

Township of West Lincoln
318 Canborough Street
Smithville, ON L0R 2A0

Functional Servicing Report

6441 Smithville Road, Smithville

1. Introduction

1.1. Background

LandSmith Engineering & Consulting Ltd. (LandSmith) have been retained by RLD Group (Smithville Road) Inc. for the completion of a Functional Servicing Report in support of the re-zoning applications currently submitted to the Township for approval, for the lands located at 6441 Smithville Road, Smithville.

The purpose of this Functional Servicing Report is to review the existing municipal services currently available for the servicing of the proposed 22 residential townhouse units and ensure their suitability for Site Plan Approval. In addition, this report will address the local Stormwater Management (SWM) context for the site including the required stormwater quantity and quality control measures.

1.2. Site Location & Topography

The site is located at 6441 Smithville Road (Niagara Regional Road 14), Smithville. Approximately 0.643 hectares in size, the site consists mainly of grassed areas and contains an existing 1-storey brick church building with a gravel parking lot that is accessible off of Smithville Road. The site is bound by single detached residential homes to the north and west, a two-storey apartment building to the east, and Smithville Road to the south. As per the Township of West Lincoln's Zoning By-Law No. 2017-70, the site is currently in an Institutional (I) zone. A site location plan is illustrated on Figure 1 on the following page.

A topographic survey of the subject lands was completed in June 2026, by A.T. McLaren Ltd. and is attached in Appendix 'A' for reference purposes. The topography of the site is relatively flat and there is an existing split drainage pattern. The front portion of the site including the church building drains uncontrolled towards the roadside ditch on the north side of Smithville Road. The rear portion of the site drains uncontrolled towards northeast corner where there is an existing catchbasin located in the rear-yard of the adjacent property at 24 Killins Street. This catchbasin conveys flows north towards

the Smithville Country Estates subdivision through a storm easement located between the houses at 24 and 26 Killins Street.



Figure 1: Site Location Plan

1.3. Proposed Development

The current development proposal is described on the Site Plan attached in Appendix 'A' for reference purposes. The existing church building is to be demolished and the existing water and sanitary services removed as per Township standards. The developed site will include the construction of four 2-storey townhouse blocks. There will be a total of 22 townhouse units, with Building's 1 and 2 containing 6 units each, and Building's 3 and 4 containing 5 units each. Vehicular access will be provided by a private laneway off of Smithville Road at the south of the site. Each townhouse unit will have a driveway at the frontage, and there will be 8 additional surface parking spaces provided for the development. The Proposed Site Plan contained in Appendix 'A' was the basis of the following engineering analysis.

2. Servicing Analysis

2.1. Water Servicing

Adjacent to the site, there is an existing 150mm diameter watermain along Smithville Road which is illustrated on the Smithville Country Estates General Plan drawing contained within Appendix 'A' for reference purposes.

As seen on the Servicing Plan attached in Appendix 'A' for reference, the development will be serviced by a proposed 150mm diameter watermain that will connect to the municipal 150mm diameter watermain and run north within the private laneway. Two proposed hydrants will be located north of the private laneway, with one hydrant adjacent to the southwest corner of Building 3, and one hydrant adjacent to the southeast corner of Building 4. The water services for the 22 townhouse units will be 25mm diameter, Type K copper pipe that branches off of the 150mm watermain within the private laneway.

The Ontario Building Code has been utilized to calculate the expected maximum hydraulic load and associated flow rate for the proposed development. These calculations have been based on the Site Plan provided by KNYMH Inc. It was assumed that each townhouse unit will have two bathroom groups, one dishwasher, one clothes washer, one kitchen sink, and one hose bibb.

Based on the fixture unit method the proposed development will have a total of 305.8 fixture units. This is equivalent to a maximum hydraulic load for the building of 6.73 L/s. The supporting calculations describing how this value was determined are attached in Appendix 'B' for reference purposes.

The Ontario Building Code has also been utilized to calculate the fire-flow demands for the proposed buildings based on their proposed size. Building 1 was analyzed due to its proximity to adjacent existing structures. Based on the average floor area and the building height of Building 1, the total building volume of 6,180 cubic metres was calculated. Taking into consideration the appropriate water supply and spatial coefficients this building size results in a required flow rate of 75 L/s. Details of the fire-flow calculations are contained within Appendix 'B' for reference purposes. Based on this analysis the fire-demand for the development will be 75 L/s.

Attached in Appendix 'B' from the 2016 Niagara Region Master Servicing Plan is Figure 3.A.8 and Figure 3.A.9 which illustrate the watermain network in Smithville. These figures show that adjacent to the site along Smithville Road, the existing maximum day demand pressure is between 50-60 psi, and the available fire flow is 50-100 L/s. This indicates that the watermain adjacent to the site have the capacity to meet the domestic use and fire flows for the proposed development. However, prior to

development, the existing watermain should be tested in order to determine the exact and currently available pressures in the nearby system.

2.2. Sanitary Servicing

There is an existing 250mm diameter sanitary sewer on Smithville Road that has a slope of approximately 0.50% in the area adjacent to the frontage of the site. A map illustrating the downstream sanitary sewers is attached in Appendix 'B' for reference.

The proposed development will connect to the existing sanitary sewer along Smithville Road through a proposed 200mm diameter sanitary sewer running through the proposed private laneway. Within the site there will be a total of 120m of 200mm diameter sanitary sewers and five sanitary manholes, including a manhole at the front property line. Each of the 22 townhouse units will have a dedicated 150mm diameter sanitary lateral that will connect to the proposed 200mm diameter sanitary sewer within the private laneway. The proposed sanitary sewer layout is illustrated on the Servicing Plan attached in Appendix 'A' for reference.

2.2.1 Wastewater Assessment

Based on the Ontario Building Code, the 2023 Smithville Master Community Plan and the 2024 Development Charges Background Study for the Township of West Lincoln, the calculation of the expected generation of sanitary effluent based on the existing conditions and the proposed development is as follows:

As per OBC 8.2.1.3 Sewage System Design Flows, Table 8.2.1.3.B:

5. a) Churches and Similar Places of Worship (no kitchen) = 8 L/day/seat

As per Section 3.2: Wastewater System Design Criteria from the 2023 Smithville Water and Wastewater Master Servicing Plan:

Residential Average Dry Weather Flow = 255 L/day/person

Infiltration Allowance = 0.286 L/s/ha (new developments)

= 0.400 L/s/ha (existing developments)

Peaking Factor (Harmon) = 4.0

As per Schedule 3: Current Year Growth Forecast from Appendix A of the 2024 Development Charges Background Study for the Township of West Lincoln:

Persons per unit (townhouse) = 2.16

Existing Sanitary Flows:

Assuming the existing church building has 150 seats, the existing sanitary flows generated from the site (0.643 ha) are as follows:

$$\text{Church Flows} = 150 \text{ seats} \times (8 \text{ L/day/seat}) = 1200 \text{ L/day} = 0.014 \text{ L/s}$$

$$\text{Infiltration Flow} = 0.400 \text{ L/s/ha} \times 0.643 \text{ ha} = 0.257 \text{ L/s}$$

$$\text{Estimated Existing Peak Design Flow} = (0.014 \times 4.0) + 0.257 = \mathbf{0.313 \text{ L/s}}$$

Proposed Sanitary Flows:

The proposed sanitary flows generated from the site (0.621 ha with the road widening) are as follows:

$$\text{Site Population} = 22 \text{ units} \times 2.16 \text{ persons/unit} = 48 \text{ persons}$$

$$\text{Site Population (per hectare)} = 48 \text{ persons} / 0.621 \text{ ha} = 78 \text{ persons/ha}$$

$$\text{Population Flow} = 255 \text{ L/day/person} \times 48 \text{ persons} = 12,240 \text{ L/day} = 0.142 \text{ L/s}$$

$$\text{Infiltration Flow} = 0.286 \text{ L/s/ha} \times 0.621 \text{ ha} = 0.178 \text{ L/s}$$

$$\text{Estimated Proposed Peak Design Flow} = (0.142 \times 4.0) + 0.178 = \mathbf{0.746 \text{ L/s}}$$

The proposed sanitary service lateral to the site is 200mm in diameter. At a 2.0% slope this lateral has a capacity of 46 L/s which is sufficient for the proposed sanitary flows from the site.

The 2023 Smithville Water and Wastewater Master Servicing Plan indicates that the downstream Smithville Sanitary Pumping Station (SPS) has a rated capacity of 120 L/s and an existing capacity surplus of 5.7 L/s to meet the existing design peak wet weather flow. However, the Region's Master Servicing Plan and DC Background Study have identified an upgrade requirement for Smithville SPS to accommodate future growth. The downstream 450mm diameter trunk sanitary sewer which conveys flows from the site to the SPS along Twenty Mile Creek is reaching the maximum available capacity in the existing peak wet weather flow scenario based on the 5-year design storm, as illustrated in Figure 4-6: Existing Wastewater Modelling Results from the 2023 Smithville MSP which is attached in Appendix 'B' for reference.

2.3 Stormwater Servicing

There are no existing municipal storm sewers adjacent to the site along Smithville Road. There are roadside ditches adjacent to the site which convey flows easterly through CSP culverts running under the driveway entrances. The ditch runoff is conveyed easterly for approximately 180m east of the site, until it enters the 600mm diameter storm sewer along Canborough Street and continues flowing north towards Twenty Mile Creek.

Adjacent to the north of the site is the Smithville Country Estates subdivision. Built in the mid-1970's, this subdivision includes 66 lots of detached single-family dwellings. The Storm Drainage Plan for this subdivision is attached in Appendix 'C' for reference. As can be seen, the northern portion of the site was included as a catchment area for the subdivision – with the downstream receiver being a rear-yard catchbasin (shown in Lot 40 on the Storm Drainage Plan) that conveys flows north through a storm easement towards the Killins Street storm sewer. This easement is in favour of the Township for maintenance of the rear-yard catchbasin and lead (the land transfer documents relating to the easement are attached in Appendix 'C' for reference). LandSmith also attended the site and was able to locate the existing catch-basin box and take photos of the structure. These photos are included in Appendix 'C' of this report for reference. Since the northern portion of the site drains towards the existing catchbasin adjacent to the northeast corner of the site and the downstream sewers were designed to account for these flows, there will be a proposed storm connection to this existing catchbasin. Notwithstanding the fact that the current system accounts for site flows, additional stormwater controls will be placed in the rear yard areas of the site behind Buildings 3 and 4. The proposed storm servicing layout is illustrated on the Servicing Plan attached in Appendix 'A' for reference.

3. Stormwater Management

3.1. Quantity Criteria

As per the Township's SWM quantity criteria from the Smithville Master Community Plan, the development is to incorporate quantity controls to control post-development flows to pre-development levels for all design storm events up to and including the 100-year storm event. The design shall also incorporate on-site extended detention storage for erosion control.

3.2. Quality Criteria

Considering the runoff for the site will ultimately discharge into Twenty Mile Creek, Enhanced stormwater quality treatment control (80% overall total suspended solids removal) will be applied for the proposed development. This will include treatment train design principles in accordance with the Township's and MECP's standards.

3.3. Stormwater Design

3.3.1. Quantity Control

The Pre-Development Storm Drainage Area Plan attached in Appendix 'C' illustrates the existing split drainage pattern for the lot. Pre-development Drainage Area 1 is 0.344 hectares, 7.6% impervious, and includes the front roof portion of the site and the existing church. Drainage Area 1 drains uncontrolled southerly towards the Smithville Road roadside ditch. Pre-development Drainage Area 2 is 0.299 hectares, 0.2% impervious, and includes the rear grassed area of the site. Drainage Area 2 drains uncontrolled towards the northeast corner of the site, towards the low-point and the existing catchbasin located in the rear-yard between the houses at 24 and 26 Killins Street.

The Post-Development Storm Drainage Area Plan attached in Appendix 'C' illustrates the drainage areas for the proposed development. As can be seen the post-development drainage areas will maintain the existing split drainage pattern for the site. Post-development Drainage Area 1 is 0.495 hectares, 66.5% impervious, and consists of the front portion of the site, including the private laneway, Buildings 1 and 2, and the front half of Buildings 3 and 4. Drainage from Post-Dev. Area 1 will be controlled through underground storage tanks and be conveyed southerly towards the roadside ditch adjacent to the frontage of the site. Post-development Drainage Area 2 is 0.126 hectares, 31.7% impervious, and consists of the rear portion of the site, including the back half of Buildings 3 and 4. Drainage from Post-Dev. Area 2 will be controlled through underground storage tanks and be conveyed towards the existing catchbasin adjacent to the northeast corner of the site.

Peak flows for the pre- and post-development areas were found using MIDUSS v2 and the 3-Hour Chicago design storm distribution. Mount Hope's IDF Curve Values were used for the 5, 25, and 100-year storm events. The pre-development peak flows are shown in Table 1, and the post-development flows (with no stormwater controls) are shown in Table 2 on the following page. The MIDUSS v2 output files outlining the details of the runoff calculations are attached to this report in Appendix 'C' for reference purposes.

Return Period (Year)	Peak Runoff (m ³ /s)			Runoff Volume (m ³)		
	A1	A2	Total	A1	A2	Total
5	0.010	0.008	0.018	49.08	36.18	85.26
25	0.026	0.021	0.047	95.78	75.09	170.87
100	0.045	0.035	0.080	138.64	111.28	249.92

Table 1: Pre-Development Runoff Summary

Return Period (Year)	Peak Runoff (m ³ /s)				Runoff Volume (m ³)			
	A1	A2	Total	% Change	A1	A2	Total	% Change
5	0.093	0.013	0.106	+488.9%	155.24	26.82	182.06	+113.5%
25	0.135	0.022	0.157	+234.0%	246.43	46.42	292.85	+71.4%
100	0.174	0.032	0.206	+157.5%	323.35	63.44	386.79	+54.8%

Table 2: Post-Development Runoff Summary (No SWM)

As can be seen in Table 2, the post-development peak runoff increases compared to existing conditions for all return periods. In order to keep stormwater discharge for the site to pre-development levels additional stormwater storage measures will be required for each outlet.

Based on the flow target and the depth of cover constraints of the site, the proposed storage tanks will be Aquabox underground water storage systems. The Aquabox product manual is attached in Appendix 'C' for reference. Each full block is 0.75m long, 0.75m wide, and 0.80m high with a void ratio of 96%. Within landscaped and parking areas, only 0.45m of cover is required over the Aquabox system – which makes it an ideal product for flat sites such as the subject lands. The Aquabox system is considered a Low-Impact Development feature as it includes an open-bottom which promotes groundwater recharge.

Outlet 1: Southerly towards the roadside ditch (Drainage Area 1)

Runoff which exits the site southerly towards the roadside ditch occurs in pre- and post-development drainage Area 1. Post-development Area 1 will need to be controlled in order to match the pre-development runoff rates.

As illustrated on the Site Servicing Plan attached in Appendix 'A', there will be five Aquabox tanks within Post-Dev. Area 1 that will convey flows towards the front roadside ditch – one within the private laneway parking area, and two each behind the rear and south sides of Buildings 1 and 2. Proposed catchbasins within the private laneway will convey laneway runoff to the tank underneath the parking spaces. Rear-yard swales behind Buildings 1 and 2 will convey surface runoff to area drains that will connect to the Aquabox tanks adjacent to the east and west property lines. A small portion of the adjacent western property at 6453 Smithville Road drains onto the site – in order for the proposed retaining wall to not block this runoff, a proposed area drain located to the west of the proposed retaining wall behind Building 1 will capture flows from the adjacent lot and connect to the Aquabox tank. To the south of Buildings 1 and 2 adjacent to the front ditch, area drains will convey surface runoff into Aquabox tanks. With a total of 440 full blocks and a combined bed layout covering 247.50m², the Aquabox tanks in Post-Dev. Area 1 will provide a total storage volume of 190m³.

The downstream receiver for all of the Post-Dev. Area 1 Aquabox tanks will be a proposed storm manhole with orifice controls located at the southeast corner of the site. It was determined that a triple control orifice design would be required in order to meet the discharge targets for each of the return period events as follows:

- Orifice 1 – 87mm diameter Inv. Elevation 190.70m (at the bottom of the tank)
- Orifice 2 – 140mm diameter Inv. Elevation 191.14m
- Orifice 3 – 150mm diameter Inv. Elevation 191.35m

The size and elevation of the orifice was utilized in the MIDUSS v2 analysis, as can be seen through review of the output files attached in Appendix 'C' for reference. Based on the routing of the system the discharge from the proposed Aquabox storage tanks for Post-Dev. Area 1 is summarized via Table 3 below. As can be seen the proposed storage and control orifices allow for the post-development flows towards the front ditch to match the pre-development levels.

Return Period (Year)	Max. Storage (m ³)	Peak Outflow (m ³ /s)	Allowable Outflow (%)	WSEL (m)
5	103.5	0.010	100%	191.14
25	153.3	0.026	100%	191.35
100	189.6	0.044	98%	191.50

Table 3: Post-Dev. Area 1 – Aquabox Storage and Discharge Summary

Outlet 2: Northeasterly towards the existing catchbasin (Drainage Area 2)

Runoff which exits the site northerly towards the existing catchbasin occurs in pre- and post-development drainage Area 2. As seen in Tables 1 and 2, the post-development runoff volumes for all return periods and the 100-year peak flows for this outlet decrease compared to existing conditions (with no stormwater controls). However, since the 5 and 25-year post-development peak flows increase compared to existing conditions, Post-development Area 2 will need to be controlled in order to match the pre-development runoff rates.

As illustrated on the Site Servicing Plan attached in Appendix 'A', there will be one Aquabox tank within Post-Dev. Area 2 that will convey flows towards the existing catchbasin adjacent to the northeast corner of the site. This tank will be located in the rear yard area for Buildings 3 and 4, adjacent to the northern lot line. Proposed swales will convey flows to area drains that will connect to the Aquabox tank. With a total of 85 half blocks and a bed layout covering 47.82m², the Aquabox tank in Post-Dev. Area 2 will provide a total storage volume of 19.7m³.

The downstream receiver for all of the Post-Dev. Area 2 Aquabox tank will be a proposed storm catchbasin with orifice controls located at the northeast corner of the site, south of the existing catchbasin. It was determined that a double control orifice design would be required in order to meet the discharge targets for each of the return period events as follows:

- Orifice 1 – 110mm diameter Inv. Elevation 190.20m (at the bottom of the tank)
- Orifice 2 – 110mm diameter Inv. Elevation 190.37m

The orifices will discharge via one pipe that will be cored into the existing rear-yard catchbasin adjacent to the northeast corner of the site. This existing catchbasin is located within an easement in favour of the Township. The size and elevation of the orifice was utilized in the MIDUSS v2 analysis, as can be seen through review of the output files attached in Appendix 'C' for reference. Based on the routing of the system the discharge from the proposed Aquabox storage tank for Post-Dev. Area 2 is summarized via Table 4 below.

Return Period (Year)	Max. Storage (m ³)	Peak Outflow (m ³ /s)	Allowable Outflow (%)	WSEL (m)
5	7.5	0.008	100%	190.36
25	12.6	0.016	76%	190.47
100	16.6	0.023	66%	190.56

Table 4: Post-Dev. Area 2 – Aquabox Storage and Discharge Summary

Based on the foregoing analysis the total site storage of 210m³ provided by the Aquabox storage systems is sufficient to ensure that the sum of the peak uncontrolled and controlled flows does not exceed the existing runoff for each of the noted return periods. Table 5 below summarizes the total flows from the site under the proposed design and compares them to the existing conditions. As can be seen the post-development discharge from the site is reduced by virtue of the proposed stormwater management design.

Return Period (Year)	Pre-Development Peak Runoff (m ³ /s)			Post-Development Peak Runoff (m ³ /s) (Controlled with Aquabox)			% Change
	A1	A2	Total	A1	A2	Total	
5	0.010	0.008	0.018	0.010	0.008	0.018	0.0%
25	0.026	0.021	0.047	0.026	0.016	0.042	-10.6%
100	0.045	0.035	0.080	0.044	0.023	0.067	-16.3%

Table 5: Overall Site Stormwater Discharge Summary

3.3.2. Quality Control

Given that runoff from the subject lands eventually discharges into Twenty Mile Creek, MECP Level 1 'Enhanced' stormwater quality control protection is required for this development. This includes providing 80% total suspended solids (TSS) removal. In keeping with Township of West Lincoln criteria, the Environmental Technology Verification (ETV) particle size distribution must be used for sizing of such stormwater quality control measures.

To address quality control requirements for the development a treatment train approach will be utilized. Stormwater quality can be provided by the installation of CB Shield devices in the proposed catchbasins in conjunction with a StormTech Isolator Row Plus that can be incorporated into the Aquabox storage tanks.

Preliminary analysis indicates that the installation of a CB Shield within the site catchbasin will provide approximately 50% TSS removal efficiency based on the ETV particle size distribution. A CB Shield operations manual and design chart, as well as the ETV verification statement is attached within Appendix 'C' for reference.

In addition to the CB Shields, the inclusion of an Isolator Row Plus within the Aquabox tanks will force stormwater entering the chambers to pass through a filter cloth with 0.300mm openings and reduce the amount of TSS exiting the site. The Isolator Row Plus is an ETV verified technology that will provide approximately 80% long term TSS removal as a standalone feature for the Aquabox units on

site. The Isolator Row installation guidelines and verification statement are attached in Appendix 'C' for reference purposes. Shop drawings with certification of the ability to provide 80% long term TSS removal will be provided prior to construction.

The proposed treatment train approach of CB Shields and a Separator Row will meet the noted quality control criteria for 'Enhanced' protection for the site, including the long-term removal of 80% TSS.

4. Conclusions

In conclusion, based on the foregoing analysis we recommend that the development can be serviced in accordance with the requirements of the Township of West Lincoln as follows:

1. Water servicing can be provided through a proposed 150mm diameter water service pipe entering the site off of Smithville Road. Fire demands for the site will be 75 L/s, while peak domestic demand is expected to be 6.73 L/s. These water demands can be met through the adjacent 150mm diameter watermain on Smithville Road.
2. It is proposed to provide a 200mm diameter sanitary sewer to service the proposed development which connects to the existing 200mm sanitary sewer on Smithville Road. A peak domestic sanitary flow rate of 0.746 L/s is expected to be generated from the site. The existing 250mm diameter sanitary sewer on Smithville Road will provide adequate capacity for the proposed development.
3. On-site stormwater quantity controls will be provided by Aquabox underground storage tanks. In order to match pre-development runoff levels, approximately 210m³ of storage volume shall be provided along with orifice controls.
4. On-site stormwater quality controls will be provided through the use of CB Shields within all site catchbasins as well as an isolator row within the proposed storage tanks, which will filter stormwater runoff and trap sediment prior to the release of stormwater from the site. This treatment train approach will provide an Enhanced level protection for the proposed development with 80% long-term TSS removal.

Thank you for your consideration of the above Functional Servicing Report. Should you have any questions or require clarification with respect to any part of the above please do not hesitate to contact the undersigned.

Respectfully submitted,



Andrew Smith, P. Eng.
Principal & Director
LandSmith Engineering & Consulting Ltd.
289-309-3632
andrew@landsmithec.com



Attachments:

Appendix 'A' – Background Information

Topographic Survey by A.T. McLaren Ltd.

Site Plan by KNYMH Inc.

Servicing Plan by LandSmith

Grading Plan by LandSmith

Appendix 'B' – Water and Wastewater Servicing Analysis

Smithville: Existing Sanitary Sewers Map by Amec

Domestic Water Demand Calculations

Fire Flow Requirement Calculations

Figure 3.A.8: Smithville Existing Max Day Demand Pressure (Region of Niagara, 2016 MSP)

Figure 3.A.9: Smithville Existing System Fire Flow (Region of Niagara, 2016 MSP)

Figure 4-6: Existing Wastewater Modelling Results (Smithville, 2023 MSP)

Appendix 'C' – SWM Analysis

Smithville Country Estates Storm Drainage Plan by Douglas G. Ure & Sons

Land Transfer Documents for Storm Sewer Easement between 24 and 26 Killins Street

Site Photos re Existing Catch-Basin

Pre-Development Storm Drainage Area Plan

Post-Development Storm Drainage Area Plan

MIDUSS v2 Output Files

Aquabox Design Manual

Installation Guidelines: Aquabox with StormTech Isolator Row Plus

StormTech Isolator Row Plus ETV Verification Statement

CB Shield Operations Manual and Design Chart

CB Shield ETV Verification Statement

Appendix 'A' – Background Information

Topographic Survey by A.T. McLaren Ltd.

Site Plan by KNYMH Inc.

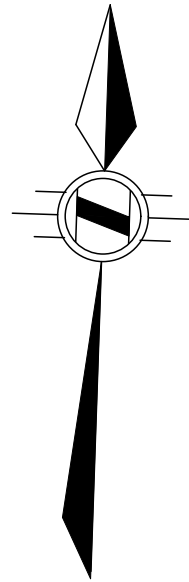
Servicing Plan by LandSmith

Grading Plan by LandSmith

PLAN OF SURVEY
OF
LOT 74
PLAN M-86
IN THE
TOWNSHIP OF WEST LINCOLN
REGIONAL MUNICIPALITY OF NIAGARA

SCALE 1:250 METRIC
5 3 0 5 10 15 metres

R.A. McLaren, O.L.S. - 2026



LOT 44

P.I.N. 46052-0046 (LT)

LOT 66

PLAN M-30

P.I.N. 46052-0070 (LT)

LOT 43

P.I.N. 46052-0045 (LT)

LOT 42

P.I.N. 46052-0044 (LT)

LOT 41

P.I.N. 46052-0043 (LT)

LOT 40

P.I.N. 46052-0042 (LT)

LOT 39

P.I.N. 46052-0041 (LT)

P.I.N. 46052 - 0091 (LT)

LOT 74

PLAN M-86

NIAGARA NORTH CONDOMINIUM PLAN No 130
BLOCK 46830

BEARING COMPARISON

FOR BEARING COMPARISONS A ROTATION OF 1°01'05" COUNTER CLOCKWISE WAS APPLIED TO BEARINGS ON PLAN P1 TO CONVERT TO GRID BEARINGS

BEARING NOTE:

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATIONS, UTM ZONE 17, NAD83 (CSRS) (2010.0)

NOTE:

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9997463

INTEGRATION DATA

OBSERVED REFERENCE POINTS (ORP's): UTM ZONE 17, NAD83 (CSRS) (2010.0). COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.R.E.G. 216/10		
POINT ID	NORTHING	EASTING
ORP A	4771975.891	617736.652
ORP B	4771981.230	617892.642
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		

NOTE:

UNDERGROUND SERVICE AND UTILITY LOCATIONS MUST BE VERIFIED PRIOR TO CONSTRUCTION.

INVERTS MUST BE VERIFIED PRIOR TO CONSTRUCTION.

BENCHMARK NOTE:

0011989U029
BISMARCK CONCRETE CULVERT ALONG REGIONAL ROAD NO. 65, 3.1 KM WEST OF CHURCH, 0.9 KM EAST OF INTERSECTION WITH C.P.R., OPPOSITE POINT ON ROAD 22 M NORTHWEST OF WOODEN POLE (NO. 481), 7.3 M SOUTHWEST OF CENTRE OF ROAD, TABLET IN TOP OF CULVERT, 30 CM SOUTHEAST OF SOUTHWEST FACE, AT ROAD LEVEL.

ELEV = 182.679 CGVD28: 78

LEGEND:

- DENOTES MONUMENT SET
- MONUMENT FOUND
- SB IRON BAR
- SSB STANDARD IRON BAR
- 824 SHORT STANDARD IRON BAR
- 824 A.T. McLaren, O.L.S.
- 539 D.G. URE, O.L.S.
- 1257 R. LANGOQUE, O.L.S.
- Mad MEASURED
- P1 PLAN M-86
- DS DOOR SILL
- FI FIRE HYDRANT
- GW GUY WIRE
- HP HYDRO POLE
- MB MAIL BOX
- MP MANHOLE
- LP LIGHT POLE
- WV WATER VALVE

METRIC NOTE:

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE:

I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEY ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM
2. THE SURVEY WAS COMPLETED ON THE DAY OF

DATE R.A. McLaren, O.L.S.

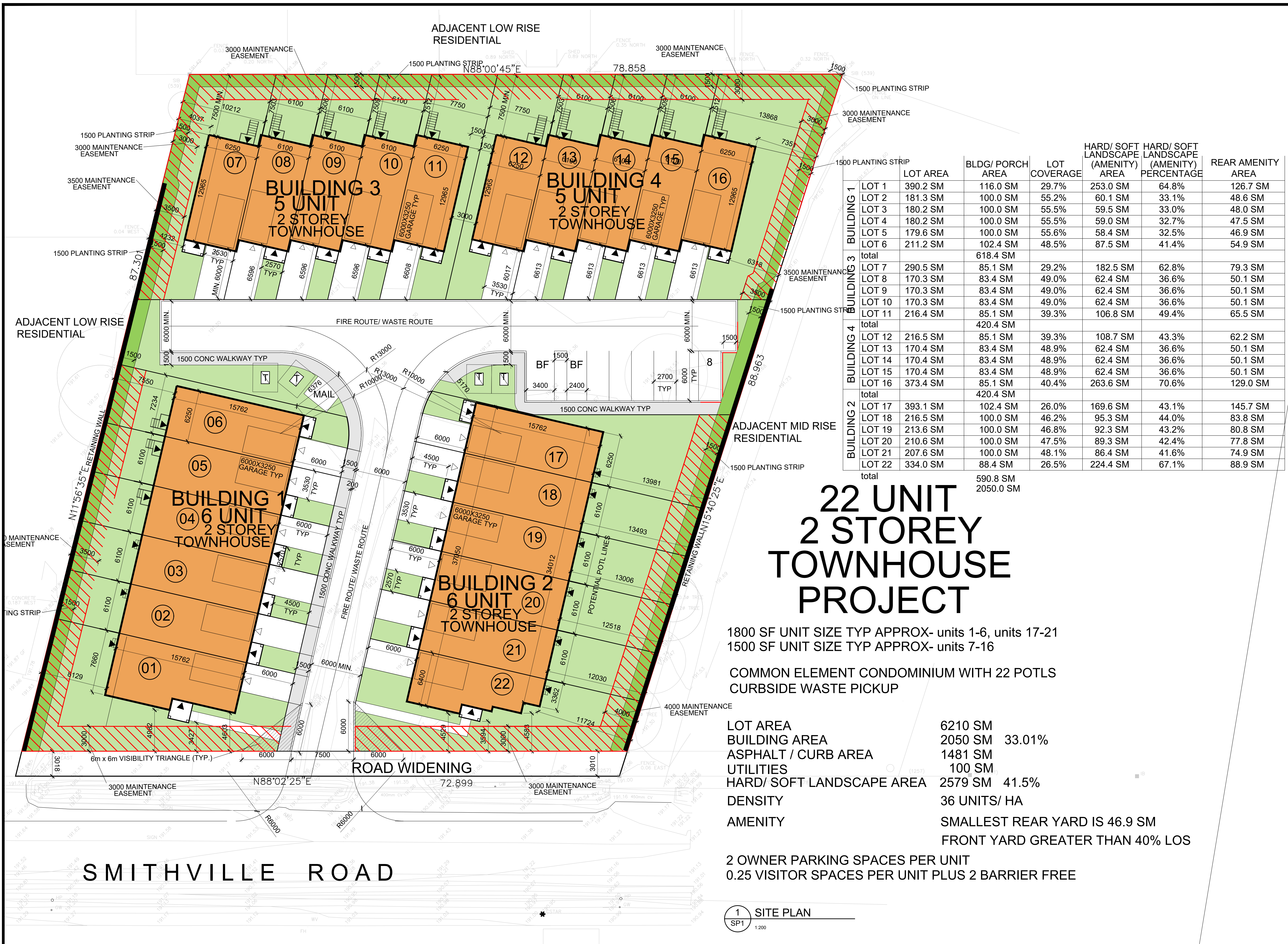
THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER

© R.A. McLaren, O.L.S. - 2026. NO PERSON MAY COPY, REPRODUCE, DISTRIBUTE OR ALTER THIS PLAN IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF R.A. McLaren, O.L.S.



A.T. McLaren Limited
LEGAL AND ENGINEERING SURVEYS
69 JOHN STREET SOUTH, SUITE 230
HAMILTON, ONTARIO, L8N 2B9
PHONE (905) 527-8559

Drawn DG Checked RBM Crew Chief JS Scale 1:250 Dwg No. 38458



22 UNIT 2 STOREY TOWNHOUSE PROJECT

1800 SF UNIT SIZE TYP APPROX- units 1-6, units 17-21
1500 SF UNIT SIZE TYP APPROX- units 7-16

COMMON ELEMENT CONDOMINIUM WITH 22 POTLS
CURBSIDE WASTE PICKUP

LOT AREA	6210 SM
BUILDING AREA	2050 SM 33.01%
ASPHALT / CURB AREA	1481 SM
UTILITIES	100 SM
HARD/ SOFT LANDSCAPE AREA	2579 SM 41.5%
DENSITY	36 UNITS/ HA
AMENITY	SMALLEST REAR YARD IS 46.9 SM FRONT YARD GREATER THAN 40% LOS

2 OWNER PARKING SPACES PER UNIT
0.25 VISITOR SPACES PER UNIT PLUS 2 BARRIER FREE

1 SITE PLAN
SP1 1:200

		LOT AREA	BLDG/ PORCH AREA	LOT COVERAGE	HARD/ SOFT LANDSCAPE (AMENITY) AREA	HARD/ SOFT LANDSCAPE (AMENITY) PERCENTAGE	REAR AMENITY AREA
BUILDING 1	LOT 1	390.2 SM	116.0 SM	29.7%	253.0 SM	64.8%	126.7 SM
	LOT 2	181.3 SM	100.0 SM	55.2%	60.1 SM	33.1%	48.6 SM
	LOT 3	180.2 SM	100.0 SM	55.5%	59.5 SM	33.0%	48.0 SM
	LOT 4	180.2 SM	100.0 SM	55.5%	59.0 SM	32.7%	47.5 SM
	LOT 5	179.6 SM	100.0 SM	55.6%	58.4 SM	32.5%	46.9 SM
	LOT 6	211.2 SM	102.4 SM	48.5%	87.5 SM	41.4%	54.9 SM
	total		618.4 SM				
BUILDING 3	LOT 7	290.5 SM	85.1 SM	29.2%	182.5 SM	62.8%	79.3 SM
	LOT 8	170.3 SM	83.4 SM	49.0%	62.4 SM	36.6%	50.1 SM
	LOT 9	170.3 SM	83.4 SM	49.0%	62.4 SM	36.6%	50.1 SM
	LOT 10	170.3 SM	83.4 SM	49.0%	62.4 SM	36.6%	50.1 SM
	LOT 11	216.4 SM	85.1 SM	39.3%	106.8 SM	49.4%	65.5 SM
	total		420.4 SM				
BUILDING 4	LOT 12	216.5 SM	85.1 SM	39.3%	108.7 SM	43.3%	62.2 SM
	LOT 13	170.4 SM	83.4 SM	48.9%	62.4 SM	36.6%	50.1 SM
	LOT 14	170.4 SM	83.4 SM	48.9%	62.4 SM	36.6%	50.1 SM
	LOT 15	170.4 SM	83.4 SM	48.9%	62.4 SM	36.6%	50.1 SM
	LOT 16	373.4 SM	85.1 SM	40.4%	263.6 SM	70.6%	129.0 SM
	total		420.4 SM				
BUILDING 2	LOT 17	393.1 SM	102.4 SM	26.0%	169.6 SM	43.1%	145.7 SM
	LOT 18	216.5 SM	100.0 SM	46.2%	95.3 SM	44.0%	83.8 SM
	LOT 19	213.6 SM	100.0 SM	46.8%	92.3 SM	43.2%	80.8 SM
	LOT 20	210.6 SM	100.0 SM	47.5%	89.3 SM	42.4%	77.8 SM
	LOT 21	207.6 SM	100.0 SM	48.1%	86.4 SM	41.6%	74.9 SM
	LOT 22	334.0 SM	88.4 SM	26.5%	224.4 SM	67.1%	88.9 SM
	total		590.8 SM				
			2050.0 SM				

CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS BEFORE PROCEEDING WITH WORK. ALL DRAWINGS MAY BE SUBJECT TO CHANGE DUE TO COMMENTS FROM MUNICIPAL DEPARTMENTS AND OTHER AGENCIES WITH AUTHORITY. ALL DRAWINGS AND SPECIFICATIONS ARE THE PROPERTY OF THE ARCHITECT AND MUST BE RETURNED AT THE COMPLETION OF THE WORK. THE CONTRACTOR WORKING FROM DRAWINGS NOT SPECIFICALLY MARKED FOR CONSTRUCTION MUST ASSUME FULL RESPONSIBILITY AND BEAR COSTS FOR ANY CORRECTIONS OR DAMAGES RESULTING FROM HIS OR HER WORK.

DRAWING SETS ISSUED	No.	DATE (YY.MM.DD.)
CONCEPT 1	1	2026.04.27
CONCEPT 2	2	2026.04.30
CONCEPT 3 - 2 STOREY TOWNS	3	2026.06.05
AS PER CURRENT SURVEY	4	2026.06.29
PER DRAFT GRADING	5	2026.08.04

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

REVISIONS TO DRAWING	No.	DATE (YY.MM.DD.)
----------------------	-----	------------------

NOT FOR CONSTRUCTION



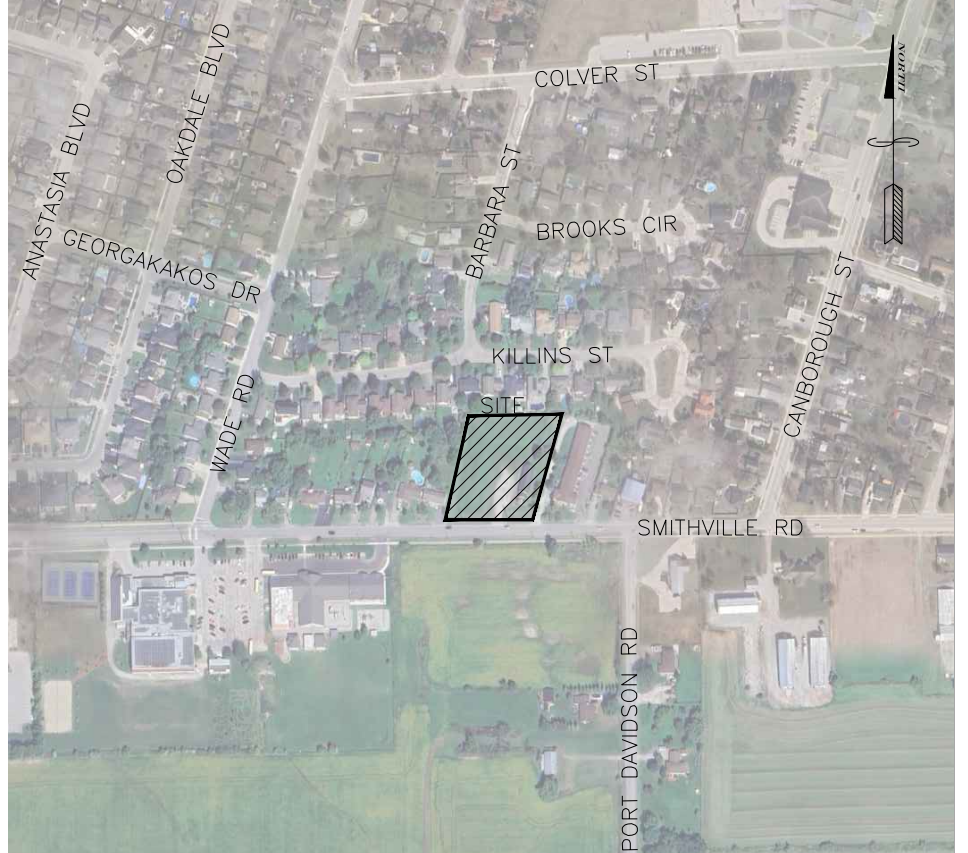
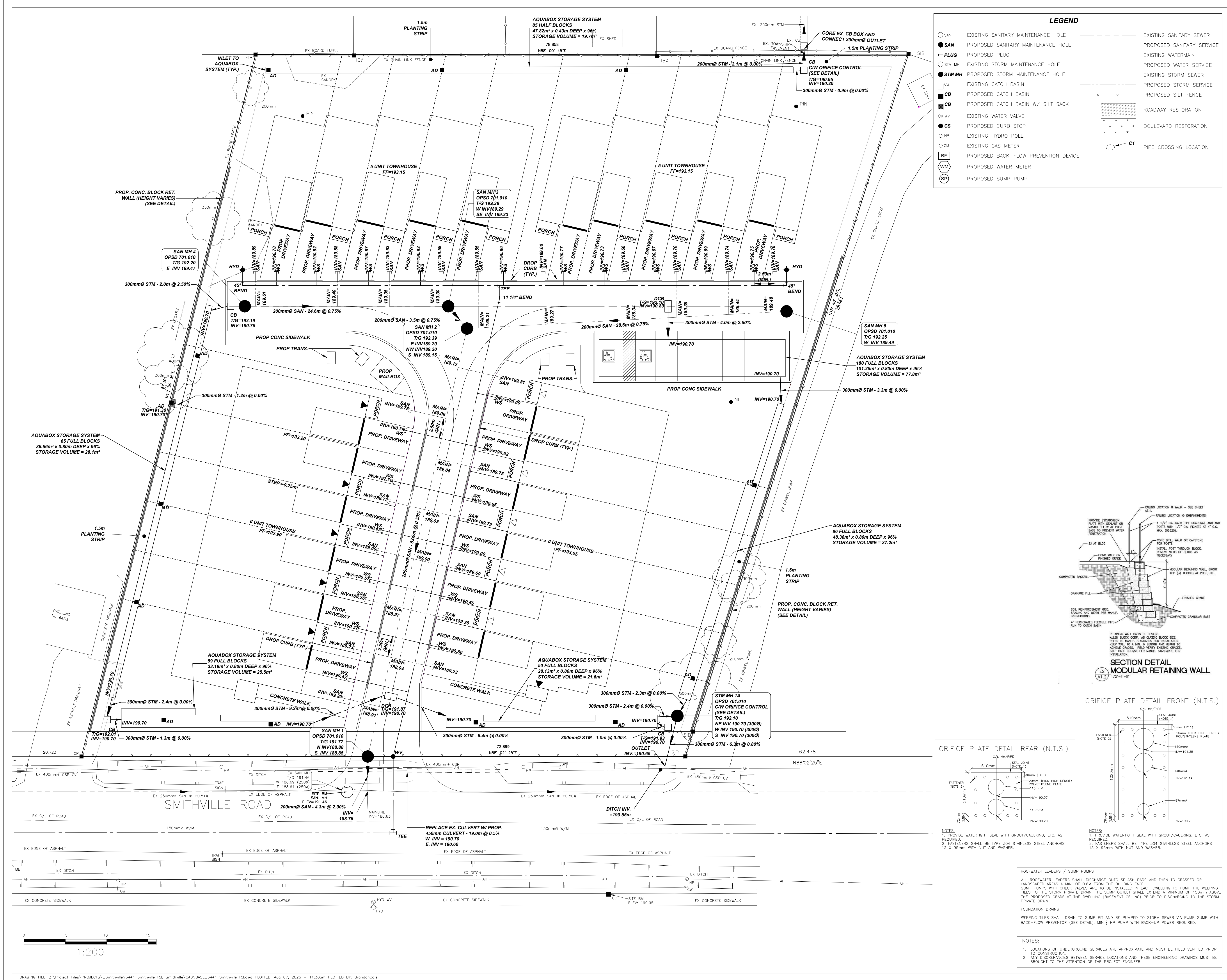
KNYMH INC.
BURLINGTON HEAD OFFICE
1000 BAYVIEW DRIVE • SUITE 101
BURLINGTON, ONTARIO • L7P 0V1
785.659.6565
www.knymh.com

CAMBRIDGE OFFICE
34 WATER STREET N. • SUITE 101
CAMBRIDGE, ONTARIO • N1R 5B1
1.519.451.9200
info@knymh.com

BUILDING PERMIT NUMBER:
NOT FOR CONSTRUCTION WITHOUT PERMIT
APPLICATION FILE NUMBER:

TOWNHOUSE
PROJECT
6441 SMITHVILLE RD
SMITHVILLE, ONTARIO
DRAWING SHEET TITLE
SITE PLAN

AS NOTED	
PROJECT NUMBER	26902
PLOT DATE	2026-08-04
DRAWING SHEET NUMBER	SP1



KEY PLAN N.T.S.

BENCHMARK NOTE:
ELEVATION = 182.679 (CGVD28:78)
MONUMENT: 0011989U029

BISMARCK CONCRETE CULVERT ALONG REGIONAL ROAD NO. 65, 3.1 KM WEST OF CHURCH, 0.9 KM EAST OF INTERSECTION WITH C.P.R., OPPOSITE POINT ON ROAD 22 M NORTHWEST OF WOODEN POLE (NO. 481), 7.3 M SOUTHWEST OF CENTRE OF ROAD, TABLET IN TOP OF CULVERT, 30 CM NORTHEAST OF SOUTHWEST END, 30 CM SOUTHWEST OF NORTHWEST FACE, AT ROAD LEVEL.

SITE BENCHMARK:
ELEVATION = 191.46m

MANHOLE ALONG THE FRONTAGE OF THE SITE, ON SMITHVILLE ROAD, AS INDICATED ON THE PLAN.

- GENERAL NOTES:**
- TENDERER SHALL SATISFY THEMSELVES AS TO THE NATURE OF THE GROUND AND BID ACCORDINGLY.
 - ALL ROCK LINE INDICATIONS SHOWN ON THE PLAN MUST BE VERIFIED BY THE CONTRACTOR.
 - CONTRACTOR SHALL VERIFY LOCATIONS AND INVERTS OF ALL EXISTING SANITARY AND STORM SEWERS AND WATERMANS, PRIVATE DRAINS AND WATER SERVICES, GAS MAINS, CABLE TV, HYDRO AND TELEPHONE DUCTS ETC AT START OF CONSTRUCTION.

0	2026-08-07	ISSUED WITH FSR
NO:	DATE:	DESCRIPTION:
REVISIONS		
SEAL		



CLIENT:	RLD GROUP (SMITHVILLE ROAD) INC.
MUNICIPALITY:	TOWN OF WEST LINCOLN
PROJECT NAME:	6441 SMITHVILLE RD, SMITHVILLE
TITLE:	SITE SERVICING PLAN
SCALE:	1:200
CHECKED BY:	AS
DWG No:	26037ROY
DATE:	2026-06-25
DESIGNED BY:	OJ/BC
SHEET No:	S1



BENCHMARK NOTE:
ELEVATION = 182.679 (CGVD28:78)
MONUMENT: 0011989U029

BISMARCK CONCRETE CULVERT ALONG REGIONAL ROAD NO. 65, 3.1 KM WEST OF CHURCH, 0.9 KM EAST OF INTERSECTION WITH C.P.R., OPPOSITE POINT ON ROAD 22 M NORTHWEST OF WOODEN POLE (NO. 481), 7.3 M SOUTHWEST OF CENTRE OF ROAD, TABLE IN TOP OF CULVERT, 30 CM NORTHEAST OF SOUTHWEST END, 30 CM SOUTHEAST OF NORTHWEST FACE, AT ROAD LEVEL.

SITE BENCHMARK:
ELEVATION = 191.46m

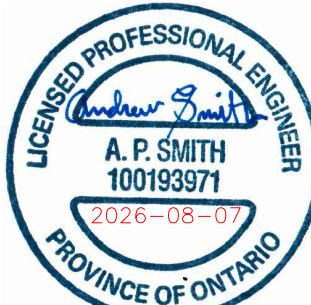
MANHOLE ALONG THE FRONTAGE OF THE SITE, ON SMITHVILLE ROAD, AS
INDICATED ON THE PLAN.

GENERAL NOTES:

1. TENDERER SHALL SATISFY THEMSELVES AS TO THE NATURE OF THE GROUND AND BID ACCORDINGLY.
2. ALL ROCK LINE INDICATIONS SHOWN ON THE PLAN MUST BE VERIFIED BY THE CONTRACTOR.
3. CONTRACTOR SHALL VERIFY LOCATIONS AND INVERTS OF ALL EXISTING SANITARY AND STORM SEWERS AND WATERMAINS, PRIVATE DRAINS AND WATER SERVICES, GAS MAINS, CABLE TV, HYDRO AND TELEPHONE DUCTS ETC AT START OF CONSTRUCTION.

0	2026-08-07	ISSUED WITH FSR
NO:	DATE:	DESCRIPTION:

REVISIONS



SFAI



LANDSMITH ENGINEERING & CONSULTING
1059 UPPER JAMES STREET, SUITE 201
HAMILTON, ON L9C 3A6
ANDREW@LANDSMITHEC.COM
289-309-3632

CLIENT: BLD GROUP (SMITHVILLE ROAD) INC.

MUNICIPALITY: TOWN OF WEST LINCOLN

PROJECT NAME:

6441 SMITHVILLE RD. SMITHVILLE

TITLE: SITE GRADING PLAN

SCALE: 1:200	DATE: 2026-06-25
CHECKED BY: AS	DESIGNED BY: OJ/BC
DWG No: 26037ROY	SHEET No: G1

Appendix 'B' – Water and Wastewater Servicing Analysis

Smithville: Existing Sanitary Sewers Map

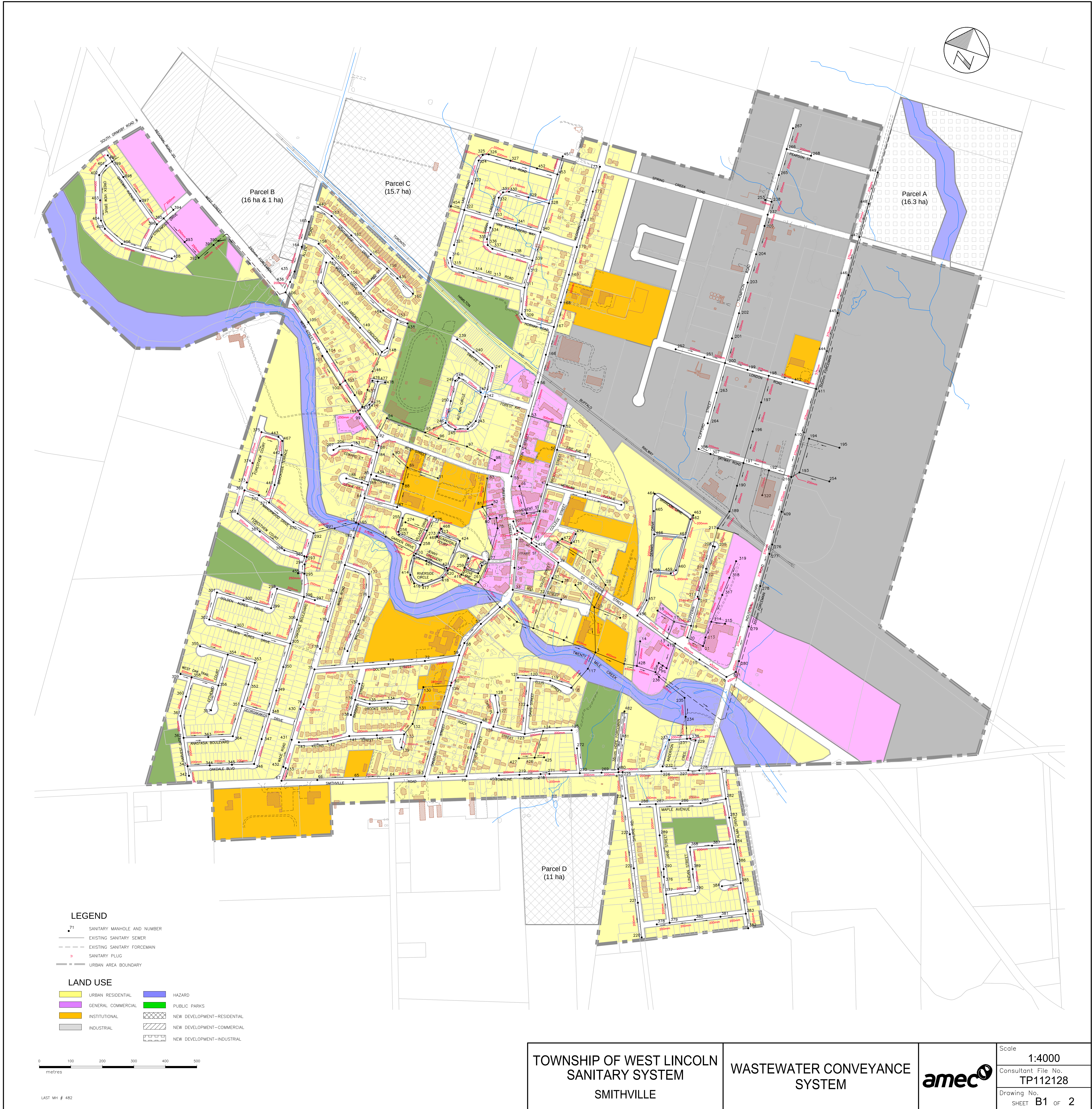
Domestic Water Demand Calculations

Fire Flow Requirement Calculations

Figure 3.A.8: Smithville Existing Max Day Demand Pressure (Region of Niagara, 2016 MSP)

Figure 3.A.9: Smithville Existing System Fire Flow (Region of Niagara, 2016 MSP)

Figure 4-6: Existing Wastewater Modelling Results (Smithville, 2023 MSP)



DOMESTIC WATER USEAGE REQUIREMENTS

Project: 6441 Smithville Road, Smithville
Method: Fixture Unit Method, Per OBC Table 7.6.3.2.A

Fixtures: The number of fixtures was estimated based on the Site Plan provided by KNYMH Inc. dated June 29, 2026.

<u>Amount</u>	<u>Fixture Type</u>	<u>Fixture Units Per</u>	<u>Total</u>
44	Private Bathroom Group	3.6	158.4
22	Dishwasher	1.4	30.8
22	Kitchen Sink	1.4	30.8
22	Clothes Washer	1.4	30.8
22	Hose Bibb	2.5	55.0
	Total:		305.8

1 - Reference Table 7.6.3.2.A, Ontario Building Code

Hydraulic Load: Fixture units are then transferred to Hydraulic Load based on Ontario Building Code Table 7.4.10.5.

Column 1	Column 2	Column 3	Column 4
<i>Fixture Units in service</i>	<i>Max Drainage Rate (Gal/m)</i>		
	Col. 1	Col. 1 × 10	Col. 1 × 100
100	53	174	900
90	51	164	835
80	49	153	750
70	47	140	680
60	44	128	600
50	41	115	520
40	38	102	435
30	33	88	350
20	27	72	262
10	21	53	174

Maximum hydraulic load is estimated to be 88.8 Imperial Gallons / Minute

305.8 Fixture Units = 88.8 Imp Gal/min = 6.73 L/s

The estimated maximum hydraulic load for the proposed development is 6.73 L/s.

FIRE FLOW DEMAND REQUIREMENTS

Project: 6441 Smithville Road, Smithville

Method: OFM-TG-03-1999

FIRE PROTECTION WATER SUPPLY GUIDELINE FOR PART 3 IN THE ONTARIO BUILDING CODE

<http://www.mcscs.jus.gov.on.ca/english/FireMarshal/Legislation/TechnicalGuidelinesandReports/TG-1999-03.html>

Formula:

$$Q = K \times V \times S_{Tot}$$

Where:

Q = minimum supply of water in litres

K = water supply coefficient (Table 1)

V = total building volume in cubic meters

S_{Tot} = total of spacial coefficient tables

Volume (V)

Building 1

Ground Floor Area: 618 (sq.m)

Height: 10 (m)

Building Volume: 6180.00 (cu.m)

Water Supply Coefficient (K)

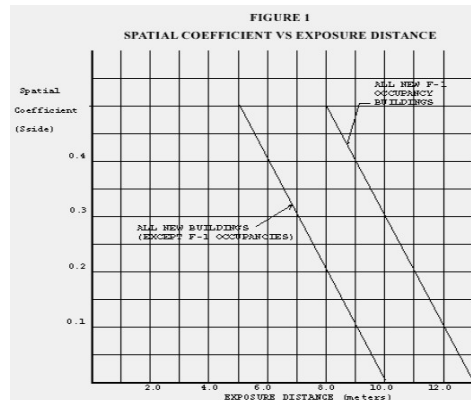
K: 18

OBC Part: C (Residential)

Construction Type: *Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC.*

Spacial Coefficients (S)

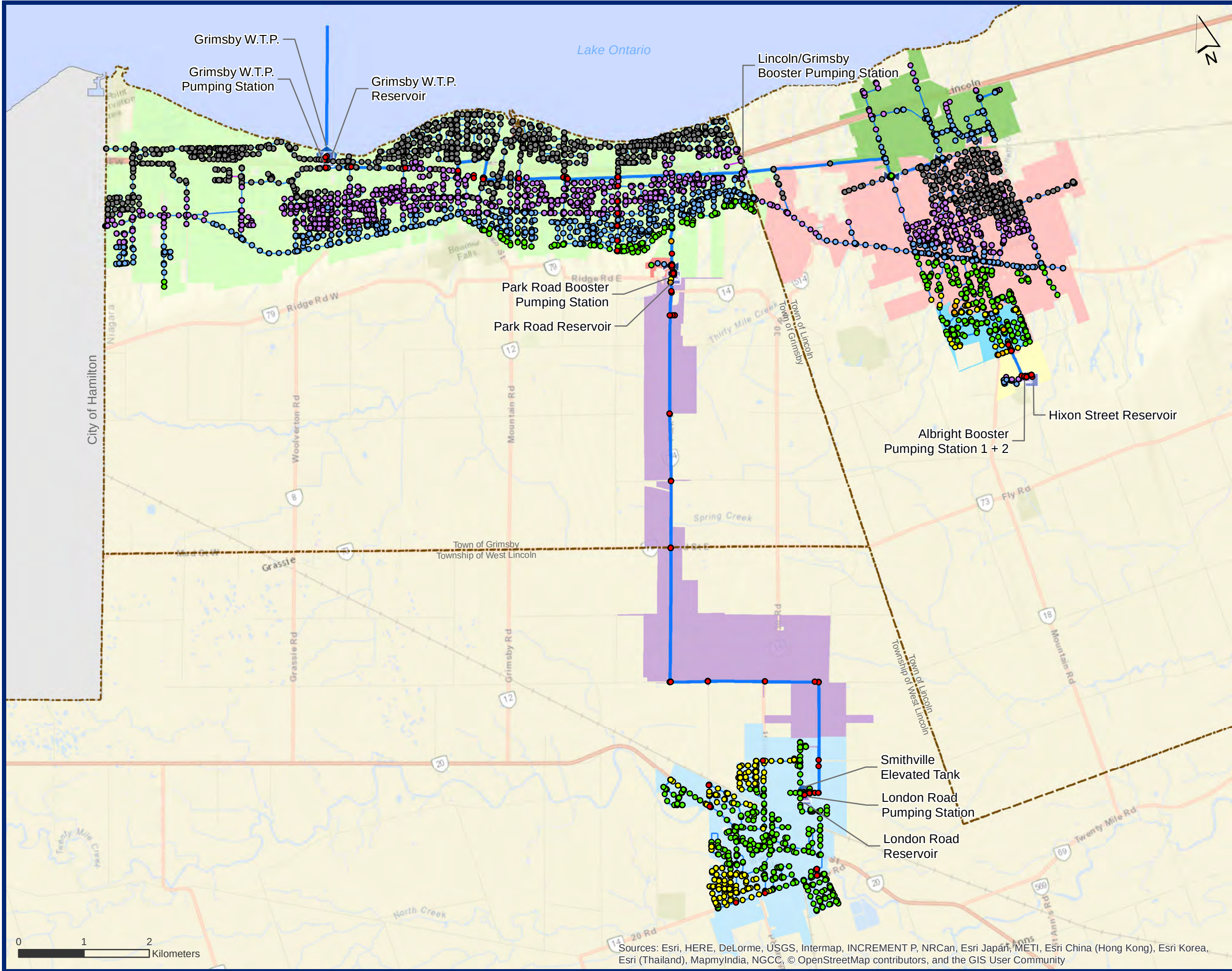
	Distance	
S_1	0	16.0 (North)
S_2	0	16.9 (East)
S_3	0	+100 (South)
S_4	0.31	9.9 (West)
$S_{Tot} = 1.0 + S_1 + S_2 + S_3 + S_4 = 1.31$		



Q = 145,724

Required Flow Rate = 4,500 L / Min
75 L / s

Table 2: Minimum Water Supply Flow Rates	
Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m ² (excluding F-1 occupancies)	1800
All other buildings	2700 (If $Q \leq 108,000L^{(1)}$) 3600 (If $Q > 108,000L$ and $\leq 135,000L^{(1)}$) 4500 (If $Q > 135,000L$ and $\leq 162,000L^{(1)}$) 5400 (If $Q > 162,000L$ and $\leq 190,000L^{(1)}$) 6300 (If $Q > 190,000L$ and $\leq 270,000L^{(1)}$) 9000 (If $Q > 270,000L^{(1)}$)



Water Facilities

- | | |
|-------------------------|-----------------|
| Water Treatment Plant | Pumping Station |
| Reservoir | Regional |
| Elevated Tank | Municipal |
| Standpipe | Water Network |
| Chlorine Facility | Regional |
| Pressure Reducing Valve | Local |
| | Private |

Pressure Zone System*

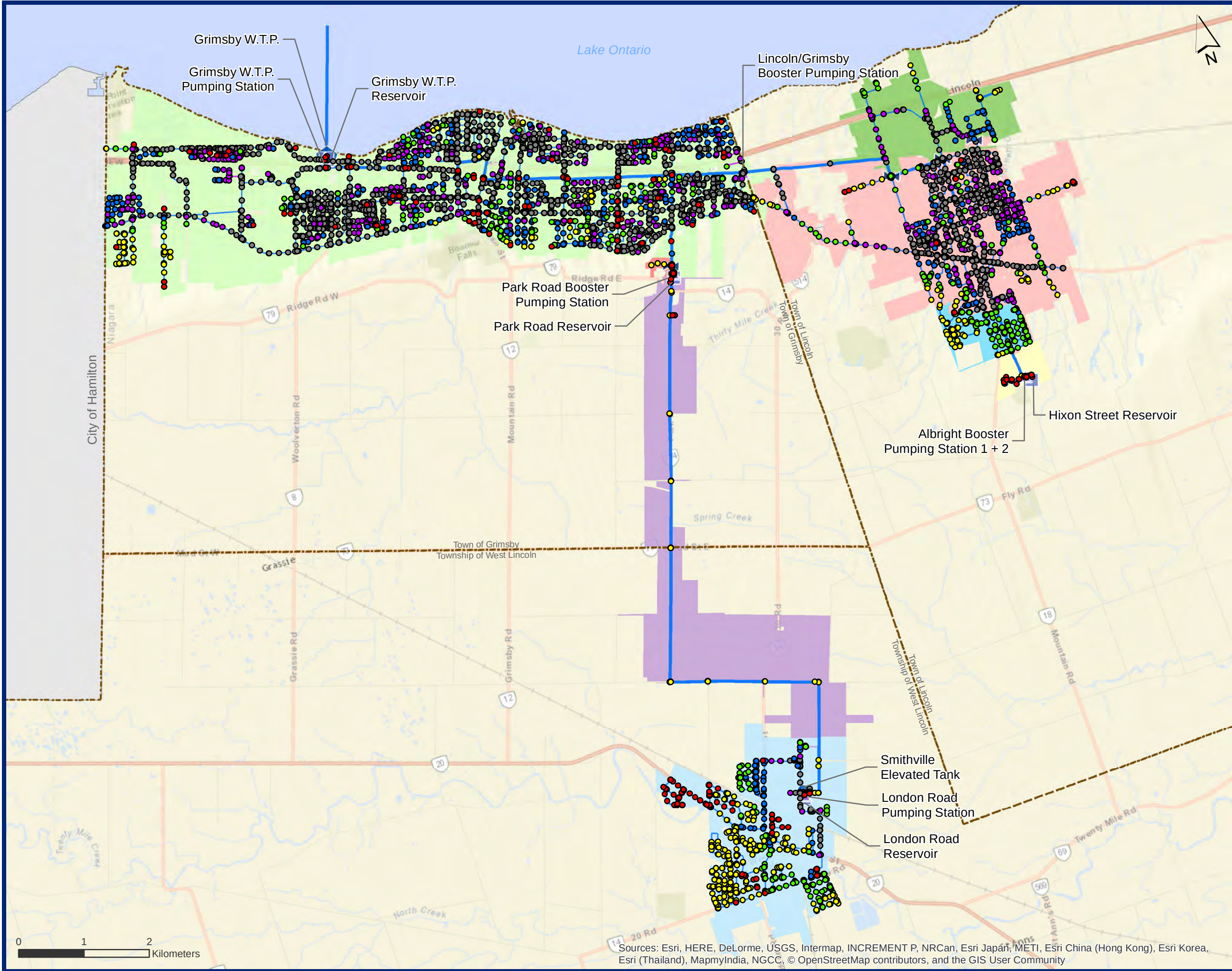
*Pressure zone limits are shown based on property boundaries.

- | | | | |
|-----|-----|-----|-----|
| 148 | 163 | 210 | 225 |
| 154 | 193 | 216 | 239 |

Minimum Pressure (psi)

- | | |
|---------|----------|
| < 40 | 80 - 90 |
| 40 - 50 | 90 - 100 |
| 50 - 60 | > 100 |
| 60 - 80 | |

Figure 3.A.8
Existing Maximum Day
Demand Pressure
Grimsby WTP



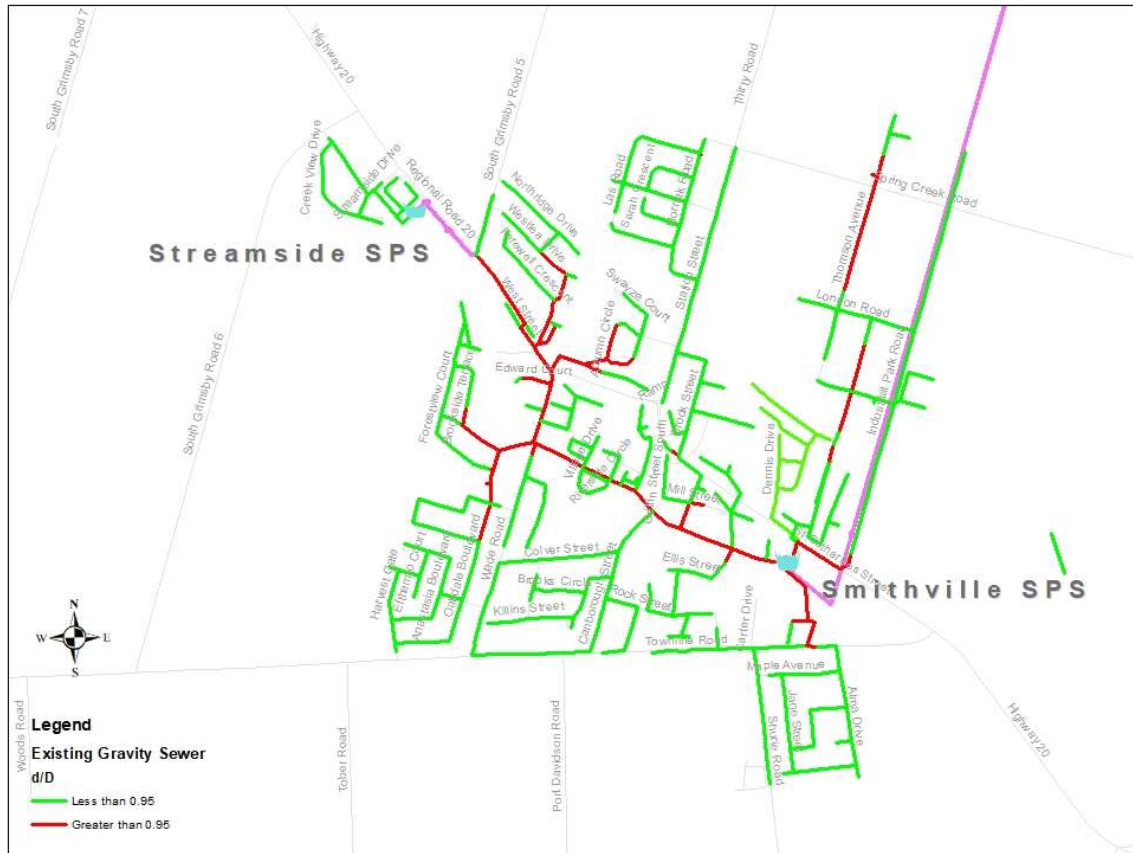
- Water Facilities
- Water Treatment Plant
 - Reservoir
 - Elevated Tank
 - Standpipe
 - Chlorine Facility
 - Pressure Reducing Valve
 - Pumping Station
 - Regional
 - Municipal
 - Water Network
 - Regional
 - Local
 - Private

- Pressure Zone System*
- *Pressure zone limits are shown based on property boundaries.
- 148
 - 154
 - 163
 - 193
 - 210
 - 216
 - 225
 - 239

- Available Fire Flow (L/s)
- < 50
 - 50 - 100
 - 100 - 150
 - 150 - 200
 - 200 - 250
 - > 250

Figure 3.A.9
Existing System Fire Flow
Grimsby WTP

Figure 4-6: Existing Wastewater Modelling Results



Appendix 'C' – SWM Analysis

Smithville Country Estates Storm Drainage Plan

Land Transfer Documents for Storm Sewer Easement between 24 and 26 Killins Street

Site Photos re Existing Catch-Basin

Pre-Development Storm Drainage Area Plan

Post-Development Storm Drainage Area Plan

MIDUSS v2 Output Files

Aquabox Design Manual

Installation Guidelines: Aquabox with StormTech Isolator Row Plus

StormTech Isolator Row Plus ETV Verification Statement

CB Shield Operations Manual and Design Chart

CB Shield ETV Verification Statement



NOT FINAL

DOUGLAS G. URE & SONS
CONSULTING ENGINEERS & ONTARIO LAND SURVEYORS
66 QUEEN STREET ST. CATHARINES
SMITHVILLE COUNTRY ESTATES
TOWNSHIP OF WEST LINCOLN

TOWNSHIP OF WEST LINCOLN		
APPROVED BY _____		
DATE _____		
STORM DRAINAGE PLAN		
DATE: JULY 1974	FILE: L-93	DWG. NR4 OF 10

Transfer/Deed of Land

Form 1 — Land Registration Reform Act, 1984

A

57253 NR..... CERTIFICATE OF RECEIPT MAR 9 - 2005 14:03 NIAGARA N. (30) ST. CATHARINES LAND REGISTRAR New Property Identifiers Executions Additional: See Schedule ☐ Additional: See Schedule ☐		(1) Registry ☐		Land Titles ☒		(2) Page 1 of 3 Pages K						
		(3) Property Identifiers(s) Part of 46052-0042 (LT)		Block Property		Additional: See Schedule ☐						
		(4) Consideration One _____ (00/100) _____ Dollars \$1.00										
		(5) Description This is a: Property ☐ Division Property ☐ Consolidation Part of Lot 40 Registered Plan M-30 Township of West Lincoln Regional Municipality of Niagara Being Part 1 on Reference Plan 30R- 11371										
(6) This Document Contains		(a) Redescription New Easement Plan/Sketch ☐		(b) Schedule for: Description ☐ Additional Parties ☐ Other ☐		(7) Interest/Estate Transferred Easement						
(8) Transferor(s) The Transferor hereby transfers the easement to the transferee and certifies that the transferor is at least eighteen years old and that we are spouses of one another.												
Name(s) Gawley, Lyle Paul Gawley, Ruthann Catherine		 			Date of Signature Y M D 2004 07 02 2004 07 02							
(9) Spouse(s) of Transferor(s) I hereby consent to this transaction Name (s) _____												
(10) Transferor(s) Address for Service 24 Killins St. Smithville Ontario L0R 2A0												
(11) Transferee(s) The Corporation of the Township of West Lincoln												
(12) Transferee(s) Address for Service 318 Canborough Street Smithville Ontario L0R 2A0												
(13) Transferor(s) The transferor verifies that to the best of the transferor's knowledge and belief, this transfer does not contravene section 50 of the Planning Act.												
Signature _____		Date of Signature Y M D		Signature _____		Date of Signature Y M D						
Solicitor for Transferor(s) I have explained the effect of section 50 of the Planning Act to the transferor and I have made inquiries of the transferor to determine that this transfer does not contravene that section and based on the information supplied by the transferor, to the best of my knowledge and belief, this transfer does not contravene that section. I am an Ontario solicitor in good standing.												
Name and Address of Solicitor _____		Signature _____		Date of Signature Y M D								
(14) Solicitor for Transferee(s) I have investigated the title to this land and to abutting land where relevant and I am satisfied that the title records reveal no contravention as set out in subclause 50 (22) (c) (ii) of the Planning Act and that to the best of my knowledge and belief this transfer does not contravene section 50 of the Planning Act. I act independently of the solicitor of the transferor(s) and I am an Ontario solicitor in good standing.												
Name and Address of Solicitor _____		Signature _____		Date of Signature Y M D								
(15) Assessment Roll Number of Property		Cty. Mun. Map Sub. Par.		Fees and Tax								
(16) Municipal Address of Property 24 Killins St. Smithville, Ontario L0R 2A0		(17) Document Prepared by: The Larocque Group 12 Lyman Street, St. Catharines, ON L2R 5M7		<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Registration Fee</td> <td style="width:50%; text-align: right;">70</td> </tr> <tr> <td>Land Transfer Tax</td> <td></td> </tr> <tr> <td>Total</td> <td></td> </tr> </table>			Registration Fee	70	Land Transfer Tax		Total	
Registration Fee	70											
Land Transfer Tax												
Total												

Planning Act - OPTIONAL

Affix Statement by Solicitor for Transferee(s) here if necessary

Additional Property Identifier(s) and/or Other Information

SCHEDULE

Form 5 – Land Registration Reform Act, 1984

1. The Transferor grants and transfers to the Transferee the free, uninterrupted and unobstructed right and easement in perpetuity for the Transferee and its servants, employees, agents, contractors and workers to enter, construct, install, operate, maintain, inspect, alter and repair its storm sewer line or catch basin along with all necessary appurtenances and accessories thereto, in, on, over, along, upon and under the lands described in Box (5) herein (hereinafter called "the servient lands"), and for the said purposes, the right to be enjoyed and exercised by the Transferee and its servants, agents, workmen and contractors at all times to have access to the servient lands and to bring upon the servient lands all necessary machinery, material, vehicles and equipment.
2. The Transferee shall fully indemnify and save harmless the Transferor in respect to any and all claims for damages, injury or loss of any nature, caused to any person or property resulting in any way either directly or indirectly from the granting of this easement or related works.
3. The Transferor covenants and agrees not to erect or permit the erection on the servient lands of any buildings, structures, or other obstructions of any nature whatsoever or to place or permit to be placed fill, earth or other covering or any object on the servient lands so as to obstruct or hinder the Transferee in the exercise of the rights hereby created, provided that the Transferor may erect a fence upon the boundary of the Transferor's lands. Should any such obstruction or hindrance be placed upon the servient lands, the Transferee, in addition to its other rights, may enter and remove same and shall not thereby render itself liable in damages to the Transferor.
4. The Transferor covenants with the Transferee, its successors and assigns, that they have the right to convey the easement over the said lands to the Transferee and that the Transferee shall quietly possess and enjoy the said easement. The Transferor further covenants that they will execute such further and other assurances of the said easement as may be required.
5. The burden and benefit of this transfer of easements shall run with the lands and shall extend to, be binding upon, and enure to the benefit of the parties hereto and their respective successors and assigns and is appurtenant to the storm sewer line, catch basin and other equipment owned, controlled and managed by the Transferee.

WHEREAS Instrument Number LT0205897 registered Dec. 28, 2001 is a Mortgage/Charge to ROYAL BANK OF CANADA

AND WHEREAS the Mortgagee, ROYAL BANK OF CANADA, in consideration of the sum of One (\$1.00) Dollar, the receipt whereof is hereby acknowledged, joins herein for the purpose of consenting hereto and agrees to the easement hereby granted and covenants that the Transferee shall have quiet possession of the right privileges and easements hereby granted.

ROYAL BANK OF CANADA

PER:  2004/ Jan 25/05
(Date of Signature)

PER:  2004/ JAN 25
GAIL BERBERICK (Date of Signature)

Property Identifier(s) No.
46052-0042 (LT)

Refer to all instructions on reverse side.

IN THE MATTER OF THE CONVEYANCE OF (insert brief description of land) Part of Lot 40, Registered Plan M-30, Township of West Lincoln,
Regional Municipality of Niagara, Being Part 1 on Reference Plan 30R-

BY (print names of all transferors in full) Gawley, Lyle Paul and Gawley, Ruthann Catherine

TO (print names of all transferees in full) The Corporation of the Township of West Lincoln

I/We have personal knowledge of the facts herein deposed to and MAKE OATH AND SAY THAT:

- 1. I am/We are (place a clear mark within the square opposite the following paragraph(s) that describe(s) the capacity of the deponents):
(a) the transferee(s) named in the above-described conveyance; AUTHORIZED on behalf of
(b) the authorized agent or solicitor acting in this transaction for the transferee(s);
(c) the President, Vice-President, Secretary, Treasurer, Director or Manager authorized to act for (the transferee(s));
(d) a transferee and am making the affidavit on my own behalf and on behalf of (insert name of spouse or same-sex partner) who is my spouse or same-sex partner.
(e) the transferor and I am tendering this document for registration and no tax is payable on registration of this document.

2. THE TOTAL CONSIDERATION FOR THIS TRANSACTION IS ALLOCATED AS FOLLOWS:

Table with 3 columns: Description, Amount, and Total. Rows include: (a) Monies paid or to be paid in cash \$ 1.00, (b) Mortgages (i) Assumed (principal and interest) \$ NIL, (ii) Given back to vendor \$ NIL, (c) Property transferred in exchange (detail below in para. 5) \$ NIL, (d) Other consideration subject to tax (detail below) \$ NIL, (e) Fair market value of the lands (see Instruction 2) \$ NIL, (f) Value of land, building, fixtures and goodwill subject to Land Transfer Tax (Total of (a) to (e)) \$ 1.00, (g) Value of all chattels - items of tangible personal property which are taxable under the provisions of the Retail Sales Tax Act \$ NIL, (h) Other consideration for transaction not included in (f) or (g) above \$ NIL, (i) Total Consideration \$ 1.00.

All blanks must be filled in. Insert "Nil" where applicable.

- 3. To be completed where the value of the consideration for the conveyance exceeds \$400,000.00
I have read and considered the definition of "single family residence" set out in subsection 1(1) of the Act. The land conveyed in the above-described conveyance:
(a) does not contain a single family residence or contains more than two single family residences.
(b) contains at least one and not more than two single family residences.
(c) contains at least one and not more than two single family residences and the lands are used for other than just residential purposes. The transferee has accordingly apportioned the value of consideration on the basis that the consideration for the single family residence is \$ and the remainder of the lands are used for purposes.

Note: Subsection 2(1)(b) imposes an additional tax at the rate of one-half of one percent upon the value of the consideration in excess of \$400,000.00 where the conveyance contains at least one and not more than two single family residences and 2(2) allows an apportionment of the consideration where the lands are used for other than just residential purposes.

- 4. If consideration is nominal, is the land subject to any encumbrance? Yes No

5. Other remarks and explanations, if necessary. Charge LT205897

Sworn before me at the Township of West Lincoln
in the Regional Municipality of Niagara
this 1 day of August, 2005
A Commissioner for taking Affidavits, etc. Joanne Sume

Signature(s)

Property Information Record

- A. Describe nature of instrument Easement
B. (i) Address of property being conveyed: (if available) 24 Killins St., Smithville, ON L0R 2A0
(ii) Assessment Roll No.: (if available)
C. Mailing address(es) for future Notices of Assessment under the Assessment Act for property being conveyed:
D. (i) Registration number for last conveyance of property being conveyed: (if available) LT69694
(ii) Legal Description of property conveyed: same as in D. (i) above. Yes No Not Known
E. Name(s) and address(es) of each transferee's solicitor:

For Land Registry Office Use Only

Registration No.
Registration Date (Year/Month/Day)
Land Registry Office No.

School Support (Voluntary Election) (see reverse for explanation)

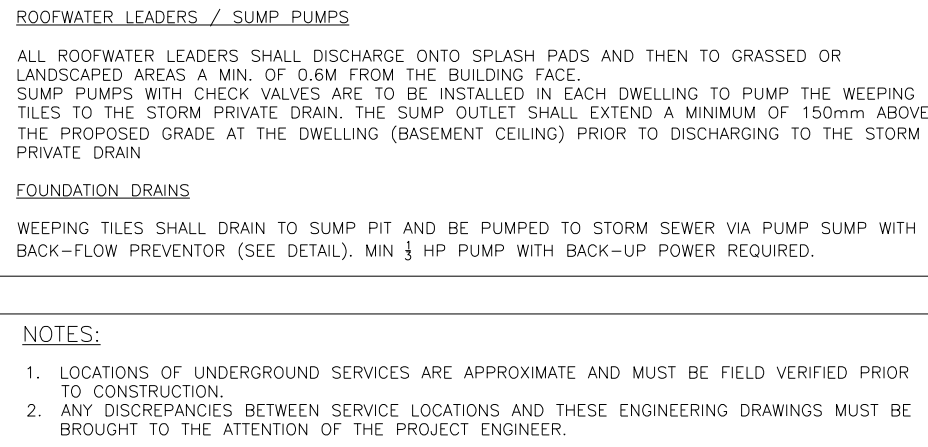
- (a) Are all individual transferees Roman Catholic? Yes No
(b) If Yes, do all individual transferees wish to be Roman Catholic Separate School Supporters? Yes No
(c) Do all individual transferees have French Language Education Rights? Yes No
(d) If Yes, do all individual transferees wish to support the French Language School Board (where established)? Yes No
Note: As to (c) and (d) the land being transferred will receive French Public School Board Election unless otherwise directed in (a) and (b).



Photo 1: Existing Low Area Near CB Inlet



Photo 2: Existing Concrete CB Box Visible Through Existing Fence



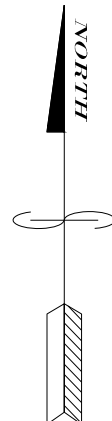
BENCHMARK NOTE:
ELEVATION = 182.679 (CGVD28:78)
MONUMENT: 0011989029

BISMARCK CONCRETE CULVERT ALONG REGIONAL ROAD NO. 65, 3.1 KM WEST OF CHURCH, 0.9 KM EAST OF INTERSECTION WITH C.P.R., OPPOSITE POINT ON ROAD 22 M NORTHWEST OF WOODEN POLE (NO. 481), 7.3 M SOUTHWEST OF CENTRE OF ROAD , TABLE IN TOP OF CULVERT, 30 CM NORTHWEST OF SOUTHWEST END, 30 CM SOUTHEAST OF NORTHWEST FACE, AT ROAD LEVEL.

SITE BENCHMARK:
ELEVATION = 191.46m

MANHOLE ALONG THE FRONTAGE OF THE SITE, ON SMITHVILLE ROAD, AS INDICATED ON THE PLAN.

- GENERAL NOTES:
1. TENDERER SHALL SATISFY THEMSELVES AS TO THE NATURE OF THE GROUND AND BID ACCORDINGLY.
 2. ALL ROCK LINE INDICATIONS SHOWN ON THE PLAN MUST BE VERIFIED BY THE CONTRACTOR.
 3. CONTRACTOR SHALL VERIFY LOCATIONS AND INVERTS OF ALL EXISTING SANITARY AND STORM SEWERS AND WATERMAINS, PRIVATE DRAINS AND WATER SERVICES, GAS MAINS, CABLE TV, HYDRO AND TELEPHONE DUCTS ETC AT START OF CONSTRUCTION.

0	2026-07-28	ISSUED WITH FSR	
NO:	DATE:	DESCRIPTION:	
REVISIONS			
			
		SEAL	

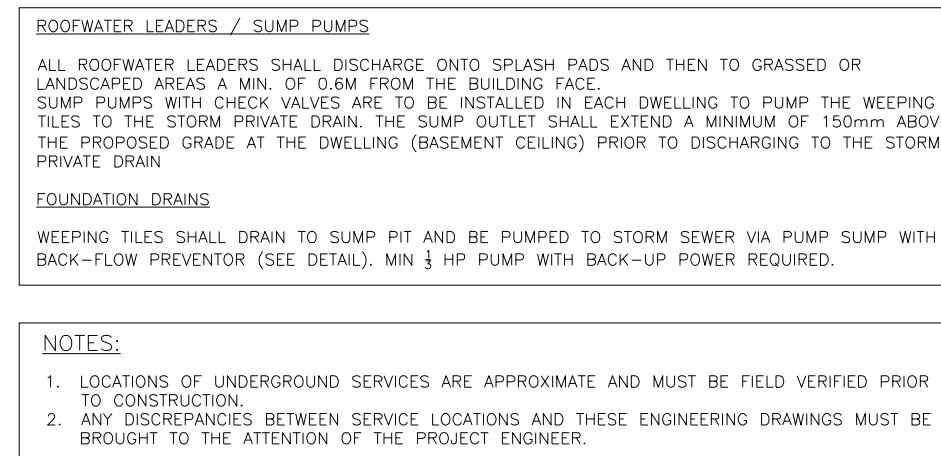
 **LandSmith**
ENGINEERING & CONSULTING LTD.

LANDSMITH ENGINEERING & CONSULTING LTD.
1059 UPPER JAMES STREET, SUITE 207
HAMILTON, ON L9C 3A6
ANDREW@LANDSMITHEC.COM
289-309-3632

CLIENT:	RDL GROUP (SMITHVILLE ROAD) INC.
MUNICIPALITY:	TOWN OF WEST LINCOLN
PROJECT NAME:	6441 SMITHVILLE RD, SMITHVILLE

SITE PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE: 1:200	DATE: 2026-06-25
CHECKED BY: AS	DESIGNED BY: OJ/BC
DWG No: 26037ROY	SHEET No: PD1



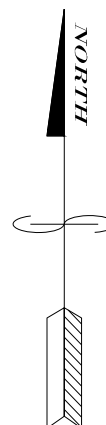
BENCHMARK NOTE:
ELEVATION = 182.679 (CGVD28:78)
MONUMENT: 0011989029

BISMARCK CONCRETE CULVERT ALONG REGIONAL ROAD NO. 65, 3.1 KM WEST OF CHURCH, 0.9 KM EAST OF INTERSECTION WITH C.P.R., OPPOSITE POINT ON ROAD 22 M NORTHWEST OF WOODEN POLE (NO. 481), 7.3 M SOUTHWEST OF CENTRE OF ROAD , TABLE IN TOP OF CULVERT, 30 CM NORTHWEST OF SOUTHWEST END, 30 CM SOUTHWEST OF NORTHWEST FACE, AT ROAD LEVEL.

SITE BENCHMARK:
ELEVATION = 191.46m

MANHOLE ALONG THE FRONTAGE OF THE SITE, ON SMITHVILLE ROAD, AS INDICATED ON THE PLAN.

- GENERAL NOTES:
1. TENDERER SHALL SATISFY THEMSELVES AS TO THE NATURE OF THE GROUND AND BID ACCORDINGLY.
 2. ALL ROCK LINE INDICATIONS SHOWN ON THE PLAN MUST BE VERIFIED BY THE CONTRACTOR.
 3. CONTRACTOR SHALL VERIFY LOCATIONS AND INVERTS OF ALL EXISTING SANITARY AND STORM SEWERS AND WATERMANS, PRIVATE DRAINS AND WATER SERVICES, GAS MAINS, CABLE TV, HYDRO AND TELEPHONE DUCTS ETC AT START OF CONSTRUCTION.

0	2026-07-28	ISSUED WITH FSR	
NO:	DATE:	DESCRIPTION:	
REVISIONS			
			
		SEAL	

 LANDSMITH ENGINEERING & CONSULTING LTD.
1059 UPPER JAMES STREET, SUITE 207
HAMILTON, ON L9C 3A6
ANDREW@LANDSMITHEC.COM
289-309-3632

CLIENT:	RLD GROUP (SMITHVILLE ROAD) INC.
MUNICIPALITY:	TOWN OF WEST LINCOLN
PROJECT NAME:	6441 SMITHVILLE RD, SMITHVILLE

SITE POST-DEVELOPMENT DRAINAGE AREA PLAN

SCALE: 1:200	DATE: 2026-06-25
CHECKED BY: AS	DESIGNED BY: OJ/BC
DWG No: 26037ROY	SHEET No: PD2

PRE-DEVELOPMENT - AREA 1 - 5-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A1_5.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:06:42 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1049.500 Coefficient A"
" 8.000 Constant B"
" 0.803 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 103.038 mm/hr"
" Total depth 46.985 mm"
" 6 005hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 7.600 % Impervious"
" 0.344 Total Area"
" 55.000 Flow length"
" 0.700 Overland Slope"
" 0.318 Pervious Area"
" 55.000 Pervious length"
" 0.700 Pervious slope"
" 0.026 Impervious Area"
" 55.000 Impervious length"
" 0.700 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.256 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.880 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.010 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.318 0.026 0.344 hectare"
" Time of concentration 36.155 4.366 29.155 minutes"
" Time to Centroid 156.592 103.887 144.985 minutes"
" Rainfall depth 46.985 46.985 46.985 mm"
" Rainfall volume 149.34 12.28 161.63 c.m"
" Rainfall losses 34.943 5.640 32.716 mm"
" Runoff depth 12.041 41.344 14.268 mm"
" Runoff volume 38.27 10.81 49.08 c.m"
" Runoff coefficient 0.256 0.880 0.304 "
" Maximum flow 0.009 0.007 0.010 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.010 0.010 0.000 0.000"

```


PRE-DEVELOPMENT - AREA 1 - 25-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\"
" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A1_25.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:23:11 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1719.500 Coefficient A"
" 10.000 Constant B"
" 0.823 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 146.101 mm/hr"
" Total depth 68.724 mm"
" 6 025hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 7.600 % Impervious"
" 0.344 Total Area"
" 55.000 Flow length"
" 0.700 Overland Slope"
" 0.318 Pervious Area"
" 55.000 Pervious length"
" 0.700 Pervious slope"
" 0.026 Impervious Area"
" 55.000 Impervious length"
" 0.700 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.364 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.901 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.026 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.318 0.026 0.344 hectare"
" Time of concentration 27.449 3.778 23.450 minutes"
" Time to Centroid 143.108 101.908 136.148 minutes"
" Rainfall depth 68.724 68.724 68.724 mm"
" Rainfall volume 218.44 17.97 236.41 c.m"
" Rainfall losses 43.680 6.833 40.880 mm"
" Runoff depth 25.044 61.891 27.844 mm"
" Runoff volume 79.60 16.18 95.78 c.m"
" Runoff coefficient 0.364 0.901 0.405 "
" Maximum flow 0.024 0.010 0.026 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.026 0.026 0.000 0.000"

```


PRE-DEVELOPMENT - AREA 1 - 100-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A1_100.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:24:22 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 2317.400 Coefficient A"
" 11.000 Constant B"
" 0.836 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 181.813 mm/hr"
" Total depth 86.135 mm"
" 6 100hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 7.600 % Impervious"
" 0.344 Total Area"
" 55.000 Flow length"
" 0.700 Overland Slope"
" 0.318 Pervious Area"
" 55.000 Pervious length"
" 0.700 Pervious slope"
" 0.026 Impervious Area"
" 55.000 Impervious length"
" 0.700 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.431 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.914 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.045 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.318 0.026 0.344 hectare"
" Time of concentration 23.603 3.455 20.611 minutes"
" Time to Centroid 136.913 100.847 131.556 minutes"
" Rainfall depth 86.135 86.135 86.135 mm"
" Rainfall volume 273.78 22.52 296.30 c.m"
" Rainfall losses 48.995 7.366 45.831 mm"
" Runoff depth 37.140 78.769 40.304 mm"
" Runoff volume 118.05 20.59 138.64 c.m"
" Runoff coefficient 0.431 0.914 0.468 "
" Maximum flow 0.041 0.013 0.045 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.045 0.045 0.000 0.000"

```


PRE-DEVELOPMENT - AREA 2 - 5-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A2_5.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:26:41 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1049.500 Coefficient A"
" 8.000 Constant B"
" 0.803 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 103.038 mm/hr"
" Total depth 46.985 mm"
" 6 005hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 0.200 % Impervious"
" 0.299 Total Area"
" 73.000 Flow length"
" 0.840 Overland Slope"
" 0.298 Pervious Area"
" 73.000 Pervious length"
" 0.840 Pervious slope"
" 0.001 Impervious Area"
" 73.000 Impervious length"
" 0.840 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.256 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.885 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.008 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.298 0.001 0.299 hectare"
" Time of concentration 40.569 4.899 40.324 minutes"
" Time to Centroid 162.139 104.588 161.743 minutes"
" Rainfall depth 46.985 46.985 46.985 mm"
" Rainfall volume 140.20 0.28 140.48 c.m"
" Rainfall losses 34.945 5.414 34.886 mm"
" Runoff depth 12.040 41.570 12.099 mm"
" Runoff volume 35.93 0.25 36.18 c.m"
" Runoff coefficient 0.256 0.885 0.258 "
" Maximum flow 0.008 0.000 0.008 c.m/sec"
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" 4 Add Runoff "
" 0.008 0.008 0.000 0.000"

```


PRE-DEVELOPMENT - AREA 2 - 25-YEAR STORM:

```

" MIDUSS Output ----->"
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" 10 Units used: ie METRIC"
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" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A2_25.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:27:23 AM"
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" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
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" 1 Chicago storm"
" 1719.500 Coefficient A"
" 10.000 Constant B"
" 0.823 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 146.101 mm/hr"
" Total depth 68.724 mm"
" 6 025hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 0.200 % Impervious"
" 0.299 Total Area"
" 73.000 Flow length"
" 0.840 Overland Slope"
" 0.298 Pervious Area"
" 73.000 Pervious length"
" 0.840 Pervious slope"
" 0.001 Impervious Area"
" 73.000 Impervious length"
" 0.840 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.364 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.911 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.021 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.298 0.001 0.299 hectare"
" Time of concentration 30.800 4.239 30.667 minutes"
" Time to Centroid 147.324 102.538 147.101 minutes"
" Rainfall depth 68.724 68.724 68.724 mm"
" Rainfall volume 205.07 0.41 205.49 c.m"
" Rainfall losses 43.685 6.112 43.610 mm"
" Runoff depth 25.039 62.612 25.114 mm"
" Runoff volume 74.72 0.37 75.09 c.m"
" Runoff coefficient 0.364 0.911 0.365 "
" Maximum flow 0.021 0.000 0.021 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.021 0.021 0.000 0.000"

```


PRE-DEVELOPMENT - AREA 2 - 100-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Pre-Dev_Hamilton"
" Output filename: PRE_A2_100.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-20 at 10:28:06 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 2317.400 Coefficient A"
" 11.000 Constant B"
" 0.836 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 181.813 mm/hr"
" Total depth 86.135 mm"
" 6 100hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 0.200 % Impervious"
" 0.299 Total Area"
" 73.000 Flow length"
" 0.840 Overland Slope"
" 0.298 Pervious Area"
" 73.000 Pervious length"
" 0.840 Pervious slope"
" 0.001 Impervious Area"
" 73.000 Impervious length"
" 0.840 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.431 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.918 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.035 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.298 0.001 0.299 hectare"
" Time of concentration 26.485 3.877 26.389 minutes"
" Time to Centroid 140.530 101.433 140.363 minutes"
" Rainfall depth 86.135 86.135 86.135 mm"
" Rainfall volume 257.03 0.52 257.54 c.m"
" Rainfall losses 49.002 7.076 48.919 mm"
" Runoff depth 37.132 79.059 37.216 mm"
" Runoff volume 110.80 0.47 111.28 c.m"
" Runoff coefficient 0.431 0.918 0.432 "
" Maximum flow 0.035 0.000 0.035 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.035 0.035 0.000 0.000"

```


POST-DEVELOPMENT - AREA 1 - CONTROLLED AQUABOX ROUTING - 5-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_A1_5 storage.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-22 at 8:03:12 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1049.500 Coefficient A"
" 8.000 Constant B"
" 0.803 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 103.038 mm/hr"
" Total depth 46.985 mm"
" 6 005hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 66.500 % Impervious"
" 0.495 Total Area"
" 50.000 Flow length"
" 2.000 Overland Slope"
" 0.166 Pervious Area"
" 50.000 Pervious length"
" 2.000 Pervious slope"
" 0.329 Impervious Area"
" 50.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.256 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.875 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.093 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.166 0.329 0.495 hectare"
" Time of concentration 24.921 3.010 5.827 minutes"
" Time to Centroid 142.493 102.020 107.224 minutes"
" Rainfall depth 46.985 46.985 46.985 mm"
" Rainfall volume 77.91 154.66 232.57 c.m"
" Rainfall losses 34.947 5.889 15.623 mm"
" Runoff depth 12.037 41.096 31.361 mm"
" Runoff volume 19.96 135.28 155.24 c.m"
" Runoff coefficient 0.256 0.875 0.667 "
" Maximum flow 0.006 0.092 0.093 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.093 0.093 0.000 0.000"
" 54 POND DESIGN"
" 0.093 Current peak flow c.m/sec"
" 0.045 Target outflow c.m/sec"
" 155.2 Hydrograph volume c.m"
" 17. Number of stages"
" 190.700 Minimum water level metre"

```

```

"      191.500    Maximum water level      metre"
"      190.700    Starting water level      metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      190.700      0.000      0.000"
"      190.750      0.00078      11.880"
"      190.800      0.00340      23.760"
"      190.850      0.00503      35.640"
"      190.900      0.00625      47.520"
"      190.950      0.00727      59.400"
"      191.000      0.00816      71.280"
"      191.050      0.00896      83.160"
"      191.100      0.00970      95.040"
"      191.150      0.01041     106.920"
"      191.200      0.01278     118.800"
"      191.250      0.01636     130.680"
"      191.300      0.02371     142.560"
"      191.350      0.02775     154.440"
"      191.400      0.03221     166.320"
"      191.450      0.03796     178.200"
"      191.500      0.04449     190.080"
"      3.    ORIFICES"
"      Orifice  Orifice  Orifice Number of"
"      invert coefficie diameter orifices"
"      190.700      0.630      0.0870      1.000"
"      191.135      0.630      0.1400      1.000"
"      191.350      0.630      0.1500      1.000"
"      Peak outflow              0.010      c.m/sec"
"      Maximum level              191.136      metre"
"      Maximum storage            103.500      c.m"
"      Centroidal lag              4.374      hours"
"          0.093      0.093      0.010      0.000 c.m/sec"

```


POST-DEVELOPMENT - AREA 1 - CONTROLLED AQUABOX ROUTING - 25-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_Al_25 storage.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-22 at 7:54:29 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1719.500 Coefficient A"
" 10.000 Constant B"
" 0.823 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 146.101 mm/hr"
" Total depth 68.724 mm"
" 6 025hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 66.500 % Impervious"
" 0.495 Total Area"
" 50.000 Flow length"
" 2.000 Overland Slope"
" 0.166 Pervious Area"
" 50.000 Pervious length"
" 2.000 Pervious slope"
" 0.329 Impervious Area"
" 50.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.364 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.906 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.135 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.166 0.329 0.495 hectare"
" Time of concentration 18.919 2.604 5.350 minutes"
" Time to Centroid 132.391 100.290 105.693 minutes"
" Rainfall depth 68.724 68.724 68.724 mm"
" Rainfall volume 113.96 226.22 340.18 c.m"
" Rainfall losses 43.710 6.461 18.940 mm"
" Runoff depth 25.014 62.263 49.785 mm"
" Runoff volume 41.48 204.95 246.43 c.m"
" Runoff coefficient 0.364 0.906 0.724 "
" Maximum flow 0.016 0.130 0.135 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.135 0.135 0.000 0.000"
" 54 POND DESIGN"
" 0.135 Current peak flow c.m/sec"
" 0.026 Target outflow c.m/sec"
" 246.4 Hydrograph volume c.m"
" 17. Number of stages"
" 190.700 Minimum water level metre"

```

```

"      191.500    Maximum water level    metre"
"      190.700    Starting water level    metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge    Volume"
"      190.700      0.000      0.000"
"      190.750      0.00078      11.880"
"      190.800      0.00340      23.760"
"      190.850      0.00503      35.640"
"      190.900      0.00625      47.520"
"      190.950      0.00727      59.400"
"      191.000      0.00816      71.280"
"      191.050      0.00896      83.160"
"      191.100      0.00970      95.040"
"      191.150      0.01039      106.920"
"      191.200      0.01210      118.800"
"      191.250      0.01536      130.680"
"      191.300      0.02244      142.560"
"      191.350      0.02679      154.440"
"      191.400      0.03141      166.320"
"      191.450      0.03726      178.200"
"      191.500      0.04386      190.080"
"      3.    ORIFICES"
"      Orifice    Orifice    Orifice Number of"
"      invert coefficie    diameter    orifices"
"      190.700      0.630      0.0870      1.000"
"      191.135      0.630      0.1400      1.000"
"      191.350      0.630      0.1500      1.000"
"      Peak outflow      0.026      c.m/sec"
"      Maximum level      191.345      metre"
"      Maximum storage      153.321      c.m"
"      Centroidal lag      4.033      hours"
"          0.135      0.135      0.026      0.000 c.m/sec"

```


POST-DEVELOPMENT - AREA 1 - CONTROLLED AQUABOX ROUTING - 100-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_Al_100 storage.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-21 at 11:53:13 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 2317.400 Coefficient A"
" 11.000 Constant B"
" 0.836 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 181.813 mm/hr"
" Total depth 86.135 mm"
" 6 100hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 66.500 % Impervious"
" 0.495 Total Area"
" 50.000 Flow length"
" 2.000 Overland Slope"
" 0.166 Pervious Area"
" 50.000 Pervious length"
" 2.000 Pervious slope"
" 0.329 Impervious Area"
" 50.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.430 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.924 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.174 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.166 0.329 0.495 hectare"
" Time of concentration 16.269 2.382 5.021 minutes"
" Time to Centroid 127.681 99.418 104.790 minutes"
" Rainfall depth 86.135 86.135 86.135 mm"
" Rainfall volume 142.83 283.53 426.37 c.m"
" Rainfall losses 49.073 6.576 20.812 mm"
" Runoff depth 37.062 79.559 65.323 mm"
" Runoff volume 61.46 261.89 323.35 c.m"
" Runoff coefficient 0.430 0.924 0.758 "
" Maximum flow 0.028 0.164 0.174 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.174 0.174 0.000 0.000"
" 54 POND DESIGN"
" 0.174 Current peak flow c.m/sec"
" 0.045 Target outflow c.m/sec"
" 323.3 Hydrograph volume c.m"
" 17. Number of stages"
" 190.700 Minimum water level metre"

```

```

"      191.500    Maximum water level    metre"
"      190.700    Starting water level    metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge    Volume"
"      190.700      0.000      0.000"
"      190.750      0.00078      11.880"
"      190.800      0.00340      23.760"
"      190.850      0.00503      35.640"
"      190.900      0.00625      47.520"
"      190.950      0.00727      59.400"
"      191.000      0.00816      71.280"
"      191.050      0.00896      83.160"
"      191.100      0.00970      95.040"
"      191.150      0.01041     106.920"
"      191.200      0.01278     118.800"
"      191.250      0.01636     130.680"
"      191.300      0.02371     142.560"
"      191.350      0.02775     154.440"
"      191.400      0.03221     166.320"
"      191.450      0.03796     178.200"
"      191.500      0.04449     190.080"
"      3.    ORIFICES"
"          Orifice    Orifice    Orifice Number of"
"          invert coefficie    diameter    orifices"
"      190.700      0.630      0.0870      1.000"
"      191.135      0.630      0.1400      1.000"
"      191.350      0.630      0.1500      1.000"
"      Peak outflow                      0.044      c.m/sec"
"      Maximum level                      191.498      metre"
"      Maximum storage                      189.600      c.m"
"      Centroidal lag                      3.677      hours"
"          0.174      0.174      0.044      0.000 c.m/sec"

```


POST-DEVELOPMENT - AREA 2 - CONTROLLED AQUABOX ROUTING - 5-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_A2_5 storage.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-22 at 9:01:37 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1049.500 Coefficient A"
" 8.000 Constant B"
" 0.803 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 103.038 mm/hr"
" Total depth 46.985 mm"
" 6 005hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 31.700 % Impervious"
" 0.126 Total Area"
" 20.000 Flow length"
" 2.000 Overland Slope"
" 0.086 Pervious Area"
" 20.000 Pervious length"
" 2.000 Pervious slope"
" 0.040 Impervious Area"
" 20.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.256 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.877 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.013 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.086 0.040 0.126 hectare"
" Time of concentration 14.381 1.737 6.616 minutes"
" Time to Centroid 129.223 100.270 111.444 minutes"
" Rainfall depth 46.985 46.985 46.985 mm"
" Rainfall volume 40.43 18.77 59.20 c.m"
" Rainfall losses 34.959 5.757 25.702 mm"
" Runoff depth 12.025 41.228 21.283 mm"
" Runoff volume 10.35 16.47 26.82 c.m"
" Runoff coefficient 0.256 0.877 0.453 "
" Maximum flow 0.005 0.011 0.013 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.013 0.013 0.000 0.000"
" 54 POND DESIGN"
" 0.013 Current peak flow c.m/sec"
" 0.008 Target outflow c.m/sec"
" 26.8 Hydrograph volume c.m"
" 10. Number of stages"
" 190.200 Minimum water level metre"

```

```

"      190.630    Maximum water level      metre"
"      190.200    Starting water level      metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      190.200      0.000      0.000"
"      190.250      0.00092      2.300"
"      190.300      0.00307      4.590"
"      190.350      0.00734      6.890"
"      190.400      0.00978      9.180"
"      190.450      0.01325      11.480"
"      190.500      0.01894      13.770"
"      190.550      0.02261      16.070"
"      190.600      0.02565      18.360"
"      190.630      0.02730      19.740"
"      2.    ORIFICES"
"          Orifice      Orifice      Orifice Number of"
"          invert coefficie      diameter      orifices"
"      190.200      0.630      0.1100      1.000"
"      190.370      0.630      0.1100      1.000"
"      Peak outflow      0.008      c.m/sec"
"      Maximum level      190.364      metre"
"      Maximum storage      7.522      c.m"
"      Centroidal lag      2.260      hours"
"          0.013      0.013      0.008      0.000 c.m/sec"

```


POST-DEVELOPMENT - AREA 2 - CONTROLLED AQUABOX ROUTING - 25-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_A2_25 storage.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-22 at 9:02:28 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 1719.500 Coefficient A"
" 10.000 Constant B"
" 0.823 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 146.101 mm/hr"
" Total depth 68.724 mm"
" 6 025hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 31.700 % Impervious"
" 0.126 Total Area"
" 20.000 Flow length"
" 2.000 Overland Slope"
" 0.086 Pervious Area"
" 20.000 Pervious length"
" 2.000 Pervious slope"
" 0.040 Impervious Area"
" 20.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.364 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.907 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.022 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.086 0.040 0.126 hectare"
" Time of concentration 10.918 1.503 5.867 minutes"
" Time to Centroid 122.329 98.833 109.723 minutes"
" Rainfall depth 68.724 68.724 68.724 mm"
" Rainfall volume 59.14 27.45 86.59 c.m"
" Rainfall losses 43.721 6.371 31.881 mm"
" Runoff depth 25.003 62.353 36.843 mm"
" Runoff volume 21.52 24.91 46.42 c.m"
" Runoff coefficient 0.364 0.907 0.536 "
" Maximum flow 0.011 0.016 0.022 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.022 0.022 0.000 0.000"
" 54 POND DESIGN"
" 0.022 Current peak flow c.m/sec"
" 0.008 Target outflow c.m/sec"
" 46.4 Hydrograph volume c.m"
" 10. Number of stages"
" 190.200 Minimum water level metre"

```

```

"      190.630    Maximum water level      metre"
"      190.200    Starting water level      metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge      Volume"
"      190.200      0.000      0.000"
"      190.250      0.00092      2.300"
"      190.300      0.00307      4.590"
"      190.350      0.00734      6.890"
"      190.400      0.00978      9.180"
"      190.450      0.01325      11.480"
"      190.500      0.01894      13.770"
"      190.550      0.02261      16.070"
"      190.600      0.02565      18.360"
"      190.630      0.02730      19.740"
"      2.    ORIFICES"
"          Orifice      Orifice      Orifice Number of"
"          invert coefficie      diameter      orifices"
"      190.200      0.630      0.1100      1.000"
"      190.370      0.630      0.1100      1.000"
"      Peak outflow      0.016      c.m/sec"
"      Maximum level      190.474      metre"
"      Maximum storage      12.569      c.m"
"      Centroidal lag      2.159      hours"
"          0.022      0.022      0.016      0.000 c.m/sec"

```


POST-DEVELOPMENT - AREA 2 - CONTROLLED AQUABOX ROUTING - 100-YEAR STORM:

```

" MIDUSS Output ----->"
" MIDUSS version Version 2.25 rev. 473"
" MIDUSS created February 7, 2010"
" 10 Units used: ie METRIC"
" Job folder: Z:\Project Files\PROJECTS\Smithville\
" 6441 Smithville Rd, Smithville\SWM\Post-Dev"
" Output filename: POST_A2_100 storagel.out"
" Licensee name: Atticus Francisci"
" Company LandSmith"
" Date & Time last used: 2026-07-22 at 8:59:47 AM"
" 31 TIME PARAMETERS"
" 5.000 Time Step"
" 180.000 Max. Storm length"
" 1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
" 1 Chicago storm"
" 2317.400 Coefficient A"
" 11.000 Constant B"
" 0.836 Exponent C"
" 0.500 Fraction R"
" 180.000 Duration"
" 1.000 Time step multiplier"
" Maximum intensity 181.813 mm/hr"
" Total depth 86.135 mm"
" 6 100hyd Hydrograph extension used in this file"
" 33 CATCHMENT 101"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 101 No description"
" 31.700 % Impervious"
" 0.126 Total Area"
" 20.000 Flow length"
" 2.000 Overland Slope"
" 0.086 Pervious Area"
" 20.000 Pervious length"
" 2.000 Pervious slope"
" 0.040 Impervious Area"
" 20.000 Impervious length"
" 2.000 Impervious slope"
" 0.250 Pervious Manning 'n'"
" 75.000 Pervious SCS Curve No."
" 0.429 Pervious Runoff coefficient"
" 0.100 Pervious Ia/S coefficient"
" 8.467 Pervious Initial abstraction"
" 0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
" 0.919 Impervious Runoff coefficient"
" 0.100 Impervious Ia/S coefficient"
" 0.518 Impervious Initial abstraction"
" 0.032 0.000 0.000 0.000 c.m/sec"
" Catchment 101 Pervious Impervious Total Area "
" Surface Area 0.086 0.040 0.126 hectare"
" Time of concentration 9.388 1.374 5.394 minutes"
" Time to Centroid 118.999 98.054 108.560 minutes"
" Rainfall depth 86.135 86.135 86.135 mm"
" Rainfall volume 74.13 34.40 108.53 c.m"
" Rainfall losses 49.155 6.968 35.782 mm"
" Runoff depth 36.980 79.167 50.353 mm"
" Runoff volume 31.82 31.62 63.44 c.m"
" Runoff coefficient 0.429 0.919 0.585 "
" Maximum flow 0.018 0.019 0.032 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.032 0.032 0.000 0.000"
" 54 POND DESIGN"
" 0.032 Current peak flow c.m/sec"
" 0.035 Target outflow c.m/sec"
" 63.4 Hydrograph volume c.m"
" 10. Number of stages"
" 190.200 Minimum water level metre"

```

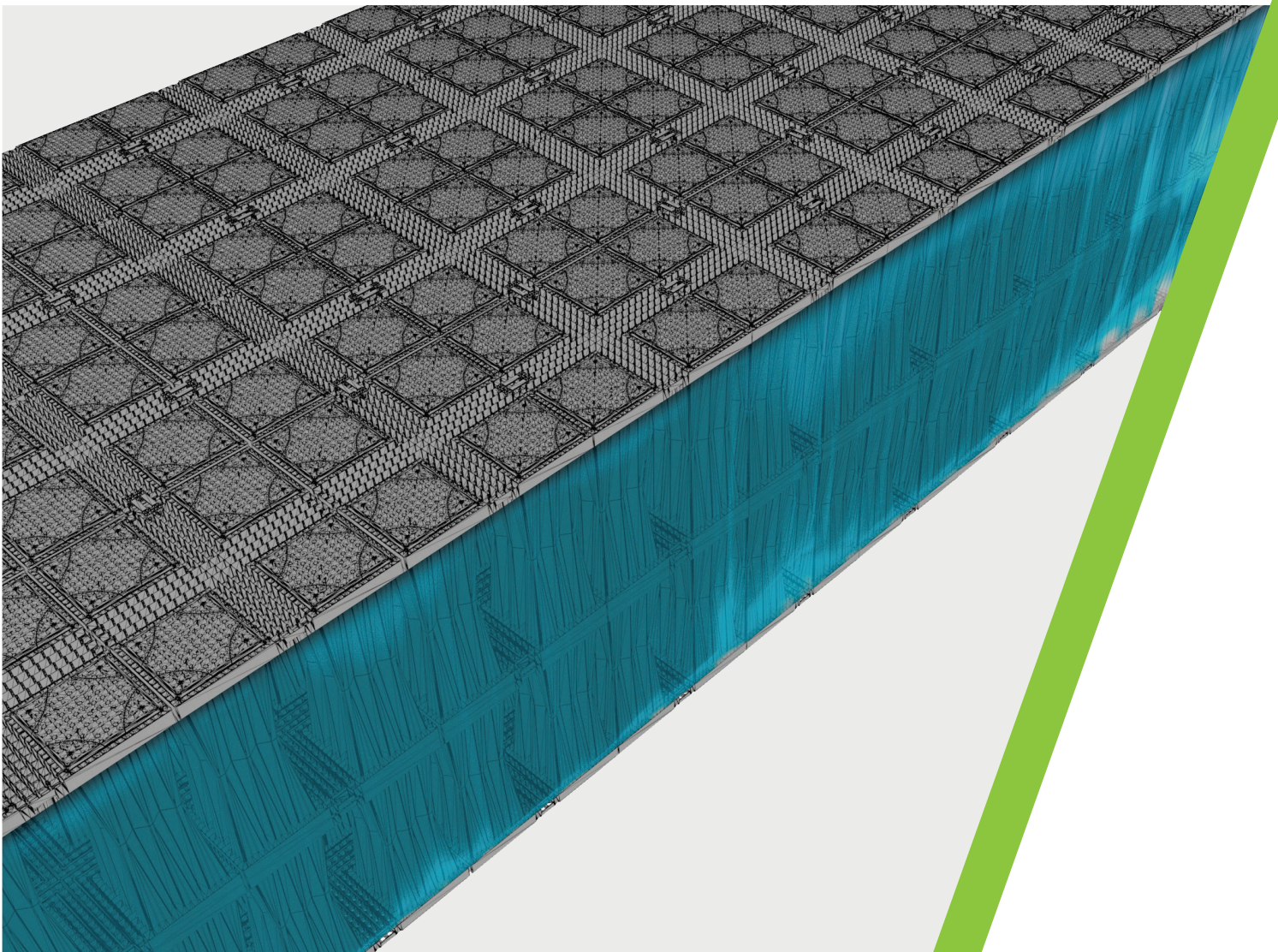
```

"      190.630    Maximum water level    metre"
"      190.200    Starting water level    metre"
"          0      Keep Design Data: 1 = True; 0 = False"
"          Level Discharge    Volume"
"      190.200      0.000      0.000"
"      190.250      0.00092      2.300"
"      190.300      0.00307      4.590"
"      190.350      0.00734      6.890"
"      190.400      0.00978      9.180"
"      190.450      0.01325     11.480"
"      190.500      0.01894     13.770"
"      190.550      0.02261     16.070"
"      190.600      0.02565     18.360"
"      190.630      0.02730     19.740"
"      2.    ORIFICES"
"          Orifice    Orifice    Orifice Number of"
"          invert coefficie    diameter    orifices"
"      190.200      0.630      0.1100      1.000"
"      190.370      0.630      0.1100      1.000"
"      Peak outflow                      0.023    c.m/sec"
"      Maximum level                      190.561    metre"
"      Maximum storage                      16.583    c.m"
"      Centroidal lag                      2.102    hours"
"          0.032      0.032      0.023      0.000 c.m/sec"

```


Aquabox Design Manual

Modular System For Stormwater Management

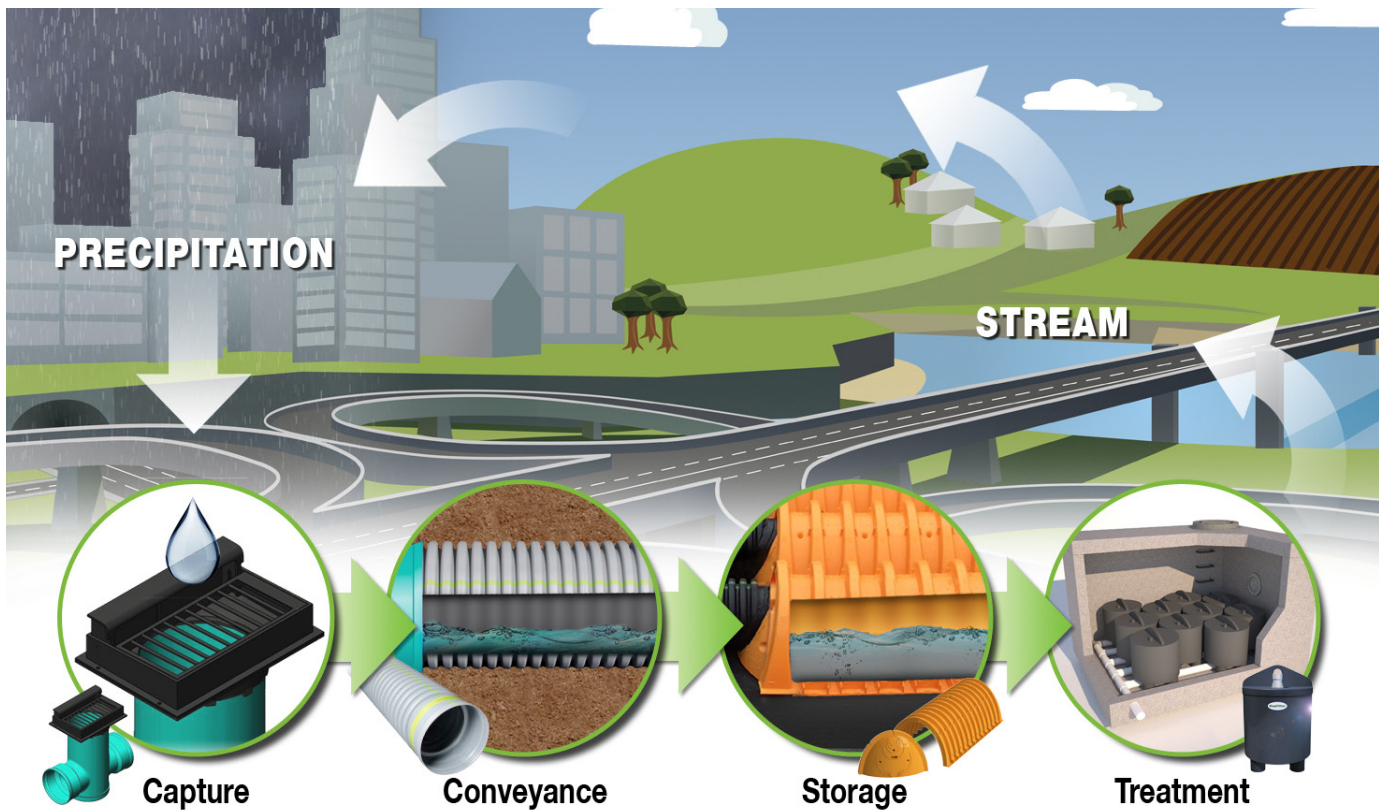
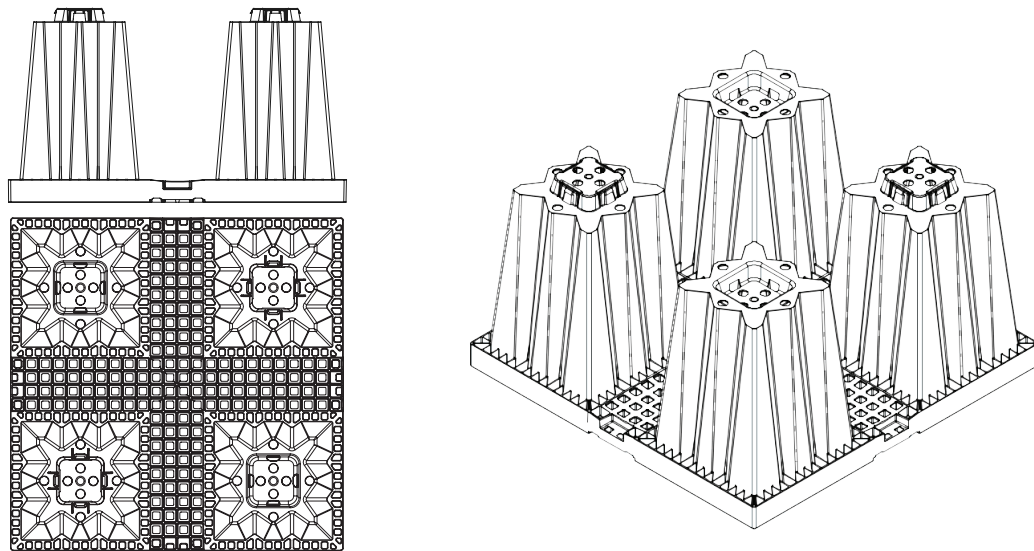


1.0 Aquabox System

1.1 Purposes and Functions

Heavy rainfalls combined with the expansion of urban impervious surfaces are showing the need for efficient and sustainable stormwater management solutions.

The Aquabox storage system offers several solutions, suitable for varying stormwater management requirements using both detention and retention techniques. Stormwater detention with a controlled release to the watershed and/or receiving waters helps to mitigate the potential negative impacts by helping to reduce flooding and degraded water quality during heavy rainfall events. In short, the Aquabox system offers a wide range of solutions capable to addressing the specific needs of a development project.



1.2 Brief Description

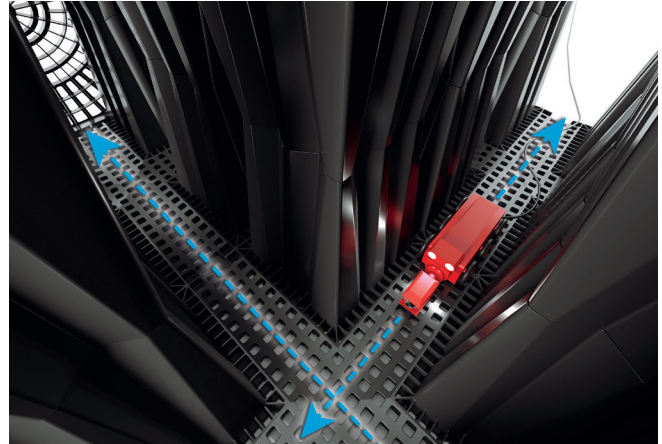
Aquabox is a modular system with a truncated pyramid structure made of recycled polypropylene with glass additive. It is designed to create an underground storage system for stormwater management.

Aquabox is used for the control of rainwater and to reduce possible flooding created by the increase of urban areas. It creates infiltration, detention or harvesting, which enhances water by reusing it.

The modules are assembled on site and installed. The modules are interlocked by means of special connectors that guarantee the stability of the tank. Aquabox has high mechanical resistance, so it can be installed both in urban areas and in industrial / commercial areas where there is an intense transit of heavy vehicles.

Aquabox modules are designed and produced to the requirements of ASTM F3754. Below is the technical data for the single Aquabox module (1 Aquabox = 2 pieces).

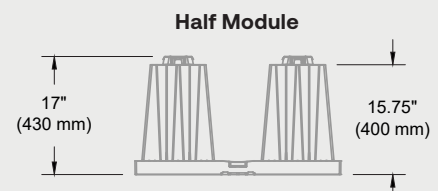
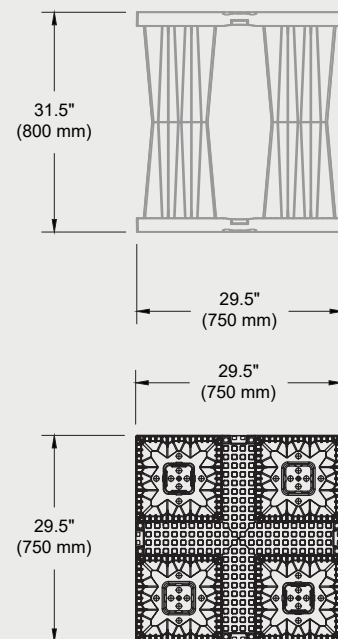
Aquabox allows one to store up to 15.24 ft³ (0.4 m³) of rainwater per module, thanks to its very high porosity of 96%. The Aquabox maintenance row traps suspended sediments near the inlet for easy inspection and maintenance.



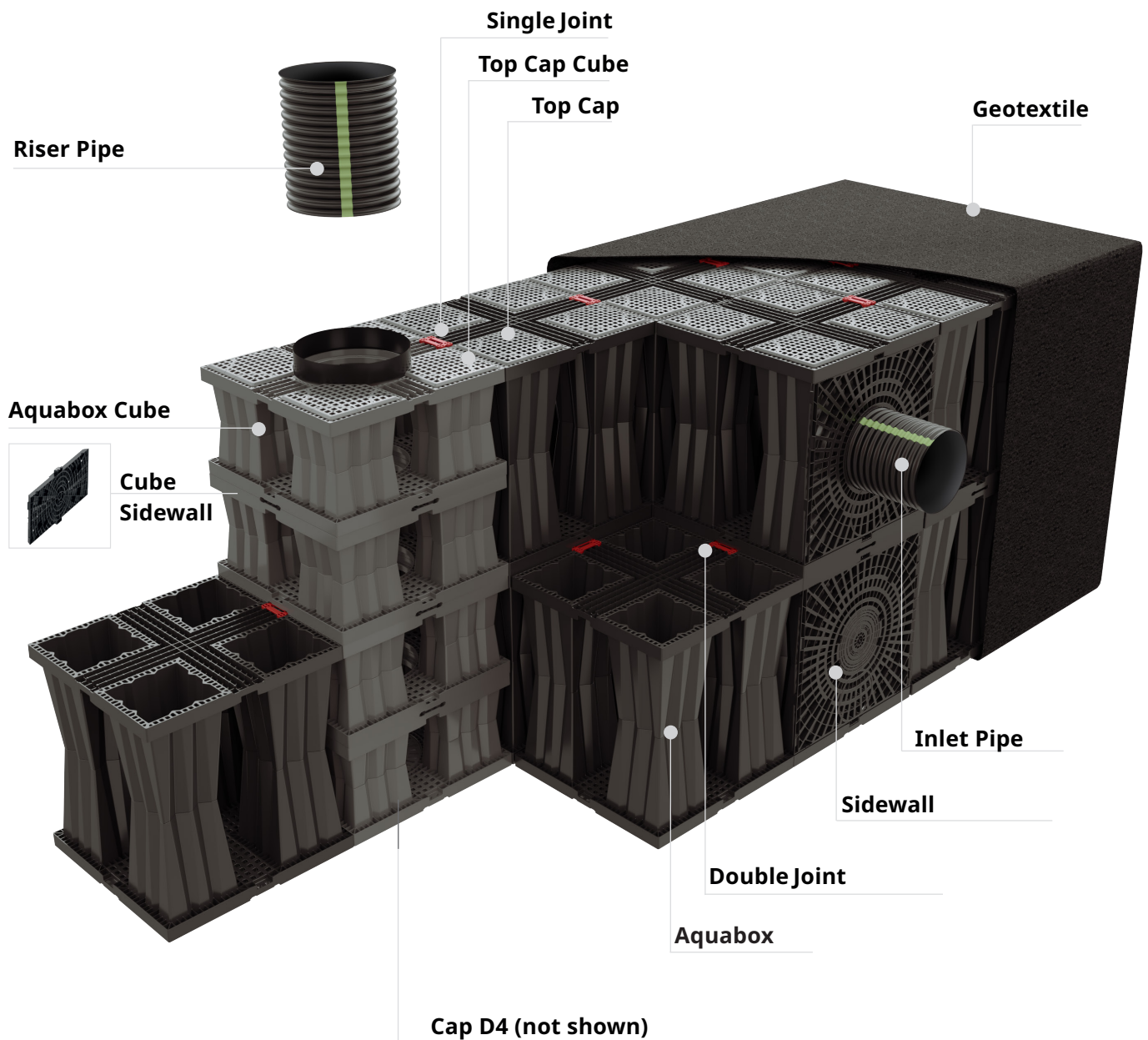
Module dimensions of Aquabox

Aquabox is designed for the passage of heavy vehicles, load class HS20. The basin is equipped with access points for inspection and cleaning of the basin.

Dimensions	29.5" x 29.5" x 31.5" (750 x 750 x 800 mm)
Weight	45 lbs (20.4 kg)
Material	Recycled polypropylene with glass additive
Net volume	15.24 ft ³ (0.43 m ³)
Porosity	96%
Pallet Size	31.5" x 60.0" x 101.6" (800 x 1520 x 2580 mm)
Number of pieces per pallet	80



1.3 Overview



Installation Guidelines:

Aquabox with StormTech®

Isolator Row Plus

Overview

Aquabox modules & StormTech chambers are both high-end stormwater retention products with dynamic installation configurations. This document outlines the necessary procedures to safely & effectively install a StormTech Isolator Row Plus within the envelope of an Aquabox stormwater management system.

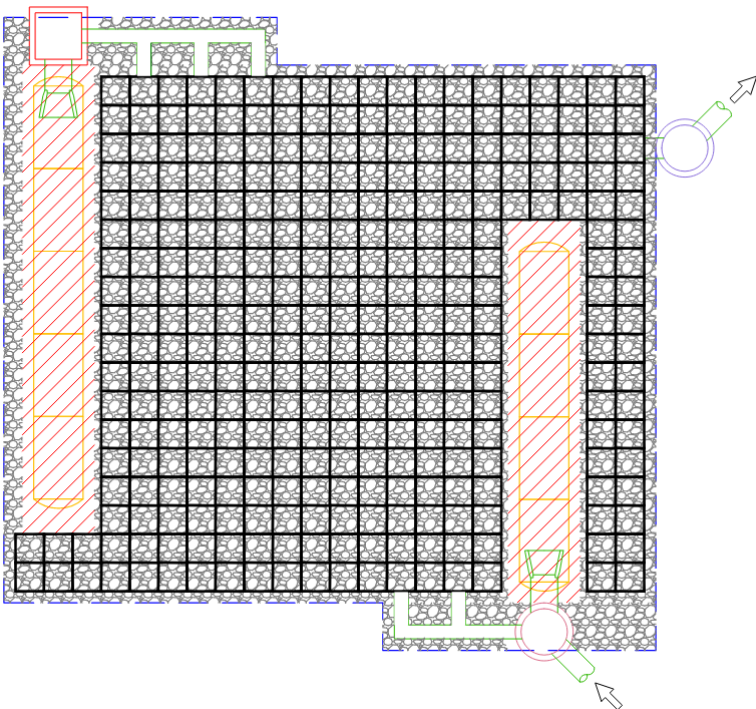
Installation Guidelines

Installation procedures vary based on site-specific constraints, however methods described below are recommended for safety & adequacy of installation.

Prior to installation of the Aquabox modules & StormTech chambers, establishing a stable base for the system is paramount. Begin by preparing the subgrade and base stone as detailed in the *Aquabox Installation Guide* and further within this document.

This document first covers standard base stone preparation before identifying two methods for product installation. These two installation methods are specific to the example system shown below.

Figure 1: Example Aquabox system with StormTech Isolator Row Plus.

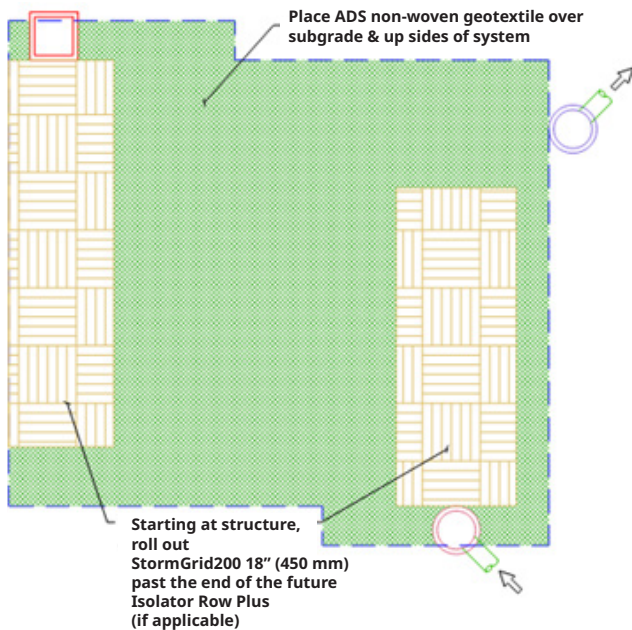


Preliminary Installation Steps

Proper preparation of the subgrade & base stone layer is an integral component of a functional system installation.

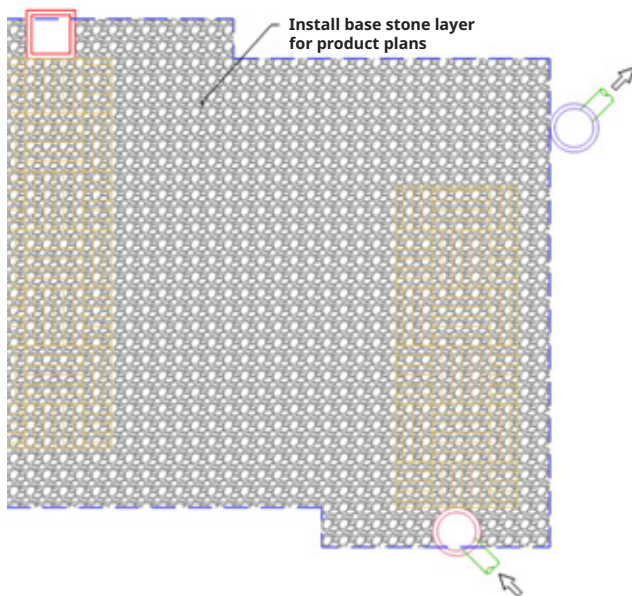
1. After preparing the subgrade, install the nonwoven geotextile (and liner, if applicable) around the excavation limits.
 - a. **DC-780 only:** Before installation of the base stone layer, identify locations where an Isolator Row Plus will be placed. Starting at the structure, roll out StormGrid200 to the end of the row, plus an additional 18" (450 mm). *This step is not required of systems using SC-310 chambers.*

Figure 2.1: Placement of non-woven and StormGrid geotextile.



2. Install the base stone layer in accordance with the project plans & Aquabox Installation Guide.

Figure 2.2: Installation of base stone layer.

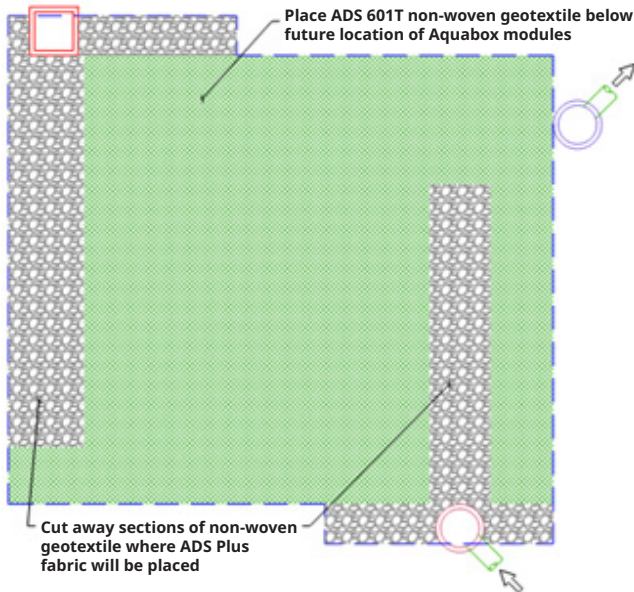


3A: Optional

Following installation of base stone, place ADS 601T non-woven geotextile over the base stone layer, in locations where Aquabox modules will be placed

- Identify locations where an Isolator Row Plus will be placed, and cut & remove the non-woven geotextile from these areas.
- Non-woven geotextile directly below the Isolator Row will hinder hydraulic performance.

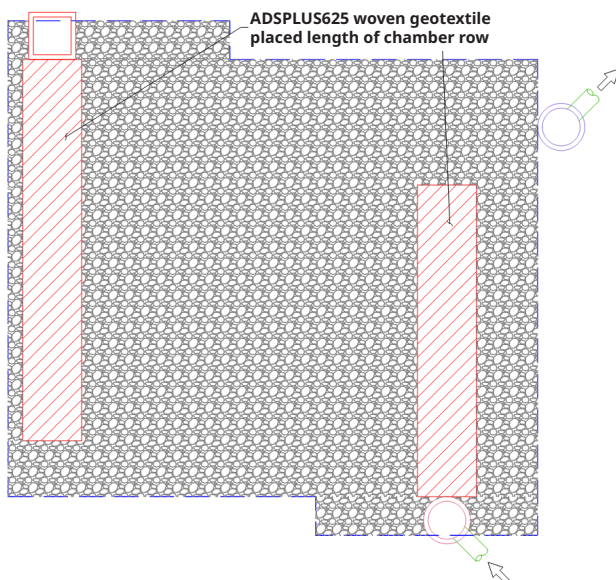
Figure 2.3: Placement of non-woven below modules if specified by engineer of record. Non-woven is removed where ADS Plus will be installed.



Note: ADS standards do not require non-woven geotextile to be place between modules and base stone but may be included if specified by the engineer of record

3B: In future Isolator Row Plus locations, roll out ADS Plus geotextile the length of the chamber row.

Figure 2.4: Placement of ADS Plus geotextile where StormTech Isolator Row Plus will be installed.

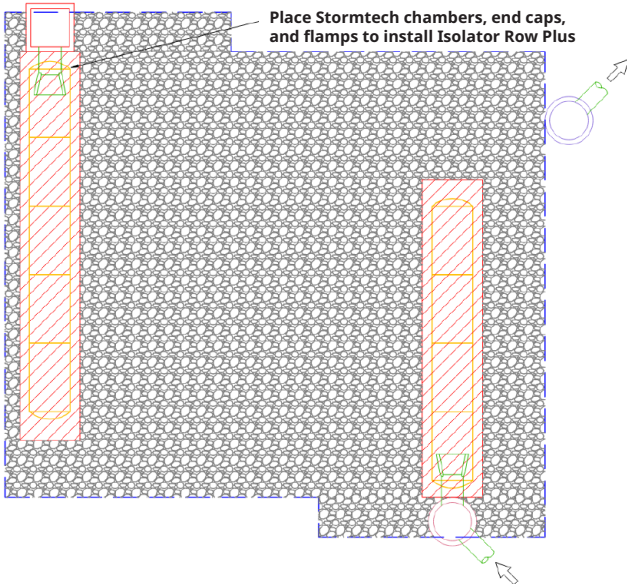


Option 1: Starting with Isolator Row Plus (Recommended)

Assembly of subsurface retention systems often begins with placement of inlet & outlet structures, establishing landmarks to be used during construction. For this reason, installation starting at a structure can be desirable. For installations starting at inlet structures, StormTech chambers are installed first.

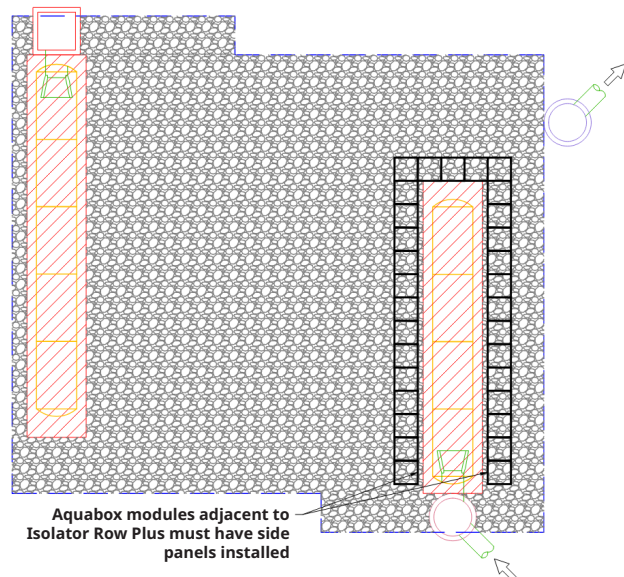
1. Place entire row of chambers, terminating with end caps once completed. Ensure the geotextile is extending beyond the feet of the chamber on both sides, and past both end caps at either end of the row.

Figure 3.1: Installation of Isolator Row Plus.



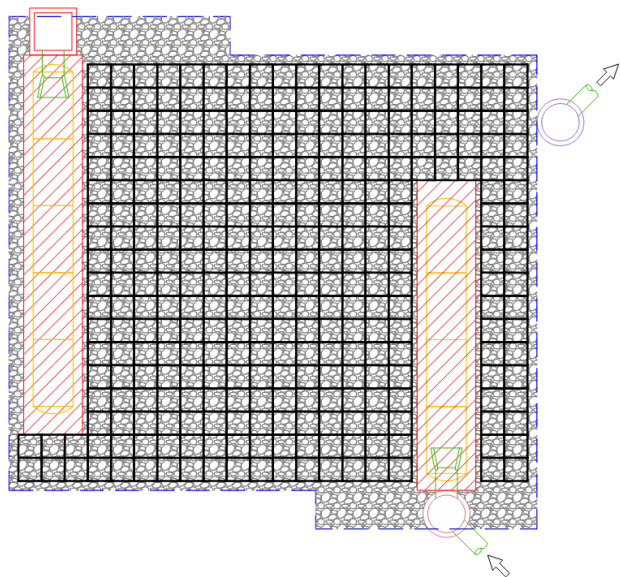
2. Once Isolator Row Plus components are installed, begin placement of Aquabox modules. Adequate spacing is required between the Aquabox modules & StormTech chambers.
 - a. Spacing must be ≥ 300 mm (12") between the StormTech chamber/end cap and Aquabox module.
 - b. Remember that modules adjacent to the Isolator Row Plus must have side panels installed. It is recommended to assemble each module with its side panel and then shift into place next to the Isolator Row Plus.

Figure 3.2: Installation of adjacent Aquabox modules with side panels.



3. Complete installation by assembling remaining Aquabox modules & system components in accordance with the Aquabox Installation Guide.

Figure 3.3: Installation of remaining Aquabox modules.

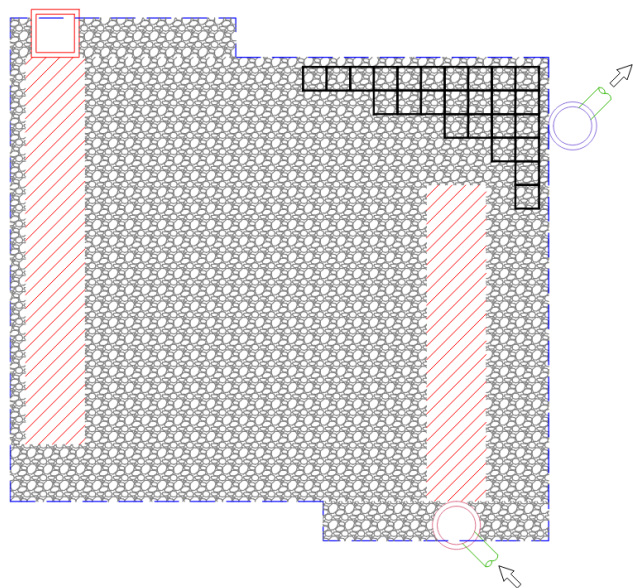


Option 2: Starting with Aquabox

An alternate installation method can be starting in one section of a system & building toward the inlet structures. This method includes near-complete installation of all Aquabox modules, followed by installation of the StormTech chambers in the spaces left behind.

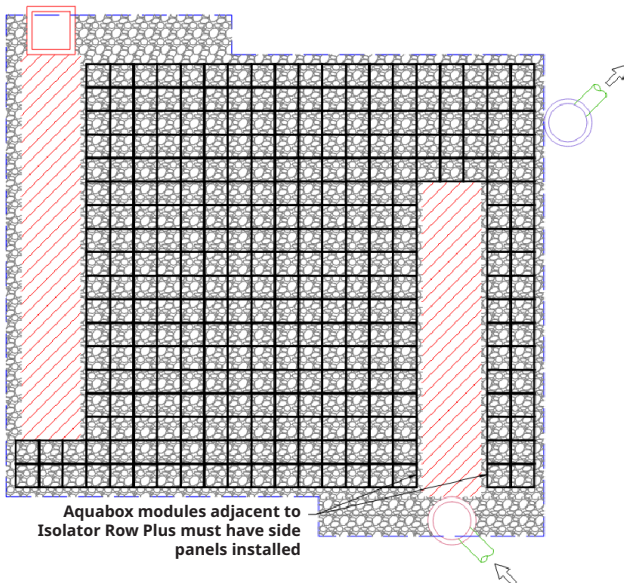
1. Begin installation of Aquabox modules at the perimeter of the system, filling in per the project drawings until all modules are installed.
 - a. Note: This installation method requires precision to ensure adequate space is left for the StormTech chambers.

Figure 4.1: Installation of Aquabox modules starting at perimeter.



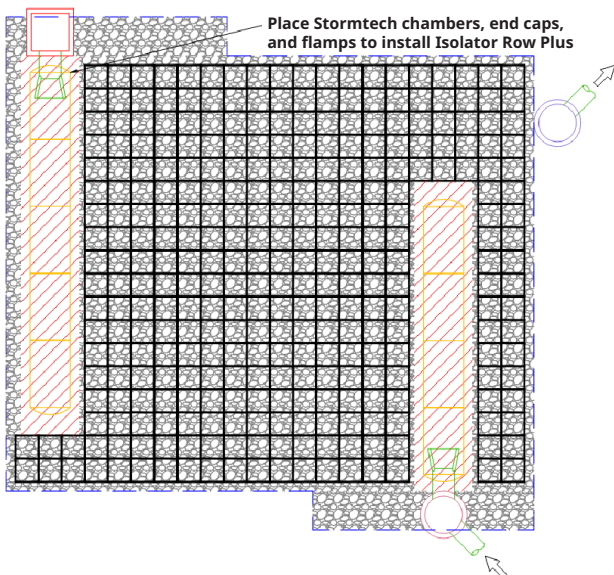
2. Complete Aquabox installation, ensuring ample space remains for StormTech Isolator Row Plus.
 - a. Ensure that Aquabox modules adjacent to the Isolator Row Plus have side panels installed.

Figure 4.2: Completed Aquabox module installation, leaving room for Isolator Row Plus chambers.



3. Install Isolator Row Plus chambers on ADSPLUS geotextile.
 - a. Install chambers starting with farthest from structure. Also install farthest end cap at this time.
 - b. Spacing must be ≥ 300 mm (12") between the StormTech chamber/end cap and Aquabox module.
 - c. Continue installing toward inlet structure until Isolator Row Plus is installed.

Figure 4.3: Installation of the Isolator Row Plus.



4. Complete installation of system components in accordance with the *Aquabox Installation Guide*.



Verification Statement



StormTech Isolator® Row PLUS Registration number: (V-2020-10-01) Date of issue: (2020-October-27)

Technology type	Stormwater Filtration Device		
Application	Stormwater filtration technology to remove sediments, nutrients, heavy metals, and organic contaminants from stormwater runoff		
Company	StormTech, LLC.		
Address	520 Cromwell Avenue, Rocky Hill, CT 06067 USA	Phone	+1-888-892-2694
Website	www.stormtech.com		
E-mail	info@stormtech.com		

Verified Performance Claims

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Based on the laboratory testing conducted, the verified performance claims are as follows:

Total Suspended Solids (TSS) Removal Efficiency - The StormTech Isolator® Row PLUS achieved $82\% \pm 1\%$ removal efficiency of suspended sediment concentration (SCC) at a 95% confidence level.

Average Loading Rate - Based on the reported flow rate data and the effective sedimentation and filtration treatment area of the test unit, the average loading rate of the test unit was 4.15 ± 0.03 GPM/ft² at a 95% confidence level.

Maximum Treatment Flow Rate (MTFR) - Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 gpm/ ft² of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft².

Detention Time and Volume - The StormTech Isolator Row PLUS detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft³ and a detention time of 2.2 minutes.

Maximum Sediment Storage Depth and Volume - The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft³ at a sediment depth of 0.5 inches.

Effective Sedimentation/Filtration Treatment Areas - The Effective Sedimentation Area (ESA) and the Effective Filtration Treatment Area (EFTA) increase as the size of the system increases. For the two overlapping StormTech SC-740 chambers tested, the ESA and the ratio of ESA/EFTA were 54.5 ft² and 1.0, respectively.

Sediment Mass Load Capacity - The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs ± 0.8 lbs (2.91 ± 0.01 lbs/ ft²) following a total sediment loading of 195.2 lbs.

Technology Application

The StormTech “Isolator® Row PLUS” is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers covered in a non-woven geotextile fabric with a single layer of proprietary woven fabric at the bottom that serves as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal. The following features make the Isolator® Row PLUS effective as a water quality solution:

- Enhanced infiltration Surface Area
- Runoff Volume Reduction
- Peak Flow Reduction
- Sediment/Pollutant Removal
- Internal Water Storage (IWS)
- Water Temperature Cooling (Thermal Buffer).

Technology Description

The Isolator® Row PLUS (shown in Figures 1 and 2) is the first row of StormTech chambers that is surrounded with filter fabric and connected to a closely located manhole for easy access. The Isolator® Row PLUS provides for settling and filtration of sediment as stormwater rises in the chamber and ultimately passes through the filter fabric. The open-bottom chambers allow stormwater to flow out of the chambers, while sediment is captured in the Isolator® Row PLUS.

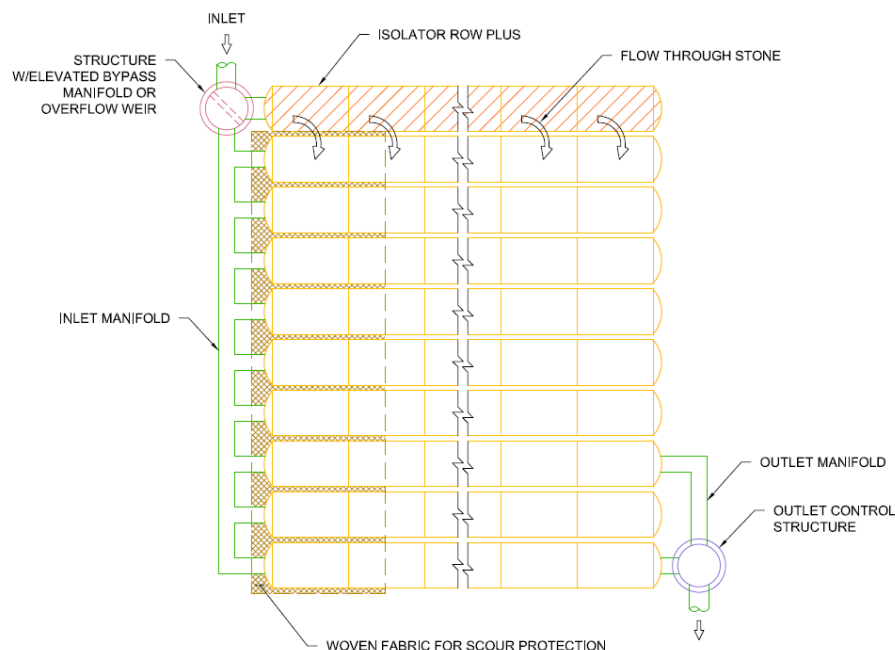


Figure 1: Schematic of the StormTech Isolator® Row PLUS System

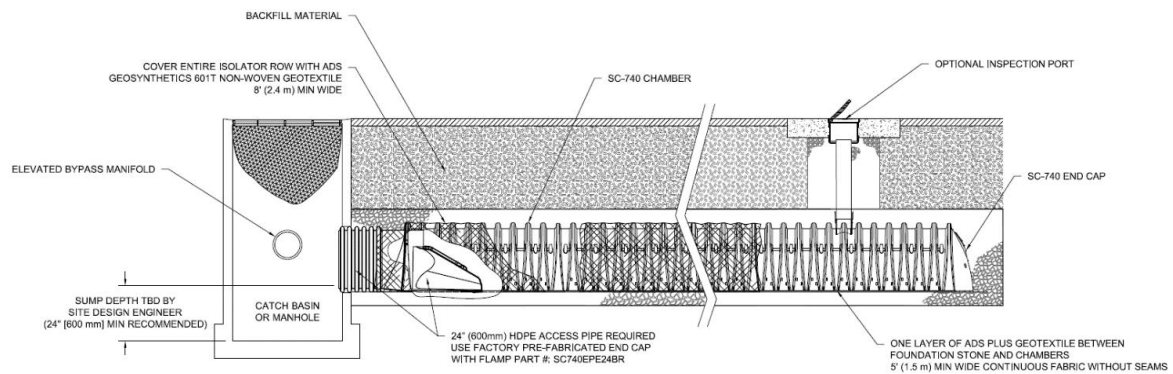


Figure 2: Isolator® Row PLUS Detail

A single layer of proprietary Advanced Drainage Systems (ADS) PLUS fabric is placed between the angular base stone and the Isolator Row PLUS chamber. The geotextile provides the means for stormwater filtration and provides a durable surface for maintenance operations. A 6 oz. non-woven fabric is placed over the chambers.

The Isolator® Row PLUS is designed to capture the “first flush” and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator® Row PLUS but includes a high low/concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator® Row PLUS bypass through a manifold to the other chambers. This is achieved with either a high-flow weir or an elevated manifold. This creates a differential between the Isolator® Row PLUS and the manifold, thus allowing for settlement time in the Isolator® Row PLUS. After Stormwater flows through the Isolator® Row PLUS and into the rest of the StormTech chamber system it is either infiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

StormTech developed and owns the Isolator® Row PLUS technology and has filed a number of patent applications relating to the Isolator® Row PLUS system.¹

Description of Test Procedure for the StormTech Isolator® Row PLUS

In January 2020, two overlapping StormTech SC-740 Isolator® Row PLUS commercial size chambers were installed at the Mid-Atlantic Storm Water Research Center (MASWRC, a subsidiary of BaySaver), in Mount Airy, Maryland, to evaluate the performance of the Isolator® Row PLUS system for Total Suspended Solid (TSS) removal (Figure 3) All testing and data collection procedures were supervised by Boggs Environmental Consultants, Inc. (BEC), who was hired by ADS for third party oversight, and were in accordance with the *New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device (January 2013)*.

Prior to the start of testing, a Quality Assurance Project Plan (QAPP), revision dated January 09, 2020, was submitted and approved by the New Jersey Corporation for Advanced Technology (NJCAT), c/o Center for Environmental Systems, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030.

¹ (U.S. Provisional Application No. 62/753,050, filed October 30, 2018; U.S. Non-Provisional Application No. 16/670,628, filed October 31, 2019; International Application No. PCT/US2019/059283, filed October 31, 2019; U.S. Application No. 16/938,482, filed July 24, 2020; U.S. Application No. 16/938,657, filed July 24, 2020; PCT International Application No. PCT/US2020/043543, filed July 24, 2020; PCT International Application No. PCT/US2020/043557, filed July 24, 2020.



Figure 3: StormTech “Isolator® Row PLUS” Test Set-up at MASWRC

Verification Results

The verification process for the StormTech Isolator® Row PLUS technology was conducted by GHIL in accordance with the VerifiGlobal Verification Plan for the StormTech “Isolator® Row PLUS” Technology – 2020-09-09. The technology performance claims verified by GHIL are summarized at the front of this Verification Statement and in Table 6 on Page 8 under the heading “Verification Summary”.

Particle size distribution analysis was performed by ECS Mid-Atlantic, LLC of Frederick, MD in accordance with ASTM D422-63(2007). ECS is accredited by the American Association of State Highways and Transportation Officials (AASHTO).

ASTM D422-63(2007) is a sieve and hydrometer method where the larger particles, > 75 microns, are measured using a standard sieve stack while the smaller particles are measured based on their settling time using a hydrometer.

The PSD meets the requirements of NJDEP, which is generally accepted as representative of the type of particle sizes an OGS would be designed to treat. Actual PSD is site and rainfall event specific, so it was necessary to choose a standard PSD to make testing and comparison manageable.

Table 1 shows the NJDEP PSD specification. Table 2 and Figure 4 show the incoming material PSD as determined by ECS Mid-Atlantic and confirmed by the verifier.

Table 1: NJDEP PSD Specification

Particle Size (µm)	NJDEP Minimum Specification
1000	98
500	93
250	88
150	73
100	58
75	48
50	43
20	33
8	18
5	8
2	3
d ₅₀	< 75 µm

Table 2 – Particle Size Distribution (PSD) of Test Sediment

Mesh (mm)	US Sieve Size	Sample ID		
		PSD A	PSD B	PSD C
		Percent Finer		
9.525	0.375	100.0	100.0	100.0
4.750	#4	100.0	100.0	100.0
4.000	#5	100.0	100.0	100.0
2.360	#8	100.0	100.0	100.0
2.000	#10	100.0	100.0	100.0
1.180	#16	100.0	100.0	100.0
1.000	#18	100.0	100.0	100.0
0.500	#35	100.0	100.0	100.0
0.425	#40	93.3	93.0	93.6
0.250	#60	90.3	89.8	90.2
0.150	#100	79.3	78.1	78.1
0.125	#120	73.6	71.7	71.7
0.106	#140	68.4	65.2	64.8
0.090	#170	60.2	58.3	57.5
0.075	#200	52.0	50.9	50.3
0.053	#270	48.0	48.3	47.8
0.045	Hydrometer	46.6	46.7	46.7
0.032		42.8	42.9	41.0
0.021		37.1	37.2	35.3
0.0125		25.7	25.7	25.8
0.0090		20.1	20.1	19.2
0.0064		16.3	16.4	14.5
0.0032		8.8	8.7	7.8
0.0014		3.8	3.7	3.8

The suspended sediment concentration analysis was completed by Fredericktowne Labs Inc., Meyersville, MD. Fredericktown Labs is accredited by the Maryland Department of Environment as Maryland Certified Water Quality Laboratory. The analysis procedure was ASTM D3977-97, Suspended Sediment Concentration. The sampling procedure and submission of samples to the test lab were overseen by the independent observer, Boggs Environmental Consultants, Inc.

All test data and calculations were detailed in the report “NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC”, July 2020, which was submitted to and verified by the New Jersey Corporation for Advanced Technology (NJCAT).

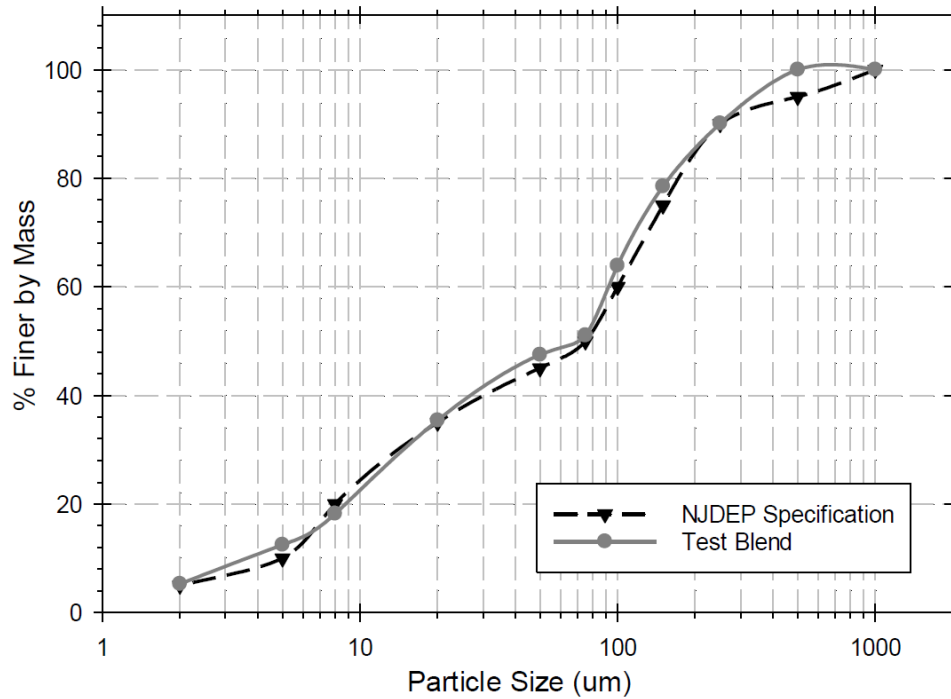


Figure 4– Particle Size Distribution (PSD)

The data in Table 3 (Flow Rate and Temperature) and Table 4 (Removal Efficiency) form the basis for the verified technology performance claim, specifically, flow rate, sediment captured and removal efficiency.

Table 3: Flow Rate and Temperature Summary

Run	Max Flow (gpm)	Min Flow (gpm)	Average Flow (gpm)	Flow COV	Flow Compliance (COV< 0.1)	Maximum Temperature (Fahrenheit)	NJDEP Temperature Compliance (< 80 F)
1	232.8	223.9	226.3	0.0078	Y	48.2	Y
2	228.9	218.6	220.8	0.0104	Y	51.5	Y
3	229.4	220.0	227.2	0.0094	Y	44.7	Y
4	230.2	218.7	223.2	0.0138	Y	40.5	Y
5	228.7	216.9	222.2	0.0103	Y	44.7	Y
6	227.6	217.0	224.2	0.0115	Y	46.7	Y
7	229.7	221.9	226.4	0.0092	Y	44.6	Y
8	230.3	222.2	226.8	0.0089	Y	43.5	Y
9	233.2	218.4	225.6	0.0136	Y	45.5	Y
10	232.2	219.7	228.4	0.0126	Y	44.7	Y
11	226.9	219.2	224.1	0.0088	Y	52.4	Y
12	232.2	222.1	226.9	0.0107	Y	48.5	Y
13	234.7	221.2	226.1	0.0109	Y	48.5	Y
14	231.9	223.4	228.7	0.0103	Y	45.6	Y
15	236.8	224.1	231.4	0.0131	Y	52.2	Y
16	232.5	221.3	229.0	0.0137	Y	47.8	Y

Table 4: Removal Efficiency Results

Run	Average Influent TSS (mg/L)	Influent Water Volume (gal)	Adjusted Average Effluent TSS (mg/L)	Effluent Water Volume (gal)	Adjusted Average Drain Down TSS (mg/L)	Drain Down Water Volume (gal)	Single Run Removal Efficiency (%)	Mass of Captured Sediment (g)	Cumulative Removal Efficiency (%)
1	203	7166	46	6881	34	285	77.8	4282	77.8
2	199	6993	32	6639	27	354	84.0	4415	80.8
3	207	7197	37	6793	27	403	82.6	4654	81.4
4	217	7068	33	6635	29	433	84.9	4923	82.3
5	215	7037	39	6593	29	444	82.2	4705	82.3
6	207	7097	40	6643	31	454	81.2	4504	82.1
7	198	7169	37	6693	30	476	81.6	4386	82.0
8	201	7184	37	6716	32	468	81.6	4473	82.0
9	205	7147	38	6675	30	472	81.8	4539	82.0
10	203	7235	38	6759	31	476	81.4	4523	81.9
11	208	7096	38	6624	30	472	81.8	4567	81.9
12	209	7185	41	6709	30	476	80.7	4584	81.8
13	198	7162	41	6680	32	482	79.7	4277	81.6
14	200	7242	43	6757	34	485	78.8	4318	81.4
15	196	7329	41	6842	32	487	79.5	4320	81.3
16	202	7254	44	6769	31	485	78.9	4384	81.2
Avg.	204.2	7160	39	6713	31	447	81.2	4491	N/A
Cumulative Mass Removed (g)							71854		
Cumulative Mass Removed (lb)							158.4		
Total Mass Loaded (lb)							195.2		
Cumulative Removal Efficiency (%)							81.2		

Quality Assurance

Performance verification of the StormTech Isolator® Row PLUS technology was performed in accordance with the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. This included reviewing all data sheets and calculated values, as well as overall management of the test system, quality control and data integrity.

Additional information on quality control measures taken can be found in section 5 of the QAPP for StormTech Isolator Row New Jersey Department of Environmental Protection Testing, Rev. 1/9/2020.

Specific QA/QC measures reviewed by the verifier are summarized in Table 5 below.

Table 5. Validation of QA/QC Procedures

QC Parameter	Acceptance Criteria
Independence of observer	Confirmed in letter from Boggs Environmental Consultants, Inc. to NJCAT
Consistency of procedure	Daily logs confirm proper procedure
Existence of QAPP	Confirmed. "QAPP For StormTech Isolator Row New Jersey Department of Environmental Protection Testing", Rev. 1/9/2020)
Use of appropriate sample analysis method – ASTM D3799	Confirmed by method reference on lab reports from Fredericktowne Labs Inc.
Test method appropriate for the technology	Used industry stakeholder approved protocol: <i>New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids</i>

	<i>Removal by a Filtration Manufactured Treatment Device (January 2013)</i>
Test parameters stayed within required limits	Confirmed in report "NJCAT TECHNOLOGY VERIFICATION Isolator® Row PLUS StormTech, LLC", July 2020
Third party verified data	All testing was observed and reviewed by Boggs Environmental Consultants, Inc.

Variance

Performance claims regarding structural load limitations were not verified as they are outside the scope of the performance testing that was conducted in accordance with the 'Quality Assurance Project Plan (QAPP) for StormTech Isolator Row, New Jersey Department of Environmental Protection Testing', revision dated January 09, 2020.

Verification Summary

The StormTech "Isolator® Row PLUS" is a stormwater treatment technology designed for use under parking lots, roadways and heavy earth loads while providing a superior and durable structural system. The technology comprises a row of chambers wrapped in woven geotextile fabric with two layers at the bottom that serve as a filter strip, providing surface area for infiltration and runoff reduction with enhanced suspended solids and pollutant removal.

The StormTech Isolator® Row PLUS technology was tested at the Mid-Atlantic Storm Water Research Center (MASWRC), under the supervision of Boggs Environmental Consultants, Inc. The performance test results for two overlapping StormTech Isolator® Row PLUS chambers (commercial unit model SC-740) were verified by Good Harbour Laboratories Inc. (GHL), following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. Table 6 summarizes the verification results in relation to the technology performance parameters that were identified in the Verification Plan to determine the efficacy of the StormTech Isolator® Row PLUS technology.

Table 6 - Summary of Verification Results Against Performance Parameters

Parameters	Verified Claims	Accuracy
Total Suspended Solids (TSS) Removal Efficiency	Based on the laboratory testing conducted, the StormTech Isolator® Row PLUS achieved an average 82% removal efficiency of SSC	± 1% (95% confidence level)
Average Loading Rate	Based on the laboratory testing parameters, the StormTech Isolator® Row PLUS maintained a loading rate of 4.15 GPM/sf	±0.03 GPM/sf (95% confidence level)
Maximum Treatment Flow Rate (MTFR)	Although the MTFR varies among the StormTech Isolator® Row PLUS model sizes and the number of chambers, the design surface loading rate remains the same (4.13 GPM/ft ² of treatment surface area). The test unit consisted of two overlapping StormTech SC-740 chambers with a nominal MTFR of 225 GPM (0.501 CFS) and an effective filtration treatment area (EFTA) of approximately 54.5 ft ² .	± 1.4 GPM (95% confidence level)
Detention Time and Volume	Detention time and wet volume varies with model size. The unit tested had a wet volume of approximately 65.1 ft ³ (based on	N/A

	physical measurement) and a detention time of 2.2 minutes.	
Maximum Sediment Storage Depth and Volume	The sediment storage volume and depth vary according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the maximum sediment storage volume is 2.3 ft ³ at a sediment depth of 0.5 inches.	N/A
Effective Sedimentation/ Filtration Treatment Area	The effective sedimentation and filtration treatment area increases as the size of the chamber increases. Under the tested conditions using 2 overlapping chambers, the treatment area was 54.5 ft ²	The sedimentation /filtration area was determined from the actual physical dimensions of the test unit*
Sediment Mass Load Capacity	The sediment mass load capacity varies according to the StormTech Isolator® Row PLUS model sizes and system configuration. For the two overlapping StormTech SC-740 chambers tested, the mass loading capture was 158.4 lbs (2.91 lbs/ ft ²) following a total sediment loading of 195.2 lbs	± 0.8 lbs (±0.01 lbs/ft ²) (95% confidence level)

*Note: These numbers are determined based on physical measurement or a dimensional drawing, which is standard practice. Highly accurate measurements are not practical.

In conclusion, the StormTech Isolator® Row PLUS is a viable technology that can be used to remove contaminants from stormwater runoff via filtration. This technology has proven effective at removing suspended sediment from stormwater through in-lab testing using an industry recognized laboratory protocol.

By extension of sediment removal, this technology should also remove particle bound nutrients, heavy metals, and a wide variety of organic contaminants. Performance is a function of pollutant properties, hydraulic retention time, filter media, pre-treatment, and flow rate, such that proper design of the system is critical to achieving the desired results.

What is ISO 14034?

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

Benefits of ETV

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

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Signed for StormTech: <i>Original signed by:</i>  Greg Spires, P.E. General Manager	Signed for VerifiGlobal: <i>Original signed by:</i>  Thomas Bruun, Managing Director <i>Original signed by:</i>  John Neate, Managing Director

NOTICE: Verifications are based on an evaluation of technology performance under specific, predetermined operational conditions and parameters and the appropriate quality assurance procedures. VerifiGlobal and the Verification Expert, Good Harbour Laboratories, make no expressed or implied warranties as to the performance of the technology and do not certify that a technology will always operate as verified. The end user is solely responsible for complying with any and all applicable regulatory requirements. Mention of commercial product names does not imply endorsement.

VerifiGlobal and the Verification Expert, Good Harbour Laboratories, provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

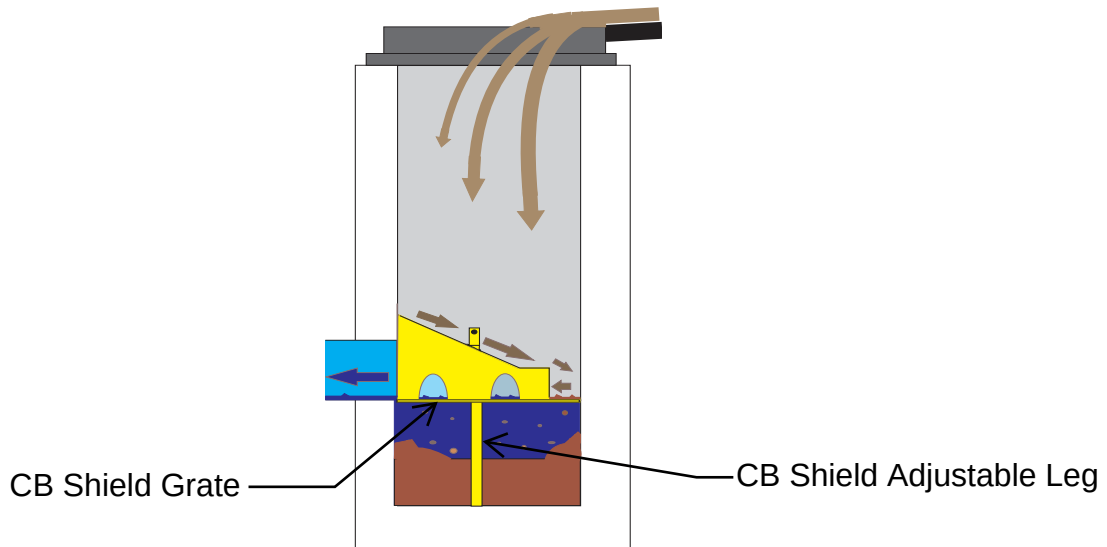
CB Shield Operations Manual

Installing CB Shield

It is important the catch basin frame and cover is aligned properly with the catch basin below

If it is misaligned it may be difficult to install the CB Shield insert

Determine the depth of the sump (i.e. the distance from the invert of the outlet pipe to the bottom of the catch basin). If the catch basin is in service the sump depth will be the depth of the water. The grate section of the CB Shield insert should be the same elevation as the water depth in the sump.



Adjust the leg of the CB Shield to achieve the appropriate elevation

The CB Shield is lowered into place with the rope attached to the top of the leg. The high side of the sloped plate should face the wall with the outlet pipe. (The incoming water should be directed to the wall furthest from the outlet)

The flexible plastic skirt around the outer edges of the CB Shield insert may interfere with some misaligned frame and grates. If so a slice can be cut into the skirt with a utility knife at the point of interference.

Make sure the grate is at the desired level or remove CB Shield and re-adjust the leg length.

Inspecting a CB Shield Enhanced Catch Basin

Open grate

A lifting rope is attached to the top of the centered leg of the CB Shield insert. Lift and remove the insert. Inspect CB Shield for any possible damage. Quite often leaves will accumulate on the grate. This can actually improve the Shield's ability to capture sediment and assist in preventing leave litter from being washed down stream.

Use a Sludge Judge to measure the sediment depth in 4 - 6 locations of the sump.

If the sediment depth is 300mm – 600mm deep it is recommended that the unit be cleaned.

Cleaning a CB Shield Enhanced Catch Basin

Open grate and remove CB Shield with lift rope.

Clean catch basin as usual with a Vacuum truck.

Clean CB Shield (if needed) and re-install into catch basin.

If there is any significant damage to a CB Shield please send a picture and its location to CB Shield Inc. (info@cbshield.com).

**Average Annual Sediment Removal Rates (%) using a CB Shield
(based on ETV Sediment - 1 to 1000 micron Particle Size Distribution)**

Area to CB (ha)	Imperviousness ¹ (%)					
	20%	35%	50%	65%	80%	100%
0.02	57%	57%	57%	57%	56%	56%
0.05	56%	56%	56%	55%	55%	54%
0.10	56%	55%	54%	53%	52%	51%
0.20	54%	53%	51%	49%	48%	46%
0.30	53%	50%	48%	46%	45%	43%
0.40	51%	48%	46%	44%	42%	40%
0.50	50%	47%	44%	42%	40%	38%
0.60	49%	45%	43%	40%	39%	36%

Notes:

1. Runoff Coefficient 'C' is approximately equal to $0.05 + 0.9 \times \text{Impervious Fraction}$.
2. Above chart is based on long term continuous hydrologic analysis of Toronto, Ontario (Bloor St) rainfall data.
3. Assumes 0.6 m sump in CB and that maintenance is performed (i.e. CB cleaning) when required by sediment/pollutant build-up or otherwise.
4. See accompanying chart for suggested maintenance scheduling - AND - get CB Shield Inc. to monitor it for you in field.
5. Sediment/Pollutant removal rates based on third party certified laboratory testing using ETV sediment (PSD analysis available on request).
6. See additional discussion regarding scour protection from CB Shield during more infrequent runoff events.

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

CB Shield® Stormwater Quality Device

Developed by CB Shield Inc.
Oakville, Ontario, Canada

Registration: **GPS-ETV_VR2022-10-31**

In accordance with

ISO 14034:2016

**Environmental Management —
Environmental Technology Verification (ETV)**



John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

October 31, 2022
Vancouver, BC, Canada



Verification Body
GLOBE Performance Solutions
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Technology description and application

The CB Shield® technology provides an environmental benefit of controlling sediment wash off at upstream locations. A standard catch basin has a 1.2 m waterfall inflow that churns up sediment in the sump below causing a very poor rate of sediment retention. The CB Shield is a flow deflection device that is inserted into a standard catch basin. It contains a sloped plate to direct runoff to the back wall of the catch basin, thereby dissipating the energy of stormwater inflows. The dissipation of inflow energy allows time for settling of sediment in stormwater runoff, increasing capture and reducing scour/ re-suspension of previously deposited sediment. Installation involves lowering the unit into a standard sized catch basin, and adjusting the height of the unit to the height of the permanent pool in the sump. The unit is manufactured with durable fiberglass requiring little maintenance and is estimated to be operated on the same cleanout schedule set for the catch basin. Due to high rates of scour in a standard catch basin, they are seldom filled beyond 40% of sump capacity. Clean out routines and expenses are optimized when the CB Shield captures and retains more sediment within the sump.

In an urban setting, there are typically approximately 5 catch basins installed per hectare. Assuming an equal distribution of overland flow, the tested flow rates for the scour and capture tests are meaningful in the context of 78 L/s per hectare and 42 L/s per hectare, respectively. The CB Shield's scour prevention performance has been evaluated in a laboratory setting relative to a standard unshielded catch basin for flows of 1.2 to 15.6 L/s. The device's sediment capture performance was evaluated for flows of 0.24 to 8.4 L/s. Hydraulically, the CB Shield has been tested to pass flows up to 60 L/s without any negative impacts (i.e., surcharging).

Performance conditions

Claim 1: Capture test

The capture test is carried out in a laboratory with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width). The catch basin was clean of any litter or debris. Capture performance was tested by comparing the mass of retained sediment with the influent sediment mass for each of six inflow rates: 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s. The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the *Procedure for Laboratory Testing of Oil Grit Separators (TRCA, 2014)*. Sediment was injected onto the street scape at a point just upstream of the catch basin to allow mixing prior to discharge while avoiding excessive buildup of sediment on the street scape. The sediment feed rate was adjusted for each flow rate to keep the influent concentrations consistent at 200 mg/L. The tests were conducted with a false floor set at 300 mm below the outlet invert simulating a catch basin that is filled to 50% of the manufacturer's recommended maximum sediment storage.

Claim 2: Scour test

The scour test was carried out in a laboratory on catch basins with and without the CB Shield® insert with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width) and the catch basins clean of any litter or debris. A false floor was set in the catch basins at 254 mm below the outlet invert and preloaded with the test sediment (1- 1000 micron silica blend) test up to 150 mm below the outlet invert simulating a catch basin that is ¾ full of sediment. Water was filled to the effluent pipe and sediments were allowed to settle for 12-24 hours. Flows of 1.2, 4.8, 8.4, 12, and 15.6 L/s were tested on a continuous run with flow rates maintained at 5 minutes and a one minute transition time between flow rates. A minimum effluent grab sample of 500 mL was collected in 1000 mL jars by holding it under the entire effluent stream. A sample was taken at 30 seconds during the flow transitions to account for scour during the transition. Background samples were also taken at least once

every flow rate and effluent concentrations were corrected accordingly. Effluent flow was filtered using a 10µm filter and was recycled during the continuous 30 min test.

Performance claim(s)

Claim 1: Capture test

During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield® insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Claim 2: Scour test

For a catch basin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield® insert, scouring of test sediment is at most 8% of the control catch basin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Performance results

The test sediment used to evaluate the CB Shield® technology was the same as that required by CETV for the evaluation of Oil Grit Separators. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 1 indicates that the test sediment was finer than the specified PSD, with a median particle size of approximately 50 microns.

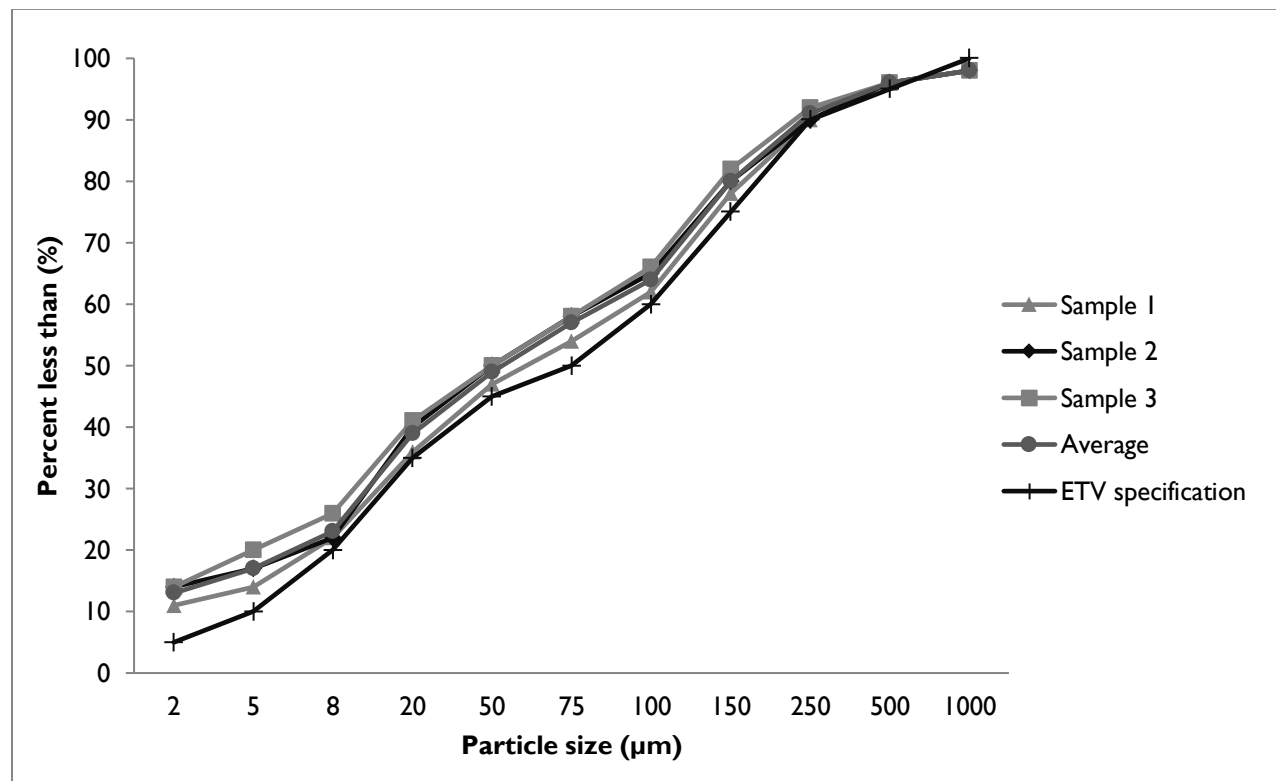


Figure 1. Test sediment particle size distribution (PSD) in relation to specified PSD.

The capacity of the device to retain sediment was determined at six surface loading rates using the modified mass balance method (see TRCA, 2014). During each of the tested flow rates, a known quantity

of sediment was injected at a constant rate onto a simulated street scape just upstream of the catch basin containing the CB Shield® technology. Based on these results, removal efficiencies were determined for each of the tested surface loading rates (Table 1).

Table 1. Removal efficiencies (%) based on modified mass balance results at specified surface loading rates.

Flow rate	(L/s)	0.24	0.48	1.20	2.40	6.00	8.40
Surface loading rate	(L/min/m²)	40	80	200	400	1000	1400
Total mass added	(kg)	1.217	2.302	5.072	5.150	4.921	4.812
Total mass captured	(kg)	0.778	1.378	2.659	2.196	1.238	1.287
Removal efficiency	(%)	64.0	59.9	52.4	42.6	25.2	26.7

Table 2 shows the results of the sediment scour and re-suspension test. This test involved preloading fresh test sediment into the sedimentation area of two catch basins with and without the CB Shield technology, as described in Performance Conditions section above. Effluent samples were collected at one-minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC). The mean sediment scour load of the catch basin with the CB shield insert was shown to be only 5% that of the control catch basin.

Table 2. Scour test effluent sediment concentration and loads.

Run	Flow rates (L/sec)	Surface loading rate (L/min/m²)	CB Shield®			Control			
			Run time (min)	Effluent suspended sediment concentration (mg/L)	Sediment load (g)	Run time (min)	Effluent suspended sediment concentration (mg/L)	Sediment load (g)	
1	1.2	200	1:00	17.7	1.3	1:00	129.2	9.7	
			2:00	6.5	0.47	2:00	185.3	13.9	
			3:00	2.7	0.19	3:00	206.0	15.5	
			4:00	3.1	0.22	4:00	176.0	13.2	
			5:00	4.6	0.33	5:00	523.6	39.4	
			6:00	0.6	0.04	6:00	495.7	41.8	
			Sum			2.6	Sum		
2	4.8	800	7:00	8.2	2.4	7:00	7164.0	2069.0	
			8:00	4	1.2	8:00	8094.0	2338.0	
			9:00	0.6	0.2	9:00	6762.0	1950.0	
			10:00	0.6	0.2	10:00	4842.0	1393.0	
			11:00	1.7	0.5	11:00	5266.0	1517.0	
			12:00	0.6	0.2	12:00	4768.0	1457.0	
			Sum			4.7	Sum		
3	8.4	1400	13:00	5.4	2.7	13:00	5429.0	2725.0	
			14:00	10.0	5.0	14:00	6648.0	3332.0	
			15:00	9.5	4.8	15:00	5025.0	2528.0	
			16:00	10.0	5.0	16:00	5859.0	2939.0	
			17:00	8.4	4.2	17:00	5019.0	2515.0	
			18:00	8.2	4.1	18:00	3249.0	1628.0	
			Sum			25.8	Sum		
4	12	2000	19:00	38.4	27.6	25:30	1886.0	1347.0	
			20:00	79.4	57.2	26:30	1432.0	1027.0	
			21:00	113.0	81.3	27:30	1167.0	844.0	
			22:00	103.0	74.2	28:30	1508.0	1089.0	
			23:00	114.0	82.1	29:30	1100.0	795.0	
			24:00	92.3	66.5	30:30	708.0	512.0	
			Sum			388.9	Sum		
5	15.6	2600	25:00	117.4	166.0	52:30	386.9	364.8	
			26:00	211.6	198.1	53:30	252.7	237.8	
			27:00	220.3	206.2	54:30	372.5	349.6	
			28:00	187.8	175.8	55:30	332.4	311.7	
			29:00	224.4	210.0	56:30	279.8	262.6	
			30:00	199.2	186.5	57:30	310.2	290.9	
			Sum			1142.6	Sum		
Total load					1564.6				33956.0

Potential sources of error

1. Background concentrations during the scour test were measured to be generally under 5 mg/L for both CB Shield® and Control treatments. However, background concentrations for the Control treatment at flow rates of 12.0 L/s and 15.6 L/s were substantially higher than the expected threshold of 20 mg/L as a result of inefficient recycling of water in the laboratory. Effluent samples were corrected based on the measured background concentrations since it was assumed that background sediments consisted of fine particles that were not captured in the device and flowed through as effluent concentration. If instead, some of the background sediments settled, the correction for all background sediments would bias against the relative performance of the CB Shield and therefore result in a more conservative evaluation of the CB Shield technology performance.
2. The reduction in scour at higher flow rates for the Control treatment suggested that the amount of preloaded sediment (10.2 cm depth) may have been insufficient to provide a continuous supply of fine particles for scour throughout the test. A similar decrease in scour at high flow rates was not observed for the CB Shield® treatment. This interpretation of the data implies that preloading both catch basins with additional sediment would likely have shown increased relative scour for the Control treatment, particularly at high flow rates. Although further testing would be required to verify this interpretation, it is reasonable to suggest that the test as conducted may have produced a smaller relative difference, resulting in a more conservative claim for the CB Shield technology.

Verification

This verification was first completed in October, 2016 and is considered valid for subsequent renewal periods every three (3) years thereafter. Data and information provided by CB Shield Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories of Mississauga, Ontario, dated 24 August 2016; the report was based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

The original verification was completed by the Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the Canadian ETV Program's General Verification Protocol (June 2012) and taking into account ISO/FDIS 14034:2015(E). This ETV renewal is considered to meet the equivalency of an ETV verification completed using the International Standard **ISO 14034:2016 Environmental management – Environmental technology verification (ETV)**.

What is ISO 14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

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Limitation of verification - Registration: GPS-ETV_VR2022-10-31

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