Executive Summary

1.1 Introduction

1.1.1 Study Purpose

The City of London (the City) is planning for future growth and development expected on the east side of the City, within the Vauxhall and Pottersburg sewersheds. To shape this strategy, the City has conducted the East London Servicing Study Environmental Assessment (the study) to identify the preferred approach for managing future wastewater flows collected and treated within these two sewersheds.

The expected population growth in the sewersheds, their current capacity, and the condition of the Vauxhall and Pottersburg wastewater treatment plants (WWTPs) were assessed. This capacity and condition assessment acted as the baseline against which potentially feasible alternatives were evaluated. The study followed the requirements for a Schedule B project under the Municipal Class Environmental Assessment (EA) process outlined in the Municipal Engineers Association's (MEA) Municipal Class EA document (as amended in 2007, 2011 and 2015).

1.1.2 Problem Statements

The Pottersburg Service Area currently experiences the following issues, which the study aimed to address:

- The Pottersburg sewershed is a growth area and the WWTP will require more treatment capacity.
- Substantial wet weather flows in the sewershed cause capacity constraints in the collection system.
- Aging infrastructure at the WWTP will require substantial structural repairs and replacement of existing equipment. Recent stress testing demonstrated that the WWTP may not be able to treat the full amount of peak wastewater flows for which it was designed.
- The construction approach to repair and upgrade the WWTP will be complicated in order to maintain the wastewater treatment capacity.
- Lower phosphorus discharge limits to Lake Erie (via the Thames River) are pending – meaning reduced levels of phosphorus in the WWTP effluent will be required in the future.
- Any additional flow from the Vauxhall WWTP via the planned Pottersburg-Vauxhall Interconnection would need to be treated at the Pottersburg WWTP.
- High flows from storm events cause bypasses of the Pottersburg WWTP to the Thames River or Pottersburg Creek.

The Vauxhall Service Area currently experiences the following issues, which the study aimed to address:

- Aging infrastructure, including equipment and physical structures, will require replacement and upgrades. Lower phosphorus discharge limits to Lake Erie (via the Thames River) are pending – meaning reduced levels of phosphorus in the WWTP effluent will be required in the future.
- Any additional flow from the Pottersburg WWTP via the planned Pottersburg-Vauxhall Interconnection would need to be treated at the Vauxhall WWTP.
- Optimization of the treatment processes is required to reduce the amount of new infrastructure needed to treat potential Pottersburg flows.

- High flows from storm events cause bypasses of the Vauxhall WWTP to the Thames River.
- Substantial wet weather flows in the sewershed cause capacity constraints in the collection system.
- Management of sludge generated at the Vauxhall WWTP needs to be reviewed to determine if transport through the Vauxhall neighbourhood can be reduced.

1.2 Study Area Conditions

1.2.1 20-Year and 50-Year Flow Projections

Potential treatment and collection system alternatives to address the study goals were developed based on 20-year and 50-year growth projections within each sewershed. Table 1-1 summarizes the ultimate (50-year) Pottersburg WWTP design flows. The total estimated ultimate residential population for the Pottersburg sewershed based on this approach is 171,888 people; approximately 50,000 more people than predicted using *The London Plan* and GMIS boundary approach. This value should continue to be refined with Official Plan and GMIS updates to more accurately outline the proportions of residential place types.

Based on the City design criteria, it is estimated that the ultimate average dry weather flow (ADWF) for the Pottersburg WWTP will be approximately 77,000 m^3/d. The ultimate average day flow (ADF), equivalent to ADWF and infiltration, is estimated to be approximately 103,000 m^3/d. Using the 2011 land use from the 2011 calibrated model, the 2011 ADWF and ADF for the Pottersburg WWTP were similarly estimated to be approximately 27,500 m^3/d and 46,700 m^3/d. The 2037 ADWF and ADF were linearly interpolated to be 50,600 m^3/d and 73,000 m^3/d respectively.

The accuracy of the City's design criteria was checked against historical plant flows. The 2011 calculated ADF design flow is approximately 100 percent greater than historical flow to the Pottersburg WWTP. As a result, the ADFs to the Pottersburg WWTP in 2037 and 2067 will more realistically be in the range of 36,500 m^3/d and 51,600 m^3/d, respectively.

Vauxhall WWTP influent flows between 2012 and 2015 were relatively consistent with an average ADF of 14,960 m^3/d. It is assumed that the 2017 ADF is equivalent to this average due to minimal development within the sewershed during this timeframe. The population within the Vauxhall sewershed is anticipated to grow by 1,454 people between 2017 and 2037 due to residential infill of 16.15 ha of greenfield space. Using a similar estimation approach as the Pottersburg sewershed, this growth in population is equivalent to an increase in ADF of approximately 474 m^3/d. No growth beyond 2037 is anticipated. As a result, the Vauxhall sewershed is expected to reach its maximum ADF of 15,434 m^3/d by 2037. Table 1-2 summarizes the estimated 20-year (and subsequently 50-year) increase in Vauxhall WWTP design flows.

Table 1-1. Estimated Increase in Pottersburg WWTP Design Flows

Place Type	Area (ha)	City Design Criteria				Equivalent Population (people)	Harmon	Peaking Factor	ADWF (m^3/d)	ADF (m^3/d)	Peak DWF (m^3/d)	PWF (m^3/d)
		People/ha	Per Capita Flow (Lpcd)	Uncertain Deviation Factor	Infiltration Allowance (L/s/ha)							
Neighbourhood	1,361	126 [2]	230	1.1	0.1	171,690	2.00 [3]	2.00	39,489	51,251	86,875	98,637
Rural Neighbourhood	2	90	230	1.1	0.1	198	4.15	4.15	46	65	208	227
Shopping Area	44	100	230	1.1	0.1	4,353	3.30	3.30	1,001	1,377	3,635	4,011
Institutional	10	100	230	1.1	0.1	1,006	3.80	3.80	231	318	967	1,054
Commercial Industrial	90	100	230	1.1	0.1	8,995	3.00	2.40	2,060	2,833	5,441	6,215
Light Industrial	983	100	230	1.1	0.1	98,258	2.01	1.61	22,599	31,089	39,900	48,389
Heavy Industrial	423 [1]	100	230	1.1	0.1	42,341	2.33	1.87	9,738	13,397	19,989	23,647
Future Industrial Growth	92	100	230	1.1	0.1	9,246	2.99	2.39	2,127	2,925	5,592	6,391
Total	3,005	-	-	-	-	336,048	-	-	77,291	103,255	162,608	188,572

Notes:

1. Airport area (517 ha) not included.
2. Density proportion assumed to be the same as 2011 model proportions (83.2 percent light residential, 9.8 percent medium residential, 7 percent heavy residential). As a result, the neighbourhood density is 126 people/ha.
3. Good practice that the Harmon Peaking Factor should be a minimum of 2. As a result, the calculated factor of 1.8 was increased to 2.

Table 1-2. Estimated Increase in Vauxhall WWTP Design Flows

Place Type	Area (ha)	City Design Criteria				Equivalent Population (people)	Harmon	Peaking Factor	ADWF (m^3/d)	ADF (m^3/d)	Peak DWF (m^3/d)	PWF (m^3/d)
		People/ha	Per Capita Flow (Lpcd)	Uncertain Deviation Factor	Infiltration Allowance (L/s/ha)							
Residential	16.15	90	230	1.1	0.1	1,454	3.69	3.69	334	474	1,357	1,496

1.3 Development and Selection of Alternatives

1.3.1 Treatment System Alternatives

In consideration of the wastewater treatment opportunities and constrains identified in the report, a long list of potential management alternative components was created, and is provided in Table 1-3, below, categorized as either short-term (next 20 years) or long-term (next 50 years) integrated solutions.

Table 1.3. Short- and Long-term Treatment System Alternatives

Alternative Number	Alternative	Description
Short-term		
1	Do-Nothing	Do nothing, leave as is.
2	Minor capacity Increase at Vauxhall WWTP	Capacity increase to handle anticipated growth in the Vauxhall sewershed.
3	Major capacity Increase at Vauxhall WWTP	Capacity increase to handle anticipated growth in both sewersheds.
4	Minor capacity increase at Pottersburg WWTP	Capacity increase to handle anticipated growth in Pottersburg sewershed.
5	Major capacity increase at Pottersburg WWTP	Capacity increase to handle anticipated growth in both sewersheds.
Long-term		
1	Do-Nothing	Do nothing, leave as is.
2	Replace Pottersburg WWTP	Replacement with new facility capable of handling anticipated growth in the Pottersburg sewershed.
3	Replace Vauxhall WWTP	Replacement with new facility capable of handling anticipated growth in the Vauxhall sewershed.
4	Replace Pottersburg and Vauxhall WWTP with two new WWTPs	Replacement with new facilities capable of handling anticipated growth in their respective sewershed.
5	Replace Vauxhall and Pottersburg WWTPs with one new WWTP	Replacement with new facility capable of handling anticipated growth in both sewersheds.
6	Replace Vauxhall and Pottersburg WWTPs with one new WWTP with capacity for additional flow from other sewersheds	Replacement with new facility capable of handling anticipated growth in both sewersheds, plus flow from outside the sewershed.
7	Convert either Pottersburg or Vauxhall WWTPs to an Industrial Pre-treatment Facility	Focus industrial wastewater pre-treatment at one location while other location treats municipal wastewater and pre-treated industrial wastewater.
8	Concentrate liquids treatment at Pottersburg WWTP	Focus liquids treatment from both sewersheds at Pottersburg WWTP and solids treatment at Vauxhall WWTP.
9	Concentrate liquids treatment at Vauxhall WWTP	Focus liquid treatment from both sewersheds at /Vauxhall WWTP and solids treatment at Pottersburg WWTP.

1.3.2 Collection System Alternatives

A long list of collection system alternatives was identified to mitigate the capacity constraints in the collection system and compliment the wastewater treatment preferred alternative. Alternatives were developed under existing, short-term, and long-term categories, and are presented in Table 1-4, below.

Table 1-4. Existing Collection System Alternatives

Alternative Number	Alternative	Description
1	Do-Nothing	Do nothing; leave as-is
2	Disconnect Weeping Tiles	Applies to homes built between 1920 to 1985. Weeping tile connections to sanitary and combined sewers are a source of I&I. The City has a Basement Flooding Grant Program available to residential homeowners, condominium corporations and non-profit housing co-operatives to help pay for the costs of installing a sump pit and pump, and backwater valve, once weeping tiles are disconnected from the sanitary system.
3	Disconnect Downspouts	Downspout disconnection programs to educate and/or provide incentives and/or prohibit through municipal bylaw to home and building owners for disconnecting roof drains from the sanitary or combined sewers. Disconnection can reduce the volume of I&I to the sewer system. Downspout disconnection includes flat roof disconnection. The removal of these connections can be difficult to enforce.
4	Separate Sewers	This applies only to combined areas and involves separating combined sewers into separate storm and sanitary sewers.
5	Replace Pottersburg Trunk upstream of Dundas St.	The existing Pottersburg Trunk upstream of Dundas Street is in poor conditions and through easements. The existing Pottersburg Trunk Realignment Study (CH2M, 2017) was a study complete to evaluate realigning and replacing the Pottersburg Trunk upstream of Dundas Street.
6	Implement Pump Capacity Upgrades for East Park PS	A recent EA recommended increasing the capacity of the East Park PS at its existing site (R.V. Anderson Associates Limited, 2016).
7	Implement Pottersburg-Vauxhall Interconnection	This was a Municipal Class EA Master Plan completed by AECOM that involves being able to transfer flow between the Vauxhall and Pottersburg WWTPs to utilize the available capacity at each.

These existing alternatives align with the goal of improving the capacity of collection system. After these existing initiatives are implemented, it is recommended that the collection system capacity be reassessed. No further evaluation of the existing alternatives was completed in this EA.

Table 1-5 describes the short-term collection system alternatives and identifies the technical, economic, social, and environmental impacts for each alternative.

Table 1-5. Short-Term Collection System Alternatives

Description	Technical Impacts	Economic Impacts	Social Impacts	Environmental Impacts
Alternative 1 – Do-Nothing				
Do nothing; leave as-is				
Alternative 2 – Inspect Sanitary Sewers for Cracks				

Table 1-5. Short-Term Collection System Alternatives

Description	Technical Impacts	Economic Impacts	Social Impacts	Environmental Impacts
This applies to aging sanitary infrastructure in both sewersheds that may have cracks that allows infiltration into the sanitary sewers.	Potential to decrease the I&I entering the sanitary sewers. Could reduce the diameter of the sewer if sewer relining is implemented	Moderate to high capital costs	Sewer relining or new sewers could involve road closure Reducing I&I in the sewer system could reduce downstream bypasses Can reduce basement flooding risks	Reducing I&I in the sewer system could reduce downstream bypasses and sanitary sewer overflows Reducing cracks in the sewer system could improve the surrounding environment Construction should have limited impact on surrounding area
Alternative 3 – Conduct Study to Upsize Eleanor STS				
This involves upsizing the Eleanor STS in the Vauxhall sewershed.	Can be an effective means of reducing basement flooding and SSOs	High capital costs	Major disruptions to public including road closures Can reduce upstream basement flooding risks	Construction should have limited impact on surrounding area
Alternative 4 – Evaluate Available Capacity of Trunks in the Pottersburg Sewershed				
Model simulations in the Pottersburg Sewershed that account for population growth suggest that the Jackson Rd. Trunk, the Pottersburg Trunk (Downstream of Dundas Street), and the Hamilton Rd Trunk have some capacity constraints. This alternative is to verify and evaluate the capacity of these trunks further.	Can be an effective means of reducing basement flooding and SSOs	High capital costs	Major disruptions to public including road closures Can reduce upstream basement flooding risks	Construction should have limited impact on surrounding area

Table 1-5. Short-Term Collection System Alternatives

Description	Technical Impacts	Economic Impacts	Social Impacts	Environmental Impacts
Alternative 5 – Add Offline Storage along Pottersburg Trunk (downstream of Dundas St.)				
This alternative involves adding offline storage along the Pottersburg Trunk downstream of Dundas Street. Offline Storage combines a number of storage alternatives including offline storage (pipes or tanks), sewer replacement or twinning for additional storage capacity or storage tank or tunnel. Specific storage alternative to be used will need to be confirmed using site specific information at a future design stage.	Typically most cost effective means of controlling basement flooding related to wet weather flow Lack of appropriate design standard for sizing Operational challenges to operate and maintain this type of infrastructure Moderate difficulty to implement depending on land availability and site conditions	High capital costs High O&M costs	Construction may significantly disrupt surrounding neighborhood If available open space is used, impact on private property would be minimized	Impact during construction would be confined to surrounding area
Alternative 6 – Implement Pump Capacity Upgrades for Clarke Rd. PS				
Bypassed flow from the Clarke Rd. PS enters the upstream end of the Pottersburg Trunk, and the large majority of the Pottersburg Trunk is simulated to be surcharged during a two-year design storm event. The Clarke Rd. PS currently pumps flows to the Admiral Drive Sub-Trunk, which feeds the Trafalgar Street Sub-Trunk that connects to the southern portion of the Pottersburg Trunk at Trafalgar Street. Increasing the capacity of the Clarke Rd. PS would increase the flows in the southern portion of the Pottersburg Trunk.	Will increase flows to downstream system and treatment facility Flexible pump operation	Moderate capital costs due to cost of mechanical equipment O&M costs similar to normal operation	Implemented using existing infrastructure, impact on residents should be minimal Increased risk of basement flooding downstream of pumping station	Construction should have limited impact on surrounding area

Table 1-5. Short-Term Collection System Alternatives

Description	Technical Impacts	Economic Impacts	Social Impacts	Environmental Impacts
Alternative 7 – Conduct Study to redirect pumped flows from the Clarke Rd. PS				
This alternative is to conduct a study to evaluate redirecting the flows from the Clarke Rd. PS to the Adelaide WWTP. It would involve installing a forcemain that can convey flows north along Clarke road to the sanitary trunk sewer along Cheapside Street leading to the Adelaide WWTP.	Will increase flows to the downstream Adelaide system and treatment facility Will alleviate capacity constraints in the Pottersburg sewershed	High capital costs due to forcemain design and construction O&M costs similar to normal operation	Increased risk of basement flooding downstream of pumping station in the Adelaide sewershed Decreased risk of basement flooding in the Pottersburg sewershed Major disruptions to public including road closures	Construction should have limited impact on surrounding area
Alternative 8 – Conduct study to divert flow from Pottersburg Sewershed				
This alternative is to conduct a study to evaluate diverting flow from the Pottersburg Trunk at Dundas St. under the Pottersburg Creek to the Vauxhall sewershed. This alternative would require replacing approximately 750 m of the sanitary sewer along Dundas St. and Highbury Ave. in the Vauxhall sewershed to allow flow by gravity.	Will increase flows to the downstream Vauxhall system and treatment facility Will alleviate some capacity constraints along the Pottersburg Trunk	High capital costs due to bridge work and downstream sewer replacement Moderate O&M costs for potential required siphon	Increased risk of basement flooding downstream of pumping station in the Adelaide sewershed Decreased risk of basement flooding in the Pottersburg sewershed Would disrupt traffic on arterial road	Implementation could have little to moderate impact on surrounding environment

The long-term alternatives are described below in Table 1-6. Long-term alternatives were screened but were not evaluated in detail in this EA as these alternatives are dependent on the location of the proposed new WWTP.

Table 1-6. Long-Term Collection System Alternatives

Alternative Number	Alternative	Description
1	Do-Nothing	Do nothing; leave as-is
2	Conduct Study to Identify Collection System Efficiencies	This alternative depends on the location of the proposed new WWTP and is to consider efficiencies in conveying the wastewater to the WWTP.

Table 1-6. Long-Term Collection System Alternatives

Alternative Number	Alternative	Description
3	Replace existing Vauxhall and Pottersburg WWTPs with Pump Stations	This alternative depends on the location of the proposed new WWTP and involves adding pump stations to the existing WWTP locations that can pump flow to the proposed new WWTP.
4	Reroute Collection System	This alternative depends on the location of the proposed new WWTP and involves rerouting trunks and pump stations in both sewersheds upstream of the proposed new WWTP.

1.4 Preferred Alternatives & Recommendations

1.4.1 Preferred Treatment System Alternatives & Recommendations

Following screening and evaluation, Alternative 3 was identified as the only feasible short-term alternative and Alternatives 5 and 6 were tied for the preferred long-term alternative. A preliminary cost estimate was developed to the -30% / +50% level and provides an overall estimate range of $34.8 million to $74.5 million to implement the short-term treatment alternative, based on proposals received by the City from Evoqua for the BioMag and CoMag systems.

The cost to implement either long-term treatment alternative was developed at a high level to provide an order-of-magnitude indication of the total project cost by implementing either Alternative 5 or 6. The costs are based on a dollar per litre of treatment value ($3.3/L), as used by the City. Using this factor, the rough costs for implementing one of the two long-term alternatives is:

- Alternative 5: $330 million for 100 MLD of treatment
- Alternative 6: $462 million for 140 MLD of treatment

Additional work is recommended that will impact the overall cost estimates outlined above, including:

- Study and assess the options for conveying flow from outside sewersheds
- Determine possible siting locations for the new facility
- Evaluate costs, benefits, and drawbacks associated with each alternative

Supporting studies and/or investigations recommended in the short-term are listed below:

- Technology review and evaluation to confirm the recommended approach for capacity upgrades at the Vauxhall WWTP
- Hydraulic study and debottlenecking to confirm that the flow paths within the Vauxhall WWTP can accommodate a re-rating
- Review of solids handling capability at the Pottersburg WWTP and identification of recommended upgrades/improvements, as required. Consideration can be given to whether solids are dewatered at Pottersburg WWTP to reduce the number of trucks taking the solids for ultimate disposal at Greenway WWTP
- Assess the condition of the existing equipment at the Vauxhall WWTP to determine if anything requires immediate repair or replacement for continuing service until the long-term preferred alternative is ultimately identified and implemented

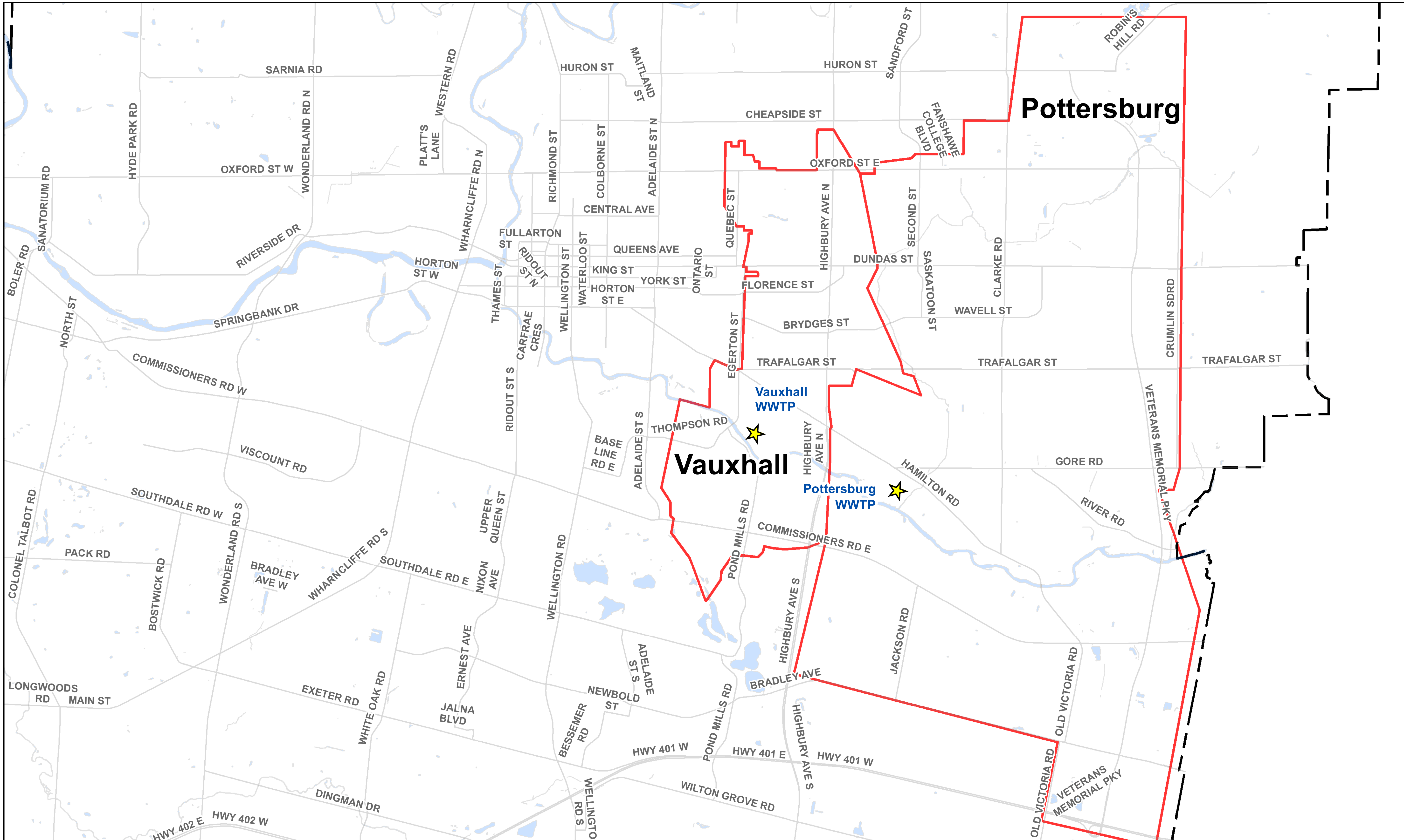
Further work is recommended during a future project phase to identify an ultimate preferred long-term treatment alternative:

- Study and assess the options for conveying flow from outside sewersheds, which will inform the feasibility of constructing Alternative 6 (140 MLD facility) over Alternative 5 (100 MLD facility). Considerations can include development potential of redirecting flow from outside sewershed(s) to a new, large facility (Alternative 6) and the costs associated with doing so
- Determine possible siting locations for the new facility, and whether significant environmental impacts would need to be mitigated as a result
- Complete the design of a pumping station at the Pottersburg WWTP to forward flow to the new facility. Flow from Vauxhall WWTP could be sent to Pottersburg WWTP via the Vauxhall-Pottersburg Interconnection. The design of a pumping station at the Vauxhall WWTP will need to be completed as well
- Evaluate costs, benefits, and drawbacks associated with each alternative, based on the completion of additional work and studies
- Timing to implement the ultimate preferred long-term solution is over 20 years away, and will depend on the remaining life of the infrastructure at Pottersburg WWTP, the actual growth in Pottersburg sewershed, and/or the actual impacts of improvements to the collections systems (for example, a reduction of wet weather peak flows and inflow/infiltration).

1.4.2 Preferred Collection System Alternatives & Recommendations

Collection system Alternatives 2 and 4 were the two short-term alternatives that scored favourably during the evaluation. Alternative 2 will identify cracks in aging sewers and prioritize sewers to be relined. This alternative may help reduce the I&I in the collection system. Alternative 4 will assess the capacity of the Jackson Rd. Trunk, the Pottersburg Trunk (downstream of Dundas St.) and the Hamilton Rd. Sub-Trunk. This study should include flow monitoring, consider population projections, and consider the implementation of the existing alternatives.

The long-term alternatives 2 and 3 were recommended due to their complementary nature with the preferred long-term WWTP alternatives and are dependent on the location of the proposed new WWTP. Therefore, it was recommended that the two screened long-term alternatives be carried forward and revaluated when the location for the new proposed WWTP is selected. Consequentially, this EA did not evaluate these alternatives further.



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Kilometers

City of London Boundary
Major Roads

Applicable WWTP
Pottersburg WWTP
Vauxhall WWTP

Study Area
Pottersburg
Vauxhall

Notes: Source GIS information and aerial imagery property of the City of London

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Figure X-X
Study Area
East London Sanitary Servicing Study Master Plan Environmental Assessment
City of London

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