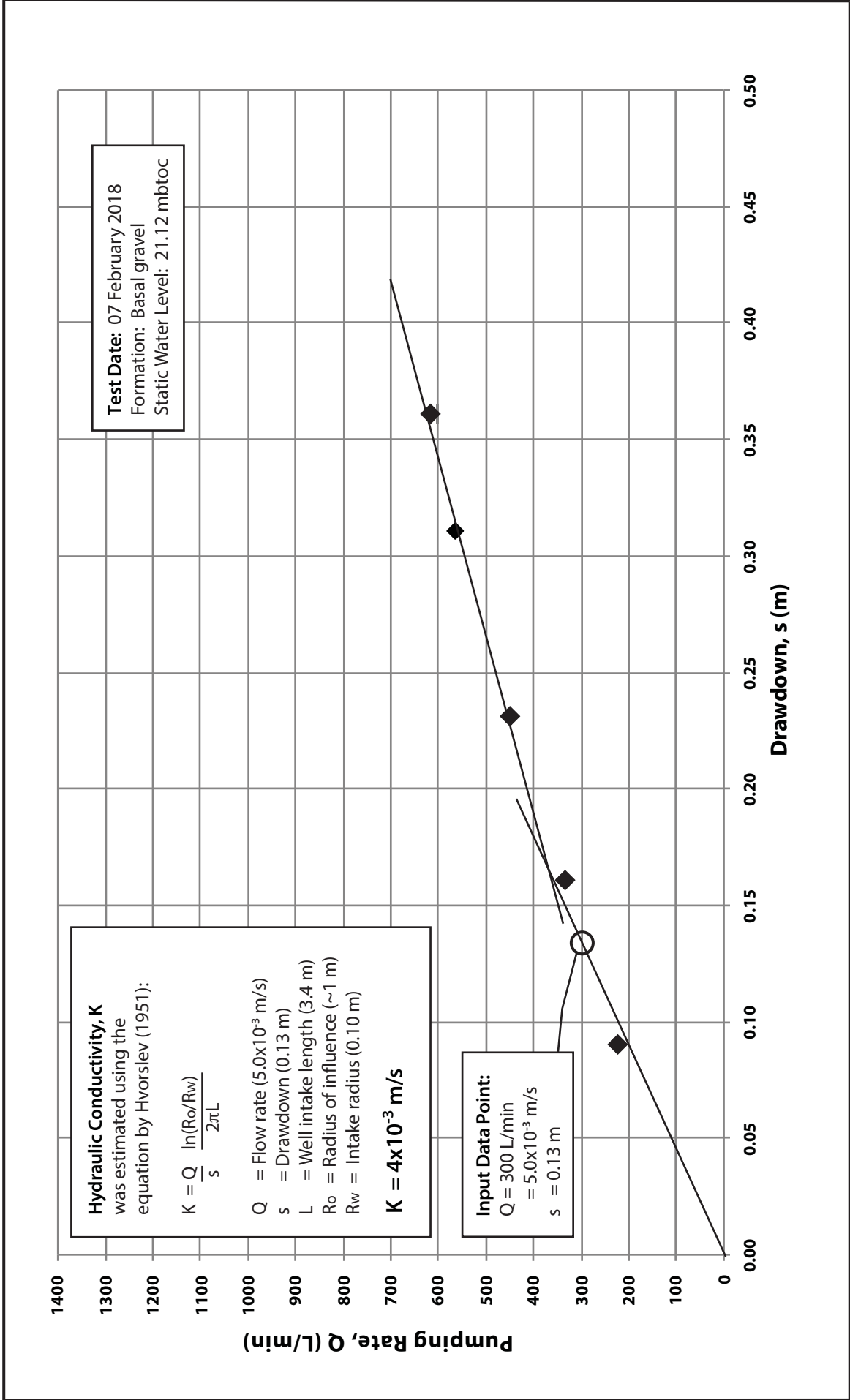
APPENDIX B:

ANALYSIS OF STEP PUMPING TESTS
(Data from D.M. Wills Associates Limited)



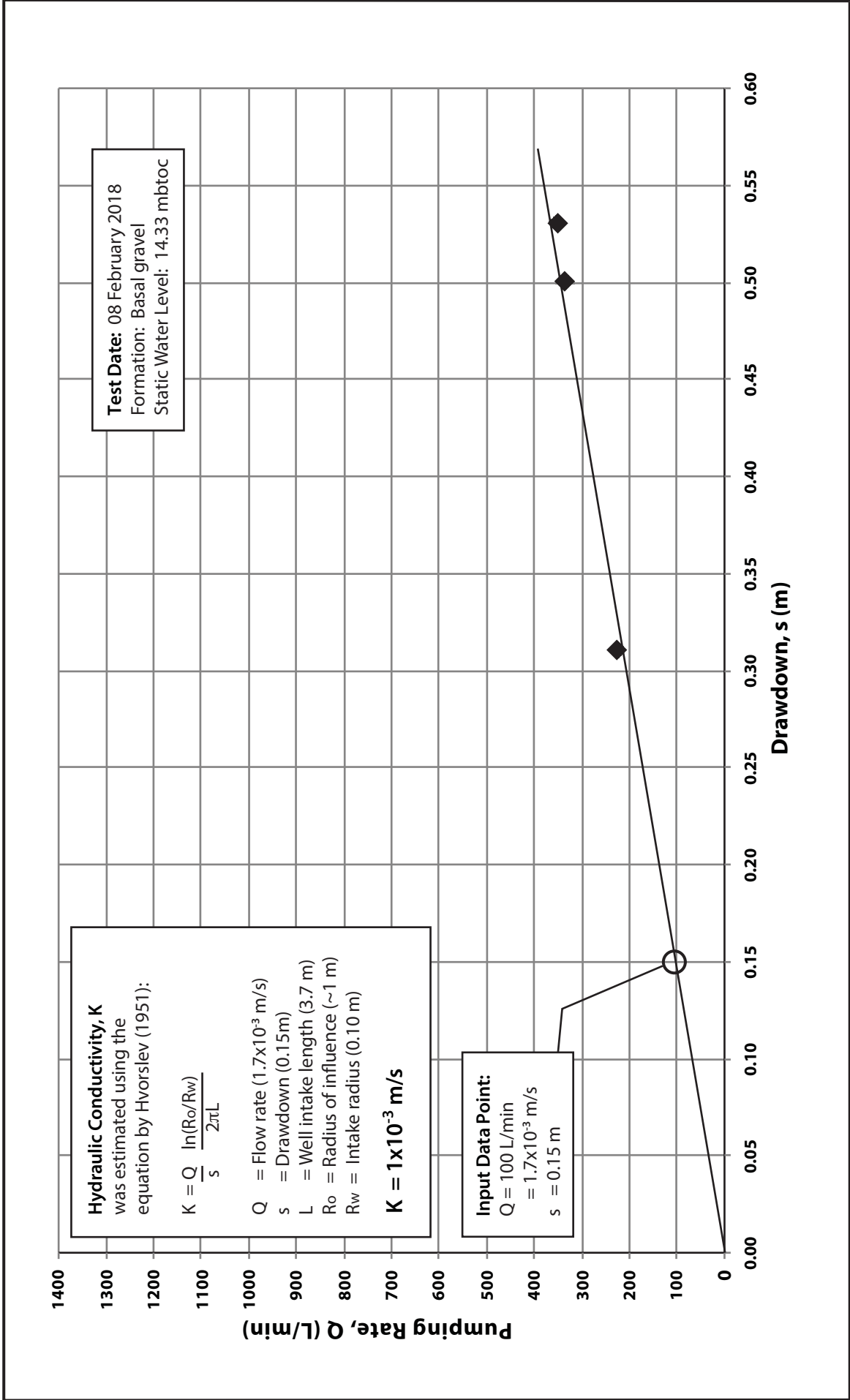
◆ Field data point

Notes:
 Data provided by D. M. Wills Associates Limited.
 Data are in Appendix B-5 and Table 4.

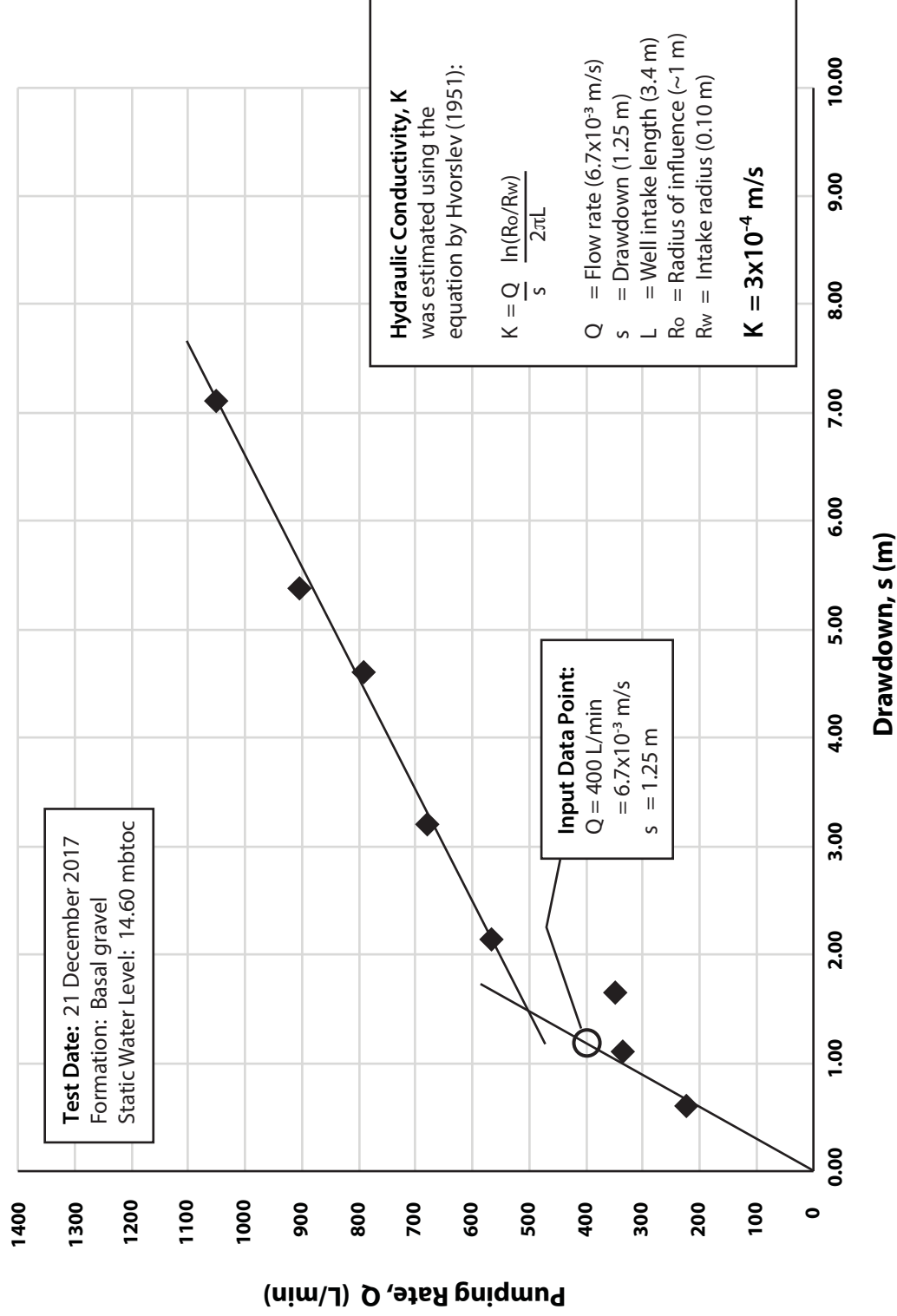


◆ Field data point

Notes:
Data provided by D.M. Wills Associates Limited.
Data are in Appendix B-5 and Table 4.



◆ Field data point Notes: Data provided by D. M. Wills Associates Limited. Data are in Appendix B-5 and Table 4.	
tedrannieMSc PGeo647.528.5511 hydrogeologistted@knowyourground.com	HYDROGEOLOGY REVIEW MUNICIPAL GROUNDWATER SUPPLY NORWOOD, ONTARIO
Constant-Head Analysis, Well 2	
APPENDIX B-3	



Notes:
 Data provided by D.M. Wills Associates Limited.
 Data are in Appendix B-5 and Table 4.



Tel: (705) 887-3331
 Fax: (705) 887-4788
 E-Mail: ghart@ghart.ca

APPENDIX B-5.1 Step Pumping Test Data Well 4 22 December 2017

WELL TAG #: A230644

Norwood TW17-01

Date: Dec 22, 2017

Measuring Point: Top of Casing (3 feet above ground)

PUMPING										RECOVERY																			
50 IGPM Step					100 IGPM Step					150 IGPM Step					200 IGPM Step					250 IGPM Step					275 IGPM Step				
Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average
(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)		
0	70.50				0	70.65				0	70.73				0	70.93				0	71.21				0	71.43			
1	70.68				1	70.65				1	70.80				1	71.06				1	71.25				1	71.60			
2	70.66				2	70.65	101.4			2	70.81	152.6			2	71.07	201.5			2	71.26	250.1			2	70.59			
3	70.68	51			3	70.65				3	70.80				3	71.08				3	71.26				3	70.58			
4	70.68				4	70.65				4	70.80				4	71.08				4	71.27				4	70.57			
5	70.68				5	70.65				5	70.81				5	71.08				5	71.27	251.2			5	70.56			
6	70.68	52.4			6	70.65				6	70.81				6	71.08				6	71.27				6	70.56			
7	70.68				7	70.65				7	70.81				7	71.08				7	71.26				7	70.55			
8	70.68			51	8	70.65			101.8	8	70.81				8	71.08				8	71.26				8	70.55			
9	70.68				9	70.65				9	70.81	152.2			9	71.08	201.5			9	71.27	251.9			9	70.54			
10	70.68	52.4			10	70.65	101.4			10	70.81				10	71.08				10	71.27				10	70.54			
12	70.68				12	70.65				12	70.81				12	71.08				12	71.28				12	70.53			
14	70.68				14	70.65				14	70.81				14	71.08				14	71.28				14	70.52			
16	70.68				16	70.65				16	70.81				16	71.08				16	71.28				16	70.52			
18	70.68				18	70.65				18	70.81				18	71.08				18	71.28				18	70.51			
20	70.68				20	70.66				20	70.81				20	71.08				20	71.28				20	70.50			
25	70.65	52.4			25	70.65	101.4			25	70.81	152.2			25	71.08	200.2			25	71.28	251.2			25				
30	70.65				30	70.65				30	70.81				30	71.08				30	71.28				30				
75 IGPM Step					125 IGPM Step					175 IGPM Step					225 IGPM Step					275 IGPM Step									
Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average	Time	Water Level	Flow Rate	Point	Average
(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)			(Min)	(Feet)	(lmp. gpm)		
0	70.65				0	70.65				0	70.81				0	71.08				0	71.28				0	71.43			
1	70.65				1	70.70				1	70.91				1	-				1	71.40				1	71.60			
2	70.65	75			2	70.72	125.6			2	70.91	177			2	71.18	227.7			2	71.40	283.8			2	71.40	283.8		
3	70.65				3	70.72				3	70.91				3	71.20				3	71.40				3	71.40			
4	70.65				4	70.72				4	70.91				4	71.20				4	71.40				4	71.40			
5	70.65	75			5	70.72				5	70.91				5	71.20				5	71.41				5	71.41			
6	70.65				6	70.72				6	70.91				6	71.20				6	71.41				6	71.41			
7	70.65				7	70.72				7	70.91				7	71.20				7	71.42				7	71.42			
8	70.65			75.1	8	70.72			127	8	70.91				8	71.20				8	71.42				8	71.42			283.8
9	70.65				9	70.72				9	70.91				9	71.20				9	71.42				9	71.42			
10	70.65	75			10	70.72	126			10	70.91	177			10	71.20	225.9			10	71.42	283.8			10	71.42			
12	70.65				12	70.72				12	70.92				12	71.20				12	71.43				12	71.43			
14	70.65				14	70.72				14	70.92				14	71.20				14	71.43				14	71.43			
16	70.61				16	70.72				16	70.92				16	71.20				16	71.43				16	71.43			
18	70.61				18	70.73				18	70.92				18	71.20				18	71.43				18	71.43			
20	70.61				20	70.73				20	70.93				20	71.20				20	71.43				20	71.43			
25	70.61	75			25	70.73	125.6			25	70.93	177			25	71.21	225.9			25	71.43	283.8			25	71.43	283.8		
30	70.61				30	70.73				30	70.93				30	71.21				30	71.43				30	71.43			

APPENDIX B-5.2

Step Pumping Test Data, Well 1B

21 December 2017

WELL TAG #: A230643

Norwood TW17-02

Date: Dec 21, 2017

Measuring Point: Top of Casing (3 feet above ground)

PUMPING												RECOVERY			
50 IGPM Step				100 IGPM Step				150 IGPM Step				200 IGPM Step			
Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average
0	47.90			0	51.49	79.9		0	54.88			0	92.96	200.8	
1	49.12			1	51.90			1	58.00			1	64.95		
2				2	51.90			2				2	65.20		
3	49.45	49.3		3	53.20	100.7		3	58.20	147.8		3	65.20		
4	49.49			4	53.27			4	58.53	154		4	65.23	200.6	
5	49.52			5	53.28			5	58.30	151.8		5	65.25		
6	49.59			6	53.28			6	58.30			6	65.27		
7	49.61			7	53.28			7	58.33			7	65.29		
8	49.68	46-50	42.2	8	53.28			8	58.33			8	65.30		
9	49.75			9	53.28			9	58.32	150.9	150.7	9	65.33	199.1	196.3
10	49.79			10	53.28	100		10	58.33			10	65.33		
12	49.79			12	53.28			12	58.34			12	65.39		
14	49.75	49.9		14	53.28			14	58.30			14	65.40		
16	49.75			16	53.29			16	58.37			16	65.42		
18	49.76			18	53.29			18	58.35			18	65.40		
20	49.79			20	53.29			20	58.36	150.2		20	65.48	199.1	
25	49.82	49.9		25	53.29	100.7		25	58.36			25	65.50		
30	49.82			30	53.29			30	58.37			30	65.51		
75 IGPM Step				125 IGPM Step				175 IGPM Step				225 IGPM Step			
Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average	Time (Min)	Water Level (Feet)	Flow Rate (Imp. gpm)	Average
0	49.82			0	53.29			0	58.37			0	65.51		
1	51.70	80.5		1	53.60	107.3		1	62.25			1	69.35		
2	51.49	75.7		2	55.25	132		2	62.52	174.7		2	69.85	227.7	
3	51.48			3	54.86	125.8		3	62.54			3	69.99		
4	51.48			4	54.87			4	62.69	176		4	70.10		
5	51.48			5	54.87			5	62.71			5	70.10		
6	51.48			6	54.87			6	62.72			6	70.20		
7	51.48			7	54.87			7	62.75			7	70.30		
8	51.48			8	54.88			8	62.77			8	70.35		
9	51.48		83.2	9	54.88		125.7	9	62.78			9	70.45		
10	51.48			10	54.88	125.4		10	62.79	175.8	178.1	10	70.49	231.9	233.2
12	51.48			12	54.88			12	62.83			12	70.52		
14	51.45	73.9		14	54.87			14	62.85			14	70.60		
16	51.49	75		16	54.87			16	62.88			16	70.68		
18	51.49			18	54.87			18	62.89			18	70.70		
20	51.49			20	54.86	125.4		20	62.90	175.8		20	70.84	231.9	
25	51.49			25	54.88			25	62.94			25	71.00		
30	51.49			30	54.88			30	62.96			30	71.15		

APPENDIX B-5.3 **Step Pumping Test Data, Well 3** **07 February 2018**

Well #3					07-Feb-18
Static: 69.3 feet FTOC					
50 IGPM (227 Lpm)					
Start Time	Time	Reading	Notes		
10:40 AM	0	69.30			
	1	69.50			
	2	69.60	Flow set, 50 gpm		
	3	69.59			
	4	69.60			
	5	69.60			
	6	69.60			
	7	69.60			
	8	69.60			
	9	69.60			
	10	69.60			
	12	69.60			
	14	69.59			
	16	69.59			
	18	69.60			
	20	69.60			
75 IGPM (341 Lpm)					
Start Time	Time	Reading	Notes		
11:00 AM	21	69.65			
	22	69.71			
	23	69.77			
	24	69.79	Flow set		
	25	69.78			
	26	69.79			
	27	69.80			
	28	69.80			
	29	69.80			
	30	69.80			
	32	69.80			
	34	69.80			
	36	69.80			
	38	69.80			
11:20 AM	40	69.80			

100 IGPM (454 Lpm)					
Time	Reading	Notes			
11:21 PM	41	69.87			
	42	69.88			
	43	70.00			
	44	70.05	Flow set		
	45	70.05			
	46	70.05			
	47	70.05			
	48	70.05			
	49	70.05			
	50	70.05			
	52	70.05			
	54	70.05			
	56	70.05			
	58	70.05			
11:40 AM	60	70.05			
125 IGPM (568 Lpm)					
Time	Reading	Notes			
11:41 AM	61	70.25			
	62	70.32			
	63	70.32			
	64	70.32			
	65	70.32			
	66	70.32			
	67	70.32			
	68	70.32			
	69	70.32			
	70	70.32			
	72	70.32			
	74	70.32			
	76	70.32			
	78	70.32			
12:00	80	70.32			

137 IGPM (623 Lpm) MAX FLOW, last step					
Time	Reading	Notes			
12:00	80	70.32			
	81	70.47			
	82	70.48			
	83	70.48			
	84	70.48			
	85	70.48			
	86	70.48			
	87	70.48			
	88	70.48			
	89	70.48			
	90	70.48			
	92	70.48			
	94	70.28	Flow Down - Kyle turned it		
	96	70.00	down because of PTTW		
	98	70.00	(please see field notes for		
	100	70.00	further explanation)		
12:22 PM	102	70.00	Water Samples Taken		
Recovery					
Time	Reading	Notes			
12:43	0	70			
	1	69.4			
	2	69.37			
	3	69.37			
	4	69.39			
	5	69.37			
	6	69.35			
	7	69.33			
	8	69.33			
	9	69.32			
	10	69.32			
	12	69.30			
	14	69.30			
	16	69.30			
	18	69.30			
	20	69.30			
1:13 PM	25	69.30			
	30	69.30			

APPENDIX B-5.4 **Step Pumping Test Data, Well 2** **08 February 2018**

Well #2			
Static: 47 feet FTOC		08-Feb-18	
50 IGPM (227 Lpm)			
Start Time	Time	Reading	Notes
10:10 AM	0	47	
	1	-	Lost some flow, 2.8
	2	47.81	
	3	48.02	Flow good, 50 gpm
	4	48.03	
	5	48.03	
	6	48.03	
	7	48.04	
	8	48.04	
	9	48.04	
	10	48.04	
	12	48.04	
	14	48.04	
	16	48.04	
	18	48.04	
	20	48.04	
75 IGPM (341 Lpm)			
	Time	Reading	Notes
	10:30 AM	21 48.39	
		22 48.55	
		23 48.60	Flow Set
		24 48.63	
		25 48.65	
		26 48.66	
		27 48.66	
		28 48.66	
		29 48.66	
		30 48.66	
		32 48.66	
		34 48.66	
		36 48.66	
		38 48.66	
		40 48.66	

77.86 IGPM (354 Lpm) MAX FLOW (last step)			
Time	Time	Reading	Notes
10:50 AM	40	48.66	
	41	48.75	MAX FLOW (last step)
	42	48.75	(please see field notes for details)
	43	48.75	
	44	48.75	
	45	48.75	
	46	48.75	
	47	48.75	
	48	48.75	
	49	48.75	
	50	48.75	
	52	48.75	
	54	48.75	
	56	48.75	
	58	48.75	
	60	48.75	
	65	48.75	
	70	48.75	samples
	75	48.75	
	80	48.75	
Recovery			
Time	Time	Reading	Notes
	11:30	0	48.75
		1	47.25
		2	47.16
		3	47.12
		4	47.10
		5	47.09
		6	47.08
		7	47.05
		8	47.02
		9	47.02
		10	47.02
		12	47.02
		14	47.01
		16	47.01
		18	47.00
		20	47.00
		25	47.00
		30	47.00

Appendix G

Public Information Center

TOWNSHIP OF ASPHODEL-NORWOOD

REVISED NOTICE OF PUBLIC INFORMATION CENTER

VILLAGE OF NORWOOD

Schedule 'B' Municipal Class Environmental Assessment

POTABLE WATER STORAGE

The Township of Asphodel-Norwood has initiated a planning process to assess alternative potable water storage solutions for the Village of Norwood. Currently, the Village's potable water system provides water to a population of approximately 2,100 people. A 2020 Infrastructure Assessment Report identified significant growth potential in the Village over the next 10-20 years and beyond. As such, the Township is considering infrastructure upgrades to address the storage, pressure and fire flow deficits as it grows. J.L. Richards & Associates Limited has been retained to complete a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to assess the alternative potable water storage solutions for the Village of Norwood for the next 20 years.

During Phase 1 of the Class EA, it has been identified that the Township is in need of a solution to address the storage constraints in the communal potable water supply system, and to improve system pressure and fire flows. Phase 2 is currently underway during which various servicing approaches, storage configurations, and site locations are being evaluated against environmental, social, technical, and financial criteria. The preferred servicing alternative is to decommission the existing standpipe and construct a new standpipe at the existing water treatment plant.

Public and agency consultation is a key component throughout the Class EA process. The Township is planning to conduct one virtual Public Information Centre to present the work undertaken to date, including recommendations as to the location and configuration of the proposed standpipe. All those interested in the project are invited to attend the Virtual Public Information Center on:

REVISED Date: October 18, 2021

Time: 5:00 – 6:00 pm

A presentation will start at 5:00 pm followed by a question and answer period.

Registration: mhudson@antownship.ca

We are interested in hearing any comments or concerns that you may have about this project. A public database of comments will be maintained and, with the exception of personal information, included in the study documentation that will be made available for public review. Project information will also be available to the public on the Township's website, <https://www.antownship.ca/en/township-services/water-and-wastewater.aspx>.

If you have any questions and concerns, please contact:

**Township of Asphodel-Norwood
Potable Water Storage Class EA
c/o J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Electronic-mail: mmorkem@jlrichards.ca**

Please copy any correspondence to:

**Kyle Beacock
Water and Wastewater Operations Manager
Electronic-mail: kbeacock@antownship.ca**

Issued: October 5, 2021

TOWNSHIP OF ASPHODEL-NORWOOD**NOTICE OF PUBLIC INFORMATION CENTER****VILLAGE OF NORWOOD****Schedule 'B' Municipal Class Environmental Assessment****POTABLE WATER STORAGE**

The Township of Asphodel-Norwood has initiated a planning process to assess alternative potable water storage solutions for the Village of Norwood. Currently, the Village's potable water system provides water to a population of approximately 2,100 people. The Township is considering infrastructure upgrades to address future and existing storage deficits and to improve fire flow and system pressure. J.L. Richards & Associates Limited has been retained to complete a Schedule 'B' Municipal Class Environmental Assessment (Class EA) to assess the alternative potable water storage solutions for the Village of Norwood for the next 20 years.

During Phase 1 of the Class EA, it has been identified that the Township is in need of a solution to address the storage constraints in the communal potable water supply system, and to improve system pressure and fire flows. Phase 2 is currently underway during which various servicing approaches, storage configurations, and site locations are being evaluated against environmental, social, technical, and financial criteria. The preferred servicing alternative is to decommission the existing standpipe and construct a new standpipe at the existing water treatment plant.

Public and agency consultation is a key component throughout the Class EA process. The Township is planning to conduct one virtual Public Information Centre to present the work undertaken to date, including recommendations as to the location and configuration of the proposed standpipe. All those interested in the project are invited to attend the Virtual Public Information Center on:

Date: October 4, 2021

Time: 5:00 – 6:00 pm

A presentation will start at 5:00 pm followed by a question and answer period.

Registration: mHUDSON@antownship.ca

We are interested in hearing any comments or concerns that you may have about this project. A public database of comments will be maintained and, with the exception of personal information, included in the study documentation that will be made available for public review. Project information will also be available to the public on the Township's website, <https://www.antownship.ca/en/township-services/water-and-wastewater.aspx>.

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Township of Asphodel-Norwood
Potable Water Storage Class EA
c/o J.L. Richards & Associates Limited
203-863 Princess Street
Kingston, ON K7L 5N4
Electronic-mail: mmorkem@jlrichards.ca

Please copy any correspondence to:

Kyle Beacock
Water and Wastewater Operations Manager
Electronic-mail: kbeacock@antownship.ca

Issued: September 20, 2021



Public Information Center **October 18, 2021**

Township of Asphodel-Norwood Village of Norwood Potable Water Storage

Schedule 'B' Municipal Class Environmental Assessment

Agenda

- Introduction
- Overview of the Existing Norwood Water System
- Phase 1 - Problem/Opportunity Statement
- Phase 2 - Evaluation of Alternative Solutions and Identification of Recommended Solutions
- Source Water Protection
- Project Description and Mitigation Measures
- Project Schedule and Next Steps
- Q/A

Introduction

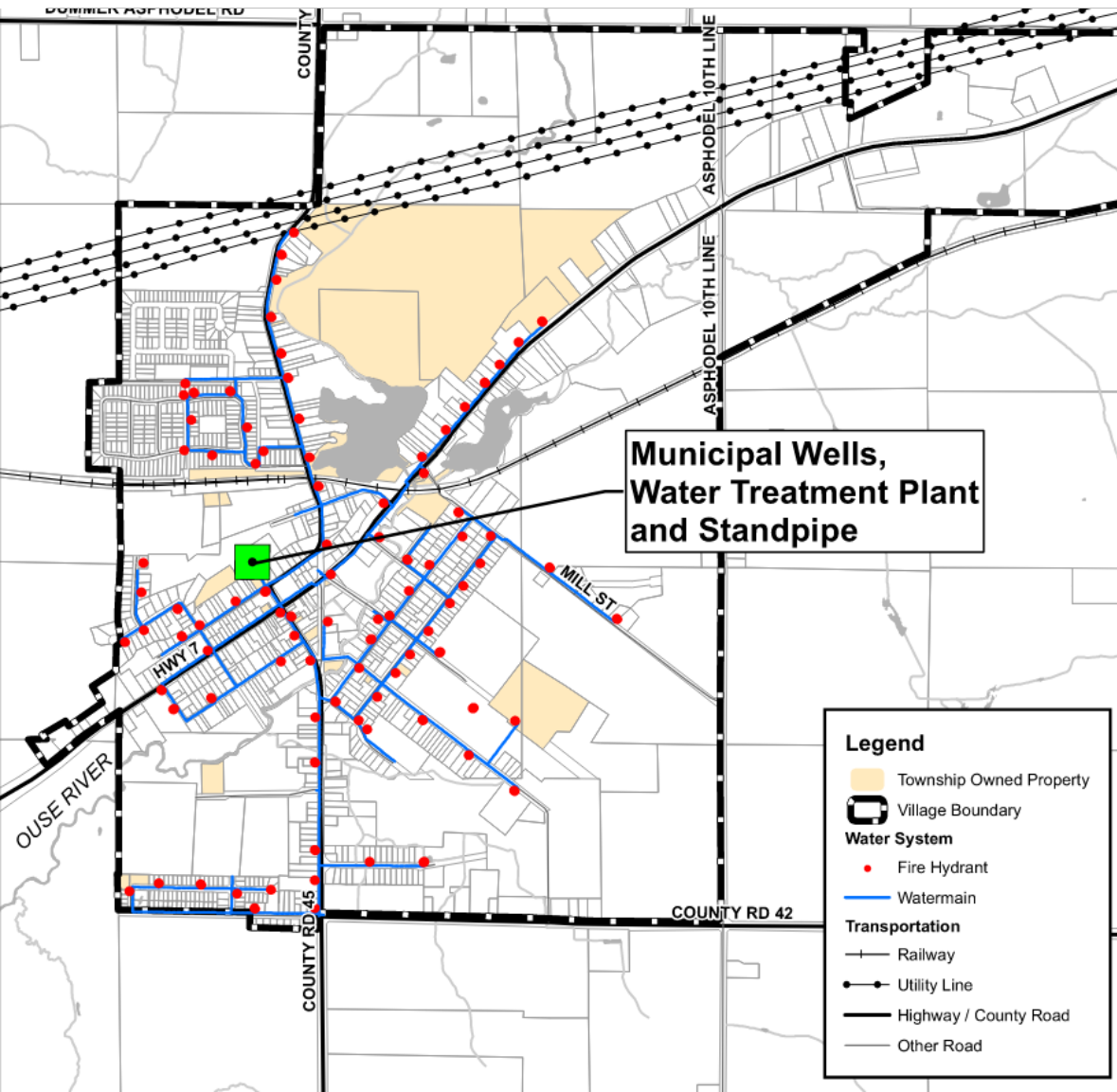
- In 2018, a standpipe inspection report identified the exterior and interior condition of the standpipe as good and fair, respectively. The action plan called for interior rehabilitation in the near future.
- In July 2020, an Infrastructure Assessment Report completed by Engage Engineering identified that the existing standpipe did not have adequate storage for the current population.
- The Township of Asphodel-Norwood (the Township) identified water pressure issues in the northwest corner of the village.
- In December 2020, the Township initiated a Municipal Schedule 'B' Class Environmental Assessment (Class EA) to assess the alternate potable water storage solutions for the Village of Norwood for the next 20 years and more.
- J.L. Richards & Associates Limited (JLR) has been retained as the prime consultant to undertake the Class EA work.

Overview of the Schedule 'B' Class EA Process



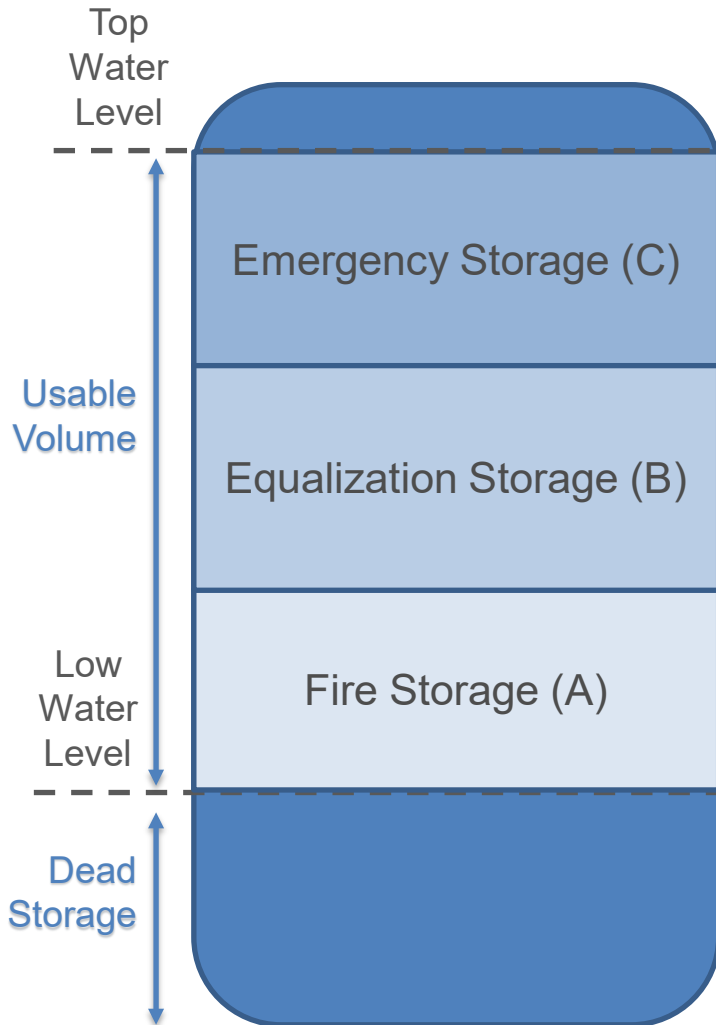
- ✓ **Phase 1 Report and WaterCAD® Hydraulic Model** evaluated existing system and identified population growth projections and associated water storage requirements.
- ✓ **Alternative Solutions Concepts** developed and reviewed against an evaluation matrix.
- ✓ Preliminary assessment of **Costing** for each alternative solution.
- ✓ **Public Consultation** with general public, stakeholder agencies and Township staff.

Existing Village of Norwood Water System



- The existing water supply system consists of four(4) groundwater wells, a chlorine disinfection treatment plant, one (1) municipal water tower (standpipe) and a dedicated distribution system.
- Existing water system services approximately 2,100 people in the Village.
- The existing standpipe is 7.6m in diameter, and 27.4m in height and was originally constructed in 1993.

Existing Water Storage

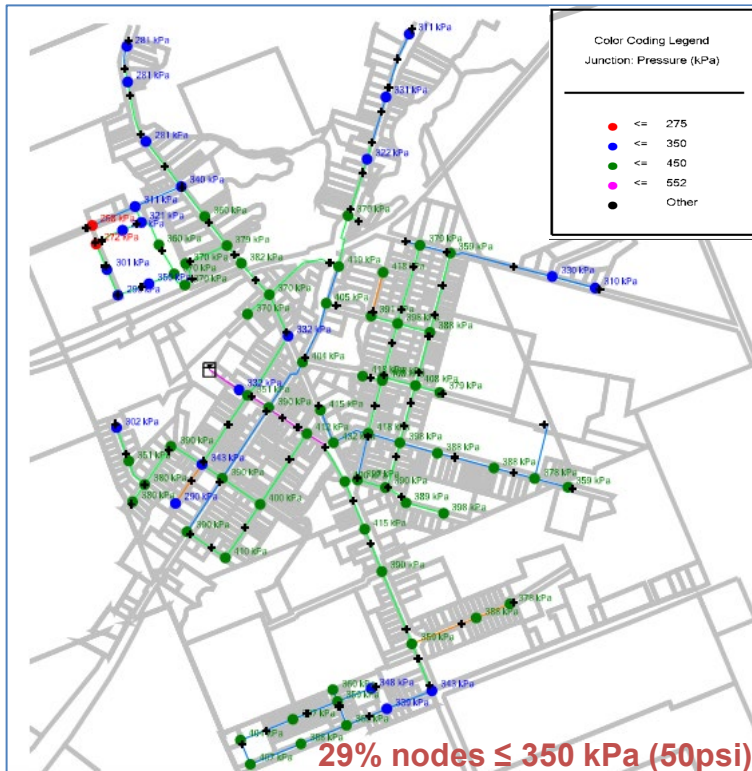


Parameter	Existing
A – Fire Storage (m ³)	563
B – Equalization Storage (m ³)	278
C – Emergency Storage (m ³)	210
Total Usable Storage Recommended (m³)	1,051
Existing Usable Storage	885
Deficit (m³)	166

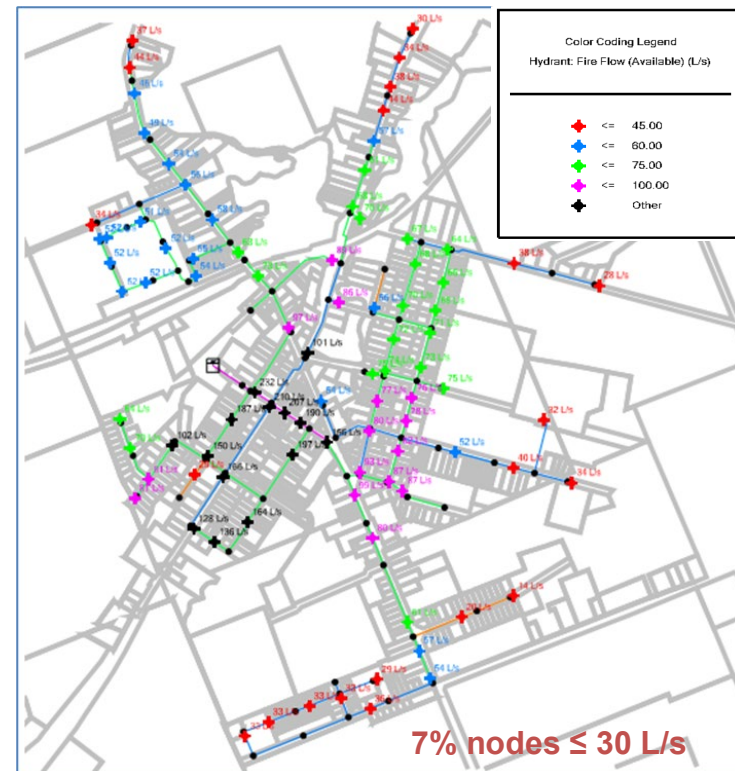
- The existing water storage capacity is insufficient for the existing population within the Village.

Existing Conditions

- A hydraulic water model was completed to assess the existing conditions. Overall, the existing water pressure and fire flow appears to be generally consistent with guidelines; however there are some areas (northwest corner of Village) that could be improved.



Peak Hour Flow



Maximum Day + Fire Flow

Summary of Existing Water System Constraints

Constraint	Description
1. Available Potable Water Storage	There is insufficient water storage available to the system as per the Ministry of the Environment, Parks and Conservation (MECP) guidelines.
2. Standpipe Condition	- The exterior and interior condition of the standpipe is good and fair, respectively. - An action plan from the 2018 inspection report calls for interior rehabilitation in the near future.
3. Pressure Constraints	29% of the nodes are below operating range under average day flow, as per MECP. - Two (2) junction nodes on Albine Street and Millpond Lane are below operating range under peak hour flow, as per MECP.
4. Fire Flow Constraints	The simulated fire flows range is below the Ontario Building Code targets at various locations in the Village.

Phase 1 - Problem/Opportunity Statement

Problem

The existing drinking water system in the Village of Norwood is facing a number of constraints, including insufficient treated water storage capacity, deteriorated standpipe conditions, low pressure concerns and fire flow issues in certain areas of the distribution system.

Opportunity

To ensure the Township has a solution that will address the current water storage constraints in the potable water supply system both now and in the future.

Phase 2 - Identification of Alternative Solutions

Approach

Do Nothing

Construct New
Storage

Location

At Existing
Water
Treatment
Plant

At the
Entrance of
Landfill Site

At Public
Works
Building (on
Top of Esker)

County Road
42 and
Asphodel 10th
Line

Configuration

Below Grade
Reservoir and
Pumping
Station

At Grade
Reservoir and
Pumping
Station

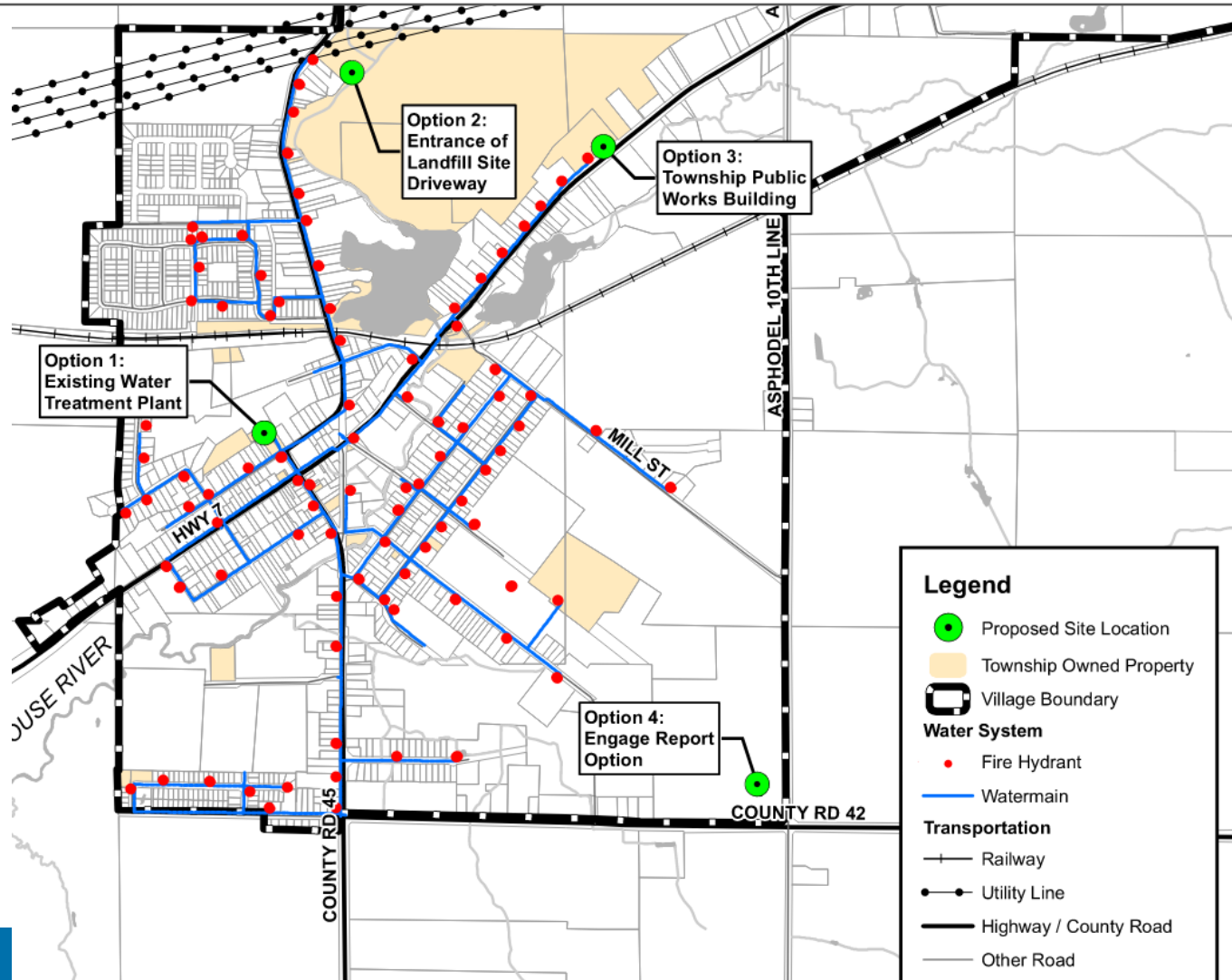
Elevated
Composite
Tank

Standpipe

Screening of Approaches

	Advantages	Disadvantages	Carried Forward?
Approach 1 Do Nothing	In accordance with the Class EA process, this option is generally carried forward to detailed evaluation for comparison	- Does not address potable water storage requirements - Does not address pressure deficiency - Does not address fire flow deficiency - Does not address future need	Yes ✓
Approach 2 Construct New Storage	- Addresses potable water storage requirements. - Addresses the pressure deficiency - Addresses the fire flow deficiency	Higher capital cost	Yes ✓

Potential Locations for Future Storage



Screening of Locations

	Advantages	Disadvantages	Carried Forward?
Option 1 Water Treatment Plant	- Limited distribution system upgrade requirements - Met minimum screening requirements - Ideally located in Institution Zone	No “showstoppers” identified	Yes ✓
Option 2 Entrance of Landfill Site Driveway	Ideally located close to the new development area and area currently experiencing low pressure	- Cost prohibitive - Close distance to Hydro One infrastructure - Located within the floodplain and not in compliance with permitted use identified in the Otonabee Region Conservation Authority Special Policy Area	No ✗
Option 3 Public Works Building (on Top of Esker)	- Met minimum screening requirements - Higher elevation at this location	No “showstoppers” identified	Yes ✓
Option 4 County Road 42 and Asphodel 10 th Line	Higher elevation	- The Township does not own the land - No adjacent watermain	No ✗

Screening of Configurations

	Advantages	Disadvantages	Carried Forward?
Configuration 1 Below-Grade Reservoir and Pumping Station 	• Low visibility of the reservoir • Less potential to impact the public • Operational flexibility to isolate separate cells for maintenance	• Not typical for a small distribution system • Largest footprint • High energy consumption • High capital cost • High operating and maintenance requirements	No ✗
Configuration 2 At-Grade Reservoir and Pumping Station 	• Moderate visibility • Operational flexibility to isolate separate storage tanks for maintenance or upset	• Not typical for a small distribution system • Medium footprint • High energy consumption • High capital cost • High operating and maintenance requirements	No ✗

Screening of Configurations

	Advantages	Disadvantages	Carried Forward?
Configuration 3 Composite Elevated Tank 	- Least complex operation - Consistent with current system operating configuration (i.e., fill/drain from standpipe)	- High visibility - Storage no longer available during maintenance or inspection - Significant capital investment	No ✗
Configuration 4 Standpipe 	- Smallest footprint - Least complex operation - Lowest energy, operating and maintenance costs - Least capital costs - Consistent with current system operating configuration (i.e., fill/drain from standpipe)	- High visibility - Storage no longer available during maintenance or inspection	Yes ✓

Phase 2 - Screening Results

Approach

Do Nothing



Construct New
Storage



Location

At Existing
Water
Treatment
Plant



At the
Entrance of
Landfill Site

At Public
Works
Building (on
Top of Esker)



County Road
42 and
Asphodel 10th
Line

Configuration

Below Grade
Reservoir and
Pumping
Station

At Grade
Reservoir and
Pumping
Station

Elevated
Composite
Tank

Standpipe



Carried Forward ✓

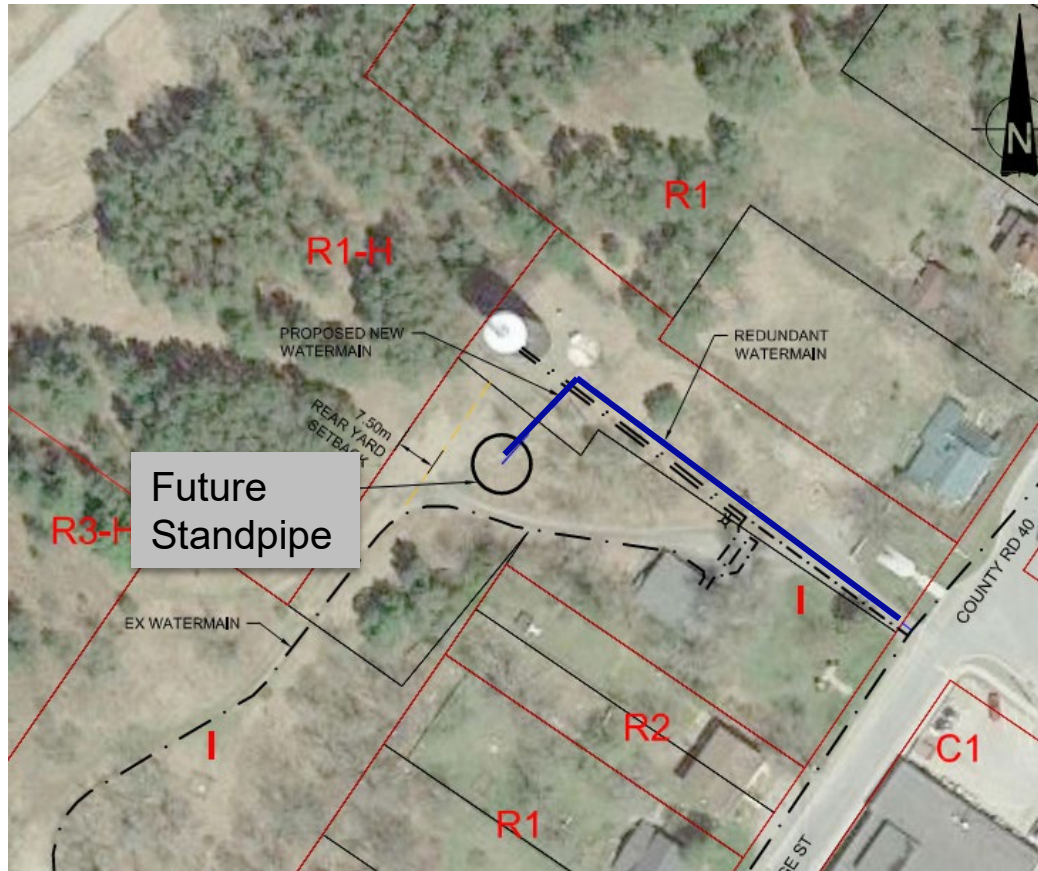
Servicing Solutions

	Description	Combination
No.1	Do Nothing	<u>Approach 1</u> – Do Nothing
No.2	Construct New Standpipe at Existing WTP	<u>Approach 2</u> - Construct New Storage <u>Location 1</u> - Existing Water Treatment Plant <u>Configuration 4</u> - Standpipe
No.3	Construct New Standpipe at Public Works Building on Top of Esker	<u>Approach 2</u> - Construct New Storage <u>Location 2</u> - Township Public Works Building (on Top of the Esker) <u>Configuration 4</u> - Standpipe

Servicing Solution No.1 – Do Nothing

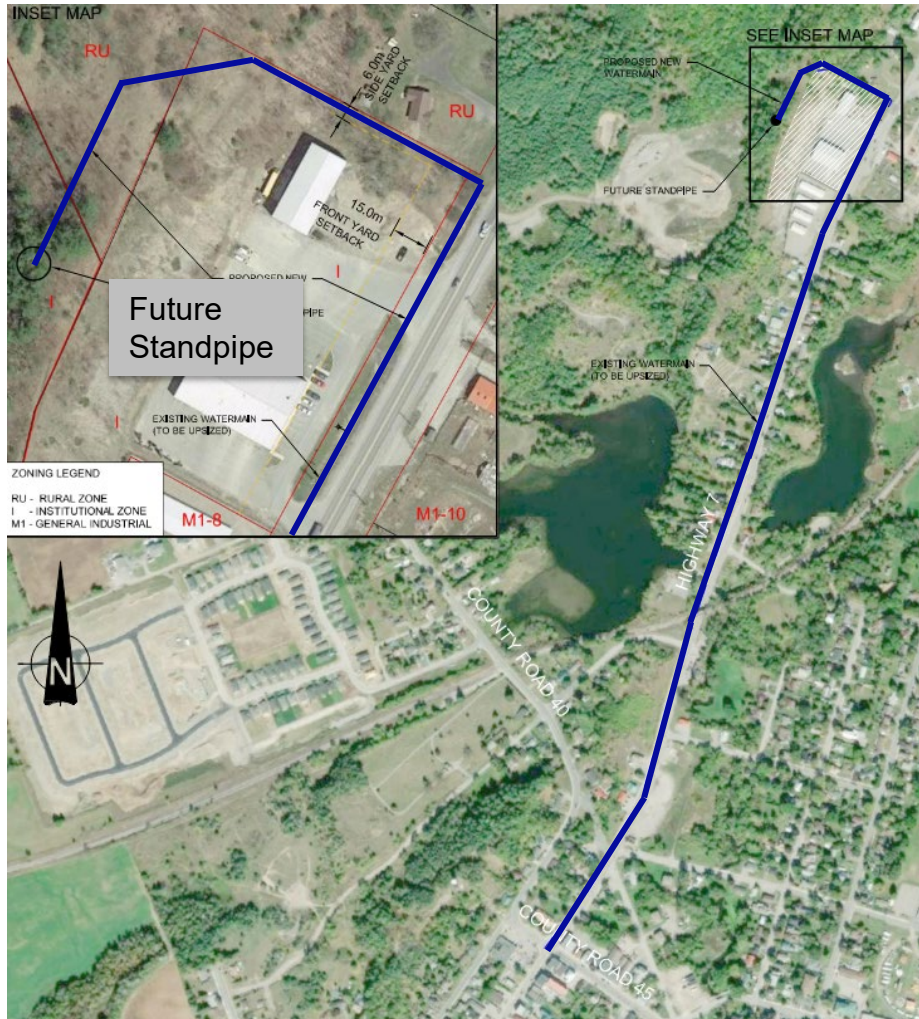
- The 'Do Nothing' alternative is generally equivalent to the status quo and typically carried forward as a baseline for review of other alternatives.
- 2018 Capital Asset Management plan noted that, every 10 years, the interior and exterior of the standpipe would require inspection. A cathodic protection system would need to be installed immediately for the standpipe to remain in service.
- This servicing solution does not address the storage, pressure, fire flow and condition issues.
- It is not being considered further.

Servicing Solution No. 2 – Existing WTP



- The existing site is already developed.
- Minimal impact is anticipated to the natural environment.
- Redundant watermain.
- Active mixer in the standpipe.

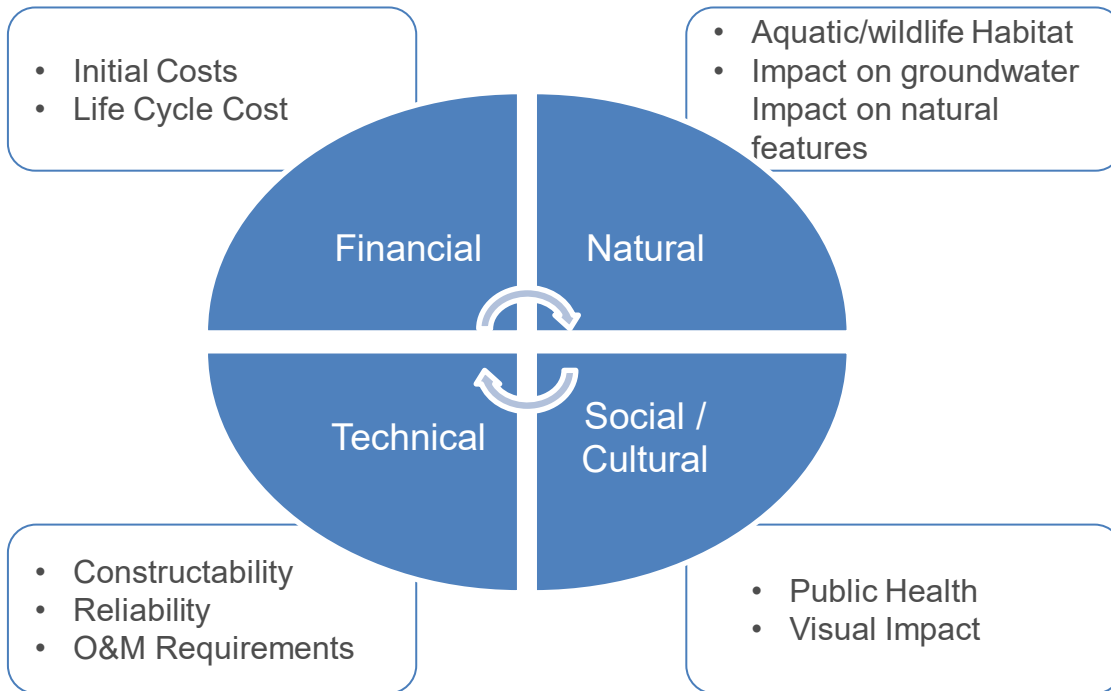
Servicing Solution No. 3A – Public Works Building



- New storage tank is located on the Esker.
- New watermain construction around existing site.
- Extensive watermain upgrades from WTP to the site along HWY 7.

Note: An alternate watermain route (along County Rd 40 and around landfill) was reviewed and it was determined the illustrated route was the best overall option.

Evaluation of Servicing Solutions



- All servicing solutions were evaluated against their impact to the natural, social/cultural environments, technical feasibility, and financial considerations.

Impact Level	Color	Relative Impact
Strong Positive Impact	Green	Preferred
Minor Impact	Yellow	Less Preferred
Strong Negative Impact	Red	Least Preferred

- The relative impact for each criterion relative to each potential solution was assessed based on a qualitative evaluation system.

Evaluation of Servicing Solutions

	Servicing Solution No.2 – Existing Water Treatment Plant	Servicing Solution No.3 – Public Works Building (on top of the Esker)
Natural Environment	- Existing Water Storage Site - No Esker Impact anticipated - No rare or at-risk wildlife - No waterway adjacent to the site	- No Esker Impact anticipated - Some impacts anticipated due to site clearing for new standpipe and required watermain construction - No waterway adjacent to the site - No rare or at-risk wildlife.
Evaluation	Preferred	Preferred
Social and Cultural Environment	- New standpipe visible to nearby community - Located within the Wellhead Protection Area - Minimal impact anticipated due to above-grade design - Noise, increased traffic and reduced air quality during construction	- New standpipe visible to nearby community - Major disruption to highway traffic anticipated due to watermain replacement - Noise, increased traffic and reduced air quality is anticipated during construction
Evaluation	Less Preferred	Less Preferred

Evaluation of Servicing Solutions

	Servicing Solution No.2 – Existing Water Treatment Plant	Servicing Solution No.3 – Township Public Works Building (on top of the Esker)
Technical Feasibility	- The new standpipe will provide required treatment prior to distribution - Minimal watermain upsizing and extension required - Minor site electrical service is required	- Highest ground elevation of all alternatives (i.e. shortest tank) - Additional piping required at the WTP to provide required treatment - Extensive watermain upsizing required from the WTP - Significant watermain extension required to connection to system - New electrical service required
Evaluation	Preferred	Least Preferred
Financial Considerations	- Moderate cost for the new standpipe - Least cost for watermain extension - Least cost for site services - No cost to add CT piping	- Lowest cost for the new standpipe. - Highest additional cost for watermain extension and upsizing - Additional piping at WTP required
Evaluation	Preferred	Least Preferred

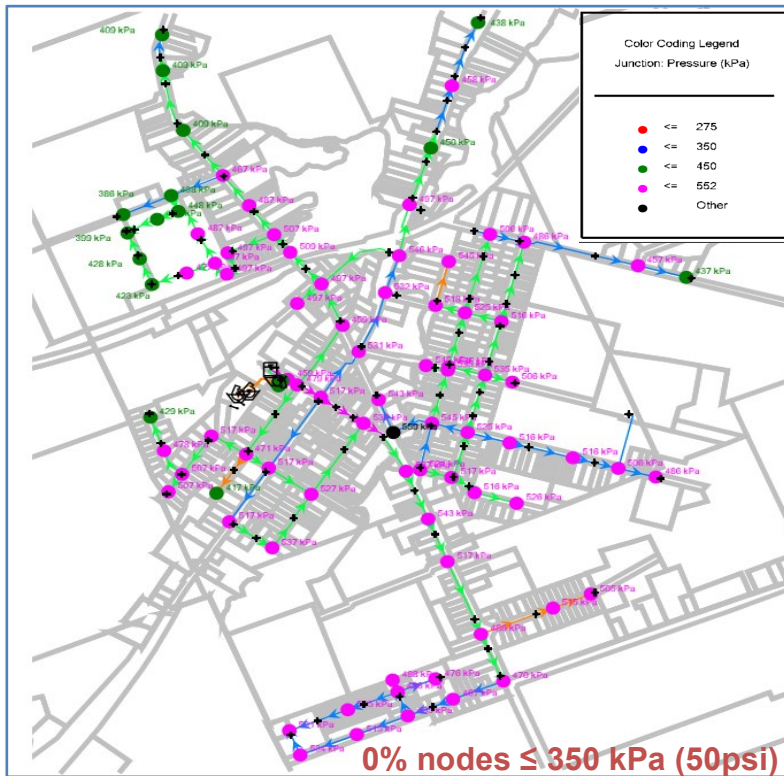
Evaluation of Servicing Solutions

	Servicing Solution No.2 – Existing Water Treatment Plant	Servicing Solution No.3 – Public Works Building (on top of the Esker)
Natural Environment	Preferred	Preferred
Social and Cultural Environment	Less Preferred	Less Preferred
Technical Feasibility	Preferred	Least Preferred
Financial Considerations	Preferred	Least Preferred
Overall	Preferred	Less Preferred

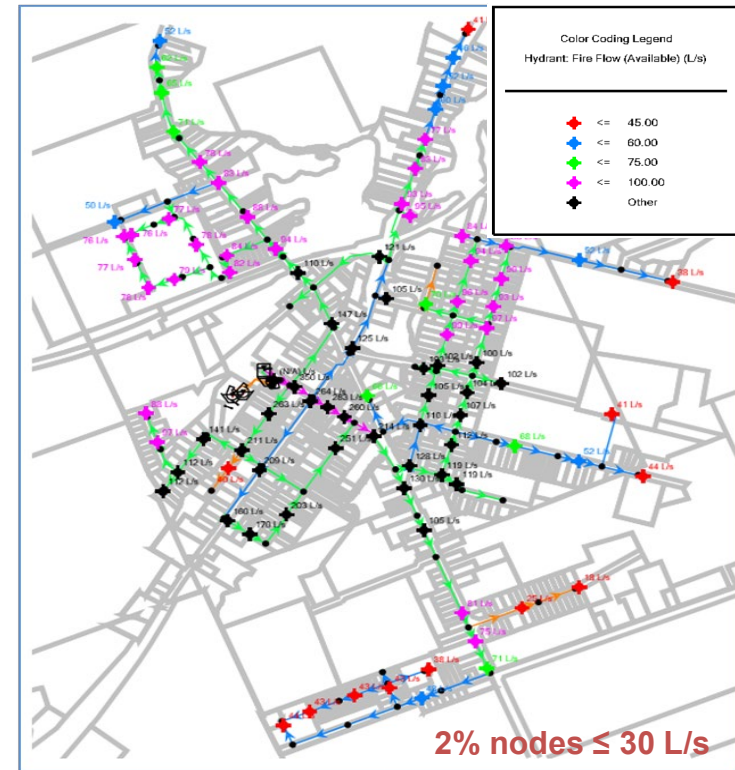
Based on the Evaluation, the preferred alternative is **Servicing Solution No.2 – Construct a new standpipe at the existing water treatment plant.**

Preferred Solution

- Using the hydraulic water model the existing potable water system was assessed with a new water storage standpipe.

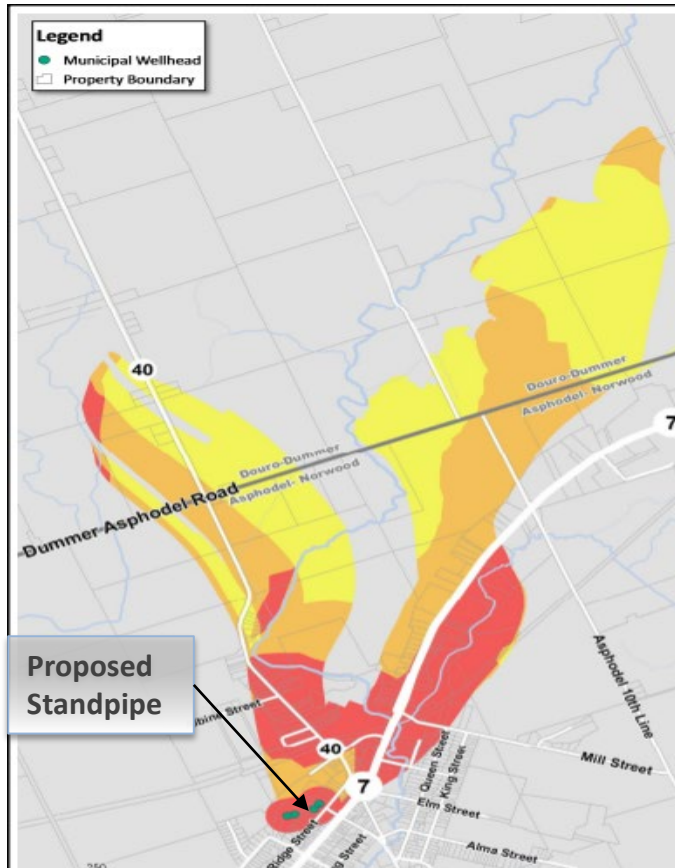


Peak Hour Flow



Maximum Day + Fire Flow

Source Water Protection



Type of Vulnerable Area	Map Colours and Vulnerability Scores		
Wellhead Protection Area	10	8	WHPA-C (2,4,6)
Intake Protection Zone	10	9	8

- It has been identified that the proposed sites are within Wellhead Protection Area with a Vulnerability Score 10.
- A detailed hydrogeological and geotechnical study will be undertaken in the preliminary design to address this concern.

General Project Timeline

General Project Timeline

***Date to commence not determined*

Preliminary Design:	4 months
Detailed Design:	6 months
Finalize Contract Drawings and Specifications:	1 month
Approvals:	6 to 12 months
Tender and Contract Award:	2 months
Construction:	12-18 months

Project Schedule and Next Steps

Milestone	Date
Notice of Study Commencement	July, 2021
Completion of Phase 1 – Identify Problem / Opportunities	July, 2021
Completion of Phase 2 – Evaluation of Alternatives	September, 2021
Public Information Centre	WE ARE HERE
Schedule 'B' Wrap-Up	Nov., 2021

- Obtain and evaluate public, stakeholders and agency comments and confirm preferred solution
- Post Schedule 'B' Report and advise stakeholders and public
- Issue Notice of Completion
- Following 30-day public review period, finalize Class EA
- Commence preliminary design of preferred solution (**Date to commence not determined*)



THANK YOU!



Platinum
member

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