Appendix A TECHNICAL MEMORANDUM

Stantec

Memo

To:	Geoff Brooks, Director of Infrastructure & Community Services Municipality of Central Elgin	From:	Elvio Zaghi London
Project/File:	165630219	Date:	April 3, 2024

Reference: Union Area Sanitary Servicing

In 2021, Stantec completed a Municipal Class Environmental Assessment (EA) for Union Area Wastewater Servicing that had then identified the preferred sanitary servicing solution for Union, generally described as a New Sanitary Pumping Station (PS) in Union and forcemain to convey wastewater to the Port Stanley sanitary system for treatment. The estimated cost then was $4.5M (in 2001 $s), however as explained herein, new information has now become available that would conclude the cost to be much higher. In 2023, municipal staff undertook a detailed modelling analysis of the Port Stanley sanitary sewer system which identified sanitary sewers lacked capacity to accommodate Union flows. Substantial sewer replacement would be required, at additional cost. Furthermore, the construction industry has been impacted by high inflationary cost increases since 2021. In lieu of this new information, Central Elgin is reconsidering the alternative servicing solution of pumping wastewater from Union directly to the Port Stanley WWTP through Southwold Township.

The WWTP's rated capacity is 2,348m^3/day (AAD). Current wastewater flow being treated is approximately 1,150m^3/day (AAD). Given 250 m^3/day has been approved to Southwold (Turville Farm Development), the reserve treatment capacity is less than 948 m^3/day (AAD), which is not enough for the proposed development growth in Union, and future growth needs of Port Stanley. However, the facility's design allows for expansion to accommodate increased capacity.

Stantec had undertaken the planning, design, and construction of the Port Stanley WWTP and Class EA for Union Area Wastewater Servicing. Stantec was retained by Central Elgin, to undertake the technical analysis for the re-evaluation of the alternative sanitary servicing strategy for Union.

1 Purpose

The purpose for this technical analysis:

- Confirm Sanitary Sewer Modelling of Port Stanley Collection System
- Assess upgrade requirements for the servicing condition changes
- Compare alternative routing
- Prepare construction cost estimate
- Prepare Technical Memorandum for key findings and recommendations.

2 Key Findings

The Key Findings are:

a. **Size of Union Development** - The initial development is estimated to be 950 lots with wastewater flow of 1,676 m^3/day (Average Day Flow; Qave). The ultimate development at full build-out is estimated to be 1,878 lots with wastewater flow of 4,139 m^3/day (Average Day Flow; Qave). These are explained in Section 6, and are substantially larger than what was originally considered during the Class EA.

b. **Available Capacity at the Port Stanley WWTP to service Union Development** – The estimated duration of the initial development phase (950 Lots; 1,676 m3/day) would be 8 to 16 years, assuming new home construction of 60 - 120 new homes/year. As explained in Section 8, the WWTP's current reserve capacity (less than 948 m3/day) is sufficient for approximately 50% of the initial development phase. In 4 to 8 years, a WWTP expansion would be required to service all of the initial development phase.

c. **Port Stanley's Sanitary Sewers System poorly suited to accommodate Union Flows** - Given the additional higher flows being proposed for Union New Development (Section 6), the sanitary sewers along Sunset Drive leading to PS 51, do not have sufficient capacity to accommodate the proposed Union flows. The Main Pumping Station (PS 51) is poorly suited to handle the additional flows from Union, as such, a New PS would be required. Also, PS51's existing forcemain (to WWTP) is 50+ years old, functions under high pressure due to steep grade (to WWTP); and its capacity is currently consumed by excessive wet weather peak flows. As such, a new forcemain will be required to handle Union flows.

3 Key Risks and Mitigating Measures

The risks and mitigating measures are:

a) **More Stringent Effluent Quality Requirements** - Expanding the WWTP could trigger more stringent treated effluent quality requirements. A Class Environmental Assessment (EA) will be required of which would include an assimilative capacity investigation of Kettle Creek to determine if more stringent treated effluent quality requirements will be imposed by the Province. Currently, Port Stanley WWTP has more stringent treated effluent quality regulated requirements compared to other treatment plants in the Kettle Creek Watershed, as such the risk of more stringent requirements is low. If more stringent requirements are imposed, this could have substantial cost increase implications.

b) **Uncommitted Reserve Treatment Capacity** - The WWTP currently has reserve treatment capacity of 1,198m3/day (equivalent to 1,200 new homes) but 250 m3/day has been committed to Southwold (Turville Farm Development). Furthermore, additional capacity could be committed to approved development in the Port Stanley service area. This flow allocation will need to be confirmed, to determine the plant's uncommitted reserve capacity, which is available for servicing future growth for Union. Depending how uncommitted serve capacity is available, this could require a WWTP expansion sooner which would have substantial cost increase implications.

c) **Long Term Growth** – The current growth potential is high but for how long? The plant has substantial reserve capacity to support growth, but eventually a plant expansion could be required, if there is enough growth over the long term. In Years 2021 and 2022, 128 and 117 new residential units were constructed in Port Stanley, respectively. As such, presuming growth of 120 new homes/year were to continue in Port Stanley, the WWTP's current reserve treatment capacity (less than 948 m3/day; 948 new homes) would be consumed in eight (8) years. If Union development were to grow 60-120 new homes/year, then the growth in Union were to occur then the WWTP's capacity could be consumed in less than five (5) years.

d) **Cost Risk** - The average cost of WWTP Phase 1 expansion (to 3,600 m3/day) could vary $13.4M to $25.5M, depending upon inflation over the next 20 years. Caution is warranted before undertaking such substantial capital costs, given the uncertainty of the long-term market conditions to support continued high development growth.

e) **Committing Capacity for Future Development** – Once development is approved, its capacity is committed against the WWTP's reserve capacity and thereby reduces capacity availability for additional growth. Potentially, this could trigger the plant expansion before actual wastewater flows reach the WWTP's rated capacity. Furthermore, Development Charges (DCs) are realized when building permits are issued, as such the Municipality assumes the cost risk of financing the plant expansion, until the new homes are built and DC revenue is received.

To protect the municipality's best interests, consideration should be given to apply special conditions to new development approvals, to ensure properties are constructed in a timely manner and if not, then their approval and treatment capacity could be rescinded.

f) **Treatment Cost Premium (Before vs Future)** – In 2016, when the Port Stanley WWTP was constructed, construction costs were substantially lower. The plant's tender bid price was $14.5M, which would be equivalent to $6,175 per home (Year 2016 $s). In contrast, if the plant were expanded in 10 years at current inflation rate (3.3%), its unit cost could be $10,700 per home (74% increase). As such, the cost of servicing new growth using the plant's reserve capacity, will be substantially lower compared to that of future expanded capacity. This will need to be reconciled in negotiations with New Development, such that they pay for the higher cost of expanded treatment capacity.

g) **Future Inflation** - The construction cost of expanding treatment capacity will increase over time, because of inflation. If the inflation rate were to increase in the future, like it did during Covid, the cost increase could be substantially more. The inflation risk and cost sharing responsibility will need to be addressed in the negotiations with New Development.

h) **Phasing strategy** - This will be developed during the design phase, as outlined in Section 11.

i) **Risk Issues and Mitigating Measures** identified in Section 10 to be addressed during design phase.

4 Recommendations

The recommendations are:

1. Three (3) route servicing alternatives were considered to convey wastewater from the Union New Development to the Port Stanley WWTP. A review meeting was held on Tuesday January 30, 2024, by Municipal staff and the Union Development Project Team, of which included Hayhoe Homes, CJDL, and others. Stantec did not participate at this meeting. We understand that the Draft Version of this Technical Memo (dated December 17, 2023) was reviewed. As explained herein, Stantec recommends Alternative B Routing (Pump Directly Along Rural Roads to Port Stanley WWTP) whereas the Development Project Team prefers Alternative A2 – Revised Class EA Preferred Solution (Pump to Port Stanley's Sanitary Sewer System and re-pump to WWTP).
2. Alternative B (Pump Directly Along Rural Roads to Port Stanley WWTP) is recommended, for the following reasons:
    - Stays clear of Port Stanley. No impact to Port Stanley streets, sanitary sewer, pumping station, or forcemain.
    - Lower construction cost. Development would be responsible for all capital costs.
    - Lower long-term operational costs and risks (ie fewer PSs).
    - Better fit to accommodate other future development. Potential cost sharing advantages.

    The Total Capital Cost could be in the range of $37.7M to $80.5M, with the average of $53.4M (Order of Magnitude Cost Estimate; Sections 9) which would be incurred in the four (4) year horizon, as explained in Section 10.1.2. There is high-cost variance (minimum to maximum range) when estimating construction costs during the conceptual planning stages because the design technical details are not yet available. As illustrated in Figure 5, this cost analysis is considered to be an Opinion of Probable Cost generally described as Class V or "Order of Magnitude Estimate". Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve.
3. The Development Project Team prefers Alternative A2 – Revised Class EA Preferred Solution (Pump to Port Stanley's Sanitary Sewer System and re-pump to WWTP), as described in Section 10.1.2 They believe this routing solution is in their best interests, presuming the Municipality were to cost share the upgrades of the sanitary infrastructure in Port Stanley.

5 Technical Analysis

The technical analysis is explained herein.

6 Union Development Growth Overview (Ref: CJDL, 2023)

An overview of the future development potential in Union is illustrated in Figure 1 and its sanitary servicing needs are summarized in Tables 1 and 2 (Ref: CJDL SAN design Sheet Nov-9-2023), respective of the previous Port Stanley WWTP Design Criteria and Central Elgin 2023 Design Criteria (Current Standard). These flows are substantially larger than was considered during the Class EA. In the past 5 years, Central Elgin has experienced unprecedented development growth, that far exceeds the historical average.

Design flow based upon Port Stanley WWTP Design Criteria:

- Initial development is estimated to be 952 lots with wastewater flow of 1,711 m^3/day (Average Day Flow; Qave) and 3,767 m^3/day (Peak Flow, Qpeak).
- Ultimate development at full build-out is estimated to be 2,143 lots with wastewater flow of 4,424 m^3/day (Average Day Flow; Qave) and 8,484 m^3/day (Peak Flow, Qpeak).
- Refer to Table 1; Ref: CJDL SAN design Sheet Nov-9-2023

Design flow based upon Central Elgin 2023 Design Criteria. This represents Central Elgin's current standard, and is preferred:

- Initial development is estimated to be 950 lots with wastewater flow of 1,676 m^3/day (Average Day Flow; Qave) and 3,612 m^3/day (Peak Flow, Qpeak).
- Ultimate development at full build-out is estimated to be 1,878 lots with wastewater flow of 4,139 m^3/day (Average Day Flow; Qave) and 7,543 m^3/day (Peak Flow, Qpeak).
- Refer to Table 2; Ref: CJDL SAN design Sheet Nov-9-2023

Given the recent home build rate for Port Stanley has been 120 homes/yr, for the purpose of this analysis, the home build rate for Union Development is assumed to be 50% to 100% of that of Port Stanley (60 – 120 homes/yr). At this assumed home build rate, the estimated duration of the initial development phase (950 to 952 Lots; 1,676 to 1,711 m^3/day) would be 8 to 16 years. As explained in Section 8, the WWTP's current reserve capacity (less than 948 m^3/day) is sufficient for approximately 50% of Union's initial development phase, as such a WWTP expansion would be required in 4 to 8 years. Taking into considering growth needs outside of Union, the WWTP expansion timeline would be quicker.

Figure 1 – Community of Union, Sanitary Servicing Tributary Area (Ref: CJDL, 2023)

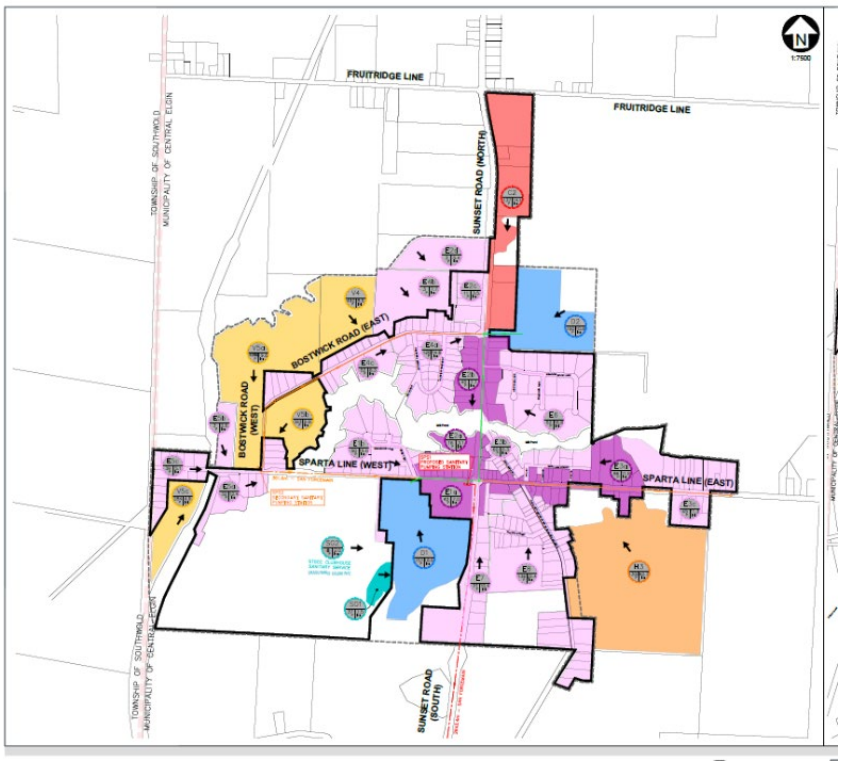


Table 1 – Sanitary Servicing Needs for Union (based upon Port Stanley Design Criteria)
(Ref: CJDL SAN design Sheet Nov-9-2023)

Development	Lots	Service Population	Wastewater Flow			
			Qave		Qpeak	
			(L/s)	(m^3/day)	(L/s)	(m^3/day)
Initial	952	2,479	19.8	1,711	43.6	3,767
Ultimate	2,143	5,586	51.2	4,424	98.2	8,484

Table 2 – Sanitary Servicing Needs for Union (based upon 2023 Central Elgin Design Criteria)
(Ref: CJDL SAN design Sheet Nov-9-2023)

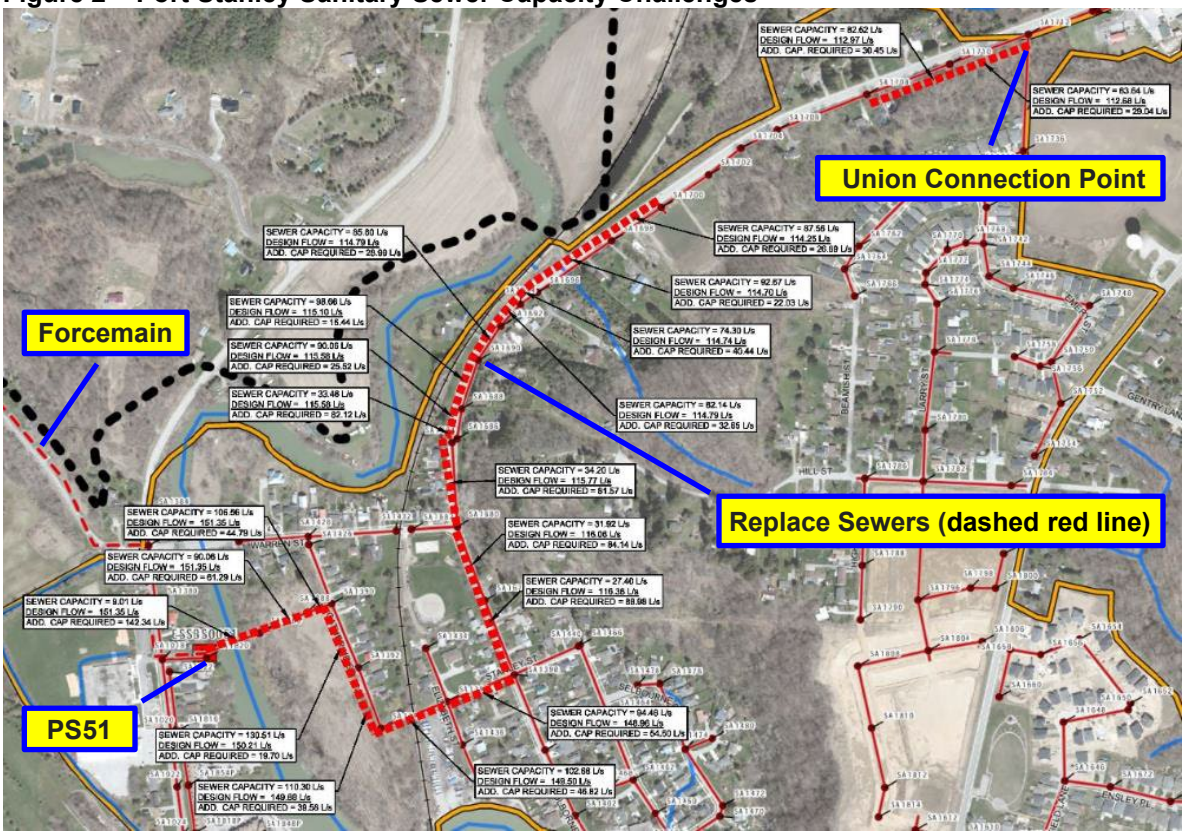
Development	Lots	Total Population	Wastewater Design Flow			
			Qave		Qpeak	
			(L/s)	(m^3/day)	(L/s)	(m^3/day)
Initial	950	2,857	19.4	1,676	41.8	3,612
Ultimate	1,878	5,645	47.9	4,139	87.3	7,543

7 Port Stanley Sanitary System

Given the high flows proposed for Union New Development (Section 6), the sanitary system in Port Stanley does not have sufficient capacity. The following upgrades are recommended:

- **Sanitary Sewers along Sunset Drive and Colborne Streets** - The modelling analysis undertaken by Municipal staff, identified sanitary sewers along Sunset Drive and Colborne Streets have available hydraulic reserve capacity for additional 150 lots, after which approximately 2 kms of sewers will need to be expanded (illustrated in Figure 2 as dashed red line). To accommodate additional flows from Union, replacing these sewers is recommended. Or the new forcemain (from Union) could be extended passed these sewers.
- **Existing Pumping Station (PS 51)** - Recent modelling analysis undertaken by Municipal staff, identified reserve capacity could be as high as additional 400 lots. However, PS51 currently experiences excessive wet weather peak flows, and its forcemain (to WWTP) is 50+ years old and functions under high pressure due to steep grade (to WWTP). As such, PS51 and its forcemain is poorly suited to handle the additional higher flows from Union. A New PS and forcemain is recommended.

Figure 2 – Port Stanley Sanitary Sewer Capacity Challenges



8 WWTP Reserve Capacity

The plant's rated treatment capacity is 2,348m^3/day (Average Annual Day; AAD). Current wastewater flow being treated is approximately 1,150m^3/day (AAD). Also, given 250m^3/day of treatment capacity has been already committed to Southwold (Turville Farm Development), the reserve treatment capacity is less than 948 m^3/day (AAD), as explained herein.

Ontario guideline (*D-5-1 CALCULATING AND REPORTING UNCOMMITTED RESERVE CAPACITY AT SEWAGE AND WATER TREATMENT PLANTS; Ref: 4.3.; HTTPS://WWW.ONTARIO.CA/PAGE/D-5-1-CALCULATING-AND-REPORTING-UNCOMMITTED-RESERVE-CAPACITY-SEWAGE-AND-WATER-TREATMENT-PLANTS*) defines the reserve treatment capacity. Ontario requires the reserve capacity take into consideration the committed flow capacity from approved properties (approved plans of subdivisions, developments committed by virtue of approved zoning, new official plans or site-specific official plan amendments) that have not yet been constructed.

The plant's uncommitted reserve capacity is defined as:

Uncommitted Reserve Capacity
= (Plant's rated capacity)
– (Current sewage flow measured as Annual Average Day flow over the past 5 Years)
– (Committed Capacity for approved properties but not yet constructed)

As such, the uncommitted reserve capacity of the Port Stanley WWTP to service additional future growth is less than 948m^3/day (AAD), presuming there are properties in Port Stanley sanitary service area that have not yet been constructed but capacity has been committed for them. These flow allocations will need to be considered, to determine how much available uncommitted reserve capacity could be committed for servicing new development growth in Union.

The sanitary servicing needs for Union development is estimated to be1,676m^3/day for initial development and 4,139 m^3/day for ultimate development, as explained in Section 6. As explained above, the uncommitted reserve treatment capacity is less than 948m^3/day. As such, less than 50% of the initial development (948 m^3/day vs 1,676 m^3/day) can be committed to, after which a WWTP expansion would be required. The plant expansion is typically triggered when actual flows plus committed reserve capacity for Approved Properties (approved plans of subdivisions, developments committed by virtue of approved zoning, new official plans or site-specific official plan amendments) reaches 85% of the plant's rated capacity.

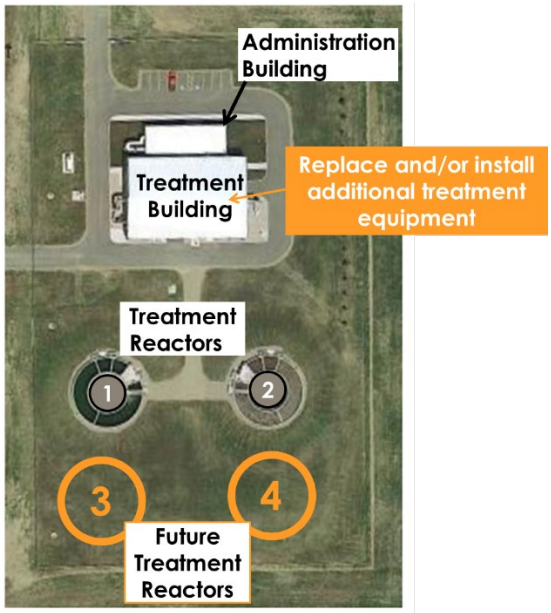
8.1 WWTP Capacity Expansion

The plant's rated treatment capacity is 2,348m^3/day (AAD). Its design is modular for phased expansion in increments of 1,200m3/day, from its current rated capacity to 3,600 m^3/day. Potentially, the plant could be further expanded in phases as needed.

Future treatment capacity expansion and upgrades (refer to Figure 3) would include:

- Replace and/or install additional treatment and ancillary equipment within the treatment building.
- Construct additional treatment reactors that are located outdoors.
- Replace and upsize the outfall pipe that conveys treated effluent toward Kettle Creek
- New forcemain pipe(s) that convey wastewater from Union to the plant and piping modifications within the Treatment Building to connect these new forcemain(s).
- The building size and fenced site area would remain unchanged.

Figure 3 – WWTP Capacity Expansion



8.2 Growth of Wastewater Flows vs Capacity Expansion

The need to expand the treatment plant capacity will depend upon the population growth and corresponding increase of wastewater flow, as explained herein. Refer to Figure 4 which illustrates growth of wastewater flows for various scenarios and triggering need for plant expansion.

As explained in Section 6, the sanitary servicing needs for Union development is estimated to be 1,676m^3/day (950 Lots) for initial development and 4,139 m^3/day (1,878 Lots) for ultimate development.

Depending how quickly these new homes are constructed and occupied, this will impact availability of reserve capacity at the Port Stanley WWTP and timing of expansion for additional capacity. Typically, housing sales are highly depending upon market conditions and could vary substantially over the long term. For example:

- Presuming annual housing sales of 60, then it would take 16 years to reach 950 new homes for the Initial Development.
- In contrast, at 120 homes/year, then 950 new homes would take 8 years.
- As explained in herein, the difference between 8 and 16 years could have substantial implications in plant expansion phasing and more importantly, its cost.

Also, in addition to Union, Central Elgin also has additional growth needs within Port Stanley which would consume the plant's current reserve capacity and trigger the need for expansion sooner, which has significant cost implications.

To compare growth rates, Central Elgin experienced record growth in Year 2021. A total of 714 building permits were issued of which 199 were for new homes and this is for the whole of the municipality. In Port Stanley, 128 and 117 new residential units were constructed respectively in Years 2021 and 2022. This far exceeds the historical growth for Central Elgin.

Plant's Current Rated Capacity (2,348m3/day; AAD)

Given the current wastewater flow is 1,150 m^3/day (AAD), the plants' current rated capacity (2,348m^3/day; AAD) will be sufficient for population annual growth rate of less than 3.3% over the 20 Year Horizon (Year 2043). This growth would be equivalent to approximately 1,200 new homes (60 new homes/year over 20 yrs), presuming a house typically produces on average approximately one (1) m^3/day of wastewater flow. In context, comparing to Central Elgin's historical growth rate of 1.1% annually, a 3.3% growth rate (60 homes/yr) would seem high; equivalent to a 300% increase. However, 128 and 117 new residential units (new homes) were constructed in Port Stanley, respectively in Years 2021 and 2022.

The plant's current capacity would accommodate the following different scenarios of population growth, after which it would need to be expanded:

- If annual growth rate less than 3.3%, the plant's capacity would be sufficient for 20 years (Year 2043) or more.
- At 3.3% annual growth rate (60 homes/yr over 20 years; 1,200 new homes), an expansion would be required in 20 years (Year 2043)
- At 5.8% annual growth rate (92 homes/yr), an expansion would be required in 13 years (Year 2036)
- At 7.4% annual growth rate (120 homes/yr), an expansion would be required in 10 years (Year 2033)
- These scenarios based upon 1,200 new homes, presuming a house typically produces on average approximately one (1) m3/day of wastewater flow.

1st Phased Expansion (Capacity Increased to 3,600 m^3/day)

The plant's design is modular for phased expansion in increments of 1,200m^3/day (AAD; equivalent to 1,200 homes), as such Phase 1 expanded treatment capacity would be 3,600 m^3/day AAD. Currently, the plant has reserve capacity for 1,200 new homes and this expansion would increase the reserve capacity to 2,400 new homes.

As previously explained, Phase 1 expansion would be required when wastewater flows plus committed serves capacity reach 85% of the plant's current rated capacity (2,348 m^3/day AAD). For budget and schedule planning purposes, the plant expansion schedule would require four (4) years (1yr for Class EA; 1yr for Design, Approvals, and Tender; and 2 yrs for construction). As such, at the planning level, the project expansion would need to start four (4) years before the wastewater flows plus committed reserve capacity reach 85% of the plant's current rated capacity.

Phase 1 expanded capacity (3,600 m^3/day AAD) will accommodate different scenarios of population growth, after which a 2nd phased expansion would be required:

- At 5.8% annual growth (120 homes/yr over 20 years; 2,400 new homes), Phase 1 expanded capacity would be sufficient for 20 years (Year 2043).
- At 7.4% annual growth (150 homes/yr), Phase 1 expanded capacity would be sufficient for 16 years (Year 2039), and Phase 2 expansion would then be required.
- These growth scenarios based upon 2,400 new homes, presuming a house typically produces on average approximately one (1) m3/day of wastewater flow.

2nd Phased Expansion (Capacity Increased to 4,800 m^3/day)

The 2nd phased expansion would be required when wastewater flows approach 3,600 m^3/day. 2nd Phased Expanded Capacity (4,800 m^3/day) will accommodate population growth rate up to 7.4% over the 20 Year

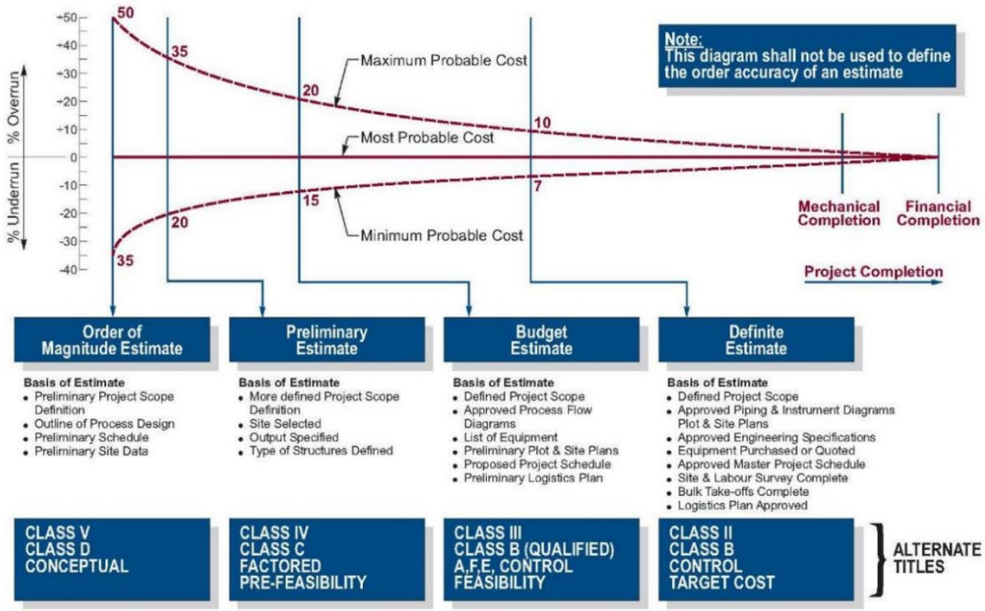
Horizon (Year 2043) which would seem unreasonably high compared to historical records. This scenario presumes 3,500 new homes (10,000+ people) that would be built over 20 years (175 new homes/yr).

Figure 4 – Growth of Wastewater Flows vs Plant Phased Expansion

9 Construction Cost

There is high-cost variance (minimum to maximum range) when estimating construction costs during the conceptual planning stages because the design technical details are not yet available. As illustrated in Figure 5, this analysis is considered to be an Opinion of Probable Cost generally described as Class V or "Order of Magnitude Estimate". Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve.

Figure 5 – Cost Estimate Classifications



9.1 Treatment Cost

9.1.1 ORIGINAL PLANT COST

The original plant was tendered in 2016. Construction start was in Fall 2016 and completed in Fall 2018. Construction duration was approximately 24 months (2 Years).

Eight (8) bids were received, ranging from $17.7M to $18.9M (HST not included; Year 2016 $s). The average tender bid price was $18.3M. The project was awarded to the lowest bid price of $17.7M. The cost for the treatment plant was $14.5M and the remaining $3.2M was for the pumping stations.

Given the plant's rated treatment capacity (2,348m^3/day), the equivalent unit cost of treatment would be $6,175 per m^3/day (Year 2016 $s). Presuming a house typically produces on average approximately 1 m^3/day of wastewater, then the unit cost of treatment would be $6,175 per house.

9.1.2 INFLATION

Since the tender in Year 2016, the economy has experienced high inflation, resulting in substantial increase in construction costs. Given the current market conditions and inflation risk, predicting future construction costs is uncertain with high-cost variance potential. Recent tenders have closed 50% over cost estimates.

Historically, the annual inflation rate in Canada was near 2%. During Covid, the annual inflation rate increased up to 6.8%. The current annual inflation rate is fluctuating in the 3.3% range. As such, the construction cost of treatment has risen substantially since the plant was originally constructed before Covid. Refer to Figure 6 which illustrates the inflation effect of increasing future costs.

Presuming historical annual inflation rate of 2%, the unit treatment cost of $6,175 (Original Plant Constructed Cost; per 1 m^3/day; Year 2016) would increase to:

- $7,100 (15% increase) in Year 2023 (Current)
- $8,600 (40% increase) in Year 2033 (10 Year Horizon)
- $10,500 (71% increase) in Year 2043 (20 Year Horizon)

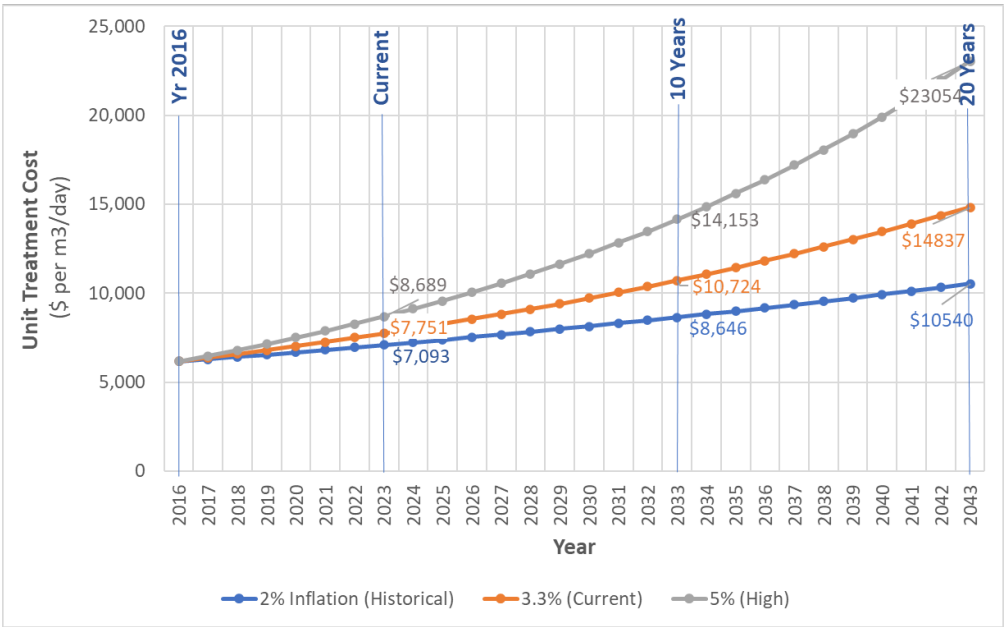
Presuming the current inflation rate of 3.3%, the unit treatment cost of $6,175 (Original Plant Constructed Cost; per 1 m3/day; Year 2016) would increase to:

- $7,800 (26% increase) in Year 2023 (Current)
- $10,700 (74% increase) in Year 2033 (10 Year Horizon)
- $14,800 (140% increase) in Year 2043 (20 Year Horizon)

Presuming a high inflation rate of 5%, the unit treatment cost of $6,175 (Original Plant Constructed Cost; per 1 m3/day; Year 2016) would increase to:

- $8,700 (41% increase) in Year 2023 (Current)
- $14,200 (129% increase) in Year 2033 (10 Year Horizon)
- $23,100 (273% increase) in Year 2043 (20 Year Horizon)

Figure 6 – Inflation Effect of Increasing Future Costs



9.1.3 FUTURE PLANT EXPANSION COST

The construction cost of expanding the plant will depend upon when it occurs and inflation effect as previously explained.

The expansion cost in Year 2024 $s

- Phase 1: expand to 3,600 m^3/day, the cost range is $9.4M to $20M, with average of $13.4M. Refer to Table 3
- Phase 2: expand from 3,600 to $4,800 m^3/day, the cost range is $12.2M to $27.1M, with average of $17.4M. Refer to Table 4.

The construction cost of expanding treatment capacity will increase over time, because of inflation. If the inflation rate were to increase in the future, like it did during Covid, the cost increase would be substantially more.

Presuming the current inflation rate (3.3%), the average cost of Phase 1 expansion (3,600 m^3/day) could increase from $13.4M to $25.5M (HST not included), over the next 20 years. Similarly, the construction cost for Phase 2 expansion (4,800 m^3/day) would increase similarly over the long-term horizon.

Reference: Wastewater Shared Servicing

Table 3 – Expansion Cost (from Current Capacity to 3,600 m^3/day; Years 2024 $s)

Work Scope Division		Supply	Install	Cost Range[1,2] Low	Average	High
1	General			$839,961	$1,199,945	$1,799,917
2	Site Construction			$712,529	$1,017,899	$1,526,849
3	Concrete			$1,477,325	$2,110,464	$3,165,696
4	Masonry					
5	Metals			$141,447	$202,067	$303,100
6	Wood & Plaster					
7	Thermal & Moisture Protection					
8	Windows & Doors					
9	Finishes					
10	Specialities			$1,687	$2,410	$3,615
11	Equipment					
11.1	Screen Grit Removal System	$ 2,250,000	$ 1,125,000	$2,362,500	$3,375,000	$5,062,500
11.2	Aeration Blowers	$ 75,000.00	$ 37,500	$78,750	$112,500	$168,750
11.3	Filters	$ 281,250.00	$ 70,313	$246,094	$351,563	$527,344
11.4	UV Disinfection	$ 112,500.00	$ 28,125	$98,438	$140,625	$210,938
11.5	Parshall Flume					
11.6	Chemical Feed System	$ 7,500.00	$ 7,500	$10,500	$15,000	$22,500
11.7	Clarifier Mechanisms	$ 450,000.00	$ 225,000	$472,500	$675,000	$1,012,500
11.8	Fine Bubble Diffusers	$ 90,000.00	$ 45,000	$94,500	$135,000	$202,500
11.9	Miscellaneous	$ 18,750.00	$ 4,688	$16,406	$23,438	$35,156
13	Special Construction					
14	Conveying Equipment					
15	Mechanical			$1,613,433	$2,304,904	$3,457,356
16	Electrical			$1,166,071	$1,665,815	$2,498,723
Total				$9,340,000	$13,340,000	$20,000,000

Notes

1. Based upon ASTM E 2516-06 (Standard Classification for Cost Estimate Classification System), the Opinion of Probable Cost for the Barrie WwTF MBR Design Concept is considered to be Class 5 level, with anticipated accurancy range of -30% to +50%.
2. All costs are based upon 2024 Year $s.

Table 4 – Expansion Cost (from 3,600 to 4,800 m3/day; Years 2024 $s)

Work Scope Division		Supply	Install	Cost Range[1,2]		
				Low	Average	High
1	General			$839,961	$1,199,945	$1,799,917
2	Site Construction			$1,425,059	$2,035,798	$4,071,597
3	Concrete			$2,215,987	$3,165,696	$4,748,545
4	Masonry					
5	Metals			$141,447	$202,067	$303,100
6	Wood & Plaster					
7	Thermal & Moisture Protection					
8	Windows & Doors					
9	Finishes					
10	Specialities			$1,687	$2,410	$3,615
11	Equipment					
11.1	Screen Grit Removal System	$ 3,000,000	$ 1,500,000	$3,150,000	$4,500,000	$6,750,000
11.2	Aeration Blowers	$ 75,000.00	$ 37,500	$78,750	$112,500	$168,750
11.3	Filters	$ 281,250.00	$ 70,313	$246,094	$351,563	$527,344
11.4	UV Disinfection	$ 150,000.00	$ 37,500	$131,250	$187,500	$281,250
11.5	Parshall Flume	$ 25,000.00	$ 5,000	$21,000	$30,000	$45,000
11.6	Chemical Feed System	$ 7,500.00	$ 7,500	$10,500	$15,000	$22,500
11.7	Clarifier Mechanisms	$ 450,000.00	$ 225,000	$472,500	$675,000	$1,012,500
11.8	Fine Bubble Diffusers	$ 90,000.00	$ 45,000	$94,500	$135,000	$202,500
11.9	Miscellaneous	$ 18,750.00	$ 4,688	$16,406	$23,438	$35,156
13	Special Construction					
14	Conveying Equipment					
15	Mechanical			$2,151,244	$3,073,206	$4,609,809
16	Electrical			$1,166,071	$1,665,815	$2,498,723
Total				$12,170,000	$17,380,000	$27,090,000

Notes

1. Based upon ASTM E 2516-06 (Standard Classification for Cost Estimate Classification System), the Opinion of Probable Cost for the Barrie WwTF MBR Design Concept is considered to be Class 5 level, with anticipated accurancy range of -30% to +50%.
2. All costs are based upon 2024 Year $s.

9.2 Pumping Station Cost

Two types of pumping stations (PSs) would be considered applicable for the Union sanitary servicing solution, as explained herein.

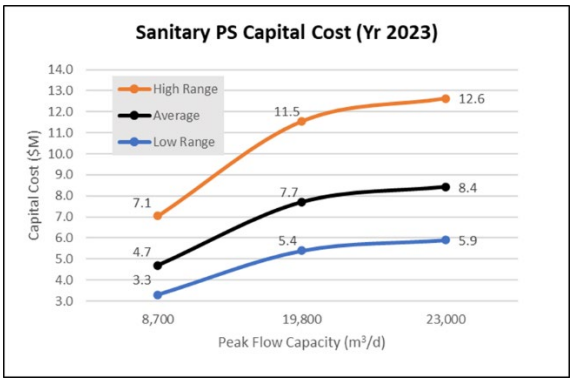
9.2.1 COMPLEX PUMPING STATION (URBAN SETTING)

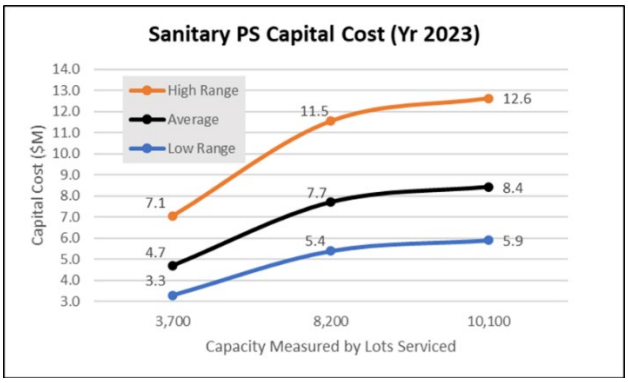
The complex pumping station is of larger pumping capacity and typical for larger urban settings. The building appearance is often architecturally appealing. All equipment (pumps, piping, valves, instruments, electrical panels, etc.) are contained within the building. The foundation is often deep and configured with wet and dry wells, for sewage pumping. These pumping stations are often configured with several large pumps. And the construction cost of these pumping stations is substantially higher. This type of pumping station would be applicable for replacing PS51 in Port Stanley. Refer to Figure 7 which illustrates a typical complex pumping station.

The reference project for costing is the Colonel Talbot Pumping Station (City of London) that was constructed in Year 2019. The design concept enabled for phased capacity expansion from 13,800m3/d (initial) to 18,100 m3/d (ultimate). Five (5) tender bids were received ranging from $5.1M to $6.5M, with the average being $5.5M (HST not included; Year 2019 $s). Presuming inflation rate (3.6%) since Year 2019, the inflation escalated average cost would be $6.2M. Cost curves for range of flows are provided in Figure 6.

Figure 7 - Complex Pumping Station (Urban Setting)

Figure 8 – Cost Curves for Complex Pumping Stations





9.2.2 SIMPLER PUMPING STATION (RURAL SETTING)

The simpler pumping station is of lower pumping capacity and typical for smaller urban/rural settings. Compared to the complex pumping station, there is no above grade building. The pumping station consists of a precast concrete chamber, which contains the pump equipment and related piping/valves/instruments. For larger capacity installations, the piping, valves, flow meter, etc., could be located in a separate precast concrete valve chamber. These pumping stations are typically sized for lower pumping capacity and fewer pumps, compared to complex pumping stations. And the construction cost of these simpler pumping stations is substantially lower. This type of pumping station would be applicable for Union. Refer to Figure 9 which illustrates a typical simpler pumping station.

Based upon a recent project tender (Year 2023 $s), cost curves for range of flows are provided in Figure 10.

Reference: Wastewater Shared Servicing

Figure 9 - Simpler Pumping Station (Smaller Urban/Rural Setting)

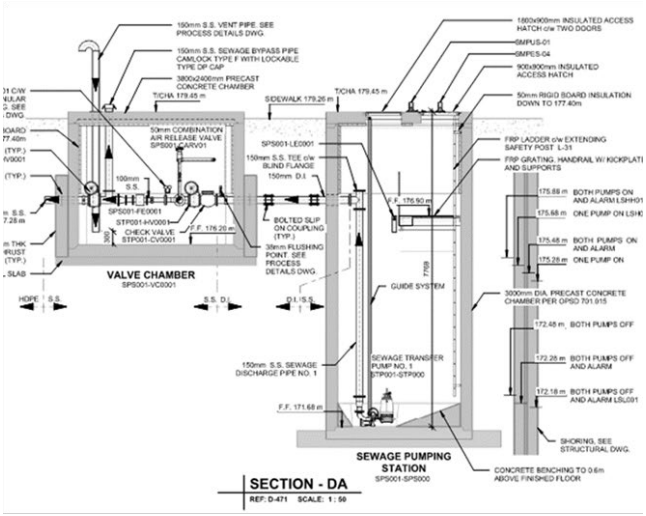
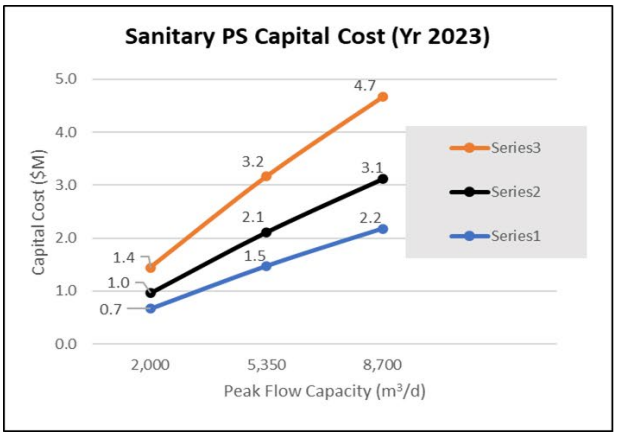
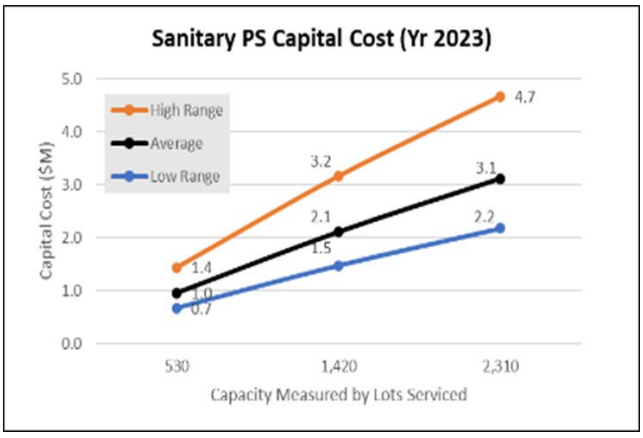


Figure 10 – Cost Curves for Simpler Pumping Stations





9.3 Construction Cost - Forcemains

The construction cost of forcemains will vary upon pipe diameter and scope of restoration within roadway allowance. Construction along rural roads tend to be lower cost compared to county roads. A summary of forcemains cost of varying diameters, capacity, and road application type are summarized in Table 5.

Table 5 – Forcemain Costs for Rural and County Roads

		Flow Capacity Unit Cost ($/km)					
Diameter	Capacity	Rural Road			County Road		
(mm)	Range	($M/km)	($/km/person)	($/km/lot)	($M/km)	($/km/person)	($/km/lot)
300	Low	$1.2	$162	$438	1.8	$243	$657
300	High	$1.2	$130	$350	1.8	$195	$525
400	Low	$1.5	$106	$287	2.2	$156	$421
400	High	$1.5	$85	$230	2.2	$125	$337
450	Low	$1.8	$101	$272	2.7	$151	$408
450	High	$1.8	$81	$218	2.7	$121	$327
600	Low	$2.3	$78	$210	3.3	$111	$301
600	High	$2.3	$65	$175	3.3	$93	$251

10 Sanitary Servicing Solutions for Union

Two (2) alternative routes, each with sub-options, were considered as explained herein.

A – Pump to Port Stanley's Sanitary Sewer System and re-pump to WWTP

B – Pump along rural roads directly Port Stanley WWTP

10.1 Alternative Route A- Pump to Port Stanley's Sanitary Sewer System & Re-Pump to WWTP

Three (3) sub-alternatives routes were considered as explained herein:

A1 – Class EA Preferred Solution

A2 – Revised Class EA Preferred Solution

A3 - Proposed Developer Solution

10.1.1 ALTERNATIVE ROUTE A1 – REVISED CLASS EA PREFERRED SOLUTION

Alternative Route A1 represents the recommended solution by the Class EA for Union Area Wastewater, to pump Union sanitary flows to Port Stanley's Sanitary System and the re-pump to Port Stanley WWTP. After the Class EA was completed, municipal staff undertook a detailed modelling analysis of the Port Stanley's sanitary sewer system and identified sewers lacked capacity to accommodate Union flows and substantial capital upgrades would be required, as explained Section 7. As such, this alternative is no

longer recommended and has been revised, because the sanitary sewers along Sunset Drive lack sufficient capacity, as explained herein as Route Alternative A2.

10.1.2 ALTERNATIVE ROUTE A2 – REVISED CLASS EA PREFERRED SOLUTION

Alternative Route A2 generally represents the revised version of the recommended solution by the Class EA for Union Area Wastewater. As explained in Section 7, the sanitary sewers, PS51 and its forcemain are poorly suited to accommodate additional flows from Union. As such, this alternative includes a New PS and forcemain in Port Stanley to convey total flow (Port Stanley + Union) to the WWTP. The existing PS51 would be decommissioned and the New PS would be located on a new site. This alternative is illustrated in Figure 11 and generally described as:

- Sanitary flows from Union would be conveyed by a new forcemain, south along Sunset Rd to Port Stanley and connect a New PS in Port Stanley which would repump combined total flows of Union and Port Stanley to the WWTP. The sanitary sewers along Sunset Drive lack capacity and would need to be replaced as explained in Section 7, or the forcemain from Union could be extended to the New PS in Port Stanley. Extending the forcemain would cost less than replacing the sewers, as such was assumed for the purpose of this evaluation the extended forcemain.
- Forcemain length from Union to New PS in Port Stanley is approximately 4.6 kms.
- Grade change: 44m up; 36m down; Overall 9m up.
- Construction would impact Port Stanley streets, sanitary sewers, PS 51 and its forcemain

The Total Capital Cost could be in the range of $37.7M to $80.5M, with the average of $53.4M (Order of Magnitude Cost Estimate; Sections 9) which could be incurred in the four (4) year horizon, as explained herein. There is high-cost variance (minimum to maximum range) when estimating construction costs during the conceptual planning stages because the design technical details are not yet available. As illustrated in Figure 5, this cost analysis is considered to be an Opinion of Probable Cost generally described as Class V or “Order of Magnitude Estimate”. Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve. The Required wastewater infrastructure upgrades:

- Wastewater infrastructure upgrades will be phased to match new home sales. Annual Rate of New Home Sales in Union is expected to be 100 homes per year. We understand this was confirmed by the Union Development project team during Jan 30th meeting, with Municipal staff.
- **New Pumping Station (PS) in Union and Forcemain to convey wastewater flows to Port Stanley** – The New PS and its forcemain will be designed, in accordance with Ontario Design Guidelines for Sewage Works, and its pumping capacity can be easily upgraded to accommodate future development growth. These will need to be constructed prior to occupancy of new homes. The Order of Magnitude Cost Estimate (as explained in Sections 9 and 10) could in the $9.2M to $19.8M range with the average of $13.1M, depending upon the complexity of PS configuration design (as explained In Section 9.2) and forcemain routing constraints.
- **Port Stanley Sanitary Sewer System Upgrades** – The modelling analysis undertaken by Municipal staff, identified sanitary sewers along Sunset Drive and Colborne Streets have available hydraulic reserve capacity for additional 150 lots, after which approximately 2 kms of sewers will need to be expanded. Presuming (100) new homes sales annually in Union, the reserve capacity of these sewers would be consumed in less than two (2) years, after which sewer replacement would be required. During the design phase, a detailed technical design analysis will be undertaken of the sanitary sewers leading to PS 51, to confirm if replacing these sewers is cost effective compared to extending the New Union PS forcemain directly to PS 51. The Order of Magnitude Cost Estimate to replace these sewers (2km length) could in the $4M to $8M range, with the average of $5M.

- **Port Stanley Main Pumping Station (PS51) and its Forcemain (to WWTP) Upgrades** – The modelling analysis undertaken by Municipal staff, identified reserve capacity could be as high as additional 400 lots. However, PS51 currently experiences excessive wet weather peak flows, and its forcemain is 50+ years old and functions under high pressure (due to steep grade increase to WWTP). As such, PS51 is poorly suited to accommodate additional flows from Union. This poses substantial risk to the Municipality, if the forcemain were to fail during excessive wet weather peak flow events. A New PS and forcemain is recommended. The Order of Magnitude Cost Estimate (as explained in Sections 9 and 10) could in the $13.8M to $29.4M range, with the average $19.5M. If the Municipality is willing to accept the risk to allow additional flows from Union into PS 51, and presuming current development growth in Port Stanley of 120 units/year and New Home Sales of 100 units/yr in Union, the reserve capacity (400 Lots) of PS 51 would be consumed in less than four (4) years, after which a New PS and Forcemain would be required.

- **Port Stanley WWTP Upgrades** - As explained in Section 8, the uncommitted reserve capacity of the Port Stanley WWTP to service additional future growth is less than 948m3/day (Annual Average Day). Ontario requires the reserve capacity take into consideration the committed flow capacity from Approved Properties (approved plans of subdivisions, developments committed by virtue of approved zoning, new official plans or site-specific official plan amendments) that have not yet been constructed. As such, approval of subject development in Union, as well as Port Stanley, will consume the uncommitted reserve capacity. The plant expansion is typically triggered when actual flows plus committed reserve capacity for Approved Properties reaches 85% of the plant's rated capacity. As such, the timing of the plant expansion will depend upon how many new home properties are approved in Union. However presuming current development of growth in Port Stanley of 120 units/year and New Home Sales of 100 units/yr in Union, the plant expansion could be triggered in less than 3 years. The typical time duration for planning (Class EA, design, approvals, tender and construction for the plant expansion is four (4) years. The Order of Magnitude Cost Estimate (as explained in Sections 9 and 10) for the plant expansion (to 3,600 m3/day) could in the $14.6M to $31.3M range, with the average of $20.9M.

The risk issues and mitigating measures to be addressed during design phase are:

- Oversizing pipe could create operational problems (ie solids settlement; odour and corrosion). Phasing strategy will be developed and implemented during the design phase, to better match new development sanitary flows with pipe capacity. Pipe sizing will take into consideration life cycle cost of pump power costs.

- Long retention times for long forcemain lengths pose odour and corrosion risk. During design, an odour and corrosion risk assessment will be undertaken to confirm need and if applicable recommend protective measures to be incorporated into the forcemain design.

- Transient pressure analysis will be undertaken during the design phase, to confirm protective measures to be incorporated into the forcemain design.

- Special chambers and crossings will be included as needed, which will be confirmed during the design phase. These could include air and vacuum release chambers. Special crossings could include creeks, railways, and critical buried utilities.

- Process Control Narrative for the New PSs will be prepared in compliance with MECP Design Guidelines, to facilitate SCADA Programming

Figure 11 – Alternative Route A2 – Revised Class EA Preferred Solution

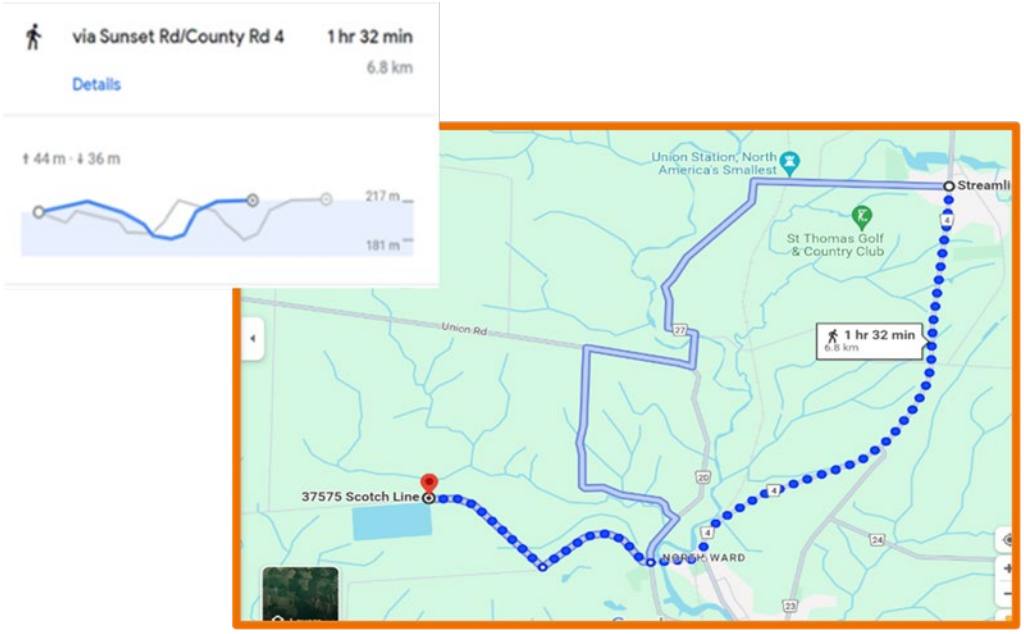


Table 6 – Alternate Route A2 – Opinion of Probable Construction Cost (Class 5; refer to Section 9)

					Capital Cost Range ($M)			
Infrastructure Asset		Quantity	Unit	Unit Cost ($M)	Low	Average	High	Comments
#	Description							
1	**Union**							
1.1	PS (Simple Design Concept)	1	each	2.1	$1.5	$2.1	$3.2	
1.2	Local Sewers	0	km	0	$0.0	$0.0	$0.0	Local sanitary sewers not included. Built by Developer
1.3	Forcemain to Port Stanley (300mm)	4.6	km	1.8	$5.8	$8.3	$12.5	County Rd. Premium cost
1.4	Special Chambers and Crossings	1	each	0.5	$0.4	$0.5	$0.8	
	Sub-Total				$7.7	$10.9	$16.5	
	Engineering + Contingency (20%)				$1.5	$2.2	$3.3	
	Total				$9.24	$13.06	$19.80	
2	**Port Stanley**							
2.1	New PS	1	each	7.7	$5.4	$7.7	$11.6	
2.2	Demolish Ex PS	1	each	0.25	$0.2	$0.3	$0.4	Allownace of $250K to demolisf ex PS51
2.3	Trunk Sewer	0.5	km	6	$2.1	$3.0	$4.5	From ex PS51 to New PS
2.4	New Forcemain to WWTP	2.2	km	2.3	$3.6	$5.1	$7.6	Local Rd. Lower cost (600mm forcemain)
2.5	Special Chambers and Crossings	1	each	0.25	$0.2	$0.3	$0.4	
	Sub-Total				$11.5	$16.3	$24.5	
	Engineering + Contingency (20%)				$2.3	$3.3	$4.9	
	Total				$13.80	$19.51	$29.40	
D	**Port Stanley WWTP**							
D.1	WWTP Expansion	1200	m^3/d	0.011	$9.4	$13.4	$20.1	
D.2	Outfall Pipe	2.2	km	1.8	$2.8	$4.0	$6.0	Local Rd. Lower cost
	SubTotal				$12.2	$17.4	$26.1	
	Engineering + Contingency (20%)				$2.4	$3.5	$5.2	
	Total				$14.64	$20.88	$31.32	
	TOTAL				**$37.68**	**$53.45**	**$80.52**	

10.1.3 ALTERNATIVE ROUTE A3 – PROPOSED DEVELOPER SOLUTION

This alternative is generally that proposed by the Developer's Engineer (CJDL), is similar to Route A2 and described generally as:

- Union flows would be conveyed independently from Port Stanley's sanitary sewer systems and PS51.
- A new PS and forcemain in Port Stanley would be constructed, to convey Union sanitary flows directly to the WWTP. Although the Developer's solution proposed connecting to PS 51's existing forcemain, as explained in Section 6, the existing forcemain (PS51) is poorly suited to accommodate additional flows from Union. As such, a new forcemain dedicated to Union flows would be required.

Construction cost is summarized in Table 7. As illustrated in Section 9, this cost analysis is considered to be an Opinion of Probable Cost generally described as Class V or "Order of Magnitude Estimate". Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve.

From a life cycle cost perspective, the key disadvantage of this alternative (compared to A2) is that an additional major PS and forcemain would need to be operated and maintained in Port Stanley. This would pose long-term cost implications to the municipality.

The risk issues and mitigating measures to be addressed during design are similar to that of Alternative Route A2.

Table 7 – Alternate Route A3 – Opinion of Probable Construction Cost (Class 5; refer to Section 9)

					Capital Cost Range ($M)			
Infrastructure Asset		Quantity	Unit	Unit Cost ($M)	Low	Average	High	Comments
#	Description							
1	**Union**							
1.1	PS (Simple Design Concept)	1	each	2.1	$1.5	$2.1	$3.2	
1.2	Local Sewers	0	km	0	$0.0	$0.0	$0.0	Local sanitary sewers not included. Built by Developer
1.3	Forcemain to Port Stanley (300mm)	4.6	km	1.8	$5.8	$8.3	$12.5	County Rd. Premium cost
1.4	Special Chambers and Crossings	1	each	0.5	$0.4	$0.5	$0.8	
	Sub-Total				$7.7	$10.9	$16.5	
	Engineering + Contingency (20%)				$1.5	$2.2	$3.3	
	Total				$9.24	$13.06	$19.80	
2	**Port Stanley**							
2.1	New PS	1	each	2.1	$1.5	$2.1	$3.2	
2.3	New Forcemain to WWTP	2.2	km	1.8	$2.8	$4.0	$6.0	Local Rd. Lower cost (450mm forcemain)
2.4	Special Chambers and Crossings	1	each	0.4	$0.3	$0.4	$0.6	
	Sub-Total				$4.6	$6.5	$9.8	
	Engineering + Contingency (20%)				$0.9	$1.3	$2.0	
	Total				$5.52	$7.75	$11.76	
D	**Port Stanley WWTP**							
D.1	WWTP Expansion	1200	m^3/d	0.011	$9.4	$13.4	$20.1	
D.2	Outfall Pipe	2.2	km	1.8	$2.8	$4.0	$6.0	Local Rd. Lower cost
	SubTotal				$12.2	$17.4	$26.1	
	Engineering + Contingency (20%)				$2.4	$3.5	$5.2	
	Total				$14.64	$20.88	$31.32	
TOTAL					**$29.40**	**$41.69**	**$62.88**	

10.2 Alternative Route B – Along Rural Roads to Port Stanley WWTP

There are different potential routes along rural roads, from Union directly to the Port Stanley WWTP. Figure 12 illustrates a representative route, described generally as:

- From Union; West along Sparta Line to Union Rd; West along Union Rd to Coon Rd; South along Coon Rd to Scoth Line; East along Scotch Line to WWTP site.
- Length is approximately 10 kms.

- Grade change: 44m up; 36m down; Overall 9m up.
- Stays clear of Port Stanley; No impact to Port Stanley streets, sanitary sewer, pumping station, or forcemain.
- Routing along rural roads is simpler to construct and of lower cost.

Construction cost is summarized in Table 8. As illustrated in Section 9, this cost analysis is considered to be an Opinion of Probable Cost generally described as Class V or "Order of Magnitude Estimate". Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve.

A key advantage of this alternative (compared to Alternate Route A), this does not consume capacity within the Port Stanley sanitary sewer system which will remain to serve its future growth needs.

The risk issues and mitigating measures to be addressed during design are similar to that of Alternative Route A2 and also include:

- There could be cost sharing opportunity with Southwold which would need to be explored during the design phase.

Figure 12 – Alternative Route B – Along Rural Roads to Port Stanley WWTP

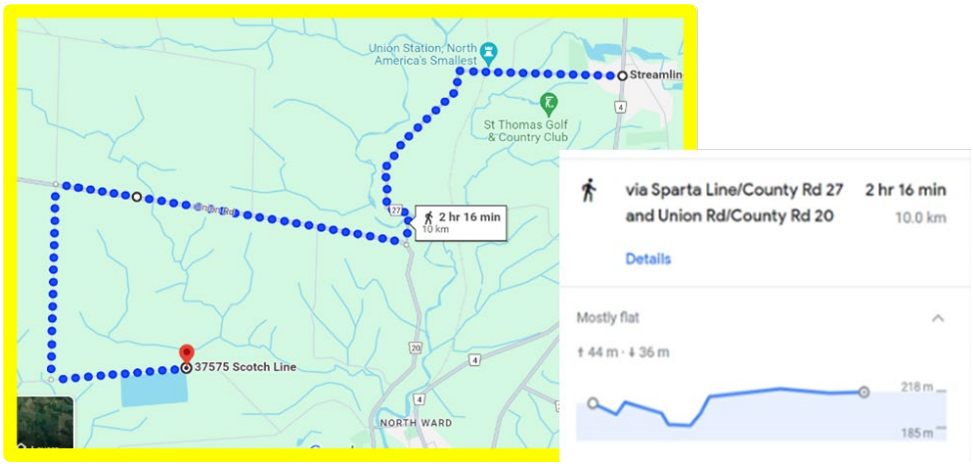


Table 8 – Alternate Route B – Opinion of Probable Construction Cost (Class 5; refer to Section 9)

Infrastructure Asset #	Description	Quantity	Unit	Unit Cost ($M)	Low	Average	High	Comments
1	**Union**							
1.1	PS (Simple Design Concept)	1	each	2.1	$1.5	$2.1	$3.2	
1.2	Local Sewers	0	km	0	$0.0	$0.0	$0.0	Local sanitary sewers not included. Built by Developer
1.3	Forcemain to Port Stanley (300mm)	10	km	1.2	$8.4	$12.0	$18.0	County Rd. Premium cost
1.4	Special Chambers and Crossings	1	each	0.5	$0.4	$0.5	$0.8	
	Sub-Total				$10.3	$14.6	$22.0	
	Engineering + Contingency (20%)				$2.1	$2.9	$4.4	
	Total				$12.4	$17.5	$26.4	
2	**Port Stanley WWTP**							
2.1	WWTP Expansion	1200	m^3/d	0.011	$9.4	$13.4	$20.1	
2.2	Outfall Pipe	2.2	km	1.8	$2.8	$4.0	$6.0	Local Rd. Lower cost
	Sub-Total				$12.2	$17.4	$26.1	
	Engineering + Contingency (20%)				$2.4	$3.5	$5.2	
	Total				$14.6	$20.9	$31.3	
TOTAL					**$27.0**	**$38.4**	**$57.7**	

11 Conclusion

A review meeting was held on Tuesday January 30, 2024, by Municipal staff and the Union Development Project Team, of which included Hayhoe Homes, CJDL, and others. Stantec did not participate at this meeting. We understand that the Draft Version of this Technical Memo (dated December 17, 2023) was reviewed.

As explained herein, Stantec recommends Alternative B Routing (Pump Directly Along Rural Roads to Port Stanley WWTP) whereas the Development Project Team prefers Alternative A2 – Revised Class EA Preferred Solution (Pump to Port Stanley's Sanitary Sewer System and re-pump to WWTP),

11.1 Recommended Routing Solution

Alternative B (Pump Directly Along Rural Roads to Port Stanley WWTP) is recommended, for the following reasons:

- Stays clear of Port Stanley. No impact to Port Stanley streets, sanitary sewer, pumping station, or forcemain.
- Lower construction cost. Development would be responsible for all capital costs.
- Lower long-term operational costs and risks (ie fewer PSs).
- Better fit to accommodate other future development. Potential cost sharing advantages.

The Total Capital Cost could be in the range of $37.7M to $80.5M, with the average of $53.4M (Order of Magnitude Cost Estimate; Sections 9) which would be incurred in the four (4) year horizon, as explained in Section 10.1.2. There is high-cost variance (minimum to maximum range) when estimating construction costs during the conceptual planning stages because the design technical details are not yet available. As illustrated in Figure 5, this cost analysis is considered to be an Opinion of Probable Cost generally described as Class V or "Order of Magnitude Estimate". Later, during the design phase, when the project scope and technical details are better defined, the costing accuracy will improve.

A phased design concept is recommended for New PS in Union.

New development growth in Union will be dependent upon economic conditions and new home sales. Ultimate buildout is estimated to be 1,878 lots (ie New Homes). Presuming new homes sales of 100 per year, full build out could take (19) years. As such, initial flows will be very low and eventually flows will increase as new homes are constructed and occupied. It is important that the new infrastructure be scaled appropriately to match development.

Initially, when there are fewer homes and flows are low, oversizing PSs and forcemain will be expensive but more importantly could cause operational problems and pose risk to the Municipality. As such, PSs and forcemains should be right-sized initially and designed to be easily expandable in future to better match development growth. Start with Smaller Simple PS, for initial low flows. When flows increase, expand PS capacity as needed. For ultimate buildout (maximum flows), construct Larger Complex PS as illustrated in Figure 13.

Phase 1 - Construct Smaller Simple PS and Forcemain to convey flows to WWTP

- Precast Concrete Triplex PS – sized for (2) Pumps initially and Future 3rd Pump, with small forcemain
- As flows increase, install 3rd Pump

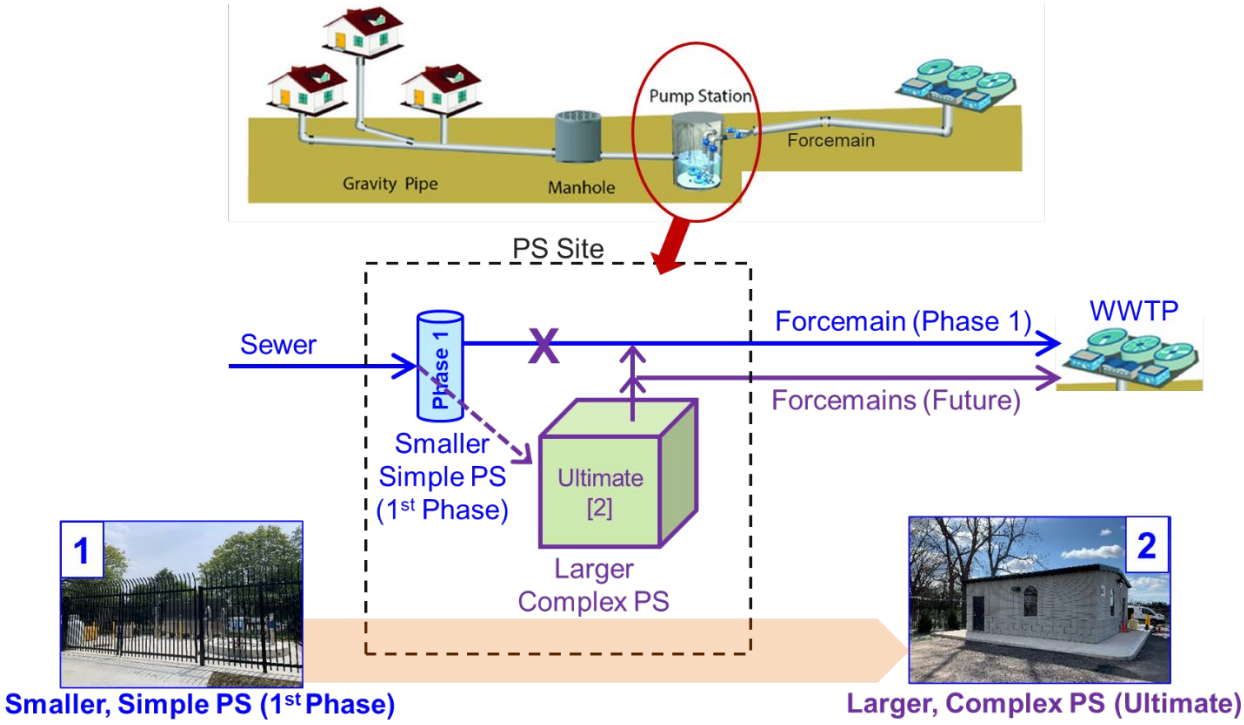
Phase 2 - Ultimate – Larger, Complex PS

- As flows continue to increase in future, eventually replace Smaller PS with Larger PS
- Construct New Larger PS and convert smaller PS into flow thru manhole to New Larger PS
- Add 2nd large forcemain

Pumping Station (PS) Site

- Size PS site with sufficient land space today, to construct ultimate PS in future.

Figure 13 – PHASED DESIGN CONCEPT



11.2 Developer's Preferred Routing Solution

The Development Project Team prefers Alternative A2 – Revised Class EA Preferred Solution (Pump to Port Stanley's Sanitary Sewer System and re-pump to WWTP), as described in Section 10.1.2 They believe this routing solution is in their best interests, presuming the Municipality were to cost share the upgrades of the sanitary infrastructure in Port Stanley.

11.3 Risks and Mitigating Measures

The risks and mitigating measures are:

a) **More Stringent Effluent Quality Requirements** - Expanding the WWTP could trigger more stringent treated effluent quality requirements. A Class Environmental Assessment (EA) will be required of which would include an assimilative capacity investigation of Kettle Creek to determine if more stringent treated effluent quality requirements will be imposed by the Province. Currently, Port Stanley WWTP has more stringent treated effluent quality regulated requirements compared to other treatment plants in the Kettle Creek Watershed, as such the risk of more stringent requirements is low. If more stringent requirements are imposed, this could have substantial cost increase implications.

b) **Uncommitted Reserve Treatment Capacity** - The WWTP currently has reserve treatment capacity of 1,198m^3/day (equivalent to 1,200 new homes) but 250 m^3/day has been committed to Southwold (Turville Farm Development). Furthermore, additional capacity could be committed to approved development in the Port Stanley service area. This flow allocation will need to be confirmed, to determine the plant's uncommitted reserve capacity, which is available for servicing future growth for Union. Depending how uncommitted serve capacity is available, this could require a WWTP expansion sooner which would have substantial cost increase implications.

c) **Long Term Growth** – The current growth potential is high but for how long? The plant has substantial reserve capacity to support growth, but eventually a plant expansion could be required, if there is enough growth over the long term. In Years 2021 and 2022, 128 and 117 new residential units were constructed in Port Stanley, respectively. As such, presuming growth of 120 new homes/year were to continue in Port Stanley, the WWTP's current reserve treatment capacity (less than 948 m3/day; 948 new homes) would be consumed in eight (8) years. If Union development were to grow 60-120 new homes/year, then the growth in Union were to occur then the WWTP's capacity could be consumed in less than five (5) years.

d) **Cost Risk** - The average cost of WWTP Phase 1 expansion (to 3,600 m^3/day) could vary $13.4M to $25.5M, depending upon inflation over the next 20 years. Caution is warranted before undertaking such substantial capital costs, given the uncertainty of the long-term market conditions to support continued high development growth.

e) **Committing Capacity for Future Development** – Once development is approved, its capacity is committed against the WWTP's reserve capacity and thereby reduces capacity availability for additional growth. Potentially, this could trigger the plant expansion before actual wastewater flows reach the WWTP's rated capacity. Furthermore, Development Charges (DCs) are realized when building permits are issued, as such the Municipality assumes the cost risk of financing the plant expansion, until the new homes are built and DC revenue is received. To protect the municipality's best interests, consideration should be given to apply special conditions to new development approvals, to ensure properties are constructed in a timely manner and if not, then their approval and treatment capacity could be rescinded.

f) **Treatment Cost Premium (Before vs Future)** – In 2016, when the Port Stanley WWTP was constructed, construction costs were substantially lower. The plant's tender bid price was $14.5M, which would be equivalent to $6,175 per home (Year 2016 $s). In contrast, if the plant were expanded in 10 years at current inflation rate (3.3%), its unit cost could be $10,700 per home (74% increase). As such, the cost of servicing new growth using the plant's reserve capacity, will be substantially lower compared to that of future expanded capacity. This will need to be reconciled in negotiations with New Development, such that they pay for the higher cost of expanded treatment capacity.

g) **Future Inflation** - The construction cost of expanding treatment capacity will increase over time, because of inflation. If the inflation rate were to increase in the future, like it did during Covid, the cost increase could be

substantially more. The inflation risk and cost sharing responsibility will need to be addressed in the negotiations with New Development.

h) **Phasing strategy** - This will be developed during the design phase, as outlined in Section 11.

i) **Risk Issues and Mitigating Measures** identified in Section 10 to be addressed during design phase.

Regards,

STANTEC CONSULTING LTD.

Elvio Zaghi MBA, P.Eng. Senior Project Manager Phone: (519) 675-6607 Mobile: (519) 319-4420
elvio.zaghi@stantec.com

Appendix B CONSULTATION

CJDL
Consulting Engineers

CYRIL J. DEMEYERE LIMITED
Peter J. Penner, P. Eng. | Deren Lyle, P. Eng.
Alex Muirhead, P. Eng.

261 Broadway, P.O. Box 460, Tillsonburg, ON N4G 4H8 T: 519-688-1000 www.cjdleng.com

Municipality of Central Elgin
450 Sunset Drive, 1st Floor
St.Thomas, Ontario
N5R 5V1

RE: UNION REGION SANITARY SERVICING
CLASS EA ADDENDUM REVIEW
MUNICIPALITY OF CENTRAL ELGIN

ATTENTION: MR. ALEX PIGGOTT, MANAGER OF ENVIRONMENTAL SERVICES

Dear Sir:

Thank you for providing the Union Sanitary Servicing Class EA Addendum decision matrix and supporting presentation, as prepared by Stantec, for our review and comment. On behalf of CJDL, Doug Tarry Limited, and Hayhoe Developments Inc., we appreciate Central Elgin and Stantec staff meeting with our group on September 12th, 2024 to present this information and provide an open venue for feedback and discussion.

Upon further internal review, and on behalf of the Developer Group in Union, we confirm we are in support of the overall recommended technical solution in the decision matrix and would ask that Stantec and Central Elgin work towards finalizing this Class EA Addendum for Central Elgin Council review and approval as soon as possible.

As discussed in our meeting of September 12th, 2024, we would ask that Stantec and Central Elgin staff further breakdown the total cost of each option to clearly identify that the costing amount to be further reviewed and discussed for cost-sharing in Union is just the Phase 1 cost at this time ($8.4 million).

It is requested that the Phase 2 cost ($8.3 million) be clearly described to council as a future cost at a subsequent stage of development that would fall under a Development Charge (DC) project which would be funded through collection of Development Charges from future and existing development. It is further requested that it be identified that the Phase 2 cost may be subject to further staging subject to future detailed design as Union and Port Stanley develop. Items that may influence timing and scope of Phase 2 that would be considered at time of detailed design include the current DC project to replace the existing 200mmø sanitary sewer on Colborne Street, connecting the proposed Union sanitary forcemain to the existing PS 51 forcemain on to the Port Stanley WWTP, and monitoring of actual sanitary inflows in the Port Stanley sanitary system, as well as any other external sanitary projects that may occur between Phase 1 and Phase 2.

Further to the above, it is requested that the Port Stanley WWTP Expansion cost ($23.5 million) be clarified within the Class EA Addendum and when presented to Council, that this is already a DC project for which Development Charges are being collected and is not a directly Developer funded project and would need to be completed whether development occurred in Port Stanley or in Union.

It is understood that cost-sharing of the pumping station and forcemain for Phase 1 of the project is still to be determined. It is strongly recommended that Central Elgin staff propose a cost-sharing option to Central Elgin Council for feedback and direction, rather than requesting Council to outline the terms of cost-sharing without being overly embedded in the details of the project. The most efficient solution may be to come to a tentative resolution between Central Elgin Staff and the Developer Group which could be presented to Council with the support of both public and private parties.

As briefly discussed at the meeting of September 12th, 2024, the cost-sharing model utilized for the recent City of St.Thomas Northwest Area 1 sanitary extension was very streamlined and fair to all parties involved. This project was Municipally led and current Developers provided cost-sharing for their respective portion of the infrastructure, with the Municipality funding the portion of the project serving existing and future development lands. Example agreements and processes from the Northwest Area 1 project can be provided to Central Elgin staff for reference.

It should be understood by all parties that cost-sharing from the Developer Group is not guaranteed at this time without further discussion, but Doug Tarry Limited and Hayhoe Developments Inc. are trying to work with all parties to reach a fair and reasonable solution to ensure this project moves forward, not only to the benefit of the Developer Group, but also to the benefit of the Municipality of Central Elgin through growth and development of Municipal infrastructure, residency, and tax base. Timing of any payment should be linked to planning approvals, with staged payments being made as residential development progresses towards construction and eventual occupancy. It is requested that allocation of treatment capacity in the Port Stanley WWTP, including allocation within the entirety of the incoming sewage conveyance system, be guaranteed by the Municipality prior to the first cost-sharing payment being provided by the Developer Group.

Further discussion is still required with Elgin County to confirm the planning approval authority would be willing to provide planning approvals without the sanitary infrastructure being installed ahead of time. It is understood this is common practice in this region historically, as well as in the Province of Ontario. Developer cost-sharing should not be expected without acknowledgement of allowing planning approvals to proceed through the review and approval process prior to installation of sanitary infrastructure.

Further to the initial Phase 1 undertaking to construct the Union sanitary pumping station and forcemain, it is understood there are a number of sanitary trunk sewers required in Union from the proposed pumping station to various regions of the settlement area. With the upcoming Development Charges Background Study, these external trunk sewers should be accounted for as Development Charge projects to be funded through collection of future Development Charges.

Thank you for your consideration of the above comments and recommendations. If possible, we would ask that Stantec and Central Elgin staff advise of timing to present the Class EA Addendum to Central Elgin Council for adoption and for staff to confirm if they are willing to undertake a cost-sharing review process with the Developer Group prior to discussing cost-sharing with Council, to provide a wholesome solution for consideration and feedback.

If there are any questions, please do not hesitate to contact this office.

Yours very truly,

AVM/kc

Deren Lyle, P. Eng.

Encl.

cc. Mr. Jeff Paul, Managing Principal, Urban Development, Stantec
Ms. Carey Herd, CAO, Municipality of Central Elgin
Mr. Geoff Brooks, Director of Infrastructure and Community Services, Municipality of Central Elgin
Mr. Mat Vaughan, Director of Planning and Development, Elgin County
Ms. Tracy Tucker, Doug Tarry Developments
Ms. Shellie Chowns, Doug Tarry Developments
Mr. Doug Tarry, Doug Tarry Developments
Mr. Rick Smyth, Developer
Mr. Will Hayhoe, Hayhoe Developments Inc.
Mr. Tom Looby, Hayhoe Developments Inc.

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Sent: Tuesday, October 15, 2024 3:07 PM
To: 'Alex Muirhead' <amuirhead@cjdleng.com>
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Subject: RE: Union, Class EA Addendum - Developer Letter

Thanks Alex, cost is a factor in the decision matrix and this was shared with the group as an overall cost for the different options. As discussed at the meeting and noted in your letter, we will separate out the direct costs of servicing Union from the costs of expanding the Port Stanley WWTP. However, how these costs are shared or divided is beyond the scope of the Environmental Assessment and will need further consideration in an overall financing strategy whether that be through front end agreements, development charges or cost sharing. Further direction will need to come from our financing consultant and Council.

Alex Piggott, C.E.T. CRS-S
Manager of Development and Compliance

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Project #18049EXT

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Further to this, is the intention that when this report is brought to council that a funding/cost-sharing recommendation from staff also be included for council consideration, and is that why the extra time is required to delay going to council in October?

If that is the case, as discussed in our attached letter, we would ask that Central Elgin staff consider receiving a cost-sharing proposal from the development group for consideration prior to the November council meeting. This initial proposal could then be discussed with CE staff and the developer group to determine a wholesome recommendation that all parties (staff & developers) are in agreement on for council to consider, rather than leaving it as an open item for council to provide recommendation on, which would then need to be reviewed and brought back to council for further review.

These discussions would of course relate to whether this will be a municipally-led or developer-led project, and to planning approvals in terms of ability to grant draft plan approval prior to servicing construction, and timing of payments. These items would be intended to be part of the initial proposal and discussion, to reach a recommended solution for the November council report.

Please let us know if staff's intention is to seek council approval for the cost-sharing approach in the November council report and if that is the case, if staff would be willing to discuss an

agreeable cost-sharing solution prior to going to council. Thank you.

Kind Regards,

Alex Muirhead, P. Eng.
Design Engineer

Cyril J. Demeyere Limited
Consulting Engineers
261 Broadway, P.O. Box 460
Tillsonburg, Ontario. N4G 4H8
Phone: 519-688-1000 Ext.24
Cell: 519-983-2606
E-mail: amuirhead@cjdleng.com

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> Manager of Development and Compliance
>
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> **Subject:** Re: Union, Class EA Addendum - Developer Letter
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> Project #18049EXT
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> Good Afternoon Alex,

Hope you had a good long weekend.

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Kind Regards,

Alex Muirhead, P. Eng.
Design Engineer

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On Sun, Sep 29, 2024 at 3:18 PM Deren Lyle <dlyle@cjdleng.com> wrote:

> Good Afternoon Alex,
>
> On behalf of Hayhoe Developments Inc. and Doug Tarry Limited, please find the attached correspondence of today's date.
>
> Deren Lyle, P. Eng.
>
> Cyril J. Demeyere Limited
> Consulting Engineers
> 261 Broadway, P.O. Box 460
> Tillsonburg, Ontario. N4G 4H8
> Phone: 519-688-1000
> E-mail: dlyle@cjdleng.com

From: Alex Muirhead <amuirhead@cjdleng.com>
Sent: Friday, November 22, 2024 11:56 AM
To: Alex Piggott <apiggott@centralelgin.org>
Cc: Tracy Tucker <ttucker@dtdev.ca>; Paul, Jeff <jeff.paul@stantec.com>; Hohner, Paula <Paula.Hohner@stantec.com>; Carey Herd <cherd@centralelgin.org>; Emerald Austerberry <EAusterberry@centralelgin.org>; Mat Vaughan <mvaughan@elgin.ca>; Geoff Brooks <gbrooks@centralelgin.org>; will.hayhoe@hayhoehomes.com; tom.looby@hayhoehomes.com; Doug Tarry <dtarry@dougtarryhomes.com>; RICHARD SMYTH <ricksmyth@rogers.com>; Sabrina Mayer <smayer@dtdev.ca>; Lloyd Perrin <lperrin@cjdleng.com>; Admin CJDL <admin@cjdleng.com>; CJDL <dlyle@cjdleng.com>; David Wassmansdorf <dwassmansdorf@dtdev.ca>
Subject: Re: Union, Class EA Addendum - Developer Letter

> You don't often get email from amuirhead@cjdleng.com. Learn why this is important

Project #18049EXT

Hi Alex,

Thanks for taking my call this morning. Just wanted to summarize what we understand to be the process for the Union Sanitary Pumping Station Class EA Addendum.

Based on our call, we understand the following to be accurate;

- At the November 25th council meeting, Stantec will be presenting the Class EA

Addendum options reviewed and the preferred alternative, which is the same preferred alternative as was discussed at our last group meeting in September

- This November 25th council presentation will start the 30-day review period for the Class EA Addendum
- Normally a staff report would accompany the presentation to indicate official council adoption at the same meeting. Based on our call, I understand there is a slight variation in this process as requested by some members of council. The 30-day review period will start at the November 25th meeting, but council has requested the official staff report recommending final adoption be brought forward at the next council meeting (Monday December 16th, 2024) to allow council members a few weeks to review prior to final adoption. I understand this is being done independent of the 30-day review period, meaning the staff report on December 16th will not push the 30-day review period longer.

Please confirm if the above is accurate or if anything is incorrect.

Appreciate your assistance on this.

Kind Regards,

Alex Muirhead, P. Eng.
Design Engineer

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Consulting Engineers
261 Broadway, P.O. Box 460
Tillsonburg, Ontario. N4G 4H8
Phone: 519-688-1000 Ext.24
Cell: 519-983-2606
E-mail: amuirhead@cjdleng.com

On Wed, Nov 13, 2024 at 4:14 PM Geoff Brooks <GBrooks@centralelgin.org> wrote:

> Hi Tracy,
>
> Staff intend on brining the EA addendum to council on November 25.
>
> Geoff Brooks
> Director of Infrastructure & Community Services
> Municipality of Central Elgin
>
> On Nov 12, 2024, at 1:38 PM, Tracy Tucker <ttucker@dtdev.ca> wrote:

Hi Alex,

Following up on this, can you please confirm the EA Addendum is still going to Council on November 25th.

Thanks,
Tracy

Tracy Tucker
Manager of Land Development

ttucker@dtdev.ca<mailto:ttucker@dougtarryhomes.com%20%0b>
<mailto:ttucker@dougtarryhomes.com%20%0b>Cell: 519-808-5895

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Design Engineer

<~WRD0315.jpg>

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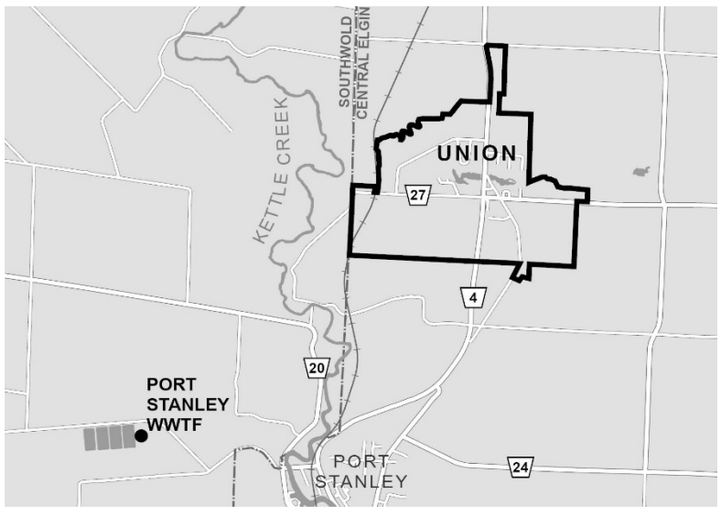
E-mail: dlyle@cjdleng.com<mailto:dlyle@cjdleng.com>

Union Sanitary Servicing Municipal Class Environmental Assessment

Notice of Addendum

What is the reason for an addendum?

In December 2021, the Municipality of Central Elgin (Municipality) completed a Schedule B Municipal Class Environmental Assessment (Class EA) for sanitary servicing within the Union settlement area. This settlement is one of several areas of focus for future growth and development. However, municipal piped sanitary services are required prior to development. The Class EA addressed alternative sanitary servicing strategies for the major areas of future development within the settlement area.



As part of the preferred solution, a full gravity conveyance system would be constructed within the Union settlement area. Flows would be collected in a centralized pumping station, then conveyed via forcemain along Sunset Drive to the Port Stanley Wastewater Treatment Plant for treatment.

After the completion of the 2021 Project File Report (PFR), a detailed modelling analysis was completed by municipal staff, which identified that the existing sanitary sewers in Port Stanley lacked capacity to accommodate Union flows. Sewer replacements would be required to increase the capacity of the Port Stanley sanitary sewer system to accommodate future flows.

An Addendum to the 2021 PFR has been completed and contains the details of the revised preferred sanitary servicing solution, including the process, recommendations, potential impacts to the environment, and the proposed mitigation measures.

How can I provide comments?

The addendum report will be filed for a 30-day public review period on the study website (www.letstalkcentralelgin.ca/union-sanitary-servicing) from **January 15, 2025 to February 14, 2025**. Please note that only the changes proposed to the project, as documented within the Addendum, are subject to review. All comments and concerns should be sent directly to one of the project team members:

Alex Piggott
Development and Compliance
Municipality of Central Elgin
(519) 631 4860 ext. 295
APiggott@centralelgin.org

Jeff Paul, P.Eng
Managing Senior Principal, Water
Stantec Consulting Ltd.
519 675-6604
jeff.paul@stantec.com

In addition, a request to the Minister of the Environment, Conservation and Parks for an order imposing additional conditions or requiring an individual environmental assessment may be made on the grounds that the requested order may prevent, mitigate, or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests should include your full name and contact information.

Requests should specify what kind of order is being requested (additional conditions or an individual environmental assessment), explain how an order may prevent, mitigate, or remedy potential adverse impacts, and can include any supporting information.

The request should be sent in hardcopy or by email to:

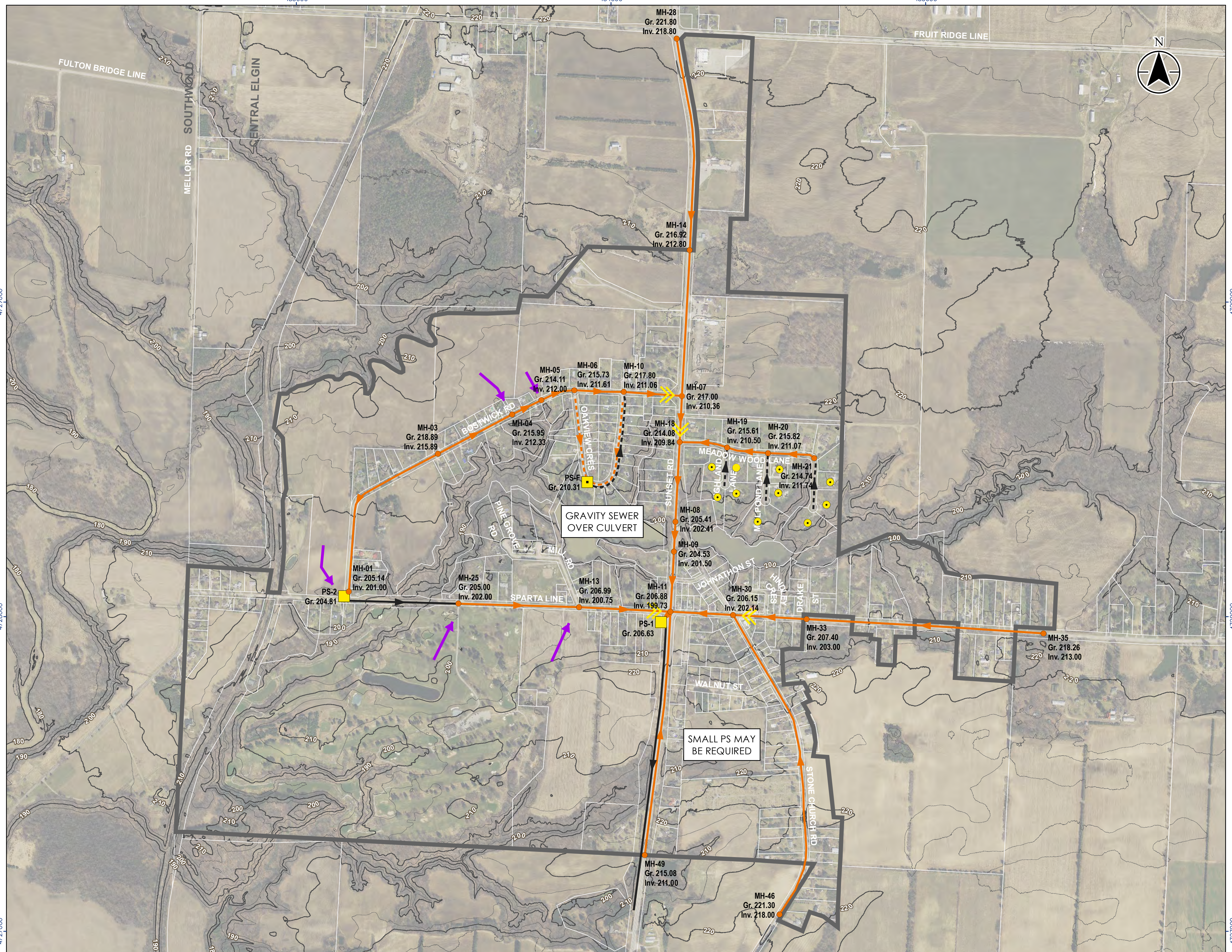
Minister of the Environment, Conservation and Parks
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W., 1st Floor
Toronto, ON M4V 1P5
EABDirector@ontario.ca

Requests should also be copied to the Municipality by mail or by e-mail. Please visit the ministry's website for more information on requests for orders under section 16 of the Environmental Assessment Act at: https://www.ontario.ca/page/class-environmental-assessments-section-16-order

This notice first issued on January 15, 2025.

Appendix C EA 2021, ALTERNATIVE 1 CONVEYANCE LAYOUT



Stantec

Legend

- SettlementArea
- Proposed Key MH
- Invert-Determining Sewer
- Proposed Municipal PS
- Proposed Municipal PS - Future
- Proposed Private PS - Future
- Proposed Forcemain
- Proposed Forcemain - Future
- Proposed Gravity Sewer
- Proposed Gravity Sewer - Future
- Development Flows
- Elevation Contour (10 m)
- Elevation Contour (5 m)

0 250 500 metres

1:12,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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3. 2015 orthoimagery © Municpality of Central Elgin.

Project Location
Municipality of Central Elgin

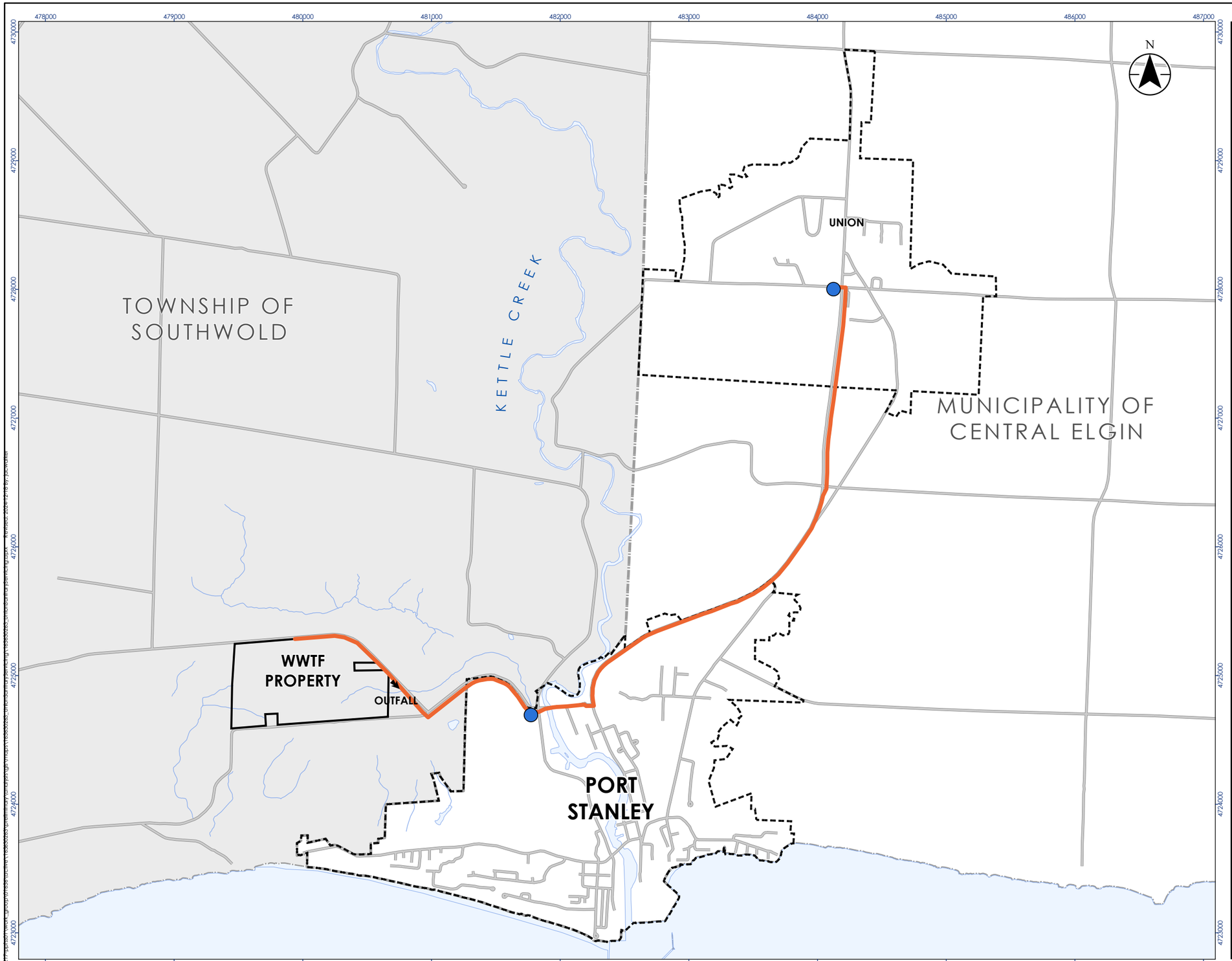
165630144 REVA
Prepared by KDB on 2021-05-27

Client/Project
MUNICIPALITY OF CENTRAL ELGIN
UNION SANITARY SERVICING
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
7-3

Title
Alternative 1 Conveyance Layout

Appendix D LAYOUTS FOR REVISED ALTERNATIVES



Legend

- WWTF Property
- Settlement Area
- New Forcemain
- New Pumping Station

0 250 500
metres
1:30,000 (At original document size of 11x17)

Notes

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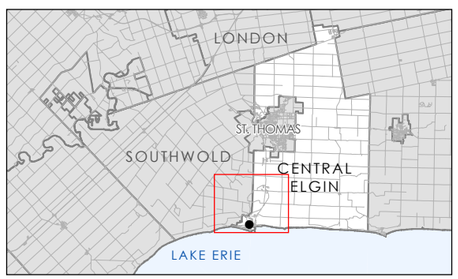

Project Location
Municipality of Central Elgin

165630263
Prepared by JW on 2024-09-06

Client/Project
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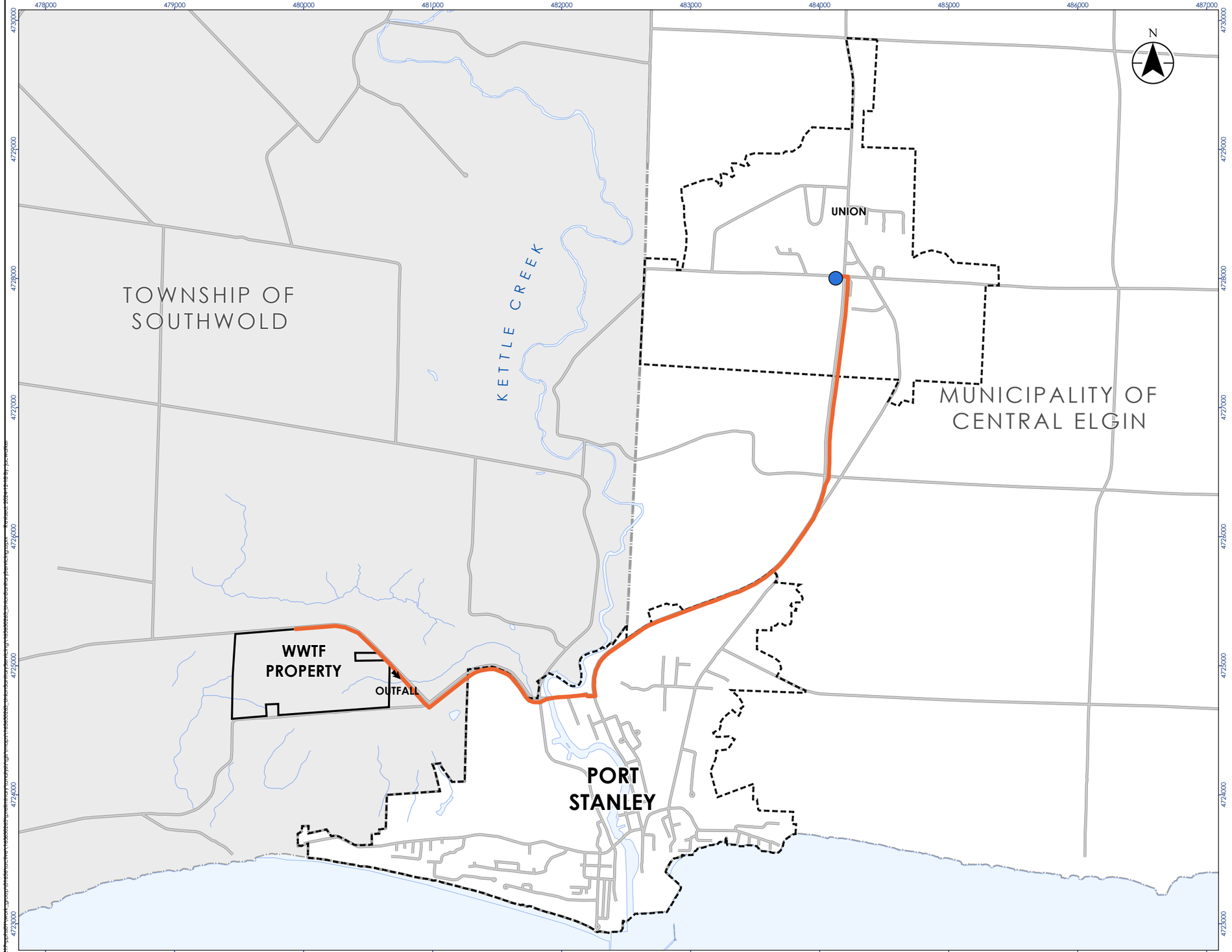
Figure No.
1

Title
Alternative Forcemain Route A2



Legend

- WWTF Property
- Settlement Area
- New Forcemain
- New Pumping Station

0 250 500 metres

1:30,000 (At original document size of 11x17)

Notes

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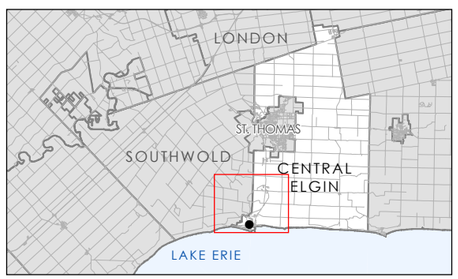

Project Location
Municipality of Central Elgin

165630263
Prepared by JW on 2024-09-06

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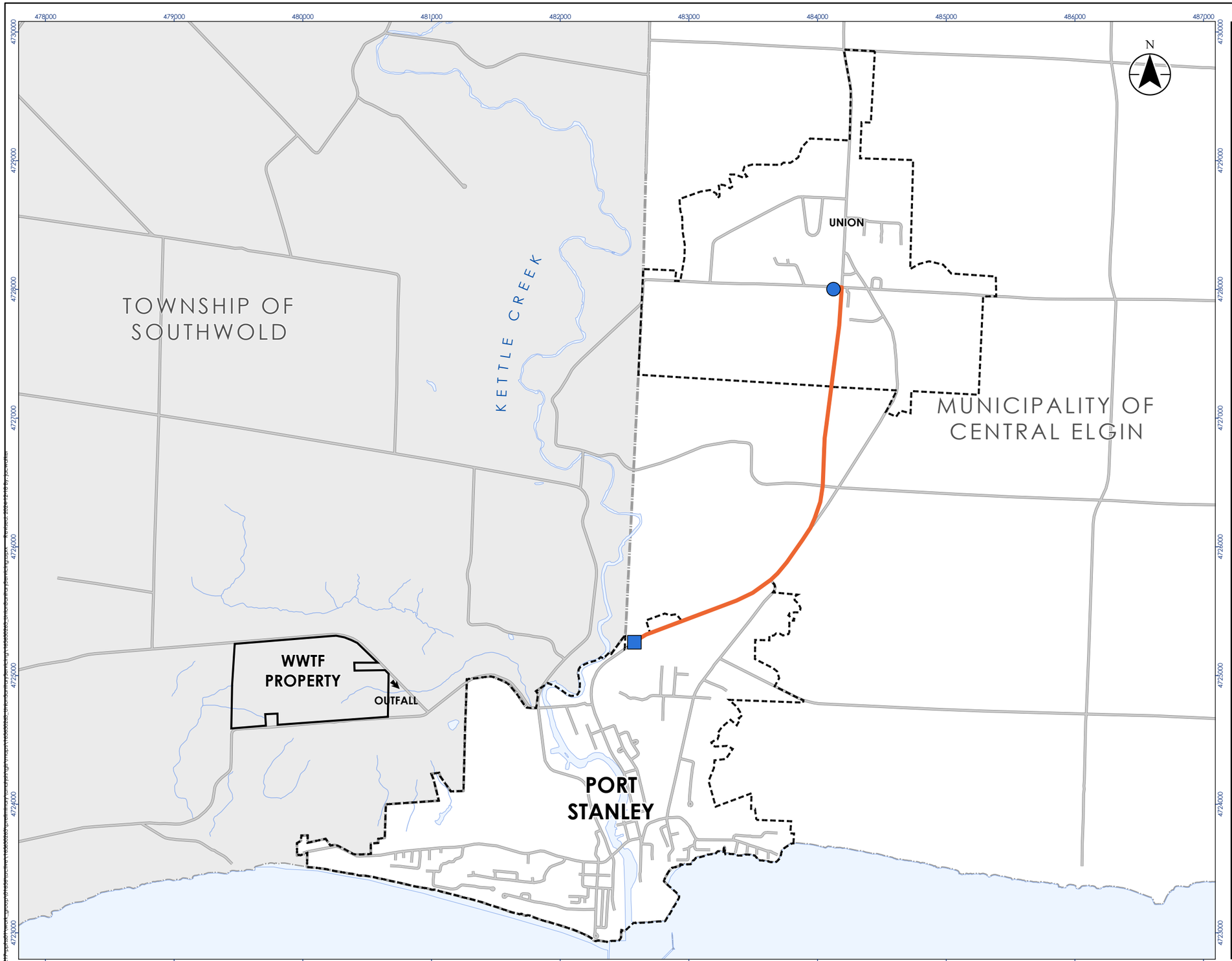
Figure No.
2

Title
Alternative Forcemain Route A3



Legend

- WWTF Property
- Settlement Area
- New Forcemain
- New Pumping Station
- Approximate Location of Proposed WWTF

0 250 500
metres
1:30,000 (At original document size of 11x17)

Notes

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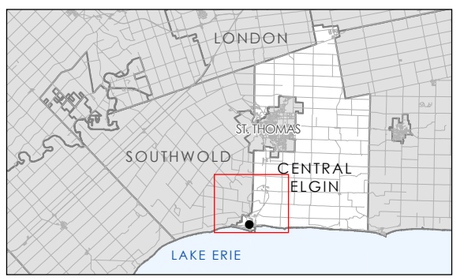

Project Location
Municipality of Central Elgin

165630263
Prepared by JW on 2024-09-06

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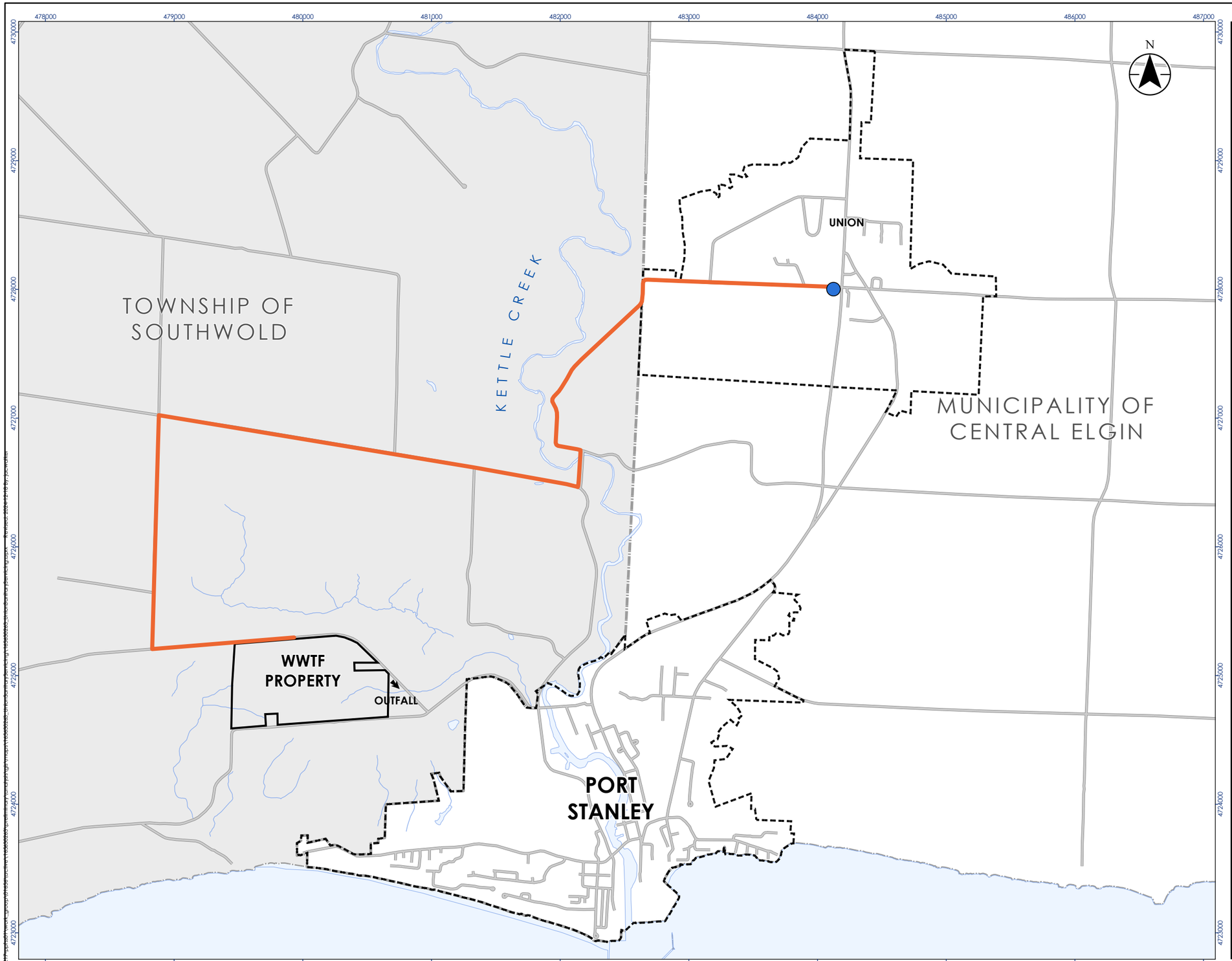
Figure No.
3

Title
Alternative Forcemain Route A5



Legend

- WWTF Property
- Settlement Area
- New Forcemain
- New Pumping Station

0 250 500
metres
1:30,000 (At original document size of 11x17)

Notes

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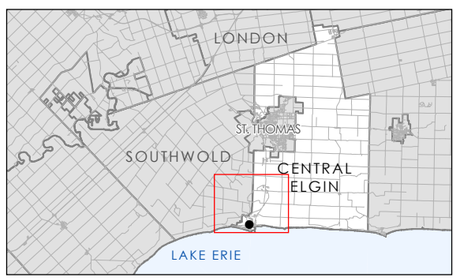

Project Location
Municipality of Central Elgin

165630263
Prepared by JW on 2024-09-06

Client/Project
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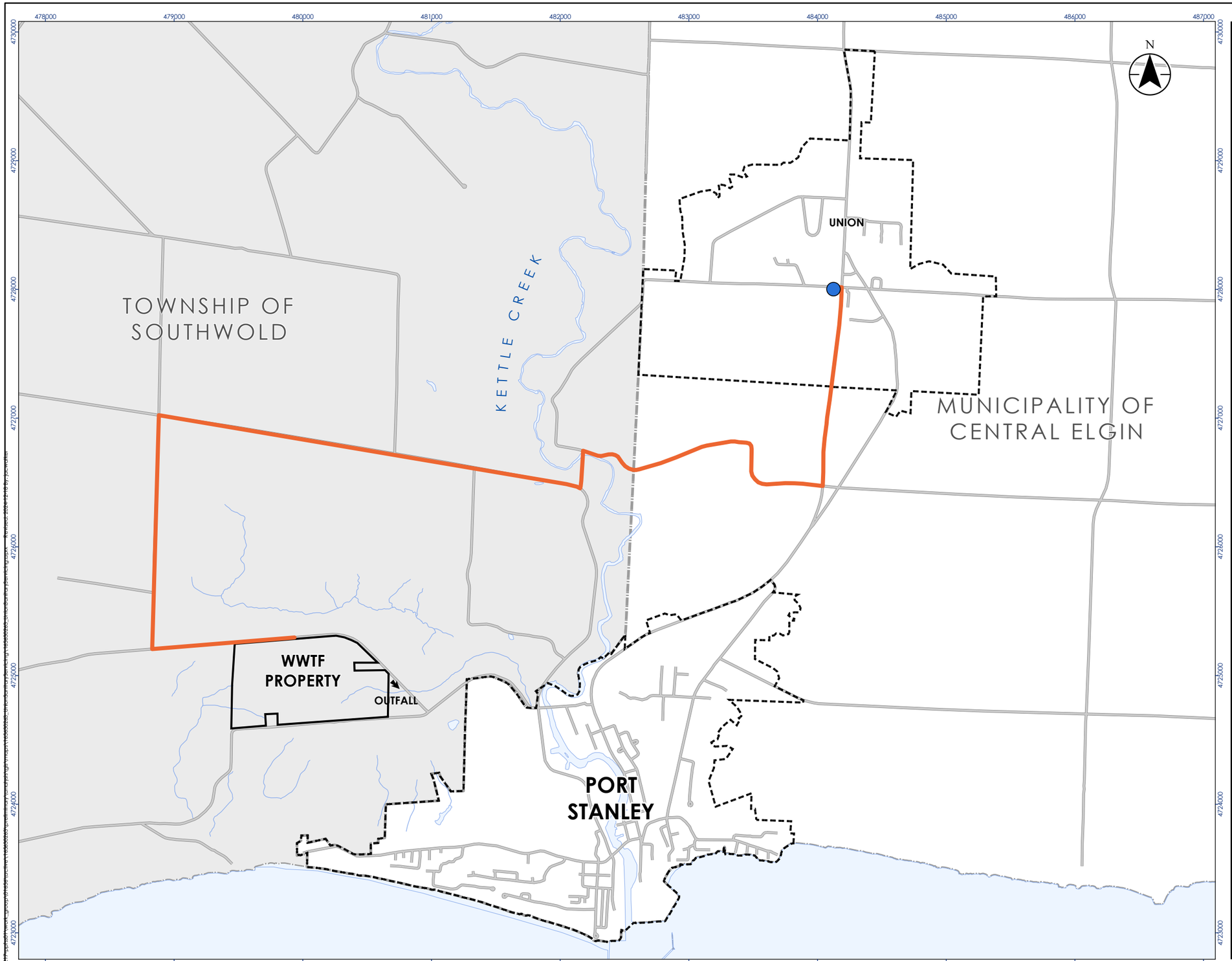
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Figure No.
4

Title
Alternative Forcemain Route B1



Legend

- WWTF Property
- Settlement Area
- New Forcemain
- New Pumping Station

0 250 500
metres
1:30,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
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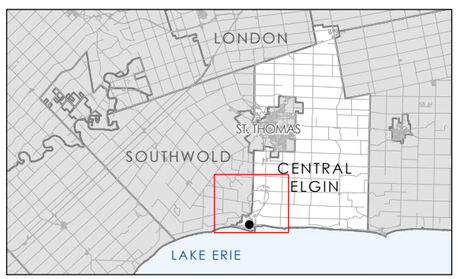

Project Location
Municipality of Central Elgin

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Prepared by JW on 2024-09-06

Client/Project
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Figure No.
5

Title
Alternative Forcemain Route B2