



S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Functional Servicing Report

SOUTH GRIMSBY, CONCESSION 9, PART LOT 5

TOWNSHIP OF WEST LINCOLN
(SMITHVILLE)

KAINTHVILLE HOLDINGS INC.

November 2024 (Revised)
September 2024 (Revised)
November 2023

SLA File: 22060

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1.0 INTRODUCTION AND BACKGROUND

1.0.1 Overview

S. Llewellyn & Associates Limited has been retained by Kainthville Holdings Inc. to provide Consulting Engineering services for the proposed development located at South Grimsby, Concession 9, Part Lot 5 in the Township of West Lincoln, Ontario (see Figure 1.0 for location plan).

The proponent proposes to develop the lands into a residential subdivision consisting of 3 single-detached dwellings, 36 semi-detached dwellings, 34 street townhouses, a retirement home (104 units), a mixed-use building (152 residential units, 9 commercial units), an industrial business park (20 units), as well as parkland (0.63 ha).

This Functional Servicing Report will provide detailed information of the proposed servicing scheme for this development. Please refer to the preliminary engineering plans prepared by S. Llewellyn and Associates Limited and the Draft Plan prepared by NPG Planning Solutions Inc., dated August 20, 2024 for additional information.

1.0.2 Background Information

The following documents were referenced in the preparation of this report:

- Ref. 1: MOE Stormwater Management Practices Planning and Design Manual (Ministry of Environment, March 2003)
- Ref. 2: Municipal Engineering Standards (Township of West Lincoln, 2022)
- Ref. 3: Erosion & Sediment Control Guidelines for Urban Construction (December 2006)
- Ref. 4: Low Impact Development Stormwater Management Planning and Design Guide (2010)
- Ref. 5: Functional Servicing Report – 6087 Regional Road 20 (S. Llewellyn & Associates Limited, November 2023)
- Ref. 6: Smithville Master Community Plan (AECOM Canada Ltd., April 2023)
- Ref. 7: Subwatershed Study Phase 1: Characterization and Integration (Wood, February 2023)
- Ref. 8: Subwatershed Study Phase 2: Impact Assessment (Wood, February 2023)
- Ref. 9: Subwatershed Study Phase 3: Management, Implementation, and Monitoring Plan (Wood, February 2023)
- Ref. 10: Stormwater Master Plan for Smithville Infill and Intensification Areas (WSP, March 2023)

Ref. 11: Niagara Region Volume 3 – Water Master Servicing Plan Update, Final Report (GM Blue Plan, June 22, 2023)

Ref. 12: Niagara Region Volume 3 – Wastewater Master Servicing Plan Update, Final Report (GM Blue Plan, June 22, 2023)

Ref. 13: Development Charges Background Study, Township of West Lincoln (Watson & Associates Economists Ltd., October 7, 2024 & May 13, 2024)

Ref. 14: Geotechnical Investigation, Proposed Residential and Commercial Development St. Catharines Street, West Lincoln, Ontario (Niagara Testing & Inspection Ltd., November 2022)



Figure 1.0 – Location Plan

1.0.3 Geotechnical Information

A geotechnical investigation (Ref. 14) was prepared by Niagara Testing & Inspections Ltd., dated November 2, 2022. The findings of this geotechnical investigation determined the following:

- Topsoil – A surficial veneer of topsoil, approximately 100 to 175mm, in thickness was encountered at all borehole locations, except for Borehole No.'s 1 and 8, where no topsoil was encountered.

- Silty Clay/Clayey Silt – A brown silty clay/clayey silt was encountered at the surface at Borehole No.'s 1 and 8 and was found to underlie the topsoil in other boreholes. The upper level of the brown silty clay/clayey silt have been described as having a 'reworked' appearance due to past agricultural ploughing and yearly freeze/thaw cycles. The silty clay/clayey silt, below the upper level was found to contain trace amount of sand and gravel, which has stiff to very stiff consistency, with trace grey seams throughout.
- A brown sand and gravel layer was found to underlie the brown silty clay/clayey silt in Borehole No. 5, at an approximately depth of 3.2m below the existing ground surface.

2.0 STORMWATER MANAGEMENT

Storm runoff generated by the proposed development will be collected by a proposed storm sewer system which will connect to the 6087 Regional Road 20 subdivision. Runoff will ultimately discharge into a Stormwater Management Facility located at 6063 Regional Road 20.

2.0.1 Stormwater Management Criteria

The following stormwater management (SWM) criteria will be applied to the site, in accordance with the Township of West Lincoln standards:

Quantity Control

Stormwater discharge for the proposed development has been included in the stormwater management strategy for the neighbouring subdivision located at 6087 Regional Road 20 (Ref. 5).

Quality Control

The stormwater runoff from the post-development condition site must meet Level 1 (Enhanced) stormwater quality control (80% TSS removal) as per MOE guidelines.

2.1 PRE-DEVELOPMENT CONDITIONS

Under existing conditions, the 7.68-hectare site is currently a vacant parcel of land, previously used for agricultural purposes. The site is bound by a Canadian Pacific Railway to the north, Regional Road 20 to the south, future development lands to the east and agricultural property to the west. The topography of the site splits along the centre, which slopes east or west. The property contains an average slope between 2 to 4%.

The subject lands are included in the Twenty Mile Creek watershed. Overland flow within the site is directed southeast or southwest towards existing tributaries that ultimately outlet into Twenty Mile Creek.

Southeast Tributary – Drainage within the eastern portion of the site will sheet flow towards the north side ditch fronting the existing roundabout at the intersection of Townline Road and Regional Road 20. Runoff will either convey through a 900mmØ culvert or a 3-sided culvert (0.90x1.0m±) which will flow overland to an existing tributary

located at 6114 Townline Road. This existing tributary ultimately discharges directly into Twenty Mile Creek.

Southwest Tributary – Drainage within the western portion of the site will sheet flow towards a regulated watercourse within an existing agricultural property located at 275 Regional Road 20. The regulated watercourse flows south towards a 1500mmØ CSP culvert which conveys across Regional Road 20 and discharges directly into Twenty Mile Creek.

2.2 POST-DEVELOPMENT CONDITIONS

Under post-development conditions, storm drainage within the subject lands will be serviced by a storm sewer system which will convey the 5-year storm event (minor system) to the neighboring subdivision to the east. Major storm events (>10-Year) will convey through the road network towards the proposed SWM Facility located at 6063 Regional Road 20.

2.2.1 Catchment Area Description

As part of the 6087 Regional Road 20 Functional Servicing Report (Ref. 5), seventeen (17) catchment areas have been defined to describe the post-development drainage. There are four catchment areas that are included within the limits of the subject lands.

Catchment 201 represents the proposed Business Park Block. This drainage area will require quality and quantity control prior to discharging to the storm sewer system within the public road allowance. Quantity control requirements shall restrict stormwater flows to **64 l/s** up to and including the 100-year storm event. Quality control shall meet **Level 1 “Enhanced”** requirements.

Catchment 202 signifies freehold townhouse and semi-detached dwellings within the subject lands. Runoff from this drainage area will be captured and conveyed through a storm sewer system which will discharge into the proposed SWM Facility.

Catchment 203 represents the proposed mixed-use and retirement apartments. Each block will be subject to quantity and quality controls. Quantity control requirements for each block shall restrict stormwater flows to **40 l/s** up to and including the 100-year storm event. Quality control shall meet **Level 1 “Enhanced”** requirements.

Catchment 204 has been designated as a Park Block.

Table 2.1 below summarizes the parameters of the four above-mentioned catchment areas. For additional information, refer to the Post-Development Storm Drainage Area Plan in Appendix A for details.

Table 2.1 – Post-Development Catchment Areas				
Catchment ID	Description	Area (ha)	% Imp.	Runoff Coefficient
201	Business Park to SWM Facility	1.22	85	0.85
202	Freehold Townhomes to SWM Facility	5.85	71	0.75
203	Apartments to SWM Facility	1.85	85	0.85
204	Parkland to SWM Facility	0.63	21	0.40

2.2.2 Quantity Control

The proposed SWM Facility located downstream of the subdivision has been designed to accommodate the proposed development. As part of the 6087 Regional Road 20 stormwater management strategy, the Site Plan Blocks will be subject to quantity controls, which have been identified in Section 2.2.1. Further stormwater management details for Catchments 201 and 203 will be provided during the Site Plan Approval process.

2.2.3 Quality Control

Catchments 201 and 203 will be required to achieve a Level 1 “Enhanced” (80% TSS removal) level of water quality protection. To achieve this criterion, discharge from these drainage areas will be subject to treatment by the use of an oil/grit separator. Further quality control details for Catchments 201 and 203 will be provided during the Site Plan Approval process. Quality control for the remaining areas within the subject lands will be accommodated by the SWM Facility included in 6087 Regional Road 20 subdivision.

2.3 SEDIMENT AND EROSION CONTROL

In order to minimize erosion during the grading and site servicing period of construction, the following measures will be implemented:

- Install silt fencing along the outer boundary of the low end of the site to ensure that sediment does not migrate to the adjacent properties.
- Install sediment control (silt sacks) in the proposed catchbasins as well as the nearby existing catchbasins to ensure that no untreated runoff enters the existing conveyance system.
- Install a mud mat at the construction entrance of the site to reduce mud tracking and sediment leaving the site via construction traffic.
- Stabilize all disturbed or landscaped areas with hydro seeding/sodding to minimize the opportunity for erosion.
- Locating stockpiled topsoil in an area that will not impact adjacent lands.

To ensure and document the effectiveness of the erosion and sediment control structures, an appropriate inspection and maintenance program is necessary. The program will include the following activities:

- Inspection of the erosion and sediment controls (e.g. silt fences, sediment traps, outlets, vegetation, etc.) with follow up reports to the governing municipality and Conservation Authority; and
- The developer and/or his contractor shall be responsible for any costs incurred during the remediation of problem areas.

Details of the proposed erosion and sediment control measures will be provided on the Erosion and Sediment Control Plan, which will be provided upon detailed design.

3.0 SANITARY SEWER SERVICING

3.1 PRE-DEVELOPMENT CONDITIONS

Under existing conditions, there is currently no municipal services fronting the proposed development. The closest sanitary sewer network to the proposed development is located at the intersection of Regional Road 20 and Industrial Park Road. Regional Road 20 contains a 450mmØ sanitary sewer, which flows west and connects to the Smithville Sanitary Pumping Station approximately 300m away.

3.2 SANITARY DEMAND

Sanitary discharge from the site was estimated in accordance with the Smithville Master Community Plan design criteria (Ref. 6). Population densities were calculated using the Smithville Master Community Plan and the Township of West Lincoln Development Charge Background Study (Ref. 13). Tables 3.1 and 3.2 summarize the sanitary sewer discharge rate for the proposed development, as well as development to the east and the Smithville Urban Boundary Expansion.

Table 3.1- Post-Development Sanitary Sewer Discharge						
Development Use	Area (ha)	Population ^A	Avg. Demand ^B (l/s)	Peaking Factor ^C	Infiltration ^D (l/s)	Peak Flow ^E (l/s)
Single/Semi-Detached Dwellings	2.71	126.7 persons	0.37	4.00	0.78	2.26
Freehold Townhouse Dwellings	1.17	73.8 persons	0.22	4.00	0.33	1.21
Retirement Apartments	0.92	183.4 persons	0.54	4.00	0.26	2.42
Mixed-Use Apartment (Residential)	0.93	268.0 persons	0.79	4.00	0.27	3.43
Mixed-Use Apartment (Commercial)	N/A	16.3 persons	0.06	4.00	N/A	0.24
Business Park (Industrial)	1.15	20 persons	0.07	4.00	0.33	0.61
Total						10.17
<p>^A <u>Population Density:</u> Single & Semi-Detached Dwellings = 3.168 persons/unit (3 single detached units, 1 future single detached unit, 36 semi-detached) Townhouse Dwelling = 2.169 persons/unit (34 freehold townhouse units) Residential Apartments = 1.763 persons/unit (104 retirement apartment units, 152 residential apartment units) Commercial = 1 employee/46.5m² gross floor area x 756m² Industrial = 1 employee/120.8m² gross floor area x 2,417m²</p> <p>^B <u>Average Demand:</u> Residential demand = 255 l/cap/day x persons Employment demand = 310 l/cap/day x persons</p> <p>^C Peaking Factor = $1 + (14/(4+P^{0.5}))$ with P expressed in thousands, 2<M<4</p> <p>^D Infiltration flow based on 0.286 l/ha/sec infiltration x site area</p> <p>^E Peak Flow = (Average Flow x Peaking Factor) + Infiltration</p>						

Table 3.2 – Post-Development Sanitary Sewer Discharge By Others						
Development Use	Area (ha)	Population ^A	Avg. Demand ^B (l/s)	Peaking Factor ^C	Infiltration ^D (l/s)	Peak Flow ^E (l/s)
6087 Regional Road 20 Subdivision						
Single Detached Dwellings	2.77	126.7 persons	0.37	4.00	0.79	2.27
Freehold Townhouse Dwellings	1.39	86.8 persons	0.26	4.00	0.40	1.44
Back-to-Back Townhouse Dwellings	2.67	269.0 persons	0.79	4.00	0.76	3.92
Apartment Building	2.10	564.2 persons	1.67	3.95	0.60	7.20
Mixed-Use Building (Residential)	1.94	950.3 persons	2.80	3.81	0.55	11.22
Mixed-Use Building (Commercial)	N/A	62.3 persons	0.22	4.00	N/A	0.88
Smithville Urban Boundary Expansion Phase 2A & 2B						
Employment	63.41±	630 persons	2.26	3.92	18.14	27.00
Total						53.93
^A Population Density: Single Dwellings = 3.168 persons/unit (40 single detached units) Townhouse Dwelling = 2.169 persons/unit (40 freehold townhouse units, & 124 back-to-back townhouse units) Residential Apartments = 1.763 persons/unit (320 senior/rental apartment units, 539 residential apartment units) Commercial = 1 employee/46.5m ² gross floor area x 2,899m ² Smithville UBE Phases 2A, & 2B = 630 persons ^B Average Demand: Residential demand = 255 l/cap/day x persons Employment demand = 310 l/cap/day x persons ^C Peaking Factor = $1 + (14/(4+P^{0.5}))$ with P expressed in thousands, 2<M<4 ^D Infiltration flow based on 0.286 l/ha/sec infiltration x site area ^E Peak Flow = (Average Flow x Peaking Factor) + Infiltration						

The density identified for the 6087 Regional Road 20 subdivision is for informational purposes. The density is to be confirmed through a separate development application.

3.3 PROPOSED SANITARY SERVICING

The sanitary sewer network for the proposed development will consist of:

- 100mmØ service laterals for each single-detached dwelling, semi-detached dwelling and townhouse unit. Each lateral will contain a minimum grade of 2.0%.
- Regional Road 20 – 375mmØ sanitary sewer extension, which will connect to the existing 450mmØ sanitary sewer at the intersection of Industrial Drive and Regional Road 20. This sanitary sewer is anticipated to be cost-shared between Kainthville Holdings Inc. and the 6087 Regional Road 20 landowner. Cost recoveries should also be provided back to the participating East Smithville Secondary Plan landowners when future development connects to this sanitary sewer.
- Street A – 250 to 375mmØ sanitary sewers with slopes between 0.30% to 0.40%. This sanitary sewer is anticipated to be cost-shared between Kainthville Holdings Inc. and the 6087 Regional Road 20 landowner.
- Site Plan Blocks – 200-250mmØ services with a minimum grade of 1.00%.
- Street B – 200mmØ sanitary sewer with slopes between 0.50% to 1.00%.
- Street C – 200mmØ sanitary sewer with slopes between 0.70% to 1.00%.
- Street D – 200 to 250mmØ sanitary sewers with slopes between 1.00% to 1.50%.

A sanitary sewer extension along Regional Road 20 will be required to service the proposed development. This sewer extension has been included in the preliminary engineering drawings for the 6087 Regional Road 20 development. It has been established that the proposed 375mmØ sanitary sewer will service the limits of the East Smithville Secondary Plan, as well as Phases 2A and 2B of the Smithville Urban Boundary Expansion. This sewer extension is consistent with wastewater strategy S2WW1 provided in the Smithville Master Community Plan (Ref. 6). It has been determined that a 375mmØ sanitary sewer run at a 0.25% grade can accommodate a full flow capacity of 88 l/s. As such, the sewer extension along Regional Road 20 can accommodate the Kainthville Holdings Inc. development, 6087 Regional Road 20 development and Phases 2A & 2B of the Smithville Urban Boundary Expansion (64.10 l/s), while maintaining 80% full flow capacity. The size of this sewer extension will be confirmed through the detailed design stage.

The Smithville Master Community Plan has also indicated that future development growth will trigger upgrade needs for the Smithville Sanitary Pumping Station as well as the downstream forcemain and sewer systems. The Niagara Region's extraneous flow allowance criteria for pumping station performance is based on two flow scenarios. These include:

- Design Allowance – Peak wet weather flow using the peaked dry weather flow plus the extraneous flow design allowance.

- 5-Year Storm – Modelled peak weather flow using the 5-year design storm. Wet well and system storage must contain adequate storage to minimize basement flooding and overflow risks.

According to the Niagara Region’s Wastewater Master Servicing Plan (Ref. 12), the Smithville Sanitary Pumping Station has existing capacity concerns under both design allowance peak wet weather flow and during a 5-year storm event. Table 3.3 below summarizes the existing performance of the pumping station.

Operational Firm Capacity (l/s)	Average Dry Weather Flow (l/s)	Peak Dry Weather Flow (l/s)	Design Allowance Peak Wet Weather Flow (l/s)	5-Year Storm Peak Wet Weather Flow (l/s)
104	32.2	83.7	230.7	322.9
* Results taken from Table 4.A.8 of Ref. 11				

The external sanitary servicing works required to service the proposed development may be dependent on the timing of the Class EA process for the Smithville Master Community Plan and the Smithville Sanitary Pumping Station. The Region’s in-service period projection for the upgraded pumping station is between 2027-2031. SLA recommends two strategies which could supersede pumping station upgrades to support the proposed development. These include:

Strategy 1 – Implement multiple flow monitoring points along the existing Smithville Trunk sewer to identify the locations for poor I&I (inflow and infiltration) performance classification. Once these locations have been identified, segments of the trunk sewer can be replaced to increase system resilience to wet weather flows. This will allow for additional operational capacity within the Smithville Sanitary Pumping Station to accommodate intensification from the proposed development.

Strategy 2 – Implement a phasing approach to the development until the upgrades have been completed to the Smithville Sanitary Pumping Station. This strategy would still require replacement along the Smithville trunk sewer. However, the length of the sewer replacement would be reduced to accommodate the density for the first phase of development.

It has been noted that the Township of West Lincoln has retained AECOM to maintain the Township’s wastewater modelling. An update to the Township’s wastewater hydraulic model will be required to verify available capacity within the existing sewer network. This modelling work is typically completed at the expense of the developer.

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

4.1 PRE-DEVELOPMENT CONDITIONS

Under existing conditions, there is currently no municipal services fronting the proposed development. The closest watermain network to the proposed development is located at

the intersection of Regional Road 20 and Industrial Park Road. The existing watermain network at the intersection include:

- Industrial Park Road – 300mmØ watermain (north-south alignment).
- Regional Road 20 – 200mmØ PVC watermain (north-south alignment) connecting to the 300mmØ watermain along Industrial Park Road.
- Regional Road 20 – 150mmØ A.C. watermain (east-west alignment) connects to the 300mmØ watermain through a reducer.

4.2 DOMESTIC WATER DEMAND

The water demand for the site was estimated in accordance with the Smithville Master Community Plan (Ref. 6) and the Niagara Region Water Master Servicing Plan (Ref. 11) design criteria. Population densities were calculated using the Smithville Master Community Plan and the Township of West Lincoln Development Charge Background Study (Ref. 13). Table 4.1 and 4.2 summarize the domestic water demand requirements for the Average Daily, Maximum Daily and Peaking Hourly demand scenarios for the proposed development, as well as the development to the east and the Smithville Urban Boundary Expansion.

Table 4.1 - Post-Development Domestic Water Demand						
Land Use	Population ^A	Average Daily Demand ^B (l/s)	Max. Daily Peaking Factor ^C	Max. Hourly Peaking Factor ^D	Max. Daily Demand ^E (l/s)	Max. Hourly Demand ^F (l/s)
Residential	651.9 persons	1.81	1.66	2.49	3.01	4.51
Employment	36.3 persons	0.11	1.66	3.32	0.18	0.37
Total					3.19	4.88
^A <u>Population Density:</u> Single & Semi-Detached Dwellings = 3.168 persons/unit (3 single detached units, 1 future single detached unit, 36 semi-detached) Townhouse Dwelling = 2.169 persons/unit (34 freehold townhouse units) Residential Apartments = 1.763 persons/unit (104 retirement apartment units, 152 residential apartment units) Commercial = 1 employee/46.5m ² gross floor area x 756m ² Industrial = 1 employee/120.8m ² gross floor area x 2,417m ² ^B <u>Average Demand:</u> Residential demand = 240 l/cap/day x persons Employment demand = 270 l/cap/day x persons ^C Max. Daily Peaking Factor = 1.66 (Recommended Peaking Factor for Grimsby WTP Refer to Ref. 11) ^D <u>Max Hourly Peaking Factor:</u> Max. Hourly Peaking Factor = 1.5 x Max Daily Demand (Refer to Ref. 6) Employment Hourly Peaking Factor 2.0 x Max Daily Demand (Refer to Ref. 6) ^E Max. Daily Demand = Average Daily Demand x Max. Daily Peaking Factor ^F Max. Hourly Demand = Average Daily Demand x Max. Hourly Peaking Factor						

Table 4.2 - Post-Development Domestic Water Demand By Others						
Land Use	Population ^A	Average Daily Demand ^B (l/s)	Max. Daily Peaking Factor ^C	Max. Hourly Peaking Factor ^D	Max. Daily Demand ^E (l/s)	Max. Hourly Demand ^F (l/s)
6087 Regional Road 20 Subdivision						
Residential	1,997 persons	5.55	1.66	2.49	9.21	13.82
Employment	62.3 persons	0.19	1.66	3.32	0.32	0.63
Smithville Urban Boundary Expansion Phase 2A & 2B						
Employment	630 persons	1.97	1.66	3.32	3.27	6.54
Total					12.80	20.99
^A <u>Population Density:</u> Single Dwellings = 3.168 persons/unit (40 single detached units) Townhouse Dwelling = 2.169 persons/unit (40 freehold townhouse units, & 124 back-to-back townhouse units) Residential Apartments = 1.763 persons/unit (320 senior/rental apartment units, 539 residential apartment units) Commercial = 1 employee/46.5m ² gross floor area x 2,899m ² Smithville UBE Phases 2A, & 2B = 630 persons ^B <u>Average Demand:</u> Residential demand = 240 l/cap/day x persons Employment demand = 270 l/cap/day x persons ^C Max. Daily Peaking Factor = 1.66 (Recommended Peaking Factor for Grimsby WTP Refer to Ref. 11) ^D <u>Max Hourly Peaking Factor:</u> Max. Hourly Peaking Factor = 1.5 x Max Daily Demand (Refer to Ref. 6) Employment Hourly Peaking Factor 2.0 x Max Daily Demand (Refer to Ref. 6) ^E Max. Daily Demand = Average Daily Demand x Max. Daily Peaking Factor ^F Max. Hourly Demand = Average Daily Demand x Max. Hourly Peaking Factor						

The density identified for the 6087 Regional Road 20 subdivision is for informational purposes. This density is to be confirmed through a separate development application.

4.3 FIRE FLOW DEMAND

Fire flow demands were determined using the Fire Underwriters Survey (2020 edition). Attached in Appendix B is an estimate of the required fire flow rates for the proposed development and the 6087 Regional Road 20 subdivision. The required fire flow is based on the worst-case scenario.

It was determined that the worst-case scenario within the Kainthville Holdings Inc. development would be the two-storey townhouse dwellings. The proposed dwellings will be a wood frame (C=1.5) construction type, with limited combustible occupancy (-15% correction). As such, the required fire flow for the townhouse dwelling is **208 l/s**.

It was determined that the worst-case scenario within the 6087 Regional Road 20 subdivision would be the three-storey back-to-back townhouses. The proposed dwellings will be a wood frame (C=1.5) construction type, with limited combustible occupancy (-15% correction). As such, the required fire flow for the back-to-back townhouse dwellings is **250 l/s**. The fire flow requirement identified for the 6087 Regional Road 20 subdivision is for informational purposes and will be confirmed through a separate development application.

4.4 WATER DISTRIBUTION MODEL

As part of the Smithville Master Community Plan (Ref. 6), the Niagara Region's (2016) hydraulic model was updated to reflect ultimate demand conditions within the Smithville Urban Boundary Expansion. This model includes the projected water demands and a preliminary water servicing concept for the East Smithville Secondary Plan. It should be noted that the timing for the Niagara Region's DC projects and the water servicing upgrades highlighted in the Smithville Master Community Plan may not align with the construction timelines for the East Smithville Secondary Plan. As such, the Township's existing water model will require an update to confirm available capacity. Water modelling will be completed by the Township's consultant (AECOM), which is typically at the expense of the developer.

4.5 PROPOSED WATER SERVICING

The watermain network for the proposed development will consist of:

- 25mmØ individual water services for each single-detached dwelling, semi-detached dwelling and townhouse unit.
- Site Plan Blocks – 100mmØ domestic and 150mmØ fire water services split at property line.
- Regional Road 20 – 300mmØ watermain extension. This watermain is anticipated to be cost-shared between Kainthville Holdings Inc. and the 6087 Regional Road 20 landowner. Cost recoveries should also be provided back to the participating East Smithville Secondary Plan landowners when future development connects to this watermain.
- Street A – 300mmØ watermain. This watermain is anticipated to be cost-shared between Kainthville Holdings Inc. and the 6087 Regional Road 20 landowner.
- Street B – 300mmØ watermain.
- Street C – 150mmØ watermain.
- Street D – 150mmØ watermain.
- Street E – 150mmØ watermain.

Watermain sizing will be confirmed through the watermain analysis completed by AECOM.

5.0 COST SHARING

Infrastructure upgrades extending along Regional Road 20 have not been included in the capital programs for West Lincoln and the Niagara Region. It is anticipated that Kainthville Holdings Inc. will be expected to enter into a Cost-Sharing Agreement with neighboring landowners to facilitate the infrastructure upgrades required to service the

East Smithville Secondary Plan and Urban Boundary Expansion. It is recommended that the Township of West Lincoln includes cost-sharing as a condition of approval for all future development applications.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided herein, it is concluded that the proposed development located at South Grimsby, Concession 9, Part Lot 5 in the Township of West Lincoln can be constructed to meet the requirements of the Township of West Lincoln. Therefore, it is recommended that:

- The development be graded and serviced in accordance with the preliminary engineering plans prepared by S. Llewellyn & Associates Limited.
- Stormwater management has been accounted for in the 6087 Regional Road 20 development.
- The proposed Site Plan Blocks adhere to the quantity and quality control requirements identified in the 6087 Regional Road 20 Functional Servicing Report (Ref. 5) prepared by S. Llewellyn & Associates Limited.
- The proposed sanitary servicing network follow the preferred strategies and recommendations presented in the Smithville Master Community Plan.
- The proposed watermain network follow the recommendations provided by AECOM's watermain analysis.

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

Prepared by:

S. LLEWELLYN & ASSOCIATES LIMITED

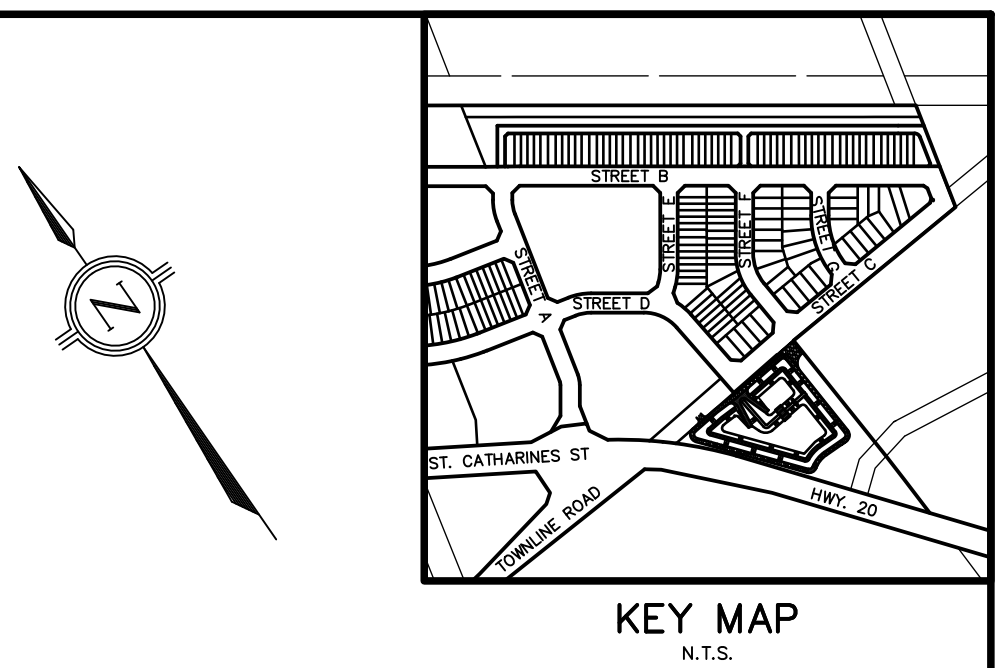


C. Dougan, Dipl.T.



S.Frankovich, P.Eng.

APPENDIX A
STORMWATER MANAGEMENT INFORMATION



LEGEND:

	CATCHMENT ID
	CATCHMENT AREA (HA)
	IMPERVIOUSNESS (%)
	RUNOFF COEFFICIENT
	DRAINAGE BOUNDARY
	MAJOR STORM OVERLAND FLOW ROUTE

NO.	DATE	BY	REVISIONS

NOTES TO CONTRACTOR:

- CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
- ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
- PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
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DESIGN	CD	CHK'D	SF	DATE
DRAWN	CD	CHK'D		NOV. 2023

SCALE
 1:3000

APPROVALS

S. LLEWELLYN & ASSOCIATES LIMITED
 CONSULTING ENGINEERS

Tel: (905) 631-6978
 Fax: (905) 631-8927
 email: info@sila.on.ca

3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

TOWNSHIP OF WEST LINCOLN

PROJECT NAME
 1826343 ONTARIO INC.
 6087 REGIONAL ROAD 20

TITLE
 PRE-DEVELOPMENT
 CATCHMENT AREA PLAN

PROJECT No. 22078	DRAWING No. PRE-DAP	SHEET No.
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STORMWATER MANAGEMENT CRITERIA

QUALITY CONTROL: LEVEL 1 ENHANCED

CATCHMENT 200 (FUTURE DEVELOPMENT)

QUANTITY CONTROL:

EXTENDED DETENTION = 15.14 ha x 1 l/s/ha = 15.1 l/s
 25-YEAR = 15.14 ha x 12 l/s/ha = 181.7 l/s
 100-YEAR = 15.14 ha x 17 l/s/ha = 257.4 l/s

CATCHMENT 211 (FUTURE DEVELOPMENT)

QUANTITY CONTROL:

EXTENDED DETENTION = 16.93 ha x 1 l/s/ha = 16.9 l/s
 25-YEAR = 16.93 ha x 12 l/s/ha = 203.2 l/s
 100-YEAR = 16.93 ha x 17 l/s/ha = 187.8 l/s

PROPOSED SWM FACILITY

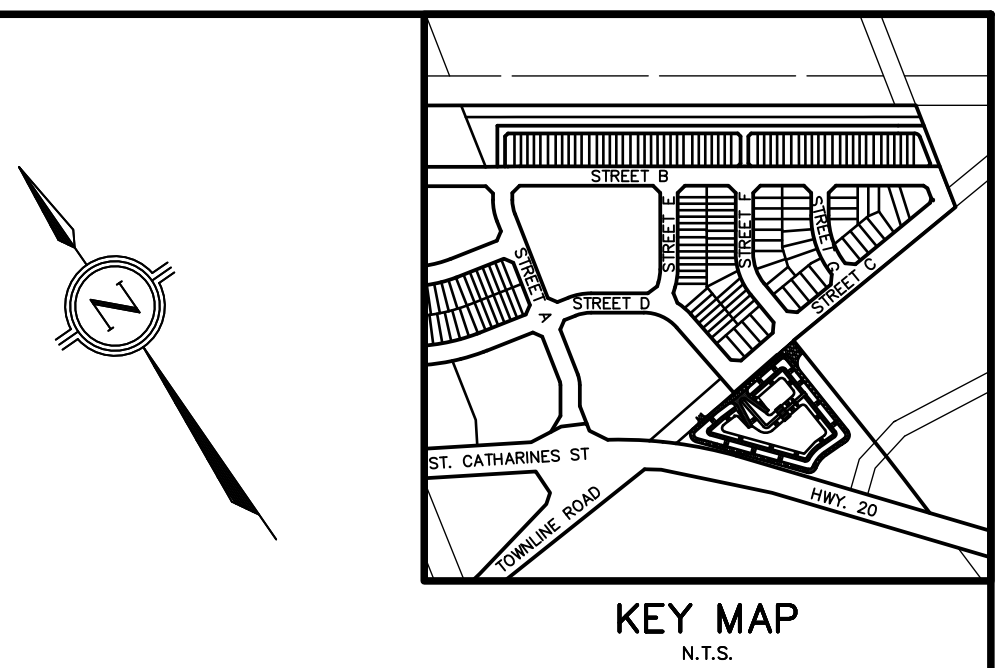
QUANTITY CONTROL:

EXTENDED DETENTION = 36.94 ha x 1 l/s/ha = 36.9 l/s
 25-YEAR = 36.94 ha x 12 l/s/ha = 443.3 l/s
 100-YEAR = 36.94 ha x 17 l/s/ha = 628.0 l/s

NODE JS7D

QUANTITY CONTROL:

25mm = 341 l/s (PRE-DEVELOPMENT FLOW)
 2-YEAR = 1057 l/s (PRE-DEVELOPMENT FLOW)
 5-YEAR = 1857 l/s (PRE-DEVELOPMENT FLOW)
 10-YEAR = 2550 l/s (PRE-DEVELOPMENT FLOW)
 25-YEAR = 3428 l/s (PRE-DEVELOPMENT FLOW)
 50-YEAR = 4177 l/s (PRE-DEVELOPMENT FLOW)
 100-YEAR = 8420 l/s (PRE-DEVELOPMENT FLOW)



LEGEND:

	CATCHMENT ID
	CATCHMENT AREA (HA)
	IMPERVIOUSNESS (%)
	RUNOFF COEFFICIENT
	DRAINAGE BOUNDARY
	MAJOR STORM OVERLAND FLOW ROUTE

NO.	DATE	BY	REVISIONS

NOTES TO CONTRACTOR:

- CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
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DESIGN	CD	CHK'D	SF	DATE
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TOWNSHIP OF WEST LINCOLN

PROJECT NAME

1826343 ONTARIO INC.
 6087 REGIONAL ROAD 20

TITLE

POST-DEVELOPMENT CATCHMENT AREA PLAN

PROJECT No. 22078	DRAWING No. POST-DAP	SHEET No.
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**APPENDIX B
FIRE FLOW INFORMATION**

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Project Number: 22060
 Project Name: SOUTH GRIMSBY, CONCESSION 9, PART LOT 5
 Date: Sep-24

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$F = 220 C \sqrt{A} \quad (1)$$

where:

- the required fire flow in litres per minute
- coefficient related to the type of construction
- = 1.5 for wood frame construction (structure essentially all combustible).
- = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
- = 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
- = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
- Total floor area in square metres

Building / Location	# of Storeys	Building Area (m ²)	Total TFA (m ²)	Type of Construction	(1) Fire Flow "F"		(2) Occupancy			(3) Sprinkler		(4) Exposure		Final Adjusted Fire Flow	
					(l/min)	(l/s)	%	Adjustment (l/min)	Adjusted Fire Flow (l/min)	%	Adjustment (l/min)	%	Adjustment (l/min)	(l/min)	(l/s)
Mixed-Use Building (Kainthville Holdings)	8	2907	14535	0.8	21219	353.6	-15	-3182.8	18036.0	-50	-9018.0	10	1803.6	10822	180
Retirement Building (Kainthville Holdings)	6	1933	7732	0.8	15476	257.9	-15	-2321.4	13154.6	-50	-6577.3	10	1315.5	7893	132
Townhouse c/w Fire Wall (Kainthville Holdings)	2	472	944	1.5	10139	169.0	-15	-1520.9	8618.2	0	0.0	45	3878.2	12496	208
Mixed-Use Building (6087 Regional Road 20)	8	2275	11375	0.8	18771	312.9	-15	-2815.7	15955.4	-50	-7977.7	30	4786.6	12764	213
Apartment Building (6087 Regional Road 20)	5	2822	9125	0.8	16812	280.2	-15	-2521.9	14290.5	-50	-7145.3	30	4287.2	11432	191
Back-to-Back Townhouse c/w Fire Wall (6087 Regional Road 20)	3	545	1635	1.5	13344	222.4	-15	-2001.5	11342.1	0	0.0	32	3629.5	14972	250

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No Charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

Minimum credit for systems designed to NFPA 13 is 30%.
 If the domestic and fire services are supplied by the same municipal water system, then take an additional 10%.
 If the sprinkler system is fully supervised (ie. annunciator panel that alerts the Fire Dept., such as a school), then an additional 10% can be taken. Maximum credit = 50%.

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
30.1m <	0%	exceed 75%

Side	Exposure (m)	Charge (%)
North =		
South =		
East =		
West =		
Total Exposure =		0