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Township of Leeds and the Thousand Islands

Schedule B Municipal Class Environmental Assessment for a New Treated Water Storage Facility in the Village of Lansdowne

Phase 2 Report

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1.0 Introduction

1.1 Background

The Village of Lansdowne (Village) is the largest village in the Township of Leeds and the Thousand Islands (Township). It is located at the intersection of County Roads 3 and 34, north of County Road 2, and around 50 kilometres northeast of the City of Kingston. The Village has a population of approximately 550 people. It is serviced by two municipal wells, a filtration and disinfection system, one standpipe, and a dedicated distribution system comprised of approximately six kilometres of water piping that is owned by the Township and operated by the Ontario Clean Water Agency (OCWA).

Refer to Figure 1 for a Location Plan map.

A Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study, completed by JLR in 2022, found that the Village's standpipe did not have adequate storage for the current population and insufficient capacity to service projected growth over the next 25 years and beyond. The study identified that the hydraulic grade line (HGL) in the water distribution system did not provide adequate flow. Thus, the Township is considering options for additional potable water storage capacity in the Village to ensure the continued provision of safe drinking water well into the future.

The standpipe was last recoated in 2019. A recent inspection revealed that the standpipe is generally in good condition. However, OCWA noted there is ice formation in the standpipe during cold weather that damages the active mixer in the standpipe. The standpipe is not currently used for disinfection contact time. The first user of the system is the splashpad in front of the standpipe.

In September 2022, 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 25 years.

The main objective of Phase 2 of a Class EA is to identify and evaluate feasible alternative solutions to the Problem/Opportunity Statement that was identified in Phase 1. All reasonable potential solutions to the problem, including the 'Do Nothing' option, are considered. The objective is to determine an overall "generalized solution" to the problem, where further details are developed during Phase 5 of a Schedule 'B' Class EA, "Implementation" (i.e., preliminary, and detailed design).

The following sections describe the identification and evaluation of the alternative solutions, and the selection of a preferred servicing solution.

1.2 Class Environmental Assessment Process

The Ontario Environmental Assessment Act (Act) sets out a planning and decision-making process to consider potential environmental effects before a project begins. The purpose of the Act is to provide for the protection and conservation of the natural environment (R.S.O. 1990, c.E.18, s.2).

The Municipal Class EA (MCEA) process is followed for common types of projects to streamline the review process while ensuring that the project meets the requirements of the Act. In 1987, the first Class EA document prepared by the Municipal Engineers Association (MEA) on behalf of Ontario Municipalities was approved under the Act. Amendments were subsequently made in 1993, 2000, 2007, 2011, 2015, and 2023.

The MCEA process includes the following stages:

- Phase 1: Problem and/or opportunity identification.
- Phase 2: Identification and evaluation of alternative solutions.
- Phase 3: Preparation of alternative design concepts to support a preferred solution.
- Phase 4: Preparation of an Environmental Study Report (ESR) for posting and review on the public record.
- Phase 5: Project implementation and monitoring.

Since projects may vary in their environmental impact, they are classified in terms of the following schedules, pursuant to the most recent amendment to the MCEA process in 2023:

- 'Exempt' projects, most of which were formerly classified as Schedule A and A+ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal environmental effects. While these projects are exempt from the MCEA process, proponents should consider whether notice about the project should be given or consultation on the project should be carried out. Furthermore, proponents are also responsible for obtaining any other applicable permits, approvals, and authorizations for the project.
- 'Eligible for Screening to Exempt' projects may be eligible for exemption based on the results of a screening process. Proponents may choose to complete the applicable screening process to determine whether the project is eligible for exemption or proceed with the applicable Schedule 'B' or Schedule 'C' process, as noted below.
- Schedule 'B' projects have the potential for some adverse environmental impacts and therefore, the proponent is required to undertake the first two phases of the MCEA process. This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; and the preparation of a Project File which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. Generally, these projects include improvements and minor expansions to existing facilities or smaller new projects.

- Schedule 'C' projects have the potential for greater environmental impacts and are subject to the full MCEA process. This includes mandatory consultation with Indigenous Communities, the public and other affected stakeholders as well as relevant review agencies; identifying, assessing, and refining alternative solutions to determine a preferred solution; and preparing the ESR which documents the Class EA process and is placed on the public record for review and comment. If there are no outstanding concerns and the regulatory process has been completed, then the proponent may proceed to implement the project. 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 that is eligible for screening:

"6c. Establish new water storage facilities where the facility is not located in or adjacent to an environmental sensitive natural area, residential or other sensitive land use, or on lands with cultural heritage or archaeological potential".

2.0 Phase 1: Problem and Opportunity Identification

2.1 Problem and Opportunity Statement

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

The drinking water system in the Village of Lansdowne is facing pressure issues, water quality issues, fire flow constraints, and dead ends in the distribution network. The proposed new development will trigger an expansion to the existing treated water storage capacity.

There is an opportunity to ensure that the Township has a solution that will address existing and future constraints on the drinking water storage and distribution system.

2.2 Design Basis

The storage requirements developed as part of Phase 1 are summarized in Table 1. Refer to the Phase 1 Report for the full analysis.

Table 1: Future Water Storage Requirements

Parameter	Existing (2023)	Short-term (2028)	Mid-term (2031)	Long-term (2048)
Equivalent Population	670	983	1,560	4,365
Fire Flow (1) (L/min)	4,000	4,000	8,000 (7)	12,000
Duration (2) (Hours)	2	2	3 (8)	3
A – Fire Storage (3) (m^3)	480	480	1,440	2,160
B – Equalization Storage (4) (m^3)	106	158	250 (9)	700
C – Emergency Storage (5) (m^3)	147	159	423	715
TOTAL STORAGE REQUIREMENT (m^3)	**733**	**797**	**2,113**	**3,575**
EXISTING STORAGE (6) (m^3)	500	500	500	500
DEFICIT (m^3)	**232**	**297**	**1,613**	**3,075**

Table Notes:

(1) Value from Tables 7 and 8 of the Water Supply for Public Fire Protection: A Guide to Recommended Practice in Canada (Fire Underwriters Survey, 2020).
(2) Value from Table 8-1 of the MECP Design Guidelines (2008) based on equivalent service population (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’
(6) Section 8.42 of the MECP Design Guidelines states that the Equalization Volume ‘B’ should be located between the top water level (147.5 m) and the elevation needed to produce a minimum pressure of 40 psi during peak hourly flow (143.5 m). The fire and emergency volumes of A and C should be located between the elevation needed to produce 40 psi under peak hourly flow and the elevation needed to produce a minimum pressure of 20 psi under maximum day plus fire flow conditions (129.6 m).
(7) Assumed to be midway between the short- and long-term requirements.
(8) Assumed to be the same as the long-term requirements.
(9) From the potential future PTTW Maximum Day Demand of 1,000 m^3/d.

As determined in Phase 1, the volume of the existing treated water storage is insufficient to supply the existing and future growth.

3.0 Hydraulic Water Distribution System Model

In Phase 1, the WaterCAD® hydraulic water model developed as part of the Lansdowne Serviced Area Infrastructure Assessment and Growth Readiness Study Update (JLR, May 24, 2022) was updated to reflect existing conditions using more recent data. Existing demands were distributed based on the historical demands, number of units, and proximity of units to nodes as determined through satellite imagery. This process is described in more detail in the Phase 1 report.

The Phase 2 modelling consisted of determining the average day, maximum day, and peak hour demands for the short- and long-term growth periods, then assigning them to nodes in the model. New representative watermains were modelled in assumed locations to connect the existing potable water system to future development areas. Each future development area was modelled as a representative loop with a single demand node.

The development areas and demands were determined based on the growth areas and units identified in Phase 1. The watermains that make up the representative loops to service the future development areas are not considered as upgrades in the model analysis below (i.e., they are included in the short-term and long-term "No Upgrades" scenarios). These watermains are shown in grey on Figure 1 and are listed in Table 5. The locations of these watermains are not finalized, they are only representative, and are included to connect the projected demand for each development to the existing system for modelling and overall assessment purposes. The final layouts will be determined for each development individually when each development project is in its design phase.

The results of the modelling, as described above, are summarized in Table 2, Table 3, and Table 4 under the headings "No Upgrades". These scenarios assess the existing system's capacity to supply adequate water to the existing and future areas without upgrading any existing infrastructure.

Table 2: Percentage of Nodes within Listed Pressure Ranges during Average Day Demand

Pressure Range (kPa)			**Existing**	**Short-Term**		**Long-Term**	
				No Upgrades	With Upgrades	No Upgrades	With Upgrades
	Less than	**276**	0.0%	0.0%	0.0%	0.0%	0.0%
276	up to	**350**	64.0%	60.4%	61.1%	60.4%	57.6%
350	up to	**400**	10.0%	9.4%	9.3%	9.4%	9.1%
400	up to	**450**	26.0%	30.2%	29.6%	30.2%	31.8%
450	up to	**500**	0.0%	0.0%	0.0%	0.0%	1.5%
500	up to and incl.	**552**	0.0%	0.0%	0.0%	0.0%	0.0%
	Greater than	**552**	0.0%	0.0%	0.0%	0.0%	0.0%

Table 3: Percentage of Nodes within Listed Pressure Ranges during Peak Hour Demand

Pressure Range (kPa)			Existing	Short-Term		Long-Term	
				No Upgrades	With Upgrades	No Upgrades	With Upgrades
	Less than	**276**	0.0%	0.0%	0.0%	18.9%	0.0%
276	up to	**350**	64.0%	60.4%	61.1%	43.4%	59.1%
350	up to	**400**	10.0%	9.4%	9.3%	34.0%	19.7%
400	up to	**450**	26.0%	30.2%	29.6%	3.8%	21.2%
450	up to	**500**	0.0%	0.0%	0.0%	0.0%	0.0%
500	up to and incl.	**552**	0.0%	0.0%	0.0%	0.0%	0.0%
	Greater than	**552**	0.0%	0.0%	0.0%	0.0%	0.0%

Table 4: Percentage of Nodes within Listed Fire Flow Ranges during Maximum Day Demand

Available Fire Flow (L/s)			Existing	Short-Term		Long-Term	
				No Upgrades	With Upgrades	No Upgrades	With Upgrades
	Less than	**30**	0.0%	0.0%	0.0%	0.0%	0.0%
30	up to	**45**	2.0%	1.9%	0.0%	1.5%	0.0%
45	up to	**67**	4.0%	3.8%	0.0%	10.6%	0.0%
67	up to	**83**	14.0%	15.1%	9.3%	57.6%	3.0%
83	up to	**100**	28.0%	34.0%	14.8%	15.2%	10.4%
100	up to	**117**	30.0%	24.5%	16.7%	7.6%	23.9%
117	up to	**150**	14.0%	13.2%	35.2%	3.0%	41.8%
150	up to and incl.	**200**	2.0%	1.9%	11.1%	0.0%	11.9%
	Greater than	**200**	6.0%	5.7%	13.0%	4.5%	9.0%

The results show that the available pressures and fire flows generally decrease over the long term as more development occurs. This is most evident in the peak hour scenario, where all nodes are expected to experience at least 276 kPa (40 psi) of pressure until the long term when 18.9% of nodes cannot meet this MECP minimum recommended pressure.

Fire flows exceed the minimum of 45 L/s per the Ontario Building Code (OBC), except for the nodes adjacent to the school. This can be remedied by connecting the dead end watermains at Jessie and Frederick Streets with a new watermain along Ivan Street. This watermain is one of two proposed upgrades to the existing system, shown in red on Figure 1.

During the kick off meeting for this project, OCWA noted that currently there is only a single watermain linking the water source and the distribution system. This leaves the system vulnerable should this pipe break. To address this vulnerability, a new watermain connection between Church Street and Jessie Street is proposed as the second upgrade to the existing system. This upgrade is also shown in red on Figure 1.

In addition to these two upgrades, the Outlet Road development was connected to the existing system at one location in the “No Upgrades” scenario, and at two locations in the “With Upgrades” scenario.

The results of modelling the two upgrades mentioned above, and alternate Outlet Road configuration, is summarized in Table 2, Table 3, and Table 4 under the heading “With Upgrades”. From this data, the proposed watermain upgrades are expected to improve the system’s capacity to support development into the long term by increasing available pressures and fire flows.

The watermain connection between Church Street and Jessie Street improves the reliability of the system and significantly increases the available fire flow throughout the community. With no upgrades, the system maintains a minimum available fire flow of 30 L/s. With upgrades, the minimum available fire flow is raised to 67 L/s.

The upgraded system can also maintain the minimum 276 kPa (40 psi) of pressure in the long term.

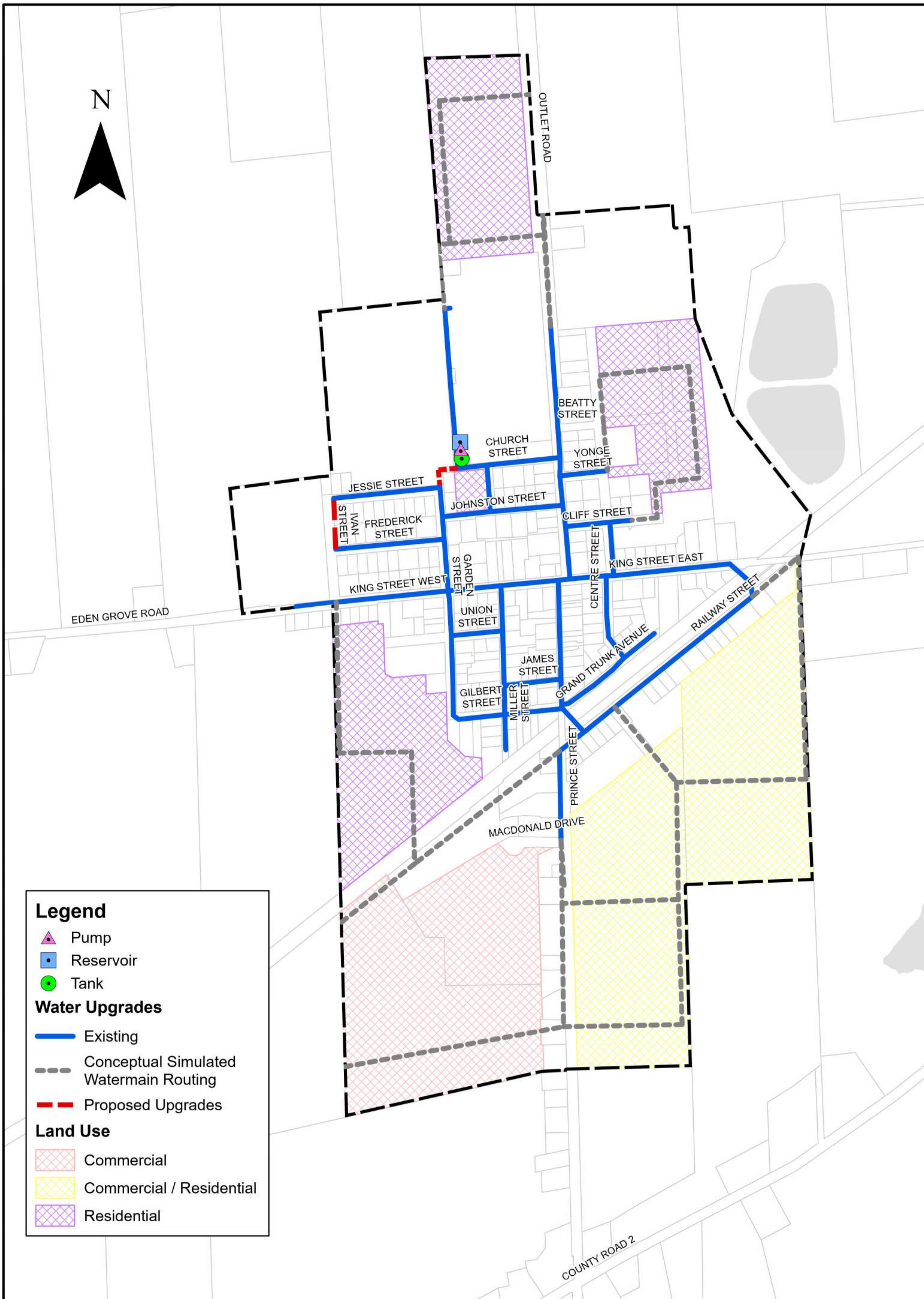
In summary, the model did not identify a need for the hydraulic grade line (HGL) to be raised, so the existing standpipe can continue to maintain the HGL in the future.

Refer to Figure 1 for a depiction of all upgrades discussed in this section. Table 5 summarizes the length and sizing of the proposed upgrades and watermain loops to service new developments. As discussed earlier in this section, the watermains to service future developments are placed as representatives for modelling purposes, and final locations will be determined in the detailed design phase for each project.

Table 5: Summary of Estimated New Watermains

Water Distribution Project	Approximate length (m)	Diameter (mm)
Ivan Street watermain connection	100	200
Watermain connecting Church and Jessie Streets	100	200

Refer to Appendix A for the inputs and outputs of the model.



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

PROPOSED WATER DISTRIBUTION SYSTEM UPGRADES

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #: FIGURE 1

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4.0 Natural Heritage Study

JLR retained Cambium Inc. to conduct a desktop natural heritage study for the municipally owned lands in Lansdowne. Cambium produced a Desktop Natural Heritage Review Memo, dated April 4, 2024. It is included in Appendix B and is summarized in this section.

The desktop review of publicly available data sets identified the following natural heritage and hydrologic features within 120 m of the East Parcel at 1233 Prince St. (Municipal Office) and the West Parcel at 1 Jessie St (Jerry Park).

The East parcel is adjacent to an unnamed tributary of LaRue Mills Creek, woodlands, and wastewater treatment ponds. There may be unmapped wetlands on the eastern portion of this site. There may be potential habitat for species at risk, such as the Bobolink, Eastern Meadowlark, Eastern Wood-peewee, Grasshopper Sparrow, Wood Thrush, and/or Barn Swallow on undeveloped portions of this parcel or in the neighbouring woodlands. A breeding bird study was recommended to be undertaken if construction is proposed on the unmanicured portion of the East parcel.

The West parcel may be adjacent to lands with agricultural buildings that may provide nesting habitat for the Barn Swallow, but otherwise consists of manicured land that is “not constrained by natural heritage features”.

If vegetation needs to be cleared on either site, it should occur outside the breeding bird season of March 31 to August 31. If clearing or construction must occur during this period, “vegetation should be investigated by a qualified biologist to confirm if any active nests are present, prior to site alteration.” Vegetation clearing can proceed if there are no active nests. Active nests must be left undisturbed “until young have fledged or the nest is determined to be inactive.”

5.0 Phase 2: Identification and Evaluation of Alternative Solutions

5.1 Evaluation Methodology

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 alternative solutions.
- Detailed evaluation of screened alternative solutions.
- Selection of a preferred alternative solution.

5.2 Initial Screening of Alternative Solutions

The initial screening process considers the overall feasibility of the potential alternative solutions and identifies which alternatives fully address the Problem/Opportunity Statement as identified in the Phase 1 Report. This ensures that unsuitable alternatives are not carried forward to the detailed evaluation.

As discussed in Section 2.0, new potable water storage is required to service Lansdowne into the long term. Alternative potable water storage solutions will need to consider the location and configuration (i.e. type) of new storage, and whether the existing standpipe should be decommissioned or maintained. These solutions were developed for the initial screening process, as listed in Table 6.

Table 6: Alternate Solutions

Solution Category	Alternate Solutions Identified
Approach	Approach 1: Do Nothing
	Approach 2: Decommission Existing Standpipe and Build New Storage
	Approach 3: Maintain Existing Standpipe and Build New Storage
Location	Location 1: East Parcel at 1233 Prince St. (Municipal Office)
	Location 2: West Parcel at 1 Jessie St. (Jerry Park)
Configuration	Configuration 1: Below-Grade Reservoir with Pumping Station
	Configuration 2: At-Grade Reservoir with Pumping Station
	Configuration 3: Elevated Storage Tank
	Configuration 4: Standpipe

5.2.1 Approach

5.2.1.1 Approach 1: Do Nothing

The 'Do Nothing' approach examines what may occur if none of the alternatives are implemented. **It is carried forward to detailed evaluation as a comparison and baseline.**

5.2.1.2 Approach 2: Decommission Existing Standpipe and Build New Storage

Approach 2 involves the decommissioning of the existing standpipe and building new storage to accommodate a total volume of 3,575 m^3. Costs incurred include the construction of a storage option that is much larger than the other approaches, in addition to the decommissioning of the existing standpipe. The existing standpipe was recoated and relined in 2018.

The water model results demonstrated the existing standpipe's ability to continue to provide storage and pressure to the system, i.e., the HGL will be maintained in the long-term scenario. Decommissioning the standpipe would result in unnecessary and prohibitively high costs. Therefore, it is recommended this approach is not carried forward to detailed evaluation.

5.2.1.3 Approach 3: Maintain Existing Standpipe and Build New Storage

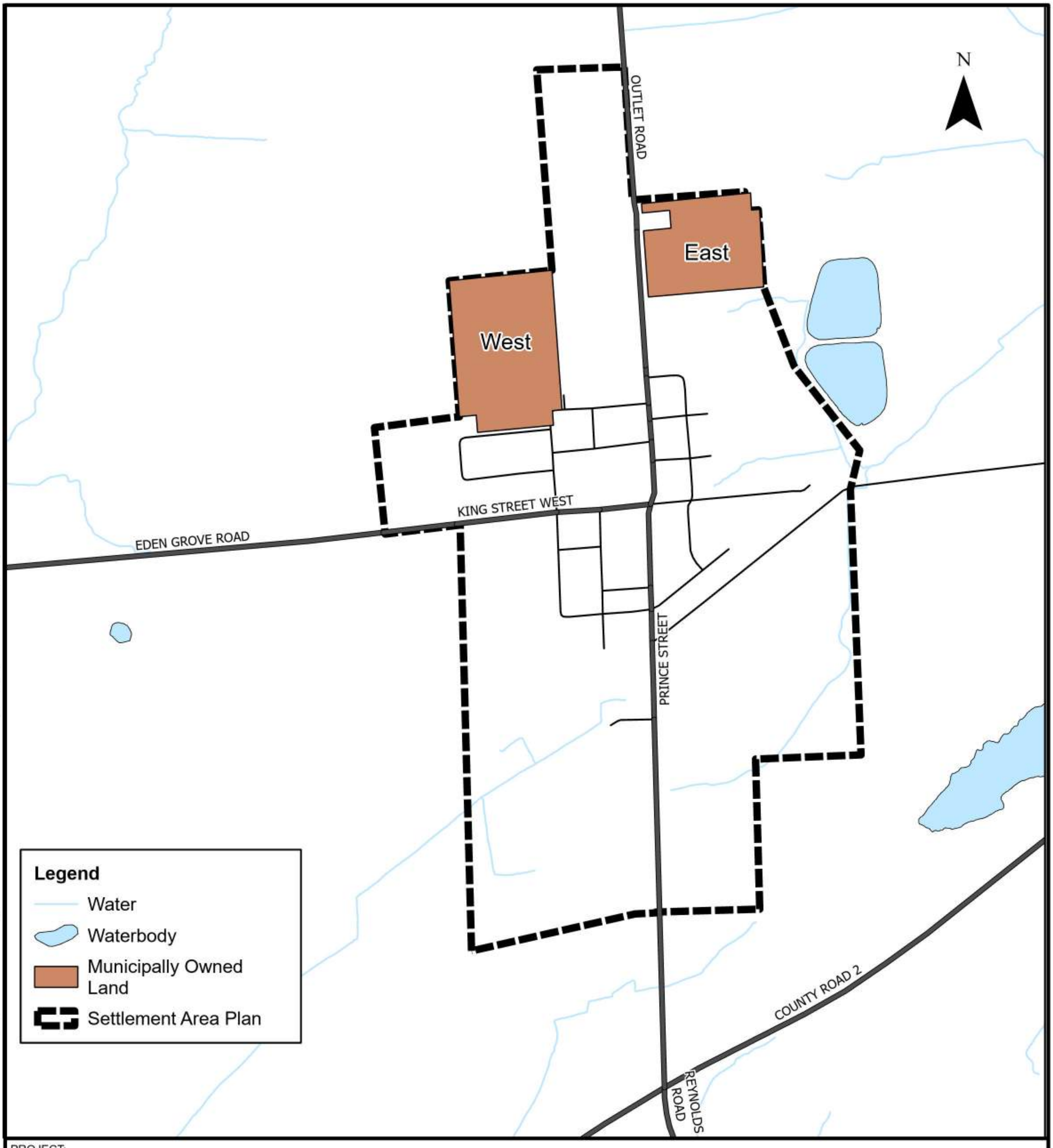
Approach 3 will involve the construction of a new water storage facility to make up the storage volume deficiency identified in Section 2.2. This storage will be at one of the locations described below in Section 5.2.2, of the type described in Section 5.2.3.

The existing standpipe will be maintained, with the new storage constructed to accommodate an additional 3,075 m^3. The cost of this solution is limited to the construction of the smaller (compared to Approach 2) storage system, including connections to the existing water infrastructure.

This approach addresses the storage capacity limitations in the system and is therefore recommended to be carried forward for detailed evaluation.

5.2.2 Potential Storage Locations

In consultation with the Township, it was determined that the potential storage solution will be located on one of two land parcels owned by the Township. They are depicted in Figure 2 below.



PROJECT:

TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

VILLAGE OF LANSDOWNE

DRAWING:

MUNICIPALLY OWNED LAND

J.L.Richards
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DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #:

FIGURE 2

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5.2.2.1 Location 1: East Parcel

The East Parcel is located at 1233 Prince St. and is approximately 15 acres in area. It is located northeast of the existing standpipe, on the eastern side of Prince Street. It contains the Municipality's offices and associated parking lot, with some undeveloped land.

A tributary of LaRue Creek and woodlands are located on the lands adjacent to this parcel. Any development should maintain a 30 m setback from this tributary and the Cataraqui Region Conservation Authority (CRCA) will need to be consulted to determine if a permit is required. The parcel also contains unmanicured lands that may contain grassland habitat suitable for the life processes for some Species at Risk (SAR) known to inhabit the area (Cambium, 2024). A breeding bird study would be required to determine if bird SAR are present on the site. There may also be unmapped wetland on this parcel, which would need to be confirmed through a field review.

Due to the distance from the existing watermain, and potential impact on possible natural heritage features, this location is not recommended to be carried forward for detailed evaluation.

5.2.2.2 Location 2: West Parcel

The West Parcel is located at 1 Jessie St. and is approximately 20.5 acres in area. It is located directly west of the existing standpipe, in the northwestern corner of the Jessie St. and Garden St. intersection. It contains the Lansdowne Community Building, two baseball diamonds, a pavilion, paved recreational areas including tennis courts, and a significant amount of green space. It houses one of the well buildings and is immediately west of the second well building. The land is directly bordered on the east by existing watermain.

The Cambium desktop study found that the West Parcel is "not constrained by natural heritage features as it is primarily a manicured park." Therefore, new construction on this site is "not anticipated to result in negative impacts to natural heritage features." (Cambium, 2024).

Due to its minimal impact on natural heritage and proximity to the existing infrastructure, this is a feasible location for the storage solution. It is recommended to be carried forward for detailed evaluation.

5.2.3 Potential Storage Configurations

Water storage is typically built in one of four configurations:

- a below-grade reservoir with a pumping station,
- an at-grade reservoir with a pumping station,
- an elevated storage tank,
- 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.

5.2.3.1 Configuration 1: Below-Grade Reservoir with Pumping Station

Below-grade reservoirs are constructed underground, then covered by earth and vegetation. This hides the reservoir from view, which improves visual aesthetics. However, excessive costs can be incurred depending on the depth of bedrock. This also enables the reservoir to have two or more cells that can be taken offline independently, which allows for maintenance or inspection activities to proceed without losing the facility's entire storage capacity. These reservoirs are typically constructed with concrete.

The associated pumping station can be to be at-grade or below-grade, but at-grade buildings are more operator friendly and are typically used. The usage of a pumping station increases the complexity of this solution relative to others, such as an elevated tower. It incurs higher operational and maintenance costs. The new pumping station would require redundant pumping capacity to allow flexible operations if a pump is removed from service for routine maintenance or a potential equipment failure.

Pumping capacity is also required to meet the full range of everyday domestic demands up to fire protection demands. Maintaining a constant, adequate water distribution system pressure requires higher electrical consumption from continual pump operation. The pumping station will also require 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 configurations considered.

Due to the need for more storage rather than a raised HGL in Lansdowne, this configuration is recommended to be carried forward to detailed evaluation.

5.2.3.2 Configuration 2: At-Grade Reservoir with Pumping Station

At-grade reservoirs are typically made of coated/glass-fused-to steel. Glass-fused-to-steel tanks are preferred due to ease of installation, longevity, lower maintenance, and lower cost. During maintenance or inspection, all storage capacity is unavailable since there are no internal baffles that would allow some capacity to remain in service.

However, these reservoirs can be constructed in phases. Instead of constructing a large reservoir to meet the entire storage required to supply the long term, an initial reservoir module can be constructed that meets the short and mid-term needs. As the water storage needs increase in the long term, a second phase of construction can commence, where a second module is added to the short-term storage to increase its capacity to satisfy long-term requirements. This is a cost-effective method that prevents storage from being unused in the short term, which may cause water quality issues, and allows for flexibility in timing in case developments do not proceed as projected.

The footprint of an at-grade steel tank is flexible, as there are a wide variety of diameters and heights available. This means they usually occupy less space than a below-grade reservoir of comparable volume. The cost of at-grade reservoirs is also less depending on the bedrock depth than that of a below-grade reservoir. Therefore at-grade reservoirs have slightly lower capital and life cycle costs compared to a below-grade reservoir.

Like a below-grade reservoir, an at-grade reservoir configuration requires pumping station infrastructure. As discussed in Configuration 1, these operational and maintenance costs are higher than that of an elevated tank, due to their higher complexity.

Due to the need for more storage rather than a raised HGL in Lansdowne, and the flexibility of a phased modular construction, this configuration is recommended to be carried forward to detailed evaluation.

5.2.3.3 Configuration 3: Elevated Storage Tank

Composite elevated tanks are located at the top of a support structure such as a pedestal. The water level in the elevated tank sets the pressure in the water distribution system. The 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. Therefore, the diameter determines the functional capacity. No additional pumping station is required to maintain the head beyond the existing well pumps that fill the elevated tank.

An elevated tank needs lower operation and maintenance requirements when compared to a continually operating pumping station as discussed in the previous sections. This contributes to most of the difference in capital and life cycle costs between a below- or at-grade reservoir and an elevated tank. However, the cost of a composite elevated tank is significantly higher than a standpipe. For Lansdowne, the cost to construct an elevated tower will be more than $8 million. The steel tank is expected to require recoating approximately every ten years.

The Lansdowne system's HGL can be provided by the existing standpipe. Elevated storage tanks have a significant visual impact and capital investment. As such, it is recommended this configuration not be carried forward to detailed evaluation.

5.2.3.4 Configuration 4: Standpipe

Standpipes are storage tanks constructed at ground level to a height that will provide adequate system pressure in the operating range. They are entirely filled with water, i.e., for the entire height. They can be made of glass-fused-to-steel or coated steel. As with the other configurations, glass-fused-to-steel tanks are easier to install, last longer, and require less maintenance.

The taller design of a standpipe allows for water above the operating range to provide gravity-fed pressure, and chlorine contact time, if it is located before users in 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.

The Lansdowne drinking water distribution system already has a standpipe, which will be maintained as determined in the initial screening of the Approaches. Therefore, the construction of a second standpipe is unnecessary, as this configuration does not offer any additional benefits to the system without decommissioning the existing standpipe.

Since the system's HGL can be provided by the existing standpipe, it is recommended this configuration not be carried forward to detailed evaluation.

5.2.1 Summary of Initial Screening

A summary of the results of the initial screening described above is provided in Table 7.

Table 7: Results of the Initial Screening of Solutions

Solution Category	Alternate Solutions Identified	Initial Screening Result
Approach	Approach 1: Do Nothing	✓ Carried forward as baseline.
	Approach 2: Decommission Existing Standpipe and Build New Storage	× Unnecessary and high costs. Not carried forward.
	Approach 3: Maintain Existing Standpipe and Build New Storage	✓ Feasible solution. Carried forward.
Location	Location 1: East Parcel	× Not carried forward.
	Location 2: West Parcel	✓ Feasible solution. Carried forward.
Configuration	Configuration 1: Below-Grade Reservoir with Pumping Station	✓ Feasible solution. Carried forward.
	Configuration 2: At-Grade Reservoir with Pumping Station	✓ Feasible solution. Carried forward.
	Configuration 3: Elevated Storage Tank	× Unnecessary, inflexible, and high costs. Not carried forward.
	Configuration 4: Standpipe	× Unnecessary, inflexible, and high costs. Not carried forward.

5.3 Potable Water Storage Servicing Options

The solutions remaining after the initial screening process described above are:

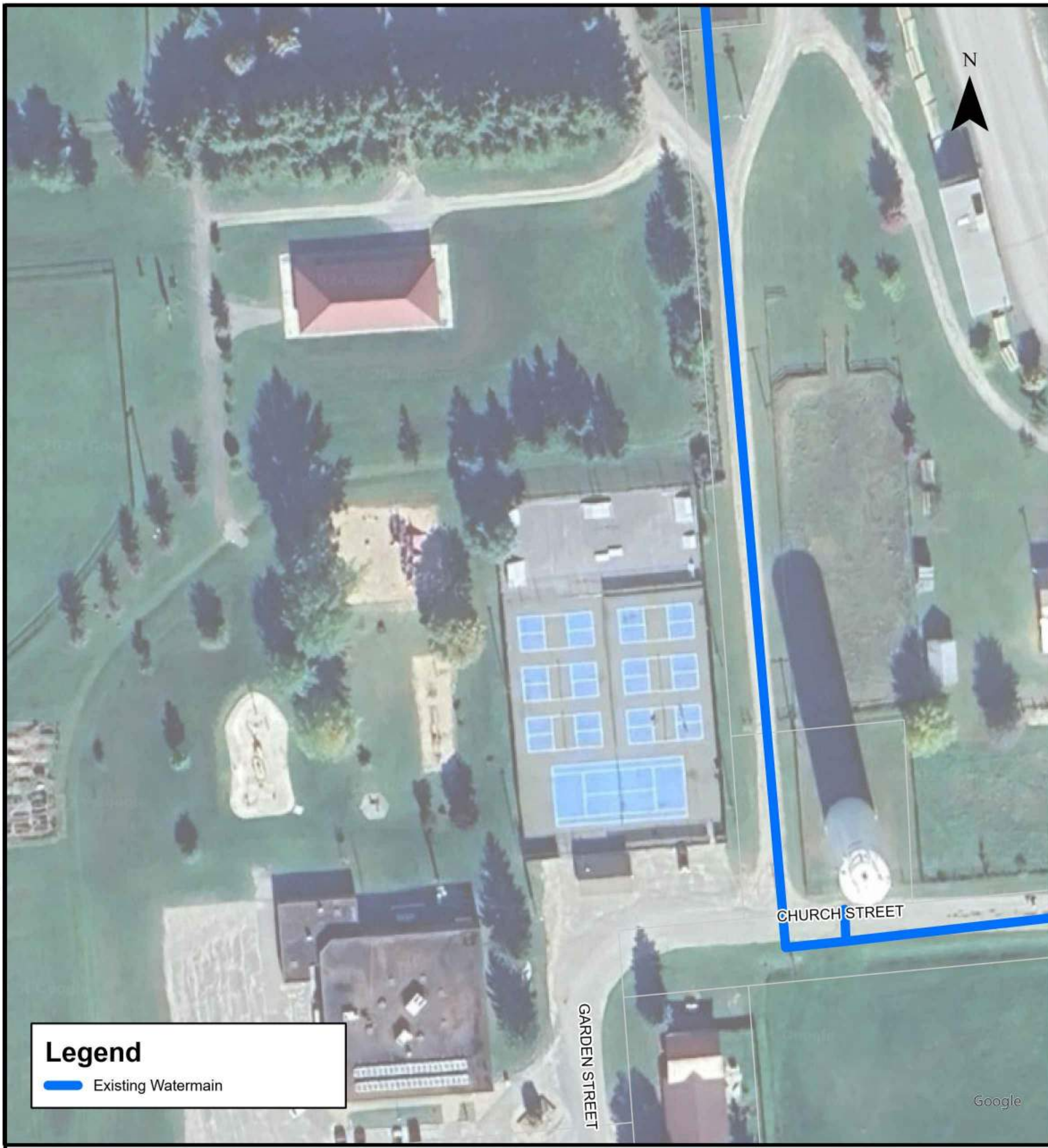
- Approach 1: Do Nothing
- Approach 3: Maintain Existing Standpipe and Build New Storage
- Location 2: West Parcel
- Configuration 1: Below-Grade Reservoir with Pumping Station
- Configuration 2: At-Grade Reservoir with Pumping Station

These solutions can be combined into the following options:

- Option 1: Do Nothing
- Option 2: Maintain Existing Standpipe and Build a Below-Grade Reservoir on the West Parcel
- Option 3: Maintain Existing Standpipe and Build an At-Grade Reservoir on the West Parcel

Refer to Figure 3, Figure 4, and Figure 5 for illustrations of these options.

File Location: \\jlrichards\Corp\Projects\31000\31681-001 - Lansdowne Standpipe EA and Design\3-Production\7-Plan\31681_EA_Figures\31681_EA_Figures.aprx



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

OPTION 1: DO NOTHING

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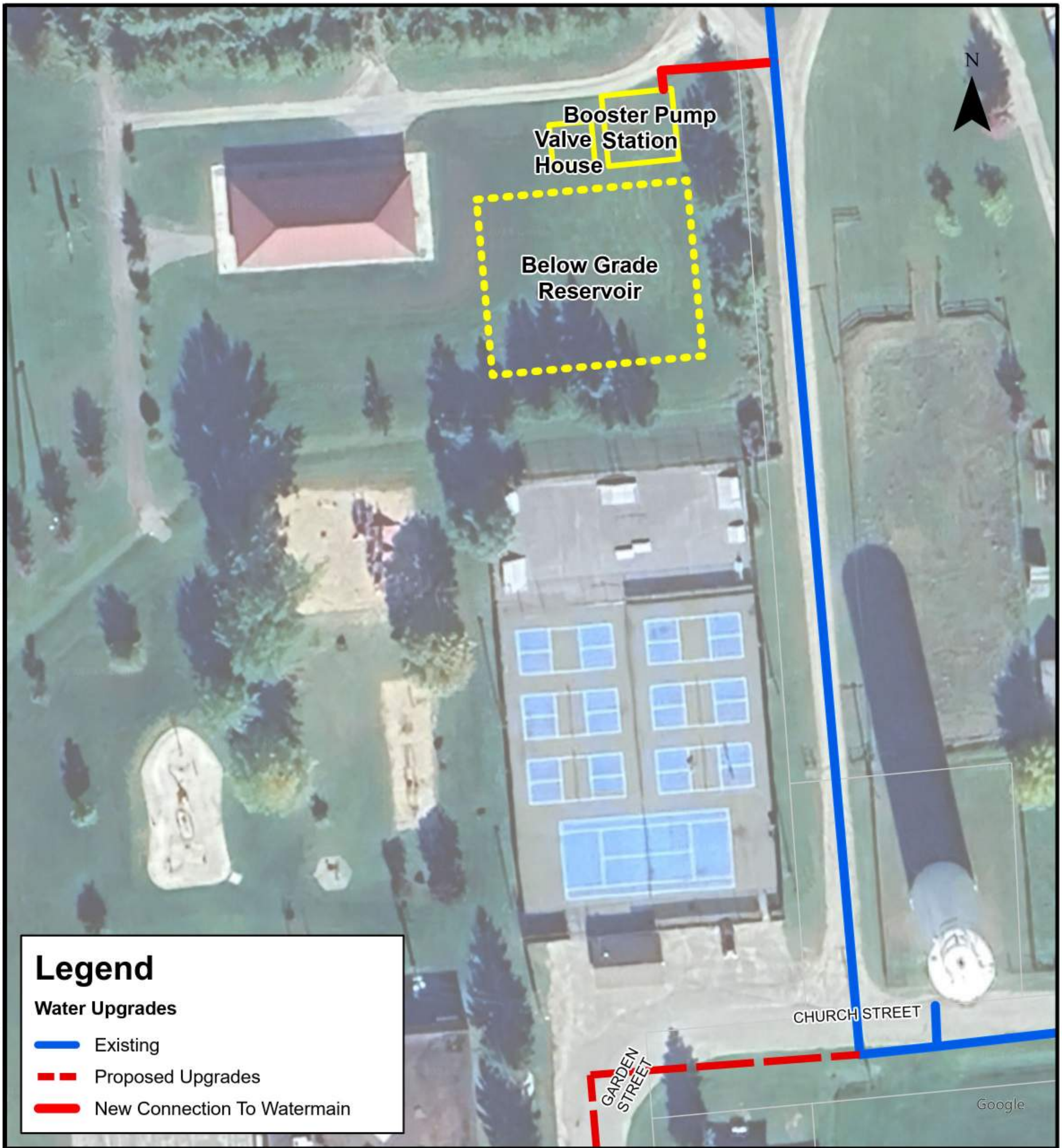
DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #:

FIGURE 3

Plot Date: April 24, 2024 2:58 PM



File Location: P:\31000\31681-001 - Lansdowne Standpipe EA and Design\3-Production\7-Plan\31681_EA_Figures\31681_EA_Figures.aprx

PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

OPTION 2: BELOW GRADE RESERVOIR

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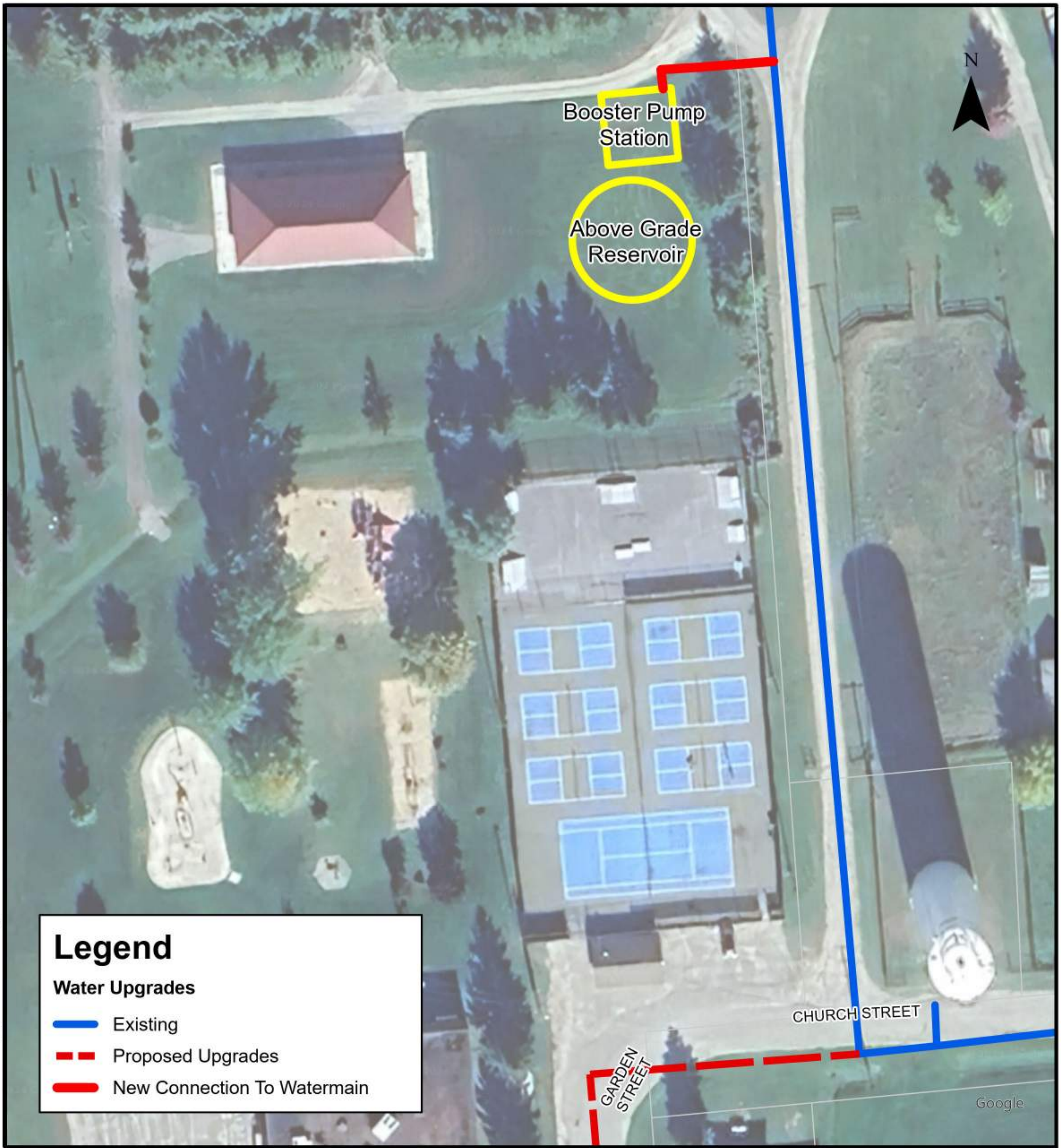
DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #:

FIGURE 4

Plot Date: March 28, 2024 2:50 PM



PROJECT:

VILLAGE OF LANSDOWNE, TREATED WATER STORAGE FACILITY SCHEDULE B MUNICIPAL CLASS EA

DRAWING:

OPTION 3: ABOVE-GRADE RESERVOIR

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DESIGN:	CK
DRAWN:	CK
CHECKED:	AG
JLR #:	31681-001

DRAWING #:

FIGURE 5

File Location: P:\31000\31681-001 - Lansdowne Standpipe EA and Design\3-Production\7-Plan\31681_EA_Figures\31681_EA_Figures.aprx

Plot Date: March 28, 2024 2:49 PM

5.4 Detailed Evaluation and Selection of Alternative Solutions

Based on the initial screening process, a detailed assessment of the shortlisted alternatives was conducted. Evaluation criteria were developed based on a review of the background information, experience on similar assessments, stakeholder comments, and consultation with Township staff. The evaluation was conducted using criterion in the following five categories:

- Natural Environment
- Climate Change Resiliency
- Social, Cultural, and Heritage Environment
- Technical Feasibility
- Financial Considerations

The relative level of impact of each potential alternative solution on each criterion is assessed based on the color weighting system summarized in Table 8. The relative impact for each criterion to each potential alternative solution was assessed based on whether the alternative solution is 'Preferred', 'Less Preferred', or 'Least Preferred' with respect to that criterion. 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.

Table 8: Detailed Screening Impact Level Colouring System

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

The evaluation criteria are described in Table 9 below. The five (5) major criteria were assigned equal weights as they were considered to have equal importance in this evaluation at the Class EA stage.

Table 9: Summary of Evaluation Criteria

Major Criteria	Description
Natural Environment	Impacts on natural features, water, and wildlife. • Proximity to and impact on natural areas, terrestrial ecosystems, and wetlands. • Effect of construction and operations on aquatic and terrestrial species & habitat, including species at risk. • Effect on ground and/or surface water quality. • Effect on ground and/or surface water quantity.
Climate Change Resiliency	Mitigation of impacts on climate change and resiliency to impacts of change. • Effects of climate change (e.g., impact of extreme weather events on water storage, such as pumps). • Ability to mitigate climate change effects (e.g., contribution to greenhouse gas (GHG) emissions, impacts on carbon sinks). • Ability to adapt to climate change impacts, i.e., resiliency and security of infrastructure.
Social, Cultural, and Heritage Environment	Impacts on the social environment, including archaeological resources, areas of archaeological potential, known and potential built heritage resources, cultural heritage landscapes, and planning. • Impacts on Indigenous communities and lands, and/or way of life. • Impacts to Lansdowne residents, institutions, businesses, and public resources (ex. parks). • Impacts of location and storage type on visual aesthetic. • Effect of noise and/or vibration from construction. • Impacts of location on archeological, cultural, and built heritage resources and/or areas. • Impacts of location on existing and future land use planning.
Technical Feasibility	Constructability, maintaining or enhancing water quality, reliability and security of drinking water system, climate change adaptation and resiliency, and approvals framework of the option. • Ability to expand infrastructure to best service future development. • Constructability. • Ease of operation and maintenance. • Impacts to public health and safety including fire fighting.
Financial Considerations	Financial costs incurred by the option. • Estimated capital cost. • Estimated operation & maintenance costs.

Table 10: Detailed Evaluation of Alternative Solutions

	Option 1: Do Nothing / Status Quo	Option 2: Maintain Existing Standpipe and Build a Below-Grade Reservoir on the West Parce	Option 3: Maintain Existing Standpipe and Build an At-Grade Reservoir on the West Parcel
Natural Environment	• No impact on natural areas, terrestrial ecosystems, and wetlands. • No construction and operational impact. • No effect on ground and/or surface water.	• West parcel is mostly developed and manicured space, so project will not increase impacts. • Construction and operations not anticipated to have a negative impact on aquatic and terrestrial species & habitat. • West parcel is in the WHPA-A zone, but no threat expected from below grade reservoir, though the increased excavation, backfill and construction poses risks to natural environment.	• West parcel is mostly developed and manicured space, so project will not increase impacts. • Construction and operations not anticipated to have a negative impact on aquatic and terrestrial species & habitat. • West parcel is in the WHPA-A zone, but no threat expected from at grade reservoir. This option represents less excavation, backfill and construction compared to Option 2.
Evaluation	**Preferred**	**Least Preferred**	**Less Preferred**
Climate Change Resiliency	• No infrastructure to be impacted by climate change. However, not enough water storage available to mitigate climate change impacts on the community such as floods, drought, and fires. • Does not produce greenhouse gases or impact carbon sinks. • Endangers the resiliency and security of the Lansdowne community due to inadequate water storage for fires.	• Reservoirs located underground may be more resilient to extreme weather, except flooding which is likely. • Some GHG production from pump and other power usage. • Significant GHG production from concrete material production and installation (i.e., embodied carbon). • Improves water system resiliency with additional storage.	• Reservoirs located above ground may be more vulnerable to extreme weather. Extreme cold can cause ice formation but mitigable through mixers. • Some GHG production from pump and other power usage. • Considerable GHG production from glass-fused-to-steel tank manufacturing. • Improves water system resiliency with additional storage.
Evaluation	**Least Preferred**	**Less Preferred**	**Preferred**
Social, Cultural and Heritage Environment	• No impact on Indigenous communities, visual aesthetic, noise, vibration, or local archaeological, cultural, and heritage resources. • Lansdowne residents negatively impacted due to lack of storage. • Land use planning negatively impacted due to inability to support future growth.	• No impacts on Indigenous communities and lands, and/or way of life. • Positive impact from water storage on quality of life and fire fighting (public health and safety). • Some disruption to park area possible during construction. • Smaller visual impact due to reservoirs being underground. • More noise and vibration due to excavation, concrete forming and backfill. • No impact on archeological, cultural, and built heritage resources. • On municipally owned land, close to existing infrastructure.	• No impacts on Indigenous communities and lands, and/or way of life. • Positive impact from water storage on quality of life and fire fighting (public health and safety). • Some disruption to park area possible during construction. • Moderate visual impact from reservoirs being above ground. • Less noise and vibration from construction due to prefabrication of reservoir materials. • No impact on archeological, cultural, and built heritage resources. • On municipally owned land, close to existing infrastructure
Evaluation	**Least Preferred**	**Less Preferred**	**Preferred**
Technical Feasibility	• Unable to service future development. • No construction, operation, or maintenance required. Negative impacts to public health and safety including fire fighting.	• Sized to accommodate future equalization, fire, and emergency storage. • Below grade more expensive to construct. Highly dependent on bedrock and water table. • Storage volume can be made available during maintenance through constructing more than one cell. Additional storage supports public health and safety, including fire fighting capacity.	• Sized to accommodate future equalization, fire, and emergency storage. • At-grade reservoir is relatively easy to construct. • At-grade reservoir volume not available during maintenance. • Can build in phases as community grows. • Additional storage supports public health and safety, including fire fighting capacity.
Evaluation	**Least Preferred**	**Less Preferred**	**Preferred**
Financial Considerations	• No construction or maintenance costs associated with this option. • Development will be limited to current capacity, i.e., loss of revenue from developers, user fees, connection fees, etc. • Costs may be incurred from failure to supply system with adequate water, such as by trucking in water for firefighting.	• Construction cost for below-grade reservoir is the most expensive. • Booster pumping station cost will be the same as Option 3	• Construction cost for at-grade reservoir is the least expensive. • Booster pumping station cost will be the same as Option 2
Evaluation	**Less Preferred**	**Least Preferred**	**Preferred**
Overall Evaluation	**Least Preferred**	**Less Preferred**	**Preferred**

6.0 Project Description

6.1 Project Overview

The preferred solution, as determined through the detailed evaluation summarized in Table 10, is Option 3: Maintain Existing Standpipe and Build an At-Grade Reservoir on the West Parcel. This option consists of constructing an at-grade reservoir in Jerry Park, to the east of the pavilion. The existing standpipe will be maintained at its current location.

The at-grade reservoir consists of a concrete base to support the glass-fused-to-steel tank. The at-grade reservoir can be built in two phases as the growth occurs in Lansdowne. A summary of the proposed reservoir characteristics is summarized in Table 11.

- The first phase of the project will enable the Village to grow until the demand on the system reaches the updated PTTW capacity of 1,000 m^3/d, as listed in Table 1. A new reservoir with a capacity of 1,700 m^3 will be constructed, along with the associated foundation, mixing system, booster pumping station, re-chlorination system, connection to the existing watermain, and other supporting features.

- The second phase will support long-term growth. The reservoir will be expanded vertically to accommodate a total storage of 3,087 m^3.

- The existing standpipe will continue to be inspected and maintained such that it can provide the required hydraulic grade line and additional storage. As discussed in Phase 1, it was recommended that the existing standpipe have the manway hatch replaced, and a new fitting be installed so the standpipe mixer's power cable can pass through the side of the standpipe.

- The proposed new water storage reservoir will add significantly more volume to the system. The daily water turnover of the combined water storage facilities will need to be carefully considered during detailed design and operation of the system to avoid water quality issues. The recommended water turnover by US EPA is between 3 to 5 days at the starting point.

Table 11: Proposed At-Grade Reservoir Characteristics

Parameter	Phase 1	Phase 2
Net Volume	1,700 m^3	3,087 m^3
Side Water Depth	7.65 m	13.6 m
Reservoir Diameter	17.2 m	
Freeboard	300 mm	
Mixing System	Active Mixer	

6.2 Opinion of Probable Costs

The following table provide the Opinion of Probable Costs for the proposed upgrades that were outlined previously. The Opinion of Probable Costs (OPC) were completed using a 2024-dollar value. An OPC with a Class 'D' (Indicative Estimate) level of accuracy was developed for each alternative 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 experience on similar projects, professional judgment, and equipment costs provided by suppliers. Design completed as part of this Master Plan is conceptual in nature for the purpose of obtaining Class 'D' cost estimates. All design parameters should be confirmed during the upcoming 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 Municipality of any conditions which JLR believes may cause such variation upon delivery of the estimate.

Table 12: Opinion of Probable Costs

	Phase 1	Phase 2	Total
At-grade Reservoir Design, Supply and Install	$1,100,000	$1,500,000	$2,600,000
Prefabricated Booster Station (incl. yard works, washroom, control room, chlorine system)	$1,500,000	$300,000	$1,800,000
New Watermains	$360,000	-	$360,000
SUB-TOTAL	$2,960,000	$1,800,000	$4,760,000
Engineering (10%)	$296,000	$180,000	$476,000
SUB-TOTAL	$3,256,000	$1,980,000	$5,236,000
Contingency (30%)	$976,800	$594,400	$1,570,800
ROUNDED PROJECT TOTAL	**$4,300,000**	**$2,600,000**	**$6,900,000**

6.3 Project Schedule and Implementation

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

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

6.4 Permits and Approvals

Several 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.

6.5 Considerations and Mitigation Measures

6.5.1 Natural Heritage

The desktop study determined that the parcel of land selected for construction is not constrained by natural heritage features. Construction and operation of the at-grade reservoir on this site is “not anticipated to result in negative impacts to natural heritage” (Cambium, 2024).

If vegetation needs to be cleared on the site, it should occur outside the breeding bird season of March 31 to August 31. If clearing or construction must occur during this period, “vegetation should be investigated by a qualified biologist to confirm if any active nests are present, prior to site alteration.” Vegetation clearing can proceed if there are no active nests. Active nests must be left undisturbed “until young have fledged or the nest is determined to be inactive.”

Refer to the report prepared by Cambium in Appendix B for further details.

6.5.2 Source Water Protection

Cataraqui Conservation provided the New Requirements for Municipal Drinking Water System Owners (August 2018) document as guidance. This regulation applies for a new municipal residential drinking water system, or changes to an existing municipal residential drinking water system located in a source protection area such as new or modified wells, and new or modified surface water intakes. These changes are not being proposed to the Lansdowne Drinking Water System in this Class EA, so this regulation does not apply.

The Wellhead Protection Areas (WHPAs) in Lansdowne are depicted in Figure 6 below (from CRCA SPP). The parcel selected for construction is within the WHPA-A zone of Lansdowne's southernmost well.

Constructing new above-grade water storage is not a Prescribed Drinking Water Threats activity. However, the handling and storage of fuel is a Prescribed Drinking Water threat, and this activity may be needed to power the reservoir or booster pumping station. This is one of the most common drinking water threats within this zone.

The SPP dictates that a risk management plan is required for the storage of more than 250 L of liquid fuel in WHPA-A zones within Lansdowne. The storage of more than 2,500 L of liquid fuel is prohibited. These restrictions should be considered when establishing fuel storage for the storage system's back up generator.

6.5.3 Cultural Heritage

Cultural heritage resources include archaeological resources, built heritage resources, and cultural heritage landscapes.

6.5.3.1 Archaeological Resources and Potential

The Ministry of Citizenship and Multiculturalism (MCM) provides a screening checklist to determine whether the study area has archaeological potential.

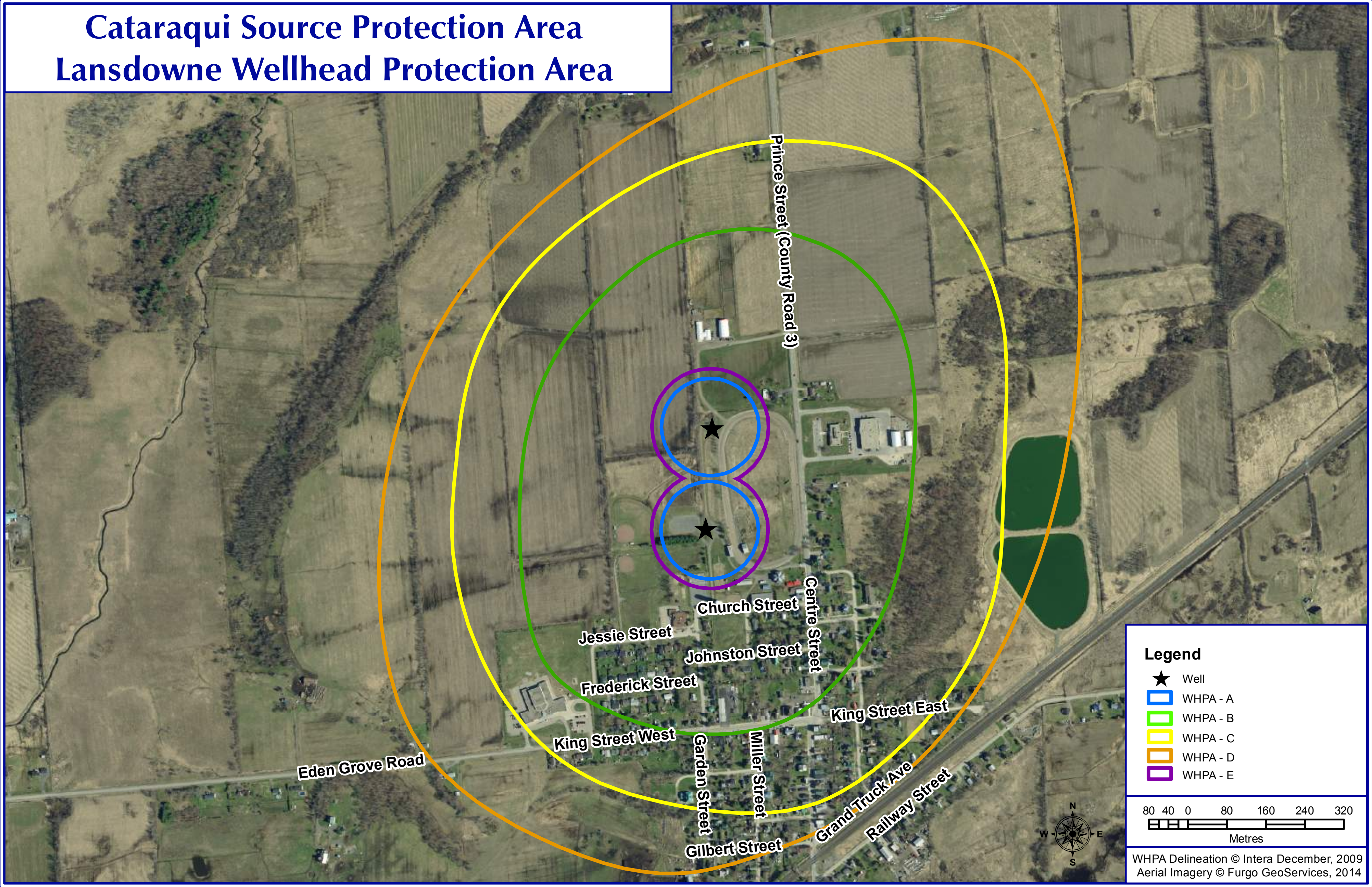
Consultation with the MCM through the screening process confirmed there are no reported archaeological sites within 300 m of the municipally owned land in Lansdowne.

As the East parcel contains developed (i.e., manicured lawn) it is unlikely to contain archaeological resources and will not require further assessment.

6.5.3.2 Built Heritage Resources and Cultural Heritage Landscapes

The Ministry of Citizenship and Multiculturalism (MCM) provides a screening checklist to determine whether the study area has built and cultural heritage potential. This process determined that the property has low potential for built or cultural heritage so a cultural heritage evaluation report (CHER) will not be required.

Cataraqui Source Protection Area
Lansdowne Wellhead Protection Area



WHPA Delineation © Intera December, 2009
Aerial Imagery © Furgo GeoServices, 2014

INTERA GEOSCIENCES & ENGINEERING

Ontario

Made possible through the support of the Government of Ontario.

CATARAQUI REGION CONSERVATION AUTHORITY

7.0 Public and Agency Consultation

Effective consultation is key to successful environmental assessments; it can generate meaningful dialogue between project planners and stakeholders such as the public, review agencies, and other interest groups.

A Public Consultation Plan was developed at the start of this Class EA, which included a project mailing list that identified stakeholders. The mailing list was updated throughout the Class EA as stakeholders requested to be added or removed.

A Notice of Project Initiation was published in the local newspaper, on the Town's website and distributed to potential stakeholders at the start of the Class EA.

A Public Information Centre (PIC) after the completion of Phase 2 work was held in Lansdowne on June 19, 2024. Stakeholders were notified through a Notice of Public Information Centre. Approximately fifteen members of the public attended the PIC, which included a presentation and question & answer session.

Refer to Appendix C for consultation activities during this Class EA.

7.1 Public Consultation

Table 13 below provides a summary of public comments received regarding this Class EA. Refer to Appendix C5 for written correspondence received from the public.

Table 13: Public Stakeholder Comments

Stakeholder	Comment	Action
Public email response to NoC	Expressed concern that growth projections were an overestimate and the resulting increased servicing costs would affect ratepayers.	Acknowledged.
Public email response to NoC	Concern regarding the funding of this project, water quality, and the need for new storage.	Acknowledged.

7.2 Agency and Developer Consultation

Table 14 provides a summary of agency and developer comments received regarding this Class EA. Refer to Appendix C5 for written correspondence from these groups.

Table 14: Review Agency and Developer Comments

Agency/Developer	Comment	Action
Ministry of Environment, Conservation, and Parks (MECP)	Provided guidance in letter	Reviewed.

Agency/Developer	Comment	Action
Cataraqui Conservation Authority	Provided guidance in letter. Requested information after PIC.	Reviewed, sent PIC materials.
Ministry of Citizenship and Multiculturalism	Provided guidance in letter. Requested status of any studies.	Reviewed. Screening forms completed. Confirmed no studies were identified as being required through the screening process.
Hydro One	Confirmed Hydro One has existing distribution assets within the study area and requires consultation throughout the project.	Noted.
Upper Canada Properties (Developer)	Expressed interest in the project and requested to be added to the mailing list.	Added to mailing list.

7.3 Indigenous Consultation

The following Indigenous communities were identified by the MECP, in their response to the Notice of Commencement, as requiring consultation during this Class EA. These communities were included in the notification mailing lists throughout the Class EA.

- Williams Treaties Communities
  - Alderville First Nation
  - Curve Lake First Nation
  - Hiawatha First Nation
  - Mississaugas of Scugog Island First Nation
- Mohawks of the Bay of Quinte
- Kawartha Nishnawbe

Table 15 provides a summary of comments from these Indigenous communities regarding this Class EA.

Table 15: Indigenous Comments and Consultation

Stakeholder	Comments	Actions
No comments from Indigenous communities as of present date.		

8.0 References

Desktop Natural Heritage Review of Two Potential Water Storage Facilities in the Village of Lansdowne, Ontario (Cambium, 2024).

9.0 Limitations

This report has been prepared by J.L. Richards & Associates Limited for the Township's exclusive use. Its discussions and conclusions are summary in nature and cannot properly be 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 is based on information, drawings, data, or reports provided by the named client, its agents, and certain other suppliers or third parties, as applicable, and relies upon the accuracy and completeness of such information. Any inaccuracy or omissions in information provided, or changes to applications, designs, or materials may have a significant impact on the accuracy, reliability, findings, or conclusions of this report.

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Appendix A

Water Model Inputs and Results

Appendix B

Desktop Natural Heritage Review (Cambium, 2024)

Appendix C

Consultation Summary

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