MEMO

To:	Cam Elsby, P.Eng. (City of Ottawa)	From:	Stantec Consulting Ltd.
Stantec Project:	163402031 – City of Ottawa Urban Expansion Area Hydraulic Assessments	Date:	July 31, 2025

Leitrim Urban Expansion Area Assessment

1. Introduction

The City of Ottawa (City)'s New Official Plan (OP) was adopted by City Council in 2021. To identify infrastructure needs required to support growth to the 2046 horizon of the OP, the City updated its Infrastructure Master Plan (IMP) in 2024.

The Province of Ontario issued a Provincial Planning Statement[1] (PPS) in October 2024, enabling private landowners to request an expansion of the urban boundary at any time, including outside of a comprehensive review or OP update. If a proponent wishes to include land within the Urban Boundary, they may make an application for an Urban and Village Boundary Expansion Official Plan Amendment (OPA), which are generally site-specific, and consist of the following five (5) steps:

- Step 1 - Assess existing servicing capacity
- Step 2 - Identify new servicing capacity
- Application submission
- Step 3 - Assess land need
- Step 4 - Settlement area parcel analysis
- Step 5 - Council decision

Steps 1 and 2 are to be performed before the planning process. Steps 3 through 5 are part of the planning process. Before applicants begin the planning process, applicants must consult with the City to obtain Servicing Capacity information as part of steps 1 and 2. To provide the Servicing

[1] https://www.ontario.ca/page/provincial-planning-statement-2024

Capacity information, the following assessments were completed for the proposed areas to be included within the urban boundary area:

1. an assessment of existing and planned servicing (water and sanitary) capacity, and
2. where system capacities will not be available to support the OPA application based on planned system upgrades, an assessment identifying off-site works and the associated costs required to accommodate the expansion.

The following technical memorandum (TM) presents the findings of the Step 1 and Step 2 assessments for the proposed Leitrim urban boundary expansion OPA application, as they pertain to potable water distribution infrastructure needs.

2. Background

2.1 Study Area

The Leitrim Urban Expansion Area (Leitrim UEA) is located in the South Urban Community (SUC) and is adjacent to Findlay Creek. The area is generally bound by the following:

- To the north by the Canadian Forces Station Leitrim (CFS Leitrim);
- To the east by Hawthorne Rd;
- To the south by the Lafarge Canada Inc. quarry; and,
- To the west by Findlay Creek and Bank St.

Figure 1 shows the location of the Leitrim UEA within the overall water distribution system. **Figure 2** provides a closer view of the Leitrim UEA and adjacent infrastructure, including planned infrastructure recommended in the 2024 IMP. The Leitrim UEA is directly adjacent to the existing pressure zone SUC. The potential to service the Leitrim UEA from this pressure zone is assessed in **Section 3.1.**

Leitrim Urban Expansion Area Assessment

Figure 1: Existing Water Distribution System & Proposed Leitrim UEA

Legend

- Pump Station (Active)
- Pump Station (Backup)
- Elevated Tank
- Reservoir

Backbone Watermain
- 152 mm - 305 mm
- 406 mm - 508 mm
- 610 mm - 914 mm
- 1067 mm - 1372 mm
- 1524 mm - 1981 mm
- 2550 mm

Distribution Watermain
- ≤ 102 mm
- 152 mm - 305 mm
- 356 mm - 508 mm
- 610 mm - 914 mm
- 1372 mm

Existing Pressure Zones
- 1E
- 1W
- 2C
- 2E
- 2W
- 3SW
- 3W
- EMR
- LEIT
- ME
- MG
- MONT
- SHADOW RIDGE
- SUC
- YOW

- Official Plan Urban Expansion Area
- Leitrim Urban Expansion Area
- Villages
- Greenbelt
- Major Rivers

0 0.75 1.5 3 Km

New 2C-OGB feedermain. Preliminary alignment and sizing as identified in 2024 IMP, to be confirmed in separate Environmental Assessment study.

New reservoir & dual booster PS to Tewin & SUC. Preliminary sizing and location within future Tewin Lands as identified in 2024 IMP, to be confirmed in separate Environmental Assessment study.

New bidirectional feed. Preliminary alignment and sizing as identified in 2024 IMP, to be confirmed in separate Environmental Assessment study.

SUC

LEIT

Tewin

Leitrim Urban Expansion Area

S-5

S-4

Leitrim PS

PS

CONROY RD

ROTARY WAY

FINDLAY CREEK DR

KELLY FARM DR

LOUISEIZE RD

RIDEAU RD

ANDERSON RD

FARMERS WAY

Leitrim Urban Expansion Area Assessment

Figure 2: Proposed Leitrim UEA & Adjacent Existing and Planned Infrastructure

Legend

- PS — Pump Station (Active)

Backbone Watermain
- 152 mm - 305 mm
- 406 mm - 508 mm
- 610 mm - 914 mm
- 1067 mm - 1372 mm
- 1524 mm - 1981 mm
- 2550 mm

Distribution Watermain
- ≤ 102 mm
- 152 mm - 305 mm
- 356 mm - 508 mm
- 610 mm - 914 mm
- 1372 mm

- Official Plan Urban Expansion Area
- Leitrim Urban Expansion Area

Planned Infrastructure (2024 IMP Recommendations)
- Planned New Reservoir
- PS — Planned New Pump Station
- Planned New Watermain or Existing Watermain Upgrade

Ottawa

0 0.3 0.6 1.2 Km

The land use within the Leitrim UEA will be primarily residential, with institutional land uses (schools). **Table 1** presents the projected growth unit counts within the Leitrim UEA. The unit types assumed for water demand calculations (based on the unit types defined in the 2024 Water Master Plan (WMP)) are also presented in the table.

Table 1: Projected Leitrim UEA Growth Unit Counts

Land Use	Unit Type	Area	Unit Type for Water Demand Calculations	Count
Residential	**Single Detached**	N/A	Single Family House (SFH)	2,356
	Townhouses		Multi-Level Townhouse (MLT)	471
	Back-to-Back Townhouses		MLT	942
	Stacked Townhouses		MLT	942
	Total	**135 ha**	**N/A**	**4,711**
Institutional	**School**	14 ha	Institutional	**N/A**

While an estimated build-out population of 13,523 was also provided, the potable water demand calculations are based on the dwelling counts and 2024 WMP level of service criteria, which include revised population calculations based on population density by unit type. The results are presented in **Section 2.5**.

No detailed concept plan or phasing plan was available at the time of this assessment, therefore a uniform distribution (density) of demand across the area was assumed, and potential phasing of recommended infrastructure is assessed based on assumed phasing of demands as a percentage of calculated build-out demand.

Projected potable water demands for the Leitrim UEA are presented in **Section 2.5**.

2.2 Background Information

The following background studies were reviewed for this analysis:

- Infrastructure Master Plan (City of Ottawa, 2024) *[2024 IMP]*, including supporting studies such as:
  - City of Ottawa 2024 Water Master Plan (Stantec Consulting Ltd., 2024) *[2024 WMP]*
  - Appendix H – Benefit to Existing Calculations *[2024 IMP Appendix H]*
- Leitrim Land East Site Map and Unit Breakdown (dated January 17th, 2025) *[Leitrim UEA Site Plan]*
- Updated Serviceability Report (Class EA OPA 76 Areas 8a, 9a and 9) Leitrim Development Area (IBI Group, 2016) *[2016 Leitrim Development Area Serviceability Report]*

A draft version of the IMP was initially prepared in 2023 (Draft 2023 IMP), which included recommendations for servicing urban expansion areas added to the Official Plan (OP) by the provincial Ministry of Municipal Affairs and Housing (MMAH). These additional urban expansion

areas included the Leitrim UEA (with slightly different boundaries), then denoted as S-5 East. However, this provincial decision was reversed in October 2023, and these additional urban expansion areas were removed from the OP. Hence, the recommendations for servicing urban expansion areas were not finalized, and are subject to revisions based on the more recent available information and the final 2024 IMP recommendations and supporting analyses.

2.3 Discussions with Stakeholders

Technical advisory committee (TAC) meetings were held with City staff to gather input on infrastructure planning, asset management and operations considerations for this assessment. The following considerations were discussed:

- The 2024 IMP identified the location of the new Riverside South Elevated Tank (RSET) in the Riverside South community, near Earl Armstrong Rd and Limebank Rd. However, the location of the new RSET is currently being re-assessed as part of a separate functional design study and Environmental Assessment (EA), and a location in the Bowesville community is being considered.
  - For this Leitrim UEA assessment, the new RSET is assumed to remain at the location identified in the 2024 IMP (i.e., near Earl Armstrong Rd and Limebank Rd). Its location is not further re-assessed in the current study. Provided there is an elevated tank as previously proposed in the general central area of the SUC, the hydraulic analysis of this Leitrim UEA assessment is not anticipated to be significantly impacted.
- The 2024 IMP identified preliminary sizing, alignments and locations for the new infrastructure from 2C to areas outside the Greenbelt (OGB). This infrastructure was recommended to address the impact of OGB growth in SUC and in Tewin on pressures in 2C and in SUC, as well as to alleviate the existing Woodroffe Rd and Ottawa South feedermains conveying flows from Inside the Greenbelt (IGB) to SUC. The alignments and locations identified in the 2024 IMP leveraged the planned Tewin development and its infrastructure needs. While alternative alignments and sites are possible, these are to be re-assessed in a separate EA study.
  - For this Leitrim UEA assessment, the alignments and sites of the new 2C-OGB infrastructure remain as identified in the 2024 IMP, and are not further re-assessed. Alternative alignments and sites can be re-assessed in a separate EA study, which would incorporate the Leitrim UEA.

2.4 Level of Service and Design Criteria

The potable water servicing analysis is based on the level of service (LOS) and design criteria established in the 2024 WMP *Table 3-1* and supporting technical memoranda (TMs). The proposed servicing alternatives and recommended alternative were developed based on an assessment of peak domestic demand conditions, fire flow (FF) conditions, reliability scenarios, and water quality.

Table 2 summarizes the main LOS targets used to develop proposed servicing alternatives, and identify a recommended alternative. The required fire flow (RFF) target is 13,000 L/min (217 L/s; 18.7 MLD) for 3 hours.

Table 2: Summary of Pressure LOS Targets

Condition	Pressure	
	(kPa)	(psi)
Maximum Pressures		
Basic Day (BSDY) Demands (Occupied Areas)	552	80
BSDY (Unoccupied Areas)	689	100
Minimum Pressures		
Maximum Day (MXDY) Demands	345	50
Peak Hour (PKHR) Demands	276	40
BSDY+FF (Reliability) ***Maximum duration below target pressure should not exceed 24 hrs***		
MXDY+FF & BSDY+FF (Reliability)	140	20

2.5 Potable Water Demands

Potable water demands were calculated for the Leitrim UEA projected developments and existing lots, using the unit counts presented in **Section 2.1** and the 2024 WMP design criteria. The demands are summarized in **Table 3**.

These demands are higher than previously calculated for the S-5 East area in the 2023 Draft IMP, although the total gross land area is approximately the same. This is primarily due to an increase in the net residential area where development could occur, resulting in an increase in the residential unit projections. The 2023 Draft IMP planning projections assumed a smaller net residential area.

Table 3: Water Demand Projections

Area	Pressure Zone Servicing	BSDY (MLD)	5-Year MXDY(1) (MLD)	1-Year MXDY(2) (MLD)
Leitrim UEA	SUC	5.4	8.4	7.9

Notes:

(1) MXDY demand based on an outdoor water demand (OWD) with a design frequency of 5 years, used for assessing and planning the pressure zones' high-lift pumping and storage capacities.

(2) MXDY demand based on an OWD with a design frequency of 1 year, used for assessing and planning the WPPs' treatment capacity. The impact of the additional demands on WPP treatment capacity, however, is not assessed in this site-specific study, and is to be reviewed at a Master Plan level.

3. OPA Step 1 – Assessment of Existing and Planned Infrastructure Capacity

3.1 Pressure Zone Boundary Analysis

The serviceability of the Leitrim UEA is first assessed conceptually using an analysis of existing pressure zone boundaries. This analysis can help identify constraints within the existing pressure zones, which are confirmed using the hydraulic model. This analysis is also used as a preliminary evaluation of the serviceability of urban expansion areas, which are then further evaluated in the capacity analysis spreadsheet tool and hydraulic model. Feasible conceptual pressure zone

servicing strategies can be identified from the onset of the analysis, and alternatives and permutations for the capacity and hydraulic assessments can be reduced.

The pressure zone boundary analysis incorporates head losses generated by flows through the system. A typical industry best practice target head loss rate of 1 m/km within the upstream water distribution network is used to derive the theoretical pressure zone boundaries. However, actual head loss rates within the network can vary due to distribution system characteristics including watermain looping, varying pipe roughness, and distribution of demands, and thus the pressure distributions are further assessed using the hydraulic model. Pressure distributions based on hydraulic model hydraulic gradelines (HGLs) and calculated Leitrim UEA demands are presented in the hydraulic assessment in **Section 3.3**.

Figure 3 shows the pressure zone boundary analysis results for the pressure zones SUC and LEIT(4C), as they pertain to servicing the Leitrim UEA. **Figure 3a** suggests that, under an ideal head loss rate of 1 m/km, the Leitrim UEA is directly serviceable from SUC with the existing Ottawa South PS, Barrhaven PS and the planned RSET. However, higher modelled peak head losses were observed in the hydraulic model within SUC in the feedermains downstream of the Ottawa South PS, feeding the Findlay Creek and Leitrim area (as reported in the 2024 WMP TM#4). As a result, a pressure distribution as shown **Figure 3b** is expected, where pressures in the higher elevation areas within the Leitrim UEA could decrease below the target minimum pressure of 40 psi. **Figure 3c** and **Figure 3d** show that, with a new PS supplying SUC (as recommended in the 2024 IMP), head losses within the feedermains from Ottawa South PS into SUC can be alleviated, and minimum pressures within Leitrim UEA are above the target level of service. Based on the 2024 IMP projections, the new PS supplying SUC is proposed to be located within the Tewin Lands, however its location should be confirmed in a separate EA study also considering the Leitrim UEA. Maximum pressures in the lower elevation areas along Hawthorne Rd will exceed 80 psi, and could require pressure reducing valves (PRVs). The servicing scenarios presented in **Figure 3c** and **Figure 3d** are further assessed using the hydraulic model in **Sections 4.2**.

As part of the Draft 2023 IMP, the potential alternative of servicing the S-5 East from the pressure zone LEIT(4C) was also considered. While this was previously deemed feasible due to the high head losses experienced within SUC, under ideal head losses of 1 m/km or less, high pressures are expected within the Leitrim UEA when serviced at LEIT(4C) HGLs, as shown in **Figure 3e** and **Figure 3f**. With a new PS supplying SUC (as recommended in the 2024 IMP), head losses within the feedermains from Ottawa South PS into SUC can be alleviated, and therefore the alternative of supplying the Leitrim UEA from the pressure zone LEIT(4C) is not further considered.

a) SUC Minimum HGL (144.3 m)
Head Loss Rate = 1 m/km
Facilities: Ottawa South PS,
Barrhaven PS & New RSET
(no New SUC PS)

Leitrim Urban
Expansion Area

b) SUC Minimum HGL (144.3 m)
Head Loss Rate = 2 m/km
Facilities: Ottawa South PS,
Barrhaven PS & New RSET
(no New SUC PS)

Leitrim Urban
Expansion Area

c) SUC Maximum HGL (147 m)
Head Loss Rate = 1 m/km
Facilities: Ottawa South PS,
Barrhaven PS, New RSET &
New SUC PS (within Tewin Lands)

Leitrim Urban
Expansion Area

d) SUC Minimum HGL (144.3 m)
Head Loss Rate = 1 m/km
Facilities: Ottawa South PS,
Barrhaven PS, New RSET &
New SUC PS (within Tewin Lands)

Leitrim Urban Expansion Area

e) LEIT(4C) Maximum HGL (165.2 m)
Head Loss Rate = 1 m/km
Facilities: Leitrim PS

Leitrim Urban Expansion Area

PS

f) LEIT(4C) Minimum HGL (160.1 m)
Head Loss Rate = 1 m/km
Facilities: Leitrim PS

Leitrim Urban
Expansion Area

Leitrim Urban Expansion Area Assessment

Figure 3: Pressure Zone Boundary Analysis - Leitrim UEA Servicing

Leitrim UEA demands are not considered in this theoretical analysis. Instead, head losses due to additional demands and resulting flows are generated using the head loss rates noted.

Legend

Pressures (psi)

- Not Serviceable
- 0 psi < Pressure ≤ 20 psi
- 20 psi < Pressure ≤ 25 psi
- 25 psi < Pressure ≤ 30 psi
- 30 psi < Pressure ≤ 35 psi
- 35 psi < Pressure ≤ 40 psi
- 40 psi < Pressure ≤ 45 psi
- 45 psi < Pressure ≤ 50 psi
- 50 psi < Pressure ≤ 60 psi
- 60 psi < Pressure ≤ 70 psi
- 70 psi < Pressure ≤ 80 psi
- 80 psi < Pressure ≤ 85 psi
- 85 psi < Pressure ≤ 90 psi
- 90 psi < Pressure ≤ 95 psi
- 95 psi < Pressure ≤ 100 psi
- Pressure > 100 psi

Ottawa

0 0.3 0.6 1.2 Km

3.2 Capacity Analysis

The capacity of the existing water distribution's pumping stations (PS) and storage facilities was assessed using the City's capacity analysis spreadsheet tool. Capacity constraints requiring upgrades were assessed based on a trigger year of 2046, which is the 2024 IMP's growth horizon. Planned upgrades in the 2024 IMP were considered, including the new 2C-OGB infrastructure (new feedermains, reservoir and PS). The alignments and locations identified in the 2024 IMP leveraged the planned Tewin development and its infrastructure needs. While alternative alignments and sites are possible, these are to be re-assessed in a separate EA study, which should also include consideration for servicing the Leitrim UEA.

The results shown in **Table 4** indicate that the existing and planned pumping and storage facilities supplying 2C and its downstream zones, as well as SUC and its downstream zones, can accommodate the demands from the Leitrim UEA when added onto the 2046 OP growth projections. No additional upgrades are triggered before the 2046 OP planning horizon. These findings are further confirmed in the hydraulic assessment presented in **Section 3.3**.

The 2024 IMP recommended that the new 2C-OGB infrastructure be in place by the time 5-year MXDY demands in pressure zones downstream of 2C have increased by +59.1 MLD (approximately equivalent to +33,000 SFH) with respect to a baseline year of 2018 (existing conditions demand horizon in 2024 WMP). This includes combined growth in SUC, YOW, LEIT(4C), in Tewin, and potential increases in supply to the Township of Russell. As shown in **Figure 4**, without the Leitrim UEA, this corresponds to a trigger year of 2037. With the addition of the Leitrim UEA onto the 2046 OP growth projections, the need for the new 2C-OGB infrastructure is triggered earlier, in 2036. Whether the Leitrim UEA servicing will require the implementation of the new 2C-OGB infrastructure prior to proceeding with development will depend on the pace of growth and on the allocation of the +59.1 MLD 5-year MXDY demands, and should be monitored and reviewed in future separate City-wide master planning assessments. The impact of the Leitrim UEA on sizing of the new 2C-OGB infrastructure was reviewed in the hydraulic assessment, as presented in **Section 3.3**.

Table 4: Impact of Leitrim UEA Peak Demands on Existing & Planned Facility Upgrade Growth Triggers

Servicing Scenario	Existing & Planned(1) Facilities *Including 2024 IMP planned facilities, i.e., new RSET, new SUC reservoir & PS (within the Tewin Lands) assumed to be in place & sized per 2024 IMP recommendations*		Timeline of Additional Facility Upgrades *In addition to 2024 IMP recommendations*	
	Pumping	**Storage**	**w/o Leitrim UEA**	**w/ Leitrim UEA**
Servicing from 2C+	**Billings Bridge PS** **Hurdman Bridge PS-2C**	**Ottawa South Reservoir** **New 9.0 ML RSET** in place by 2031(1) **New 10.7 ML SUC Reservoir (within the Tewin Lands)** in place by 2037(1)	*Upgrades **beyond 2024 IMP recommendations** needed in* 2063	*Upgrades **beyond 2024 IMP recommendations** needed in* 2056
Servicing from SUC+	**Barrhaven PS-SUC** **Ottawa South PS-SUC** **New 30 MLD SUC PS (within the Tewin Lands)** in place by 2037(1)	**New 9.0 ML RSET** in place by 2031(1)	*Upgrades **beyond 2024 IMP recommendations** needed in* 2060	*Upgrades **beyond 2024 IMP recommendations** needed in* 2055

Legend: Upgrades required by 2046

Notes:

(1) Planned facilities & trigger years per the 2024 IMP's recommendations.

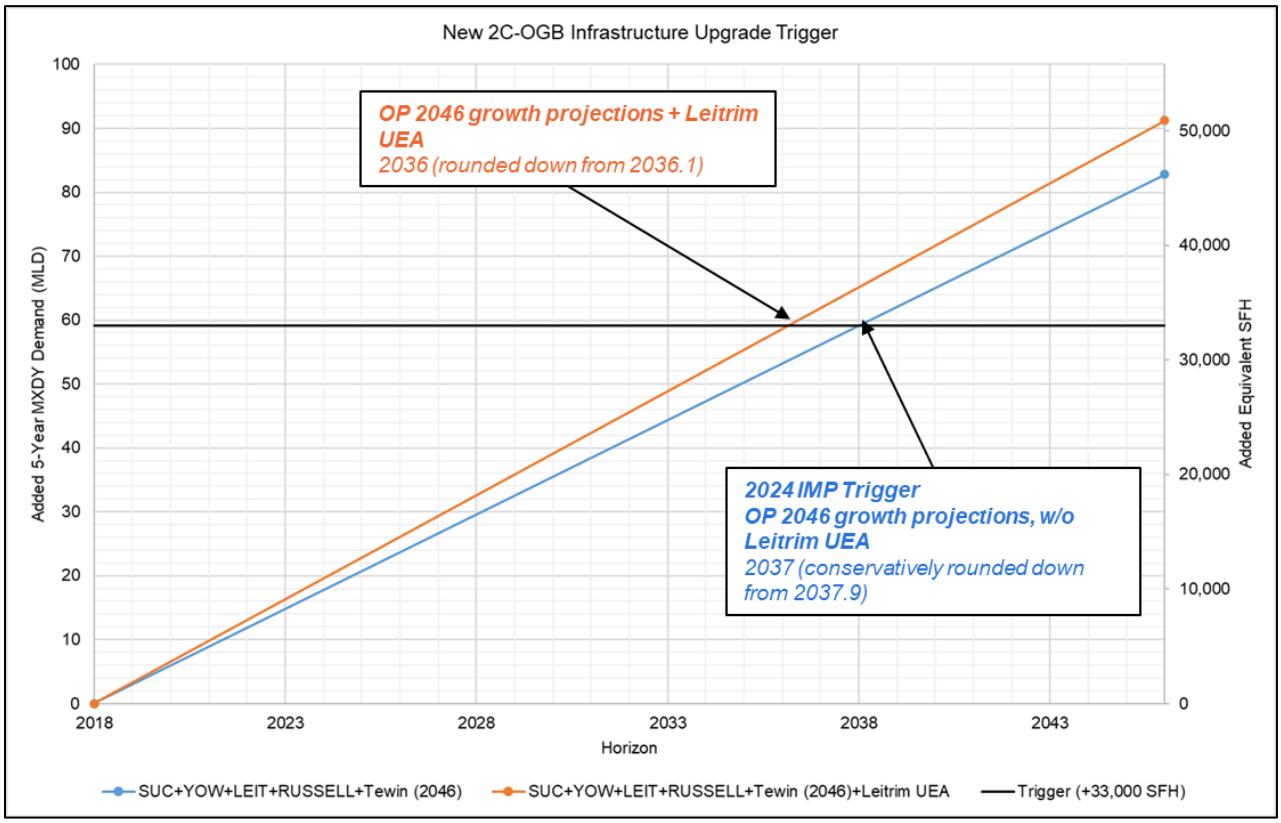


Figure 4: New 2C-OGB Infrastructure Upgrade Timeline

3.3 Hydraulic Assessment

The need for potential off-site watermain upgrades (new watermains and/or existing watermain replacement) was assessed based on a review of existing watermains in the vicinity of the Leitrim UEA, and using the City's hydraulic model, under future growth (2046 growth from the OP) and infrastructure conditions (i.e., with planned infrastructure).

Table 5 presents a summary of direct servicing opportunities and infrastructure gaps. Direct servicing opportunities include two (2) connections to the existing local water distribution system, adjacent to the Leitrim UEA. The infrastructure gaps were identified as needed, in addition to planned infrastructure recommended in the 2024 IMP.

Under BSDY+FF demands in the event of a watermain break at one of the local connections, the existing water distribution infrastructure cannot adequately service the Leitrim UEA, as illustrated in **Figure 5b**. Therefore, a 3rd feed would be needed to provide reliability and fulfil the target LOS criteria (minimum pressures of 20 psi across the Leitrim UEA), as shown in **Figure 5e**. In addition to providing redundancy, a 3rd feed would also be beneficial by increasing normal conditions minimum pressures to service potential higher buildings in higher elevation areas, as shown in **Figure 5d**. Finally, depending on the phasing of development across the Leitrim UEA (which is unknown at the time of this assessment), an additional feed could provide the reliability needed while only one of the two (2) connections to the existing local water distribution system is in service (e.g., if only the areas north of Blais Rd were developed).

Under BSDY demands, 71% of the Leitrim UEA is projected to experience pressures exceeding the target maximum of 80 psi, as illustrated in **Figure 5f**. These areas will require pressure reduction measures.

Table 5: Direct Servicing Opportunities and Infrastructure Gaps for Leitrim UEA

Servicing Area	Opportunities for Direct Servicing	Infrastructure Gaps
Leitrim UEA	• Direct connection to existing 200 mm diam. WM stub on Rosales Rdg • Direct connection to existing 400 mm diam. WM on Bank St	• Additional (3rd) feed needed for reliability in the event of a WM break in one of the direct connections to the existing network • Pressure reduction measures to address high maximum pressures above 80 psi under BSDY demand conditions

a) PKHR Minimum Pressure Distribution
w/o New Hawthorne Rd Watermain

b) BSDY+FF Minimum Pressure Distribution
Watermain Break Scenario
w/o New Hawthorne Rd Watermain

c) BSDY Maximum Pressure Distribution
w/o New Hawthorne Rd Watermain

d) PKHR Minimum Pressure Distribution
w/ New Hawthorne Rd Watermain

e) BSDY+FF Minimum Pressure Distribution
Watermain Break Scenario
w/ New Hawthorne Rd Watermain

f) BSDY Maximum Pressure Distribution
w/ New Hawthorne Rd Watermain

Planned new bidirectional feed. Preliminary alignment and sizing as identified in 2024 IMP, to be confirmed in separate Environmental Assessment study.

Watermain break scenario: watermain break at connection #1, to existing 200 mm diam. WM on Rosales Rdg

Proposed new off-site watermain along Hawthorne Rd, from Leitrim Rd to Leitrim UEA boundary.

SUC

S-5

S-4

Leitrim PS

Leitrim Urban Expansion Area

ROTARY WAY

LOUISEIZE RD

Leitrim Urban Expansion Area Assessment

Figure 5: Leitrim UEA Servicing - Pressure Distribution With & Without Off-Site Infrastructure Upgrades

Legend

- Pump Station (Active)
- **Planned Infrastructure (2024 IMP Recommendations)**
- Planned New Reservoir
- Planned New Pump Station
- Planned New Watermain or Existing Watermain Upgrade
- Official Plan Urban Expansion Area
- Leitrim Urban Expansion Area
- Proposed Connection Points

Pressures (psi)

- Not Serviceable
- 0 psi < Pressure ≤ 20 psi
- 20 psi < Pressure ≤ 25 psi
- 25 psi < Pressure ≤ 30 psi
- 30 psi < Pressure ≤ 35 psi
- 35 psi < Pressure ≤ 40 psi
- 40 psi < Pressure ≤ 45 psi
- 45 psi < Pressure ≤ 50 psi
- 50 psi < Pressure ≤ 60 psi
- 60 psi < Pressure ≤ 70 psi
- 70 psi < Pressure ≤ 80 psi
- 80 psi < Pressure ≤ 85 psi
- 85 psi < Pressure ≤ 90 psi
- 90 psi < Pressure ≤ 95 psi
- 95 psi < Pressure ≤ 100 psi
- Pressure > 100 psi

Ottawa

0 0.4 0.8 1.6 Km

Table 6 presents a summary of the impact of the Leitrim UEA on sizing of the planned new 2C-OGB infrastructure proposed in the 2024 IMP (new feedermains, reservoir and PS).

Since the proposed feedermains were originally sized with post-period capacity (PPC), i.e., considering demands beyond the approved 2046 OP growth projections, there is residual capacity that can accommodate the additional Leitrim UEA demands.

While the proposed new reservoir & PS were originally sized for the approved 2046 growth projections in Tewin, SUC, and in downstream zones, operational adjustments are possible to achieve the following:

- Leveraging residual capacity in the new 2C-OGB feedermain to increase its fill rate, and balance the increase in downstream demands; and,
- Adjusting the proposed pump design points and/or operating the pumps using variable frequency drives (VFDs) to accommodate the increase in demands.

Therefore, no additional storage and pumping capacity is needed at the new 2C-OGB reservoir & PS for the Leitrim UEA demands. The design and operational adjustments, along with confirming the location and sizing of the proposed infrastructure, should be reviewed as part of separate functional design studies, considering the Leitrim UEA demands.

Table 6: Impact of Leitrim UEA on New 2C-OGB Infrastructure Sizing

Servicing Area	New 2C-OGB Infrastructure Component		Impact of Leitrim UEA on Sizing
	2024 IMP Project ID	Project Description	
Leitrim UEA	IMP-WAT-24	New 2C-OGB Feed (Phase 1 & Phase 2)	• None – proposed watermain sizes were oversized with residual capacity beyond 2046 OP growth projections
	IMP-WAT-25	New Bi-Directional Water Feed	
	IMP-WAT-26	Billings Bridge to Conroy Feed	
	IMP-WAT-28	Conroy Tank Feed	
	IMP-WAT-27	Pump Station & Reservoir	• None ○ Residual capacity in feedermains can be used to increase reservoir filling rate and balance peak demands ○ Pump design point and/or operation can be adjusted to accommodate additional peak demands

3.4 Step 1 Conclusions & Recommendations

The capacity of the existing water distribution system to directly service the Leitrim UEA was assessed. **The existing water distribution system cannot directly supply the Leitrim UEA to fulfil the 2024 IMP's target LOS criteria. Therefore, the OPA Step 2 assessment is needed to identify off-site infrastructure needs** and address the following infrastructure gaps:

- Additional (3rd) feed needed for reliability in the event of a WM break in one of the direct connections to the existing network; and,
- Pressure reduction measures to address high maximum pressures above 80 psi under BSDY demand conditions.

Off-site infrastructure needs to address these constraints, along with Class D opinions of probable costs (OPCs) and cost allocation are addressed in Step 2 of the OPA, presented in **Section 4**.

4. OPA Step 2 – Identification & Assessment of Off-Site Infrastructure Needs

4.1 Capacity Analysis

As identified in the Step 1 capacity analysis (**Section 3.1**), the existing and planned pumping and storage facilities supplying 2C and its downstream zones, as well as SUC and its downstream zones, can accommodate the demands from the Leitrim UEA when added onto the 2046 OP growth projections. No additional upgrades are triggered before the 2046 OP planning horizon.

This assumes that planned upgrades in the 2024 IMP are implemented, including the new 2C-OGB infrastructure (new feedermains, reservoir and PS). Whether the Leitrim UEA servicing will require the implementation of this new 2C-OGB infrastructure will depend on the pace of growth and on the allocation of +59.1 MLD 5-year MXDY demands, and should be monitored and reviewed in future separate City-wide master planning assessments.

4.2 Hydraulic Assessment

As identified in the Step 1 hydraulic analysis (**Section 3.3**), infrastructure gaps need to be addressed off-site. Potential off-site infrastructure solutions for each infrastructure gap are presented in **Table 7**. As discussed in the Step 1 hydraulic analysis, these off-site infrastructure solutions would be needed in addition to already planned infrastructure from the 2024 IMP.

To provide reliability to the Leitrim UEA, a new watermain along Hawthorne Rd is proposed, which will connect to the planned new bi-directional feed from the new 2C-OGB pump station, along Leitrim Rd. This recommendation aligns with the recommendations of the *Draft 2023 IMP* for servicing the area S-5 East. It is further recommended that continuous large diameter watermain looping be achieved on-site, which should be reviewed as part of the master servicing study (MSS) for this area.

Pressure reduction measures should be implemented on-site. No additional off-site infrastructure is recommended. Pressure reduction measures could consist of pressure reducing valves (PRVs) at each property, or a single PRV station for the areas projected to experience high pressures. This should be reviewed as part of the MSS for this area.

Table 7: Infrastructure Gaps and Potential Off-Site Solutions and Additional Internal Needs to Support Off-Site Solutions

Servicing Area	Infrastructure Gaps	Potential Off-Site Solutions	Additional Internal Needs to Support Off-Site Solution
Leitrim UEA	• Additional (3rd) feed needed for reliability in the event of a WM break in one of the direct connections to the existing network	• New WM along Hawthorne Rd, from Leitrim Rd/Hawthorne Rd (connecting to the planned new bi-directional feed) to the Leitrim UEA	• Large internal backbone watermain
	• Pressure reduction measures to address high maximum pressures above 80 psi under BSDY demand conditions	• None – to be addressed on-site	• On-site PRVs

4.3 Servicing Recommendation

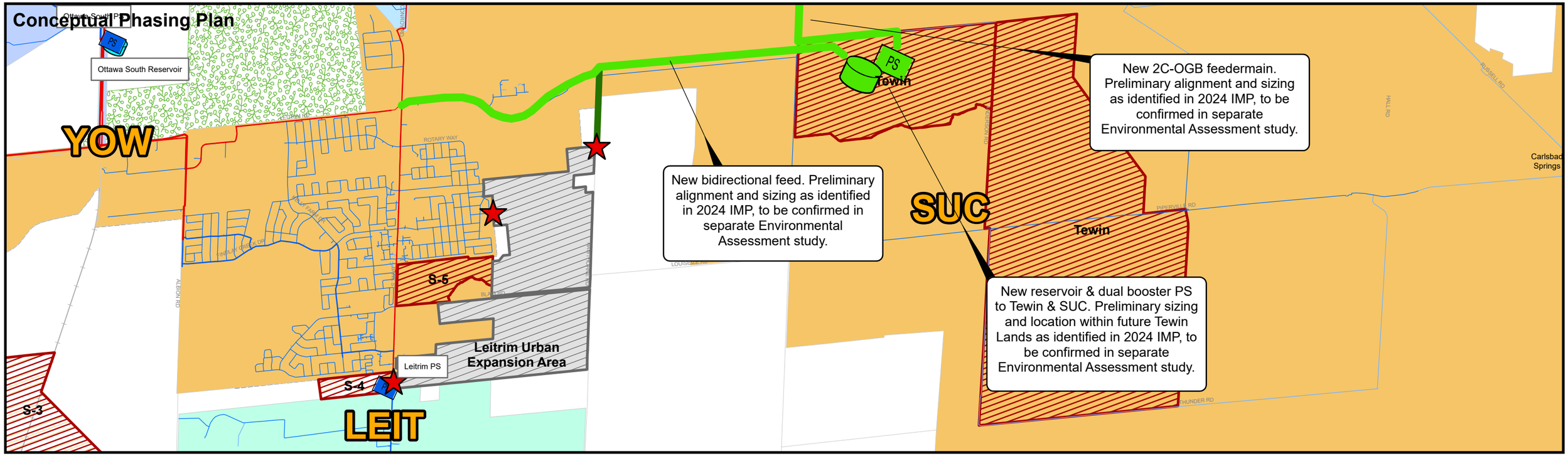
To address the infrastructure gaps identified in Step 1, off-site infrastructure needs were identified and assessed. **Table 8** summarizes the infrastructure recommendations, which are illustrated in **Figure 6**. The total OPC for the recommended infrastructure is $5.3 M, which was developed using the Class D costing templates from the 2024 IMP. Details on the OPCs are provided in **Section 4.4**.

Table 8: Leitrim UEA Servicing Constraints and Off-Site Infrastructure Needs

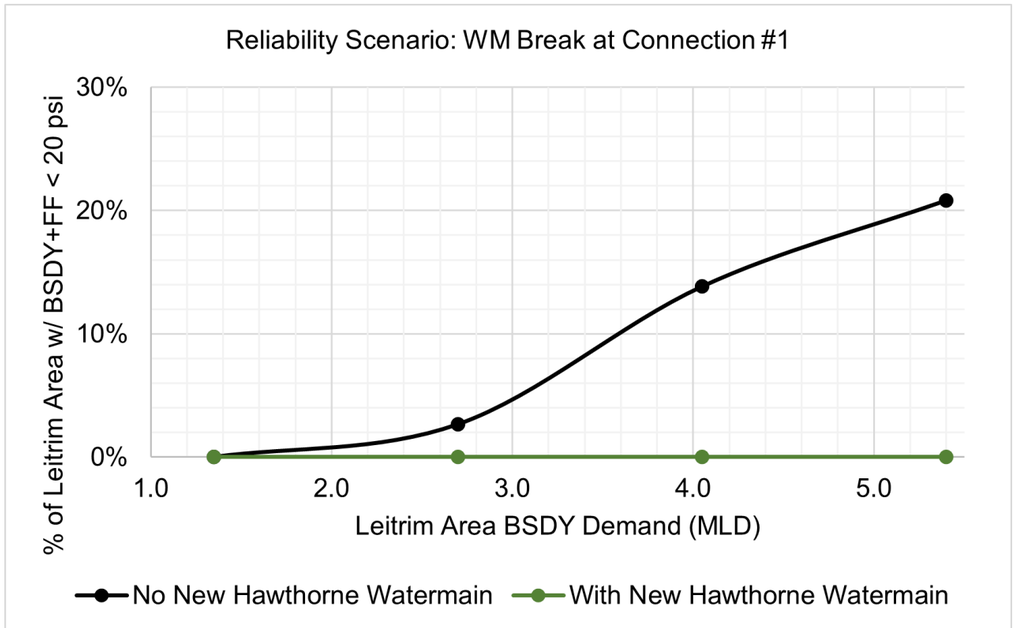
Servicing Area	Phase (ID)	Description	Diameter (mm)	Length (m)	Along	From	To
Leitrim UEA	Phase 1	New Watermain	400	720	Hawthorne Rd	Leitrim Rd	Leitrim UEA Boundary

Figure 6 also illustrates potential phases for the proposed infrastructure. Each phase is assessed in terms of LOS achieved (percentage of areas experiencing BSDY+FF minimum pressures below 20 psi in the event of a watermain break) as a function of demand supplied. There is capacity to supply up to ~1.4 MLD in BSDY demands, at which point the new watermain along Hawthorne Rd would be needed. Timing of the implementation of the new watermain should also be reviewed during the MSS, considering the design guidelines' requirements to avoid the creation of vulnerable service areas (VSAs).

Conceptual Phasing Plan



Level of Service by Phase, Based on Leitrim UEA BSDY Demand (MLD)



Leitrim Urban Expansion Area Assessment

Figure 6: Leitrim UEA Servicing Potential Phasing of Infrastructure & Level of Service

Legend

- PS — Pump Station (Active)
- Reservoir
- **Planned Infrastructure (2024 IMP Recommendations)**
- Planned New Reservoir
- PS — Planned New Pump Station
- Planned New Watermain or Existing Watermain Upgrade
- Official Plan Urban Expansion Area
- Leitrim Urban Expansion Area
- Proposed Connection Points
- Proposed Off-Site Watermains

Ottawa

0 0.5 1 2 Km

4.4 Opinion of Probable Cost & Cost Allocation

Using the Class D costing templates developed by Ainley Graham & Associates Limited – Ainley Group for use in the 2024 IMP, OPCs were developed for the servicing recommendation presented in **Section 4.3**. The OPCs are presented in 2025$, using the 2020-2024 inflation rates established in the 2024 IMP and an assumed rate of 3% from 2024 to 2025.

Cost allocations between growth stakeholders and benefit-to-existing (BTE) were developed based on the framework outlined in the *2024 IMP Appendix H*. At the time of this assessment, the details of the mechanisms to recuperate fees for the costs allocated to growth were unknown, as this assessment does not directly support an update to the Development Charges By-Law. The BTE components were determined as follows:

- For new watermains which are growth-driven and which are not sized to accommodate existing development, no BTE (BTE = 0%) was applied.

Table 9 presents the OPCs (in 2025$) and allocation by phase and between growth and BTE for the recommended off-site infrastructure. Detailed OPC calculation sheets are provided in **Appendix A**.

Table 9: OPCs (2025$), Potential Phasing and Preliminary Cost Allocation

Servicing Area	Phase (ID)	Growth (M$)	BTE (M$)	Total (M$)	Growth %	BTE %
Leitrim UEA	**Phase 1**	$5.3	-	**$5.3**	100%	0%
Total		**$5.3**	**-**	**$5.3**	**100%**	**0%**

4.5 Step 2 Conclusions & Recommendations

Off-site water distribution infrastructure will be needed to service the Leitrim UEA, consisting of a **new 720 m long, 400 mm diameter watermain along Hawthorne Rd, from Leitrim Rd to the Leitrim UEA boundary.** The Class D OPC for the proposed off-site infrastructure is $5.3 M, and is entirely allocated to growth. This OPC and the proposed allocation should be reviewed in future studies.

While there is capacity for development to proceed until the new watermain along Hawthorne Rd is in place, timing should be reviewed once more detailed concept and phasing plans are available.

This assessment assumes that planned upgrades in the 2024 IMP are implemented, including the new 2C-OGB infrastructure (new feedermains, reservoir and PS). Whether the Leitrim UEA servicing will require the implementation of this new 2C-OGB infrastructure will depend on the pace of growth and on the allocation of +59.1 MLD 5-year MXDY demands, and should be monitored and reviewed in future separate City-wide master planning assessments. No additional feedermain upsizing or storage and pumping capacity is needed for the planned new 2C-OGB infrastructure recommended in the 2024 IMP, as residual feedermain capacity can be leveraged, and design and

operational adjustments at the planned reservoir and PS could be undertaken to accommodate the additional demands from the Leitrim UEA.

The following servicing components should be reviewed in separate master servicing studies, functional design studies and Environmental Assessments:

- Impact of the final location of the new RSET on Leitrim UEA servicing;
- Sizing, alignment, location, design and operation of the new 2C-OGB infrastructure (feedermain, reservoir and PS);
- Providing continuity of large diameter watermain looping within the Leitrim UEA;
- Pressure reduction measures;
- Review of Leitrim UEA detailed concept plans and phasing plans, once available; and,
- Review of cost allocation and mechanisms to recuperate costs associated with growth.

Stantec Consulting Ltd.

Prepared by:

Christène Razafimaharo M.Sc., P.Eng.
Water Resources Engineer
Phone: 343 996 7086
Christene.Razafimaharo@stantec.com

Reviewed by:

Jasmin Sidhu P.Eng.
Senior Water Resources Engineer
Phone: 613 725 5553
Jasmin.Sidhu@stantec.com

Approved by:

Kevin Alemany M.A.Sc., P. Eng.
Senior Principal, Potable Water Systems Lead,
Urban Water Resources
Phone: 613 724 4091
Kevin.Alemany@stantec.com

Attachments: Appendix A: Opinions of Probable Costs

Appendix A Opinions of Probable Costs

Date: 7/9/2025

Asset Management

Infrastructure Planning Unit

Infrastructure Category:	**Watermain**
Project Type:	**Trunk Watermain and Appurtenances**
Project Title:	**New Watermain for Leitrim UEA**
Project Phase:	**Conceptual Design**
SAP Project Number:	TBD
Project Location:	Refer to report figures for project location

Project Location Map:
Refer to report figures for project location

Project Description
400mm diam. WM along Hawthorne Rd from Leitrim Rd to Leitrim UEA

FINAL - 2020 - CLASS D - ESTIMATED CONSTRUCTION COSTS (NO HST):	**$1,566,600**

CAPITAL COST COMPONENTS AND RISK FACTORS

Item	Percentage**	Yes/No = 1/0	Estimated Cost
Capital Cost Components*		**Change as Required**	
Engineering - Design, Contract Adm. (15% - 25%)	20.0%	1	$313,320
Utilities (5% - 20%)	10.0%	1	$156,660
Property - REPDO Estimate (1% - 10%)	1.0%	1	$15,666
City Internal Costs (7% - 10%)	8.5%	1	$133,161
Misc. Soft Costs - Permit, Public Art, etc. (5%)	5.0%	1	$78,330
Risk Factors**			
Geo-Tech Issues - Soil (1% - 10%)	10.0%	1	$156,660
Geo-Tech issues - Bedrock (1% - 5%)	5.0%	1	$78,330
Geo-Tech Issues - Grey Silty Clay (1% - 10%)	0.0%	0	$0
Special Hydro-Geo Conditions (1% - 10%)	5.0%	1	$78,330
Change in Design Standards (1% - 5%)	0.0%	0	$0
Construction Contract Duration (2% per year)	0.0%	0	$0
Species at Risk and Project Mitigation (1% - 5%)	1.0%	1	$15,666
Planning, Design and Land use Approvals (5% - 10%)	0.0%	0	$0
Provincial and Federal Environmental Assessments (5% - 10%)	0.0%	0	$0
CONSTRUCTION COST AND CAPITAL COST COMPONENTS SUBTOTAL:			**$2,263,737**
RISK FACTORS SUBTOTAL:			**$328,986**
OVERALL CLASS D CONTINGENCY (40%-50%) * **	**40%**	**1**	**$905,495**
FINAL - 2020 - CLASS D - ESTIMATED TOTAL CAPITAL COST (No HST):			**$3,498,218**

*** Capital Cost Components Percentage Allowance Range as per City 2013 PDR**

**** Risk Factors Percentage Allowance to be Applied Based on the Project Complexity**

***** Overall Contingency is Applied to Estimated Construction and Capital Cost Components**

Project Related Comments:

COST INFLATION CHART

Year	Inflation % per Year	Yearly Total Cost Projection
2021	17.2%	$4,099,911
2022	9.9%	$4,505,802
2023	7.8%	$4,857,255
2024	5.79%	$5,138,490
2025	3%	$5,292,645
2026	3%	$5,451,424
2027	3%	$5,614,967
2028	3%	$5,783,416
2029	3%	$5,956,918
2030	3%	$6,135,626
2031	3%	$6,319,695
2032	3%	$6,509,286
2033	3%	$6,704,564
2034	3%	$6,905,701
2035	3%	$7,112,872
2036	3%	$7,326,258
2037	3%	$7,546,046
2038	3%	$7,772,427
2039	3%	$8,005,600
2040	3%	$8,245,768
2041	3%	$8,493,141
2042	3%	$8,747,935
2043	3%	$9,010,374
2044	3%	$9,280,685
2045	3%	$9,559,105
2046	3%	$9,845,878

CITY OF OTTAWA	Trunk Watermains (300mm, 400mm, 600mm, 750mm & 900mm) FINAL - 2020 - Class D - Construction Cost Estimating Template New Watermain for Leitrim UEA

Estimate Note:
This Construction Cost Estimate Template for Trunk Watermains has been prepared for guidance in project evaluation and implementation from the information available at 2020 unit cost prices.

NOTE	ADJUST QUANTITIES/UNIT PRICES AS REQUIRED

Section A - General						
Code	**Spec**	**Description**	**Qty**	**Unit**	**Unit Cost**	**Cost**
A010		**Field Office**				
A010.01	F-1001	Field office for Contract Administrator 35-70m2	52	wk	$1,000	$52,000
A020		**TRAFFIC CONTROL PLAN**				
A020.01	F-1010	Traffic Control Plan	52	wk	$1,000	$52,000
A020.02	F-1012	Police Assistance at Intersection	120	hr	$280	$33,600
A030		**PEDESTRIAN CONTROL**				
A030.01	F-1013	Construction Site Pedestrian Control Implementation	1	LS	$19,000	$19,000
A040		**EROSION & SEDIMENT CONTROL**				
A040.01	805, F-1004	Erosion and Sediment Control Plan and Monitoring	1	LS	$2,400	$2,400
A040.03	805, F-1004	Erosion and Sediment Control Measures	1	LS	$6,300	$6,300
A060		**PRE-CONSTRUCTION INSPECTION**				
A060.01	F-1011	Pre-Construction Inspection	1	LS	$6,300	$6,300
A999		**Non-Standard Items**				
A999.01	GC 6.04	Construction Site Health and Safety Management and Control	1	LS	$19,000	$19,000
					Sub-Total Section A:	**$190,600**

Section G - Watermains						
G010		**EXCAVATION AND BACKFILL**				
G010.02	401, 441,F-4411, F-7010	Additional excavation & backfill with 50mm clear stone	0	m^3	$75	$0
G020		**SELECT SUBGRADE MATERIAL**				
G020.01	212, 314, F-2120, F-3147	Select subgrade material for Trench Backfill	0	m^3	$50	$0
G030		**WATERMAIN - PVC PIPE**	**720**			
G030.05	441, F-4411, F-4412, F-4491, F-4492, F-4493, F-4494	300mm watermain, PVC, CL 150, DR-18 including all appurtenances	0	m	$800	$0
G030.06	441, F-4411, F-4412, F-4491, F-4492, F-4493, F-4494	400mm watermain, PVC, CL 150, DR-18 including all appurtenances	0	m	$1,000	$0
G050		**WATERMAIN - CONCRETE PRESSURE PIPE**				
G050.01	F-4411 ,F-4412, F-4491, F-4492, F-4493, F-4494	400mm watermain, concrete pressure pipe, CL C303 including all appurtenances	720	m	$1,200	$864,000
G050.02	F-4411 ,F-4412, F-4491, F-4492, F-4493, F-4494	600mm watermain, concrete pressure pipe, CL C301 including all appurtenances	0	m	$1,500	$0
G050.03	F-4411 ,F-4412, F-4491, F-4492, F-4493, F-4494	750mm watermain, concrete pressure pipe, CL C301 including all appurtenances	0	m	$2,000	$0
G050.04	F-4411 ,F-4412, F-4491, F-4492, F-4493, F-4494	1050mm watermain, concrete pressure pipe, CL C301 including all appurtenances	0	m	$3,200	$0
G070		**VALVE AND VALVE CHAMBER**	**4**			
G070.04	F-4411 ,F-4413, F-4491, F-4492, F-4493, F-4494	300mm Gate valve,valve chamber, W3	0	ea	$9,500	$0

G080		**BUTTERFLY VALVE AND VALVE CHAMBER**				
G080.01	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	400mm Butterfly valve,W5 & valve chamber, W2	4	ea	$20,000	$80,000
G080.02	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	600mm Butterfly valve,W5 & valve chamber, W2	0	ea	$35,000	$0
G080.03	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	750mm Butterfly valve,W5 & valve chamber, W2	0	ea	$50,000	$0
G080.04	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	1050mm Butterfly valve,W5 & valve chamber, W2	0	ea	$80,000	$0
G090		**VALVE CHAMBER ONLY FOR TVS**				
G090.05	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	1500mm Valve Chamber (Only) FOR 300mm TVS per W4	0	ea	$10,000	$0
G090.05	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	R-1 valve chamber (only) for TVS(any size) off 400mm watermain, W10	0	ea	$12,000	$0
G100		**MISCELLANEOUS VALVE CHAMBER**				
G100.01	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	610mm access, air relief and drain out valve chamber type R-1 per W10	0	ea	$20,000	$0
G100.02	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	Automatic Flushing Chamber per W3.2	0	ea	$10,000	$0
G110		**BRANCH VALVE CHAMBER**				
G110.01	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	Branch Valve chamber type R-3 off 600mm watermain per W11	0	ea	$35,000	$0
G110.02	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	Branch Valve chamber type R-3 off 900mm watermain per W11	0	ea	$65,000	$0
G120		**LINE VALVE CHAMBER**				
G120.01	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	600mm Line valve chamber Type R-3 per W12	0	ea	$80,000	$0
G120.02	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	900mm Line valve chamber Type R-3 per W12	0	ea	$120,000	$0
G130		**BRANCH AND LINE VALVE CHAMBER**				
G130.01	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	600mm Line & (150mm - 400mm) Branch Valve Chamber Type R-4 per W13	0	ea	$120,000	$0
G130.02	F-4411, F-4413, F-4491, F-4492, F-4493, F-4494	900mm Line & (150mm - 400mm) Branch Valve Chamber Type R-4 per W13	0	ea	$150,000	$0
G140		**HYDRANTS**				
G140.01.	F-4411, F4414, F-4419, F4491, F-4492. F-4493, F-4494	Hydrant W19	6	ea	$7,000	$42,000
G140.02	F-4411, F4414, F-4419, F4491, F-4492. F-4493, F-4494	Hydrant W20 Complete with Ditch Culvert	0	ea	$6,500	$0
G140.03	F-4411, F4414, F-4419, F4491, F-4492. F-4493, F-4494	150 mm Hydrant lateral DI CL52 or PVC CL150, DR-18	0	m	$350	$0
G140.04	F-4411, F4414, F-4419, F4491, F-4492. F-4493, F-4494	150 mm Hydrant lateral DI, CL52 or PVC CL 150 DR18, including reinstatement	60	m	$500	$30,000
G170		**TEMPORARY OVERLAND SERVICES**				
G170.999.01	F-4411, F4416, F-4491, F-4492 F-4493, F-4494	Temporary Service Connections - Supply, Installation & Protection	0	ea	$700	$0
G180		**TRENCH REINSTATEMENT (ALL INCLUSIVE PRICE METHOD)**				
G180.02	F-4411, F-4419, F4491, F-4492. F-4493, F4494	Trench Reinstatement - Existing Road(All Inclusive Method)	720	m	$500	$360,000
G180.03	F-4411, F-4419, F4491, F-4492, F-4493, F4494	Trench Reinstatement - Green Field (All Inclusive Method)	0	m^2	$100	$0

G999		TRENCHLESS CONSTRUCTION				
G999.01	450, F-4491, F-4492, F-4493, F-4494	Entry and Exist Pits for Trenchless Comstrction (All Inclusive)	0	ea	$15,000	$0
G999.02	450, F-4491, F-4492, F-4493, F-4494	Supply and Install 750mm Steel Casing Pipe by Boring & Jacking	0	m	$8,000	$0
G999.03	450, F-4491, F-4492, F-4493, F-4494	Supply and Install 400mm Concrete Pressure Pipe Watermain Class C303 inside the 750mm Steel Casing, including Spacers and Flowable Grout	0	m	$2,000	$0
G999.04	450, F-4491, F-4492, F-4493, F-4494	Supply and Install 1000mm Steel Casing Pipe by Boring & Jacking	0	m	$10,000	$0
G999.05	450, F-4491, F-4492, F-4493, F-4494	Supply and Install 600mm Concrete Pressure Pipe Watermain Class C301 inside the 1000mm Steel Casing, including Spacers and Flowable Grout	0	m	$3,000	$0
G999.06	450, F-4491, F-4492, F-4493, F-4494	Supply and Install >1500mm Steel Casing Pipe by Boring & Jacking	0	m	$15,500	$0
G999.07	450, F-4491, F-4492, F-4493, F-4494	Supply and Install 1050mm Concrete Pressure Pipe Watermain Class C301 inside the >1500 mm Steel Casing, including Spacers and Flowable Grout	0	m	$5,500	$0
					Sub-Total Section G:	**$1,376,000.00**
Section U - Labour and Equipment						
UO10		**Labour**				
U010.01	127, F-8025	Unskilled labour (including supervision where not otherwise provided)	0	hr	$70	$0
U010.02	127, F-8025	Skilled labour (including supervision where not otherwise provided)	0	hr	$75	$0
U020		**Equipment**				
U020.01	127, F-8026	Bulldozer, 45 kW min (D3) (operated)	0	hr	$135	$0
U020.02	127, F-8026	Crawler mounted hydraulic backhoe, 24,500 kg minimum operating weight (Operated)	0	hr	$175	$0
U020.03	127, F-8026	Dump truck - rear axle, tandem drive, 22,000kg GVW min (operated)	0	hr	$110	$0
U020.04	F-8026	Front end loader backhoe, rubber tired 45 kW min (operated)	0	hr	$110	$0
U020.05	127, F-8026	Hydraulic rock breaker, boom mounted - 1400 Joules (operated)	0	hr	$500	$0
U020.06	127, F-8026	Portable air compressor 9m3/min including air hammer and all attachments (operated)	0	hr	$100	$0
U020.07	127, F-8028	Sweeper (Operated)	0	hr	$150	$0
U020.08	F-8026	Water truck - 7,500l min (operated)	0	hr	$125	$0
U020.09	F-4109	Flusher (Operated)	0	hr	$150	$0
U020.11	127, F-8028	CCTV Video Unit (with pan tilt camera)	0	hr	$180	$0
U020.12	F-4110	Combo Cleaning Unit	0	hr	$200	$0
U020.13	127, F-8026	Hydro Excavating/Vacuum Truck (Operated)	0	hr	$325	$0
					Sub-Total Section U:	**$0**
					FINAL - 2020 - Class D - Estimated Construction Costs (No HST):	**$1,566,600**